Grants or loans?
Determinants of aid composition

Pernilla Johansson*
Work in progress – please do not quote

June 2009

Abstract

This paper contributes to the aid allocation literature by studying determinants of the grant–loan mix of foreign aid. It outlines hypotheses on determinants of aid composition and tests these in a sample 70 low- and middle-income countries between 1970 and 2004. The empirical analysis shows that recipient needs in terms of income rather than indebtedness determines the grant–loan allocation.

Keywords: Grants, Concessional loans, Aid allocation, Aid composition, Indebtedness.
JEL Classification: F34, F35.

---

* Lund University, Department of Economics, P.O. Box 7082, SE-220 07 Lund, Sweden; E-mail: Pernilla.Johansson@nek.lu.se

1. Introduction

The academic and political debate on the best form of aid provision heated up in the late 1990s. Following the Heavily Indebted Poor Countries (HIPC) debt relief initiative and the Meltzer Commission report (2000), a vivid debate emerged of whether aid should be provided in the form of grants or loans. The main argument in favour of grants is that poor countries are typically heavily indebted. To avoid a further increase of the debt burden, advocates argue that grants should replace loans for those countries (e.g. Bulow and Rogoff 2005, Radelet 2005). The argument, however, is not uncontested. Critics fear that grants may limit total aid resources available and weaken incentives for fiscal discipline in the recipient countries (Gupta et al. 2004, Odedokun 2004, Djankov et al. 2004). As a matter of fact, grants have increased as a share of total aid and, by today, grants dominate total aid flows. In 2004, pure grants of all donors amounted to 54 billion US dollars, which represents 71 percent of gross aid flows.[1] Bilateral donors provide even more aid in the form of grants; in 2004, grants amounted to 81 percent of gross bilateral aid flows.[2]

The donors' decision to allocate aid involves three essential components: (i) which countries should receive aid, (ii) how much aid to provide to each country, and (iii) in which form (grant-loan mix) to allocate aid. The first two components of the aid allocation process have received broad academic interest. Various studies find that the aid allocation decision depends on a host of distinct factors, which do not only include recipient country needs and merits, but also the donor country's strategic and political interest (e.g. Alesina and Dollar 2000, Berthélemy 2006, Easterly 2007). There is, however, no research that studies the determinants of aid composition, i.e. the grant–loan mix, of individual recipient countries. Research on aid composition is all the more important as studies on absolute numbers of aggregate aid might give an incomplete picture. For example, gross aid to Bhutan and Guyana amounted to 16 per cent of each country's GDP over the period 1970–2004; however, while Bhutan received 89 per cent of total aid in the form of grants, concessional loans dominated aid flows to Guyana, amounting to 58 per cent of total aid. A similar picture emerges from an overview of the allocation of grants and loans to countries receiving a smaller amount of aid. Aid to South Africa and Argentina amounted to less than 1 per cent of the countries' GDP; however, South Africa received 93 per cent of total aid in the form of grants while Argentina received half of aid transfers as grants and half as loans.[3]

The figures illustrate that it is of utmost importance to assess determinants of the grant–loan allocation. In particular, the composition of aid is more informative than aggregate aid allocation since grants and loans are associated with distinct implications. While a grant is a pure gift, loans add to the debt stock of the recipient country, potentially generating future debt problems. Also, various studies show that grants and loans are associated with distinct growth effects (Cordella & Ulku 2007, Iimi & Ojima 2008, Dovern & Nunnemkamp 2007) as well as distinct fiscal impact (e.g. Odedokun 2004, Djankov et al. 2004). Due to the distinct incentives connected with both forms of aid provision, it is therefore important to understand the relative weight of both components.

[1] Constant prices (2005 US dollar). Author's calculation based on OECD/DAC (2007).
[2] Author's calculation based on OECD/DAC (2007).
[3] Author's calculation based on OECD/DAC (2007). See Appendix 1 for figures.

Despite the vast differences among recipient countries, few prior aid allocation studies disaggregate aid into grants and loans. Odedokun (2003) approaches the issue from the donor's perspective and identifies a number of economic and political factors that influence the donors' decisions on the grant–loan mix of aid. The study shows that high economic growth and an upturn in the economic cycle in donor countries tend to raise the grant–loan ratio. However, a high per capita income level and a high ratio of government spending to GDP in donor countries yields the opposite effect. Nevertheless, the study provides no analysis of the allocation of the grant–loan mix among recipient countries.

Prior research applying a recipient country perspective studies determinants of grants and loans separately. The studies provide mixed results on the allocation of grants and loans. Recipient needs in terms of income or recipient merits do not seem to significantly influence the allocation of bilateral or multilateral grants in a sample of low-income countries (Marchesi and Missale 2007). Instead, grants are highly persistent and influenced by the debt situation of the recipient country. However, the results may be biased since the estimation method overlooks the dynamic character of the specified model. Using a three-dimensional panel of bilateral aid to low- and middle-income countries,[4] Berthélemy (2006) finds that determinants of grants are similar to determinants of total aid; recipient needs and merits as well as donor self-interest influence the allocation of grants as well as total aid. The study confirms that the debt situation of recipient countries influence the allocation of grants. As regards loans, more indebted countries (in terms of higher debt service) receive more concessional loans from the World Bank (Ratha 2005) as well as other multilateral lenders (Cohen et al. 20007). On the other hand, on a more aggregate level, bilateral and multilateral net loans decrease to recipient countries as their debt exposure increases (Marchesi and Missale 2007).[5] While providing mixed results, the studies also overlook the complementarities of grants and loans.

This paper contributes to the aid allocation literature by highlighting determinants of the grant–loan mix from a recipient country perspective. The study relates to the existing literature of aid allocation but disaggregates aid into grants and concessional loans to analyze the determinants of the ratio between total gross inflows of grants and total gross inflows of concessional loans as well as the grant element of official loans. By focusing on recipient characteristics such as the countries' need, prospect for growth, risk of shocks and capacity to bear more debt (Radelet and Chiang 2003), the analysis identifies key determinants of the grant–loan mix. Further, the paper explores whether the allocation of grants and loans changes over time. The analysis in addition allows for different behaviour of bilateral and multilateral donor groups since previous aid allocation studies confirm different outcomes in their allocation decisions (e.g. Marchesi and Missale 2007, Dollar and Levin 2006, Birdsall et al. 2003). The empirical analysis uses an unbalanced panel data set for the period from 1970 to 2004 for 70 countries, of which 26 are low-income countries. The analysis shows that recipient needs in terms of income rather than indebtedness determines aid composition. In addition, recipient population and the total level of aid influence the grant–loan mix.

[4] The study utilises a three-dimensional panel of donor–recipient–year data.

[5] Net means gross flows minus principal and interest repayments. Net loans include concessional loans as well as non-concessional loans.

The paper proceeds as follows. The next section provides an overview of the development of grant–loan mix over time and illustrates cross-country variations. The third section reflects on the main determinants of grant–loan decisions and derives testable hypotheses on the grant–loan allocation. Section 4 develops the empirical framework and presents the data. Section 5 presents the empirical results and the final section concludes.

2. Foreign aid and the grant–loan mix

Donors provide foreign aid in the form of pure grants and concessional loans. A loan is concessional if the terms of the loan are substantially more generous than a market loan.[6] Clearly, loans with longer maturities and grace periods as well as loans with interest rates below the market rate are more concessional. Not only the proportion of aid as pure grants but also the grant element of loans reflects the overall concessionality of aid flows. This section provides descriptive statistics on the grant–loan mix of bilateral and multilateral aid to 134 developing countries, previously known as Part I countries in the OECD/DAC database.[7] It shows that aid has become more concessional in terms of an increased share of pure grants as well as in terms of loans on more concessional terms. Nevertheless, there are still a number of countries, who receive more loans than grants. The allocation of grants and loans differ by region and by country income group, but do not seem to differ by the debt level of recipient countries. However, the distribution of grants and loans differ by donors.

2.1 Aid concessionality over time

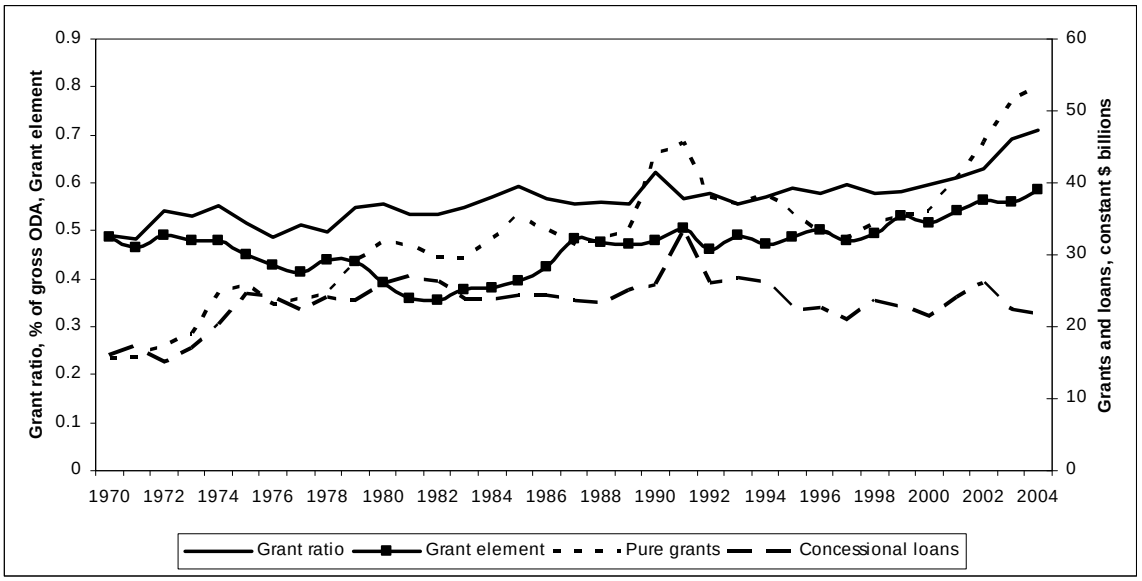
Pure grants dominate aid disbursements. Assistance in the form of grants reached 58 percent of gross aid flows between 1970 and 2004.[8] Figure 1 shows growing concessionality over time. Until 1989, pure grants as a share of total aid (the grant ratio) averaged 54 percent compared to 62 percent from 1990 onwards. Also the concessionality rate of loans (the grant element) has increased over time, following a decline around 1980. The average grant element of official loans amounted to 47 percent during the entire period in question, but averaged only 43 percent during the 1970s and the 1980s compared to 51 percent from 1990 onwards.

[6] In the DAC guidelines, a grant is defined as "transfers in cash or in kind for which no legal debt is incurred by the recipient". On the other hand, a loan is "transfers in cash or in kind for which the recipient incurs a legal debt". Loans are concessional if the grant element is at least 25 percent. To calculate the grant element (equally the concessionality rate), DAC (and the World Bank) applies a market rate of interest of 10 percent.

[7] Countries categorised as transition economies and relatively rich countries (previous known as part II countries) are excluded since data are available only from 1993 for the majority of those countries.

[8] Own calculations based on OECD/DAC 2007. The figures relates to the sum of all grant flows divided by the sum of total gross ODA to all recipient countries, which means it is a weighted average of the individual countries grant ratio. It differs from the numbers in Table 1 and Table 2 since these are the simple average of the individual countries' average grant ratio for each period.

Figure 1. Grants and loans of developing countries, 1970–2004.



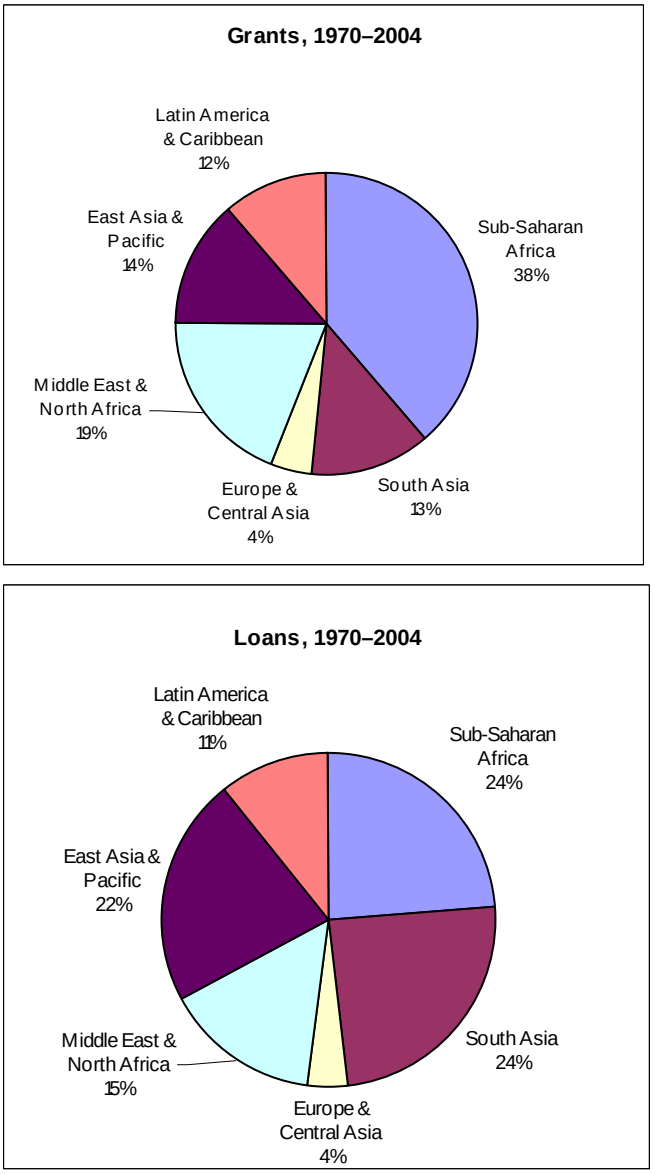
Note: Includes bilateral and multilateral aid to Part I countries in the DAC database.
Source: Author's calculations based on OECD/DAC (2007)

2.2 Allocation of the grant–loan mix

Pure grants and loans on highly concessional terms dominate flows to several recipient countries. For example, Mozambique receives 80 percent of total aid in the form of grants, while the average grant element of official loans to the country is 70 percent over the period 1970–2004. Appendix 1 summarises the relative share of grants in total aid and the grant element of official loans to individual recipient countries. While grants, on average, dominate total aid flows to most recipient countries, 19 countries in the sample receive more loans than grants. The countries with a dominant loan component appear to receive official loans on less concessional terms; also, they appear to receive less aid in relation to GDP. A review of yearly country data shows that several country–year observations correspond to situations when recipients receive development assistance exclusively in the form of grants. Around seven per cent of the observation points correspond to a grant ratio of one.

As Figure 2 illustrates, donors allocate a substantial amount of total grant disbursements to countries in the Sub-Saharan Africa region. Concessional loans, on the other hand, are disbursed foremost to the Sub-Saharan African as well as the South Asian region, closely followed by countries in the East Asia and the Pacific. Table 1 shows how the mix of grants and concessional loans as well as the grant element of official loans differs across regions, income groups and indebtedness categories. The ratio of grants to total aid is highest in the Sub-Saharan African and the East Asia and Pacific region. Meanwhile, the grant element is higher in South Asia and Sub-Saharan Africa implying that countries in these regions receive loans on more concessional terms.

Figure 2. Grants and loans by recipient region, 1970–2004



Note: Includes bilateral and multilateral aid to Part I countries in the DAC database.

As regards income groups, low-income countries receive a higher share of aid as grants than middle-income countries. [9] There is, however, no difference between low debt and high debt countries suggesting that donors do not tailor the grant–loan mix according to the recipient's debt situation.[10] Low-income countries, as well as low-debt countries, receive loans on more concessional terms. However, the descriptive statistics do not take into account that aid loans add to a country's debt stock, which the empirical analysis controls for in later sections. Still, a first review of the data indicates that more concessional aid targets low-income countries but not high-debt countries.

[9] This paper defines low-income countries as those in which 2006 GNI per capita was no more than $905 (WDI 2007).

[10] 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 (26 per cent).

Table 1. Grant ratio and grant element of official loans, 1970–2004.

	Total grant ratio	Bilateral grant ratio	Multilateral grant ratio	Total grant element
Total	0.68	0.75	0.59	0.43
By region				
Sub-Saharan Africa	0.72	0.81	0.60	0.52
South Asia	0.59	0.71	0.45	0.57
Europe & Central Asia	0.68	0.77	0.62	0.45
Middle East & North Africa	0.67	0.67	0.71	0.34
East Asia & Pacific	0.71	0.76	0.65	0.41
Latin America & Caribbean	0.60	0.71	0.50	0.31
By income group				
Low income	0.69	0.80	0.55	0.55
Lower middle income	0.66	0.72	0.60	0.39
Upper middle income	0.67	0.73	0.64	0.27
By indebtedness category				
Low debt	0.65	0.74	0.53	0.49
High debt	0.65	0.74	0.58	0.43

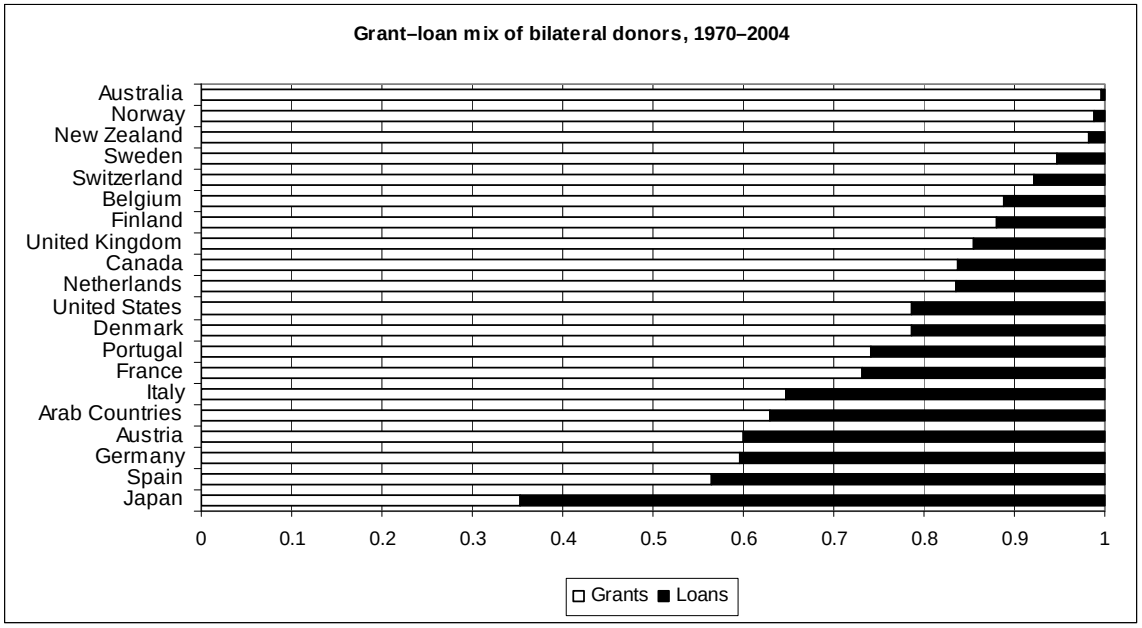
Note: Includes bilateral and multilateral aid to Part I countries in the DAC database.
Source: Author's calculation based on OECD/DAC (2007), GDF (2007).

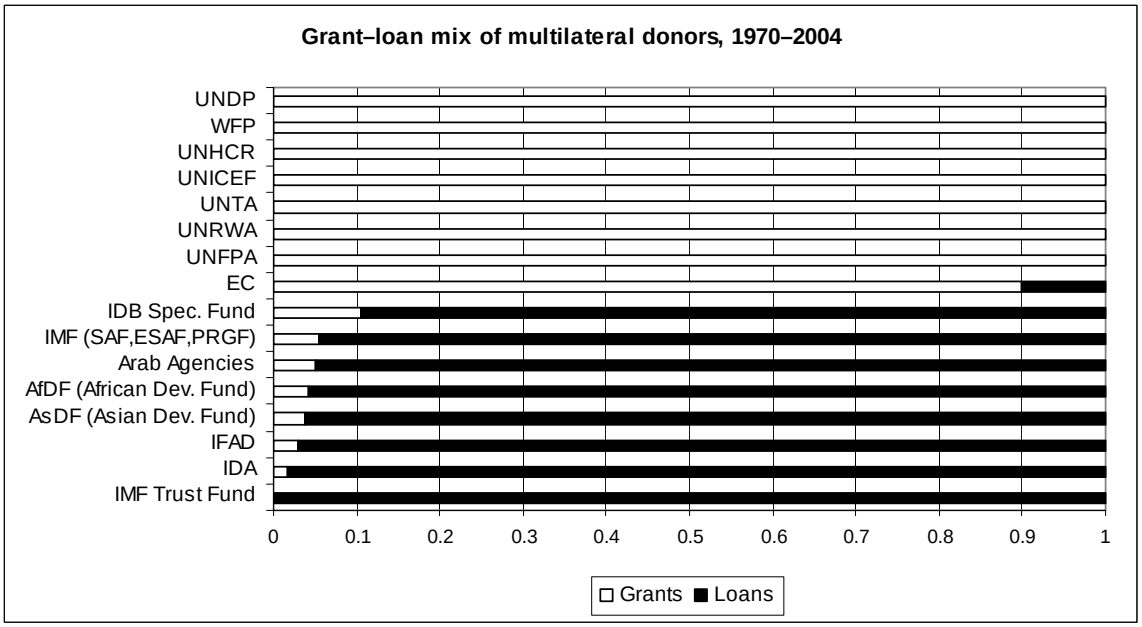
Aid allocation differs substantively by donor agencies. Particularly bilateral and multilateral donors allocate grants and loans differently.[11] First of all, bilateral donors provide a higher share of grants than multilateral donors. Moreover, distinct recipient regions are associated with certain donors. While countries in the Sub-Saharan African region receive the highest share of bilateral aid as pure grants, countries in the Middle East and North Africa receive the highest share of multilateral aid as grants. As regards income groups, low-income countries receive more bilateral aid in the form of grants than middle-income countries. On the contrary, multilateral donors provide a higher share of grants to middle-income countries. In addition, multilateral donors provide a higher share of grants to high-debt countries. In sum, bilateral grants target low-income countries, whereas multilateral grants to a greater extent target middle-income countries as well as high-debt countries.

Figure 3 illustrates cross-country differences with respect to individual donor behaviour. Among the group of bilateral donors, Japan, Spain and Germany disburse the lowest grant share of total aid. Some bilateral donors, such as Australia, Norway and New Zealand, provide aid almost exclusively as grants. In general, however, bilateral donors tend to disburse aid as a mix of pure grants and concessional loans. Multilateral donors, on the other hand, tend to provide aid either in the form of grants or loans. While the UN donor agencies provide aid entirely as grants, the World Bank, the IMF and the regional development banks disburse aid foremost as concessional loans. The figures illustrating the grant–loan mix do not suggest inferences on the amount of individual donor disbursement. Among bilateral donors, the United States disburse most aid in the form of grants, while Japan provides most concessional loans (see Figure 4).

[11] Bilateral aid granted directly to recipient countries accounts on average for 73 percent of total gross aid between 1970 and 2004.

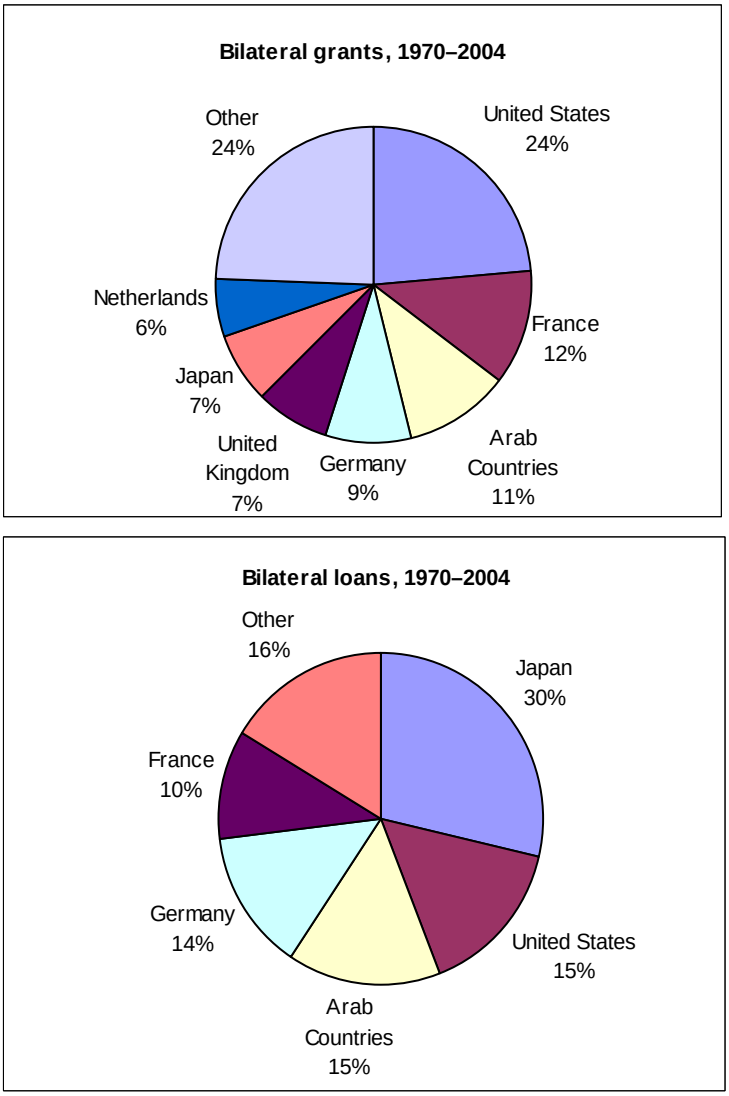
Figure 3. Grant–loan mix of bilateral and multilateral donors, 1970–2004.





Note: Figures 3a and 3b include donor agencies with aid disbursements amounting to at least a total of 4 million US dollars (in constant 2005 prices) over the period 1970–2004. As in the DAC database, aid from Arab countries is shown as a combined total. From 1993, flows from Kuwait, Saudi Arabia and the United Arab Emirates are included.

Figure 4. Grants and Loans by bilateral donor countries



Note: As in the DAC database, aid from Arab countries is shown as a combined total. From 1993, flows from Kuwait, Saudi Arabia and the United Arab Emirates are included.

3. Determinants of the grant–loan mix

This section provides the framework for the empirical analysis of the determinants of the grant–loan mix. First, it outlines the distinct character of grants and loans, but also the complementarities of the two instruments. Second, it discusses country characteristics important for the grant–loan mix and outlines hypotheses on determinants of aid composition.

3.1 Grants versus loans

Pure grants and concessional loans differ in various ways. For a given cost to the donor, loans provide a greater resource transfer than grants. For example, a donor can either

provide a pure grant of $1 billion or provide a loan of $2 billion with a grant element of 50 per cent. While the cost of the donor is the same, the loan allows a larger provision of resources upfront. In this way, loans may facilitate projects that require a larger initial investment. Note, however, that (as long as the grant element of the loan exceeds 25 per cent) aid statistics record the resource transfer as ODA of $1 billion in the grant example, and ODA of $2 billion in the loan example. Hence, a donor could, for a given cost, increase aid transfers by providing concessional loans instead of grants.

From the recipient country perspective, the additional resources provided by a loan ($1 billion) resemble a commercial loan, thereby adding to the countries debt stock. An increasing level of debt may contribute to the build-up of a debt overhang with subsequent negative growth effects (see Krugman 1988 and Sachs 1989). In contrast, a grant transfer does not increase the risk of future debt problems.[12] However, as long as investments generate enough resources through economic growth to service the loan, future debt problems are prevented. The debt crisis facing several developing countries illustrates that recipient countries have not been successful in generating sustained growth. The inability to repay loans could be due to poor investments; however, it could also be due to investments with long return periods and uncertain returns. Given that certain activities such as education lack immediate tradable output, grants might be an appropriate financing instrument in these circumstances (Collier 2005, Daseking and Joshi 2005).

The aid composition literature emphasises distinct fiscal as well as growth effects of grants and loans. The need to service loans may make the recipient countries more cautious about the use of these funds. Various empirical studies confirm that grants weaken incentives for fiscal discipline in the recipient countries, while loans encourage incentives to generate revenue (Gupta et al. 2004, Odedokun 2004, Djankov et al. 2004), although the findings are not uncontested (Morrisey et al. 2006).[13] Further, distinct growth effects of grants and loans have recently received attention in the literature (Cordella & Ulku 2007, Iimi & Ojima 2008). The theoretical proposition of Cordella and Ulku (2007) implies that the growth effect of grants and loans depends on country characteristics (more on this below). Iimi and Ojima (2008) demonstrate that there exists an optimal combination of grants and loans to enhance growth, indicating their complementarities. In all, the grants versus loans discussion suggests that the grant–loan mix should be tailored in response to country-specific circumstances and characteristics.

3.2 Country characteristics

Radelet and Chiang (2003) examine ways in which structural characteristics of low-income countries can provide guidance for the composition of new IDA financing in terms of grants or loans. The framework can be extended to all donor and recipient relations. On a general level, they discuss the allocation of grants and loans in terms of providing as much resources as possible while avoiding future debt problems. This section discusses the framework,

[12] As pointed out by Iimi and Ojama (2008), this distinction between loans and grants arises since capital markets are not perfect and most developing countries have little access to the international capital market. If capital markets were perfect, recipient governments could borrow the additional funds on the market.

[13] The distinct fiscal effect disappears if the recipient does not expect to service the loan (due to, for example, future debt relief), upon which the loan is equivalent to grants (Gupta et al. 2003).

relates it to theoretical contributions on the choice between grants and loans and derives testable hypotheses on determinants of the grant–loan mix.

The central idea is to allocate grants and loans according to the recipient country's capacity to absorb new loans and grants effectively. Radelet and Chiang (2003) indentify four structural characteristics of recipient countries that possibly influence this capacity: recipient need, prospect for growth, risk of shocks and capacity to bear debt. As will be clear from the discussion below, the categories are not mutually exclusive, but show a certain overlap.

- Recipient need

A poor country in terms of income, health and education has a lower absorptive capacity of loans. First of all, aid transfers to the neediest countries concentrate on delivery of basic services. Many projects, particularly in the social area, may not have an immediate tradable output, making them unsustainable as candidates for loans (Daseking and Joshi 2005, Collier 2005). Loans are based on the idea that the funds invested will generate enough resources through economic growth to repay the loans. However, the very poorest countries are most vulnerable to various shocks and are therefore least able to achieve sustained economic growth (more on this below). Radelet (2005) even argues that the income level of recipient countries should be the crucial factor in determining the allocation of (World Bank) grants and loans as it avoids perverse incentives and provide a simple allocation rule.

Hypothesis 1: Poorer countries receive a larger share of aid as grants.

- Prospect for growth

All else equal, countries with a greater prospect for growth can possibly absorb a larger share of aid as loans, since faster growth translate into greater capacity to repay loans. Radelet and Chiang (2003) suggest that a country's growth history and quality of policies and institutions indicate prospects for growth. There is ample evidence in the literature that institutions affect a country's growth prospects (e.g. Rodrik et al. 2004)

Cordella and Ulku (2007) formally relate country characteristics such as quality of policies and institutions to the grant–loan mix. By constructing a simple model based on the sovereign debt literature they find that, for any given level of development assistance, a higher share of grants is growth enhancing in poor and highly indebted countries with low quality institutions and bad policies. Hence, the model is consistent with providing a higher share of grants to more needy countries (see above) as well as countries with a lower quality of policies and institutions.[14] The conclusions correspond to the theoretical proposition that the optimal grant–loan ratio is a decreasing function of good governance (Iimi and Ojima 2008) as well as the empirical finding that loans can promote growth in a good institutional environment, but grants do not (Djankov et al. 2004).

The models imply that countries with a higher quality of policies and institutions should receive a larger share of aid as loans. At first sight, this can be interpreted as rewarding bad policy countries. However, it is still possible for donors to allocate more grants in absolute

[14] The influence of the debt situation of the recipient country is fully explored below.

value to good governance countries while providing a higher share of total aid as grants to low performing countries.

Hypothesis 2: Countries with a higher quality of institutions and policies receive a larger share of aid as loans.
Hypothesis 3: Countries with a good growth record receive a larger share of aid as loans.

- Risk

A country facing greater risks in the future, for example in terms of export price volatility, faces greater risk to run into repayment difficulties than countries with lower risk exposure. The development process is uncertain and developing countries face various shocks, the effects of which sometimes can last for several years. Price volatility of natural resources has long been recognised as a major source of vulnerability for developing countries. Both export instability and economic volatility have a negative effect on economic growth (Ramey and Ramey 1995) and have subsequent negative effects on the country's ability to service loans. Also, political instability results in greater future risk and negative growth and investment effects as a broad empirical literature confirms (e.g. Alesina et al. 1996, Easterly and Levine 1997). As contingent facilities do not exist (see for example Cohen et al. 2007), countries facing greater risk are expected to receive a greater share of aid in the form of grants.

Hypothesis 4: Countries facing greater risk in terms of price volatility receive a larger share of aid as grants.
Hypothesis 5: Political unstable countries receive a larger share of aid as grants.

- Capacity to borrow

The choice of the grant–loan mix is closely related to the debt situation of the recipient country. While a country with a low level of debt can take on additional borrowing without threatening sustainability, a country with high levels of debt need to be more cautious about new borrowing. Recall that the main argument in favour of grants is that grants involve a resource flow without threatening debt sustainability. The World Bank and the IMF debt sustainability framework, however, provides guidelines on a country's capacity to borrow while keeping total debt at a sustainable level. An external public debt is sustainable "when it can be serviced without resort to exceptional financing (such as debt relief) or a major future correction in the balance of income and expenditures" (World Bank 2006). To assess debt sustainability, debt burden indicators are compared to indicative debt-burden thresholds. The indicators relate the debt stock to variables showing the country's ability to repay. For example, by calculating the debt to GDP ratio, the debt stock is related to the entire resource base of the country. A country facing a debt ratio below the debt-burden threshold is able to absorb more loans.

To ensure debt sustainability in recipient countries, we therefore expect donors to allocate a larger proportion of aid as grants to more indebted countries in terms of debt stock indicators. Nevertheless, donors' interest is to disburse the largest loan the recipient country can take on. There is broad support in the aid allocation literature that not only development motives but also donor self-interest is critical in donor decisions (e.g. Berthélemy 2006, Berthélemy and Tichit 2004, Alesina and Dollar 2000). As regards the grant–loan mix, the

self-interest of donors relates to disbursing the largest loan the recipient country is able to service.[15] As the debt service ratio illustrates a country's ability and willingness to service its debt, we expect donors to allocate a larger proportion of aid in the form of loans to countries that pay higher debt service.

The debt situtation does not alone determine a country's capacity to borrow and sustainable debt-thresholds may differ between countries (World Bank 2006, Reinhard et al. 2003). Hence, to determine a country's capacity to borrow, debt burden indicators as well as country characteristics need to be taken into account. As emphasised above, the quality of the recipient country's policies and institutions influence a country's growth prospect. Countries with weaker policies and institutions also face debt-service problems at lower levels of debt since these countries tend to be more prone to misuse and mismanagement of fund (World Bank 2006). Therefore, we expect countries with a higher quality of institutions and policies to be able to take on a higher level of debt and receive a higher share of aid as loans (already included in Hypothesis 2). The default literature, moreover, identifies indicators of a country's probability to service loans. Reinhart et al. (2003), for example, find that not only a country's repayment history and indebtedness level but also macroeconomic stability explains debt intolerance. Inflation relates to macroeconomic stability. Countries with a history of higher inflation are more likely to default as high inflation implies monetary financing of government deficits (Reinhart et al. 2003), and these countries are therefore expected to receive a larger share of aid as grants.

Hypothesis 6: More indebted countries (in terms of debt stock) receive a larger share of aid as grants.
Hypothesis 7: Countries with a history of paying debt service receive a larger share of aid as loans.
Hypothesis 8: High inflation countries receive a larger share of aid as grants.

- Other possible determinants

In all, the framework implies that countries at the lowest stage of development are expected to mainly receive grants, while countries at higher development stages mainly receive loans. However, other factors may as well influence the composition of aid. The total level of aid could influence the composition of aid. Countries in need of more aid are possibly also in need of more grants which suggest a positive relation between total aid and the grant ratio. However, to extend the amount of aid by providing more loans are less costly, suggesting that the donor interest of showing generosity implies a negative relation. Previous aid allocation studies find a small country bias in the sense that less populous countries receive more aid in total. This small country bias could also influence the aid composition decision.

[15] The defensive lending literature (see for example Birdsall et al. 2003) suggests that donors disburse more aid in total to more indebted countries out of self-interest. According to this line of reasoning, donors provide new resource flows to non-creditworthy borrowers in order to prevent the debt of these countries to fall in arrears and show up as non-performing loans on creditors' balance sheets. However, the additional resources can be in the form of loans (defensive lending) as well as i grants (defensive granting).

4. Empirical approach and data

The empirical analysis uses an unbalanced panel data set for the period from 1970 to 2004. This section describes the variables and their data sources and outlines the empirical model as well as the estimation method.

4.1 Variables and data sources

The data mainly comes from the OECD/DAC database, the Global Development Finance and the World Development Indicators from the World Bank. This section describes the variables and Appendix 2 provides details of the data sources. The analysis includes the grant ratio of each recipient country as the dependent variable. More specifically, the grant ratio is the proportion of total aid disbursements that donors provide in the form of pure grants:

Grant ratio = ODA grants /(ODA grants + ODA loans extended) (2)

The focus is on actual flows disbursed to the recipient countries. Consequently, the denominator is the sum of grants and loans extended (gross ODA) rather than net ODA which subtracts principal repayments on previous loans.[16] The grant ratio is between 0 and 1.[17] Data on grants and concessional loans are obtained from Table 2a of the OECD Development Assistance Committee online database (OECD/DAC 2007). The table includes disbursement data by recipient country and region from DAC member countries, multilateral agencies and other major donors. Hence, the database covers the bulk of international aid flows; moreover, it is the only available source of comprehensive aid data from 1960 and onwards.

However, there are various limitations that should be considered. First, the data only includes loans that have a grant element of at least 25 percent, thereby excluding so called non-concessional loans. Moreover, the full face value of a concessional loan counts as a loan irrespective of the grant element. This implies that the grant ratio includes the proportion of pure grants, but not the concessionality rate of loans. Therefore, an alternative specification, with the grant element of official loans as a dependent variable, complements the baseline specification. The grant element is:

Grant element=(face value– present value of future debt service payments)/ face value (3)

Data on the grant element is from the Global Development Finance of the World Bank. Due to data limitation, the grant element refers to commitments rather than disbursements. Notwithstanding, the use of the grant element allows for inferences of determinants of the concessionality of loans in addition to determinants of the aid composition. The correlation

[16] Whereas aid data on commitments relates to the promises of the donors, disbursement data relates to the actual transactions. Dollar and Levin (2006) note that gross disbursements are preferred when current policy choices are of interest. The correlation between grants as a share of gross ODA and grants as a share of net ODA is 0.91

[17] Those observations with a grant ratio exceeding one are replaced with one (six observations) since the countries in question in fact receive grants but no loans.

coefficient between the grant ratio and the grant element of 0.07 suggests that the inclusion of the grant element analysis provides additional information. As the discussion of potential determinants of the grant ratio hypothesises that countries at lower stages of development receive mainly grants, while countries at higher development stages receive mainly loans, we also expect that countries at lower stages of development (are in need of and) receive more concessional loans than countries at higher stages of development.

- Recipient need

Recipient need refers to a country's position in terms of poverty. Indicators measuring income, health status and education level are possible measures of recipient need. Income per capita (defined as real GDP per capita) is highly correlated with life expectancy (0.58), infant mortality rate (-0.61) and literacy rate (0.53); also, there are few data points for all variables except income per capita. Therefore, income per capita is the best available proxy of recipient need.

- Prospect for growth

The previous section identified quality of policies and institutions as well as historical growth record as indicators of a country's prospect for growth. The analysis includes lagged real GDP per capita growth from World Development Indicators as a measure of past growth rates. The quality of institutions is, however, not equally straightforward. Various institutional indices and governance indicators have been used in the empirical literature relating institutions to growth. The political rights and civil liberty index from Freedom House is one recognized measure of institutional quality (first used in Scully (1988) followed by for example Alesina et al. (1996)). 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). Measuring the quality of policies is equally complicated. Trade openness is emphasized as one important aspect (see for example Wacziarg & Welch 2008). The analysis includes trade openness measured as the sum of a country's export and import as a percentage of each country's GDP. Monetary policy in terms of inflation is another aspect of the quality of policies that is accounted for in the analysis (more on this below).

- Risk

Countries facing price volatility and political instability face greater risk to run into repayment difficulties. To account for price volatility, the analysis includes the variation in export growth (Radelet & Chiang 2003). The volatility of exports is particular important in relation to external debt as export earnings determine the ability to repay.

Political stability depends among other things on the absence of war and a stable political situation. Previous studies use a variety of measures to capture those features. The analysis includes the number of years without any active conflicts (see for example Collier et al. 2009) and the incidence of coup events. Following Barro (1991) various studies include the incidence of coup events as a measure of political instability (see for example Easterly & Levine 1997).

- Capacity to borrow

The indebtedness of a country can be measured in different ways (cf. IMF 2003, chapter 15). The analysis includes the debt ratio measured as the ratio of present value of external debt to GDP. Whereas the former measure relates debt to the entire resource base, the latter relates it to the economy's basic source of external income. The present value of debt captures the heterogeneity of concessional debt. In addition, the analysis explores the ratio of debt service payments to GDP. The debt service ratio relates to actual debt service payments and corresponds to a country's ability and willingness to service its debt. A correlation coefficient between the present value of external debt and debt service payments of 0.35 confirms that the measures capture different aspects.[18] In addition, consumer price inflation is included to capture the probability of default. As inflation is a measure of monetary policy, it also relates to the macroeconomic polices of a country.

- Other variables

Gross ODA per capita controls for the magnitude of aid flows each country receives[19] and recipient country population controls for a potential small country bias. The analysis includes the logarithm of both variables. Appendix 3 provides summary statistics of the variables included in the analysis and Appendix 4 provides pairwise correlation coefficients.

4.2 Empirical model and estimation method

When modeling aid allocation and composition the timing and the nature of the disbursement decision require consideration. Allocation decisions are not determined in the year the disbursement is observed and they are based on currently available information at the time of the decision. Thus, the recipient country indicators need to be lagged. The analysis includes the moving average (mav) of the explanatory variables over the three most recent years (i.e. mav of $x_{it}=(x_{it-1} + x_{it-2} + x_{it-3})/3$) (c.f. Tarp et al. 1998, Trumbull & Wall 1994).

The influence of the potential determinants on aid composition is estimated using a fixed effects panel data model as well as a logistic model. The fixed effects model takes account of the recipient specifics that the explanatory variables do not capture. As the Hausman cannot rule out that country random effects are not correlated with the explanatory variables, the fixed effects model rather than the random-effects model provides consistent estimates. The fixed effects model, where countries are indexed by *i* and time by *t*, can be expressed as:

$$y_{it} = \mu + mavx_{it}'\beta + \gamma_t + \alpha_i + \varepsilon_{it} \qquad (1)$$

Here, y_{it} is the dependent variable of interest (the grant ratio or the grant element), $mavx_{it}$ is the vector of variables including potential determinants as well as other control variables calculated as a moving average over the three most recent years, μ is the intercept term, γ_t is a

[18] See Appendix 4. Correlation coefficients.
[19] The analysis yields similar results if gross ODA as a percentage of GDP is used rather than gross ODA per capita.

year-specific effect, and $\alpha_i+\varepsilon_{it}$ is an error term consisting of two components: a fixed individual specific component and a remainder component. The model is estimated using the fixed effects (within) estimation.

In addition, the analysis uses a logistic model. The model ensures that the predicted values fall within the unit interval. Papke and Wooldridge (2008) show how the logistic (and the probit) model provides consistent estimates in the case of a fractional dependent variable. The logistic model can be expressed as:

$$\text{logit}\left\{E(y_{it})\right\} = mavx'_{it-s}\beta, \qquad y \sim \text{Bernoulli} \tag{2}$$

Here, logit is the logit function and y_{it} is distributed Bernoulli (binomial). The model is estimated using quasi-maximum likelihood estimation.

Various aid allocation studies use a random effect Tobit model (Berthélemy and Tichit 2004, McGillivray 2003) or a two-part model (Berthelémey 2006, Tarp et al. 1998). These models take into account a potential sample selection issue of the allocation process due to the fact that some countries do not receive aid from all donors. As the analysis in this paper includes aggregated data across donors, the implication of a potential sample selection bias is possibly limited (c.f. Alesina & Dollar 2000, Alesina & Weder 2002).

5. Empirical results

Table 2 presents the baseline estimation results with respect to determinants of the grant ratio and the grant element. As previous aid allocation studies find that bilateral and multilateral donors behave differently in their allocation decisions (e.g. Marchesi and Missale 2007, Dollar and Levin 2006, Birdsall et al. 2003), the table presents results separately for bilateral and multilateral aid as well. Disaggregated data on the grant element is, however, not available so the division refers to the grant ratio only. The table presents results from the fixed effects model as well as the logit model. As the Wooldridge test for serial correlation in panel-data models cannot reject the presence of autocorrelation once the grants ratio is the dependent variable, the models are adjusted accordingly. The fixed effects estimation uses the Driscoll and Kraay standard errors that are robust to cross-sectional and temporal dependence.[20] The logit model uses the Huber/White/sandwich estimator of variance; additionally, it uses a first-order autoregressive correlation structure.[21]

The empirical analysis shows that the recipient countries' income is an important determinant of aid composition (H1). All else equal, poorer countries receive more grants as a share of aid with regard to total aid, bilateral aid, and multilateral aid. The logit model suggests that poorer countries also receive loans on more concessional terms. In addition, the results show that countries who receive more aid receive less aid as grants. This finding suggests that donors extend aid flows by providing loans rather than grants. However,

[20] The method is implemented in Stata by the use of xtscc.

[21] The logit model is implemented in Stata by the use of xtgee with family(binomial) link(logit). The robust option estimates the Huber/White sandwich estimator of variance and the correlation(ar1) option estimates the first-order autoregressive correlation structure.

donors extend these loans on more concessional terms as the aid coefficient is positive and significant in the grant element regressions. The small country bias found in aid allocation studies applies to the composition of aid as well. The grant ratio regressions show that smaller countries in terms of population receive more grants as a share of total aid, ceteris paribus.

The empirical analysis does not provide evidence that countries with higher quality of institutions and policies receive a larger share of aid as loans (H2). The political rights and civil liberties variable is not associated with grant composition (or the grant element of loans). Although countries with more open policies in terms of trade receive a larger share of total aid as loans, the coefficient is not significant across all specifications. Moreover, bilateral and multilateral donors behave somewhat different in this respect. Whereas bilateral donors provide a higher share of loans to countries with more open policies, multilateral donors provide more grants to these countries. This finding could be interpreted as if multilateral donors reward countries that implement more open policies by providing a higher share of aid as pure grants. On the one hand, the growth record of a country does not seem to influence the total grant ratio or the grant element (H3). On the other hand, past growth rates is an important determinant of multilateral aid. Countries with higher past growth rates receive a significantly larger share of multilateral aid as loans.

Whether countries face a greater risk in terms of export variation does not appear to influence aid composition or the grant element (H4). There is, however, some evidence that political unstable countries receive a larger share of aid as grants (H5) as countries with fewer years of peace receive more grants. Especially bilateral donors seem to allocate a higher proportion of grants to more unstable countries. The number of coup events in a country is, however, an insignificant determinant of aid composition.

Counter to the main argument in favor of grants - that grants avoid a further increase of the already high debt burden - the analysis provides no evidence that the debt stock of recipient countries influence aid composition (H6). The estimated relationship between the debt stock and the grant ratio is positive but insignificant. Thus, the income level of recipient countries emerges as a more important determinant of the grant–loan allocation than the debt level. Nevertheless, actual debt service payments influence the allocation (H7). Countries who pay more debt service (as a percentage of their GDP) receive a higher proportion of aid as loans suggesting that donors provide a higher proportion of loans to countries who have shown ability and willingness to repay. The finding is not robust across all specifications and it appears to be more important for multilateral aid than for bilateral aid. However, the grant element regressions show that these countries receive loans on more concessional terms as the debt service coefficient is positive and significant. The analysis provides no evidence that inflation influence the grant–loan allocation.

Determinants of the grant–loan mix and the grant element of loans might change over time, especially the influence of indebtedness. The debt situation of many developing countries became problematic in the 1980s and not until the late 1980s was the debt sustainability discussion related to aid allocation. For example, 1988 was the first year that the donor community provided aid in the form of debt relief. Consequently, the allocation of grants and loans might differ before and after the late 1980s. This period also coincides with the end of the cold war, an episode that changed the structural behaviour of donors (see e.g.

Berthélemy and Tichit 2004, Dollar and Levin 2006). Regression results presented in Table 3 shows in what way the allocation of grants and loans differ between the period before and after 1989. The table presents the fixed effect model with the Driscoll and Kraay standard errors.

The analysis reveals changes over time in the grant–loan allocation mainly with respect to political instability and the quality of institutions and policies. The influence of political stability in terms of number of peace years is larger in the 1970s and 1980s. Nevertheless it remains significant in the later period for total and bilateral aid. In contrast, donors (primarily bilateral donors) allocated more loans to more unstable countries in terms of coup events in the beginning of the sample period; however, the effect then vanishes. Recipient countries' political rights and civil liberties together with openness show mixed result and different donor behaviors. Whereas both determinants become significant in the period starting in the beginning of the 1990s, the effects point in different directions. In line with hypothesis two more open countries receive a higher proportion of (multilateral) aid as loans. In contrast, countries with better political rights and civil liberties receive a higher proportion of (bilateral) aid in the form of grants.

Determinants of bilateral and multilateral aid are distinct with respect to the influence of the debt situation in recipient countries. Multilateral donors provide a higher proportion of loans to countries that pay more debt service in both periods, although the effect decreases over time. However, neither the debt service variable nor the debt stock influences the bilateral aid composition. Multilateral donors, although weakly significant, provide more grants to more indebted countries in the beginning of the sample period rather than in the 1990s when aid allocation was related to the recipient countries' debt burdens. In addition, bilateral and multilateral donors provide relatively more grants to high inflation countries in the beginning of the sample period. While multilateral donors continue to extend aid flows by providing loans rather than grants, the level of aid disappears as a determinant for bilateral aid from the beginning of the 1990s. The analysis provides, moreover, no evidence that the determinants of the grant element have changed over time.

Table 2. Estimation of the baseline regrssions, 1970-2004.

	Total grant ratio			Total grant element		Bilateral grant ratio			Multilateral grant ratio		
	(a)	(b)	(c)	(d)	(b)	(a)	(b)	(c)	(a)	(b)	(c)
	FE	Logit	Logit	FE	Logit	FE	Logit	Logit	FE	Logit	Logit
Ln(Real GDP per capita)	-0.144***	-0.240**	-0.215**	-0.047	-0.682***	-0.136***	-0.577***	-0.601***	-0.174***	-0.311**	-0.034
	[0.000]	[0.034]	[0.011]	[0.245]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.030]	[0.761]
GDP per capita growth	-0.137	-0.454	-0.23	-0.031	-0.422	0.076	0.526	0.284	-0.499***	-2.404**	-1.794**
	[0.270]	[0.626]	[0.755]	[0.841]	[0.588]	[0.611]	[0.604]	[0.728]	[0.004]	[0.043]	[0.049]
Political rights & civil liberties	-0.006	-0.041	0	-0.012*	-0.021	-0.006	-0.042	-0.035	-0.002	-0.013	0.033
	[0.123]	[0.264]	[0.997]	[0.070]	[0.433]	[0.199]	[0.379]	[0.404]	[0.641]	[0.754]	[0.471]
Openness	-0.02	-0.235	-0.384**	-0.037	-0.035	-0.047	-0.423*	-0.629***	0.027	0.363	0.473*
	[0.552]	[0.271]	[0.033]	[0.504]	[0.862]	[0.302]	[0.096]	[0.001]	[0.217]	[0.163]	[0.097]
Export growth variation	0.036	0.253	0.104	-0.081*	-0.329	0.045	0.421	-0.071	0.063	0.252	0.144
	[0.413]	[0.406]	[0.592]	[0.094]	[0.125]	[0.248]	[0.282]	[0.782]	[0.344]	[0.432]	[0.601]
Number of peaceyears	-0.002***	-0.007*	-0.003	0	-0.001	-0.002***	-0.008*	0	-0.001	-0.003	-0.002
	[0.005]	[0.077]	[0.422]	[0.584]	[0.770]	[0.000]	[0.070]	[0.916]	[0.535]	[0.516]	[0.680]
Coup events	-0.014	-0.009	-0.142	0.004	0.035	-0.012	-0.064	-0.135	-0.036	-0.154	-0.043
	[0.624]	[0.944]	[0.140]	[0.887]	[0.745]	[0.711]	[0.732]	[0.398]	[0.154]	[0.170]	[0.740]
Present value of debt/GDP	0.02	0.096	0.08	0.001	-0.069*	0.025	0.133	0.155	-0.021*	-0.055	-0.035
	[0.310]	[0.498]	[0.383]	[0.878]	[0.082]	[0.167]	[0.464]	[0.254]	[0.081]	[0.450]	[0.656]
Debt service payments/GDP	-0.741***	-3.176**	0.063	0.688***	2.487***	-0.419*	-2.662	-1.345	-0.644***	-2.864*	-0.856
	[0.001]	[0.044]	[0.966]	[0.000]	[0.002]	[0.052]	[0.120]	[0.386]	[0.000]	[0.076]	[0.492]
Ln(1+Inflation)	0.001	-0.01	-0.052	-0.011	-0.034	-0.008	-0.016	-0.001	0.030***	0.086	-0.073
	[0.965]	[0.903]	[0.323]	[0.253]	[0.389]	[0.503]	[0.854]	[0.989]	[0.000]	[0.411]	[0.489]
Ln(Gross ODA/capita)	-0.065***	-0.231	-0.431***	0.052***	0.234***						
	[0.000]	[0.160]	[0.000]	[0.000]	[0.000]						
Ln(Bilateral gross ODA/capita)						-0.049***	-0.257	-0.450***			
						[0.004]	[0.170]	[0.001]			
Ln(Multilateral gross ODA/capita)									-0.198***	-0.988***	-0.786***
									[0.000]	[0.000]	[0.000]
Ln(Total population)	-0.583***	-0.398***	-0.492***	0.067	0.01	-0.200***	-0.480***	-0.602***	-0.613***	-0.705***	-0.546***
	[0.000]	[0.000]	[0.000]	[0.552]	[0.837]	[0.004]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Observations	1618	1618	1481	1564	1564	1618	1618	1481	1617	1617	1460
Number of groups	70	70	63	70	70	70	70	63	70	70	62
R-squared	0.218			0.29		0.179			0.435		

Notes: (a) Fixed effects estimation with Driscoll and Kraay standard errors (b) Logit model with the Huber/White/sandwich estimator of variance (c) Logit model with first-order autoregressive correlation structure. (d) Fixed effects estimation with robust option. * significant at 10%; ** significant at 5%; *** significant at 1%. P values in brackets. All regressions include time dummies. All explanatory variables, except ODA/capita, are the moving average calculated over the three most recent years.

Table 3. Changes over time. Comparison of the 1970 to 1989 period and 1990 to 2004 period.

	Total grant ratio			Total grant element			Bilateral grant ratio			Multilateral grant ratio		
	1970-1989	1990-2004	Difference	1970-1989	1990-2004	Difference	1970-1989	1990-2004	Difference	1970-1989	1990-2004	Difference
Ln(Real GDP per capita)	-0.127***	-0.099***	0.029	-0.061	-0.072*	-0.011	-0.107***	-0.149***	-0.042***	-0.146***	-0.062*	0.084***
	[0.001]	[0.000]	[0.247]	[0.166]	[0.088]	[0.450]	[0.000]	[0.000]	[0.002]	[0.000]	[0.074]	[0.004]
GDP per capita growth	-0.085	-0.23	-0.145	-0.089	0.072	0.161	0.084	-0.061	-0.145	-0.421**	-0.464**	-0.043
	[0.619]	[0.149]	[0.566]	[0.576]	[0.766]	[0.569]	[0.483]	[0.806]	[0.597]	[0.013]	[0.042]	[0.875]
Political rights & civil liberties	0.005	-0.014***	-0.018*	-0.01	-0.014*	-0.004	0.007	-0.016**	-0.023**	-0.002	0.005	0.007
	[0.579]	[0.010]	[0.072]	[0.140]	[0.065]	[0.630]	[0.359]	[0.019]	[0.023]	[0.750]	[0.598]	[0.518]
Openness	0.058	-0.053**	-0.111**	-0.051	-0.026	0.025	-0.012	-0.04	-0.028	0.194***	-0.033	-0.226***
	[0.264]	[0.035]	[0.027]	[0.425]	[0.634]	[0.625]	[0.824]	[0.352]	[0.562]	[0.000]	[0.382]	[0.001]
Export growth variation	0.061	0.012	-0.049	-0.041	-0.130*	-0.09	0.065	-0.004	-0.069	0.052	0.110**	0.058
	[0.315]	[0.860]	[0.571]	[0.563]	[0.054]	[0.338]	[0.327]	[0.958]	[0.420]	[0.627]	[0.045]	[0.585]
Number of peaceyears	-0.004***	-0.002**	0.002***	-0.001	0	0.001	-0.003***	-0.002***	0.001*	-0.003***	-0.001	0.002***
	[0.000]	[0.013]	[0.004]	[0.351]	[0.859]	[0.372]	[0.000]	[0.008]	[0.060]	[0.001]	[0.334]	[0.004]
Coup events	-0.077**	0.041	0.118**	0.039	-0.028	-0.067	-0.082*	0.052*	0.134**	-0.015	-0.064*	-0.049
	[0.028]	[0.158]	[0.016]	[0.225]	[0.376]	[0.114]	[0.062]	[0.088]	[0.020]	[0.438]	[0.081]	[0.152]
Present value of debt/GDP	-0.002	0.025	0.027	0.004	0.002	-0.002	-0.056	0.02	0.076	0.084*	-0.011	-0.095*
	[0.967]	[0.218]	[0.530]	[0.939]	[0.875]	[0.964]	[0.382]	[0.301]	[0.146]	[0.069]	[0.333]	[0.056]
Debt service payments/GDP	-0.338	-0.773**	-0.434	0.332	0.793***	0.461	0.073	-0.456	-0.53	-1.194***	-0.341**	0.852**
	[0.191]	[0.015]	[0.201]	[0.317]	[0.001]	[0.245]	[0.738]	[0.140]	[0.144]	[0.003]	[0.036]	[0.032]
Ln(1+Inflation)	0.035*	-0.014	-0.049*	-0.019	-0.007	0.012	0.034**	-0.01	-0.044*	0.048***	0.009	-0.039
	[0.080]	[0.318]	[0.064]	[0.352]	[0.512]	[0.577]	[0.032]	[0.579]	[0.099]	[0.007]	[0.411]	[0.130]
Ln(Gross ODA/capita)	-0.079***	-0.057**	0.022	0.044***	0.060***	0.016						
	[0.000]	[0.020]	[0.101]	[0.000]	[0.000]	[0.275]						
Ln(Bilateral gross ODA/capita)							-0.059***	-0.029	0.030*			
							[0.001]	[0.202]	[0.056]			
Ln(Multilateral gross ODA/capita)										-0.203***	-0.186***	0.017
										[0.000]	[0.000]	[0.328]
Ln(Total population)	-0.524***	-0.529***	-0.004	0.015	0.039	0.024**	-0.386***	-0.389***	-0.003	-0.309***	-0.323***	-0.014
	[0.000]	[0.000]	[0.669]	[0.911]	[0.772]	[0.039]	[0.000]	[0.000]	[0.756]	[0.000]	[0.000]	[0.354]
Observations	1618	1618		1564	1564		1618	1618		1617	1617	
Number of groups	70	70		70	70		70	70		70	70	
R-squared	0.245	0.245		0.303	0.303		0.217	0.217		0.468	0.468	

Notes: Estimated with the fixed effects model using Driscoll and Kraay standard errors. The regressions include interaction terms between the explanatory variables and period dummies for each time period. * significant at 10%; ** significant at 5%; *** significant at 1%. P values in brackets. All explanatory variables, except ODA/capita, are the moving average calculated over the three most recent years.

6. Summary

Counter to the main argument in favour of grants, the empirical analysis provides no evidence that donors allocate grants rather than loans to more indebted countries. Merely multilateral donors responded to the recipient countries' debt stock in the beginning of the sample period although the effect disappeared over time. However, donors appear to respond to the recipient countries' capacity to bear the debt in terms of servicing it. The analysis provides some evidence that the recipient countries debt service (as a percentage of GDP) influences total aid and multilateral aid.

Importantly, recipient need in terms of income emerges as a significant determinant of aid composition. The analysis shows that poorer countries receive a larger share of aid as grants. This finding is in line with Radelet (2005) who argues that "providing grants to the world's poorest countries is a much simpler and sensible way to allocate grants than based on debt levels". The analysis also provides certain evidence that poorer countries receive loans on more concessional terms.

Although past growth rates are an important determinant of multilateral aid composition, the analysis provides only weak evidence that the recipient country's prospect for growth influences the grant–loan allocation. Whether a country faces greater risk in terms of export volatility or political instability also appears to be weak determinants of aid composition. Particularly, the analysis reveals differences among donors. The analysis finds evidence that recipient country population and the total level of aid determines aid composition. The small country bias found in previous aid allocation studies also applies to the allocation of the grant–loan mix. Moreover, donors extend aid flows by providing loans rather than grants although this effect decreases over time for bilateral aid.

This paper provides an initial understanding of the allocation of the grant–loan mix to recipient countries. For future research, interesting extensions are to explore the behaviour of individual donors and the interdependencies in aid composition allocation among donors.

References

Alesina, A. & D. Dollar (2000). Who Gives Foreign Aid to Whom and Why? *Journal of Economic Growth,* 5(1), 33–63.

Alesina, A. & B. Weder (2002). Do Corrupt Governments Receive Less Foreign Aid? *American Economic Review,* 92(4), 1126–1137.

Alesina, A., S. Ozler, N. Roubini, and P. Swagel (1996). "Political Instability and Economic Growth," Journal of Economic Growth, Vol. 1 (June), pp. 189–211.

Barro, R. J. (1991). Economic growth in a cross section of countries. The Quarterly Journal of Economics, 106(2), 407–43.

Berthélemy, J-C. (2006). Bilateral Donors' Interest vs. Recipients' Development Motives in Aid Allocation: Do All Donors Behave the Same? *Review of Development Economics*, 10(2), 179–194.

Berthélemy, J-C. & A. Tichit (2004). Bilateral donors' aid allocation decisions - a three-dimensional panel analysis. *International Review of Economics & Finance,* 13(3), 253–274.

Birdsall, N., S. Claessens & I. Diwan (2003). Policy Selectivity Forgone: Debt and Donor Behavior in Africa. *The World Bank Economic Review*, 17(3), 409–435.

Bulow, J. & K. Rogoff (2005). Grants versus Loans for Development Banks. *American Economic Review*, 95(2), 393–397.

Chang, C., E. Fernandez-Arias, L. Serven (1998). Measuring aid flows: a new approach. World Bank Policy Research Working Paper Series, No. 2050.

Claessens, S., D. Cassimon & B. van Campenhout (2007). Empirical Evidence on the New International Aid Architecture. IMF Working Paper, WP/07/277.

Cohen, D., P. Jacquet & H. Reisen (2007). Loans or Grants. *Journal Review of World Economics*, 143(4).

Collier, P. (2005). Loans and Grants: Coherence in Aid Instruments in Kaul, I. (ed.). *Public Finance in a Globalizing World: Innovations in Theory and Practice*, Oxford University Press.

Collier, P., Hoeffler, A. & Rohner, D. (2009). Beyond greed and grievance: feasibility and civil war. *Oxford Economic Papers*, 61(1), pp. 1-27.

Cordella, T. & H. Ulku (2007). Grants vs. Loans. *IMF Staff Papers,* 54(1), 139–162.

Daseking, C. & Joshi, B. (2006). Debt and new financing in low income countries: Looking back, thinking ahead in Isard et al. (2006). *The Macroeconomic Management of Foreign Aid.*

Depetris Chauvin, N. & A. Kraay (2007). Who gets debt relief? *Journal of the European Economic Association,* 5(2–3), 333–342.

Dikhanov, Y. (2006). Historical present value of debt in developing countries, 1980-2004. World Bank, 2007.

Djankov, S. J. G. Montalvo & M. Reynal-Querol (2004). Does foreign aid help? *Cato Journal,* 26(1), 1–28.

Dollar, D. & V. Levin (2006). The Increasing Selectivity of Foreign Aid, 1984-2003. *World Development* , 34(12), 2034–2046.

Dovern, J. & Nunnenkamp, P. (2007). Aid and Growth Accelerations: An Alternative Approach to Assessing the Effectiveness of Aid. *Kyklos,* 60(3), pp. 359-383.

DCD/DAC (2007) *DAC Statistical Reporting Directives,* DCD/DAC(2007)34.

Easterly, W. (2007). Are aid agencies improving? *Economic Policy*, 22(52), 633–678.

Easterly, W., and R. Levine (1997). "Africa's Growth Tragedy: Policies and Ethnic Divisions," Vol. 112, No. 4 (November), pp. 1203–1250.

Feeny, S. & M. McGillivray (2008). What Determines Bilateral Aid Allocations? Evidence From Time Series Data. *Review of Development Economics*, 12(3), 515–529.

Freedom house (2007). *Freedom in the world 2007*. Freedom House, Inc. www.freedomhouse.org

GDF (2007). *Global Development Finance 2007,* World Bank, Online version.

Gupta, S., B. J. Clements, A. Pivovarsky & E. Tiongson (2003). Foreign Aid and Revenue Response: Does the Composition of Aid Matter? IMF Working Paper, WP/03/176.

Iimi, A. & Ojima, Y. (2008). Complementarities between grants and loans. *Journal of the Japanese and International Economies*. 22(1). Pp. 109-141.

IMF (2003). External Debt Statistics: Guide for Compilers and Users, June 25, 2003.

Krugman, P. (1988). Financing vs. forgiving a debt overhang. *Journal of Development Economics 29*(2), 407–437.

Marchesi, S. & A. Missale (2007). How defensive were lending and aid to HIPC? University of Milan – Bicocca, Department of Economics, Working Paper Series No. 115, May 2007.

McGillivray, M. (2003). Descriptive and prescriptive analyses of aid allocation: Approaches, issues, and consequences. *International Review of Economics and Finance*, 13(3), 275–292.

Meltzer, A. (2000). Report of the International Financial Institutions Advisory Commission. Washington, D.C.

Morrissey, O., Islei, O. & M'Amanja, D. (2206). Aid Loans versus Aid Grants: Are the Effects Different? Discussion Papers 06/07, University of Nottingham, CREDIT.

Neumayer, E. (2002). Is Good Governance Rewarded? A Cross-national Analysis of Debt Forgiveness. *World Development*, 30(6), 913–930.

Odedokun, M. (2003). Economics and Politics of Official Loans versus Grants Panoramic Issues and Empirical Evidence. WIDER Discussion Paper, 2003/04.

Odedokun, M. (2004). Multilateral and Bilateral Loans versus Grants: Issues and Evidence. *The World Economy*, 27(2), 239–263.

OECD/DAC (2007). *International Development Statistics (IDS) online databases on aid and other resource flows: Development Database on Aid from DAC Members*. DAC online

Papke, L. E. & Wooldridge, J. M. (2008). Panel data methods for fractional response variables with an application to test pass rates. *Journal of Econometrics*. 145(1-2). pp 121-133.

Radelet, S. (2005). Grants for the world's poorest: How the World Bank should distribute its funds. Center for Global Development Brief.

Radelet, S. & H. Chiang. (2003). Providing new financing to low-income countries with high levels of debt: Some considerations. Issue Paper on Debt Sustainability No.2, Center for Global Development.
http://www.cgdev.org/doc/expert%20pages/radelet/Radelet_Chiang.pdf

Ramey, G. & Ramey, V. A. (1995). Cross-Country Evidence on the Link Between Volatility and Growth. *The American Economic Review,* 85(5). pp. 1138-1151.

Ratha, D. (2005). Demand for World Bank lending. *Economic Systems*. 29(4). Pp. 408-421.

Reinhart, C. M., Rogoff., K. S. & Savastano, M. A. (2003). Debt Intolerance. *Brookings Papers on Economic Activity*. 2003(1), pp. 1-62.

Rodrik, D., Subramanian, A. & Trebbi, F. (2004) Institutions Rule: The Primacy of Institutions Over Geography and Integration in Economic Development. *Journal of Economic Growth,* 9(2), pp. 131-165.

Sachs, J. (1989). The debt overhang of developing countries in Calvo, G. et al. (eds.) *Debt stabilization and development*. Oxford: Basil Blackwell.

Scully, G. W. (1988). The Institutional Framework and Economic Development. *The Journal of Political Economy*. 96(3). Pp. 652-662.

Tarp, F., C.F. Bach, H. Hansen & S. Baunsgaard (1998). Danish Aid Policy: Theory and Empirical Evidence. University of Copenhagen, Department of Economics, Discussion Papers, 98-06.

UCDP/PRIO (2007). UCDP/PRIO intrastate conflict onset dataset, 1946-2007, Uppsala Conflict Data Program, Uppsala University (UCDP) and International Peace Research Institute, Oslo (PRIO). Available from http://www.prio.no/CSCW/Datasets/Armed-Conflict/UCDP-PRIO/

WDI (2007). *World Development Indicators 2007*, World Bank, Online version.

Wacziarg, R. & Welch, K. H. (2008). Trade Liberalization and Growth: New Evidence. *The World Bank Economic Review*, 22(2), pp. 187-231.

White, H. (2003). Trends in the volume and allocation of official flows from donor countries. *International Review of Economics & Finance,* 13(3), 233–244.

World Bank (2006). How to do a debt sustainability analysis for low-income countries. Debt Division,World Bank,Washington, DC.

Appendix 1. Average annual grant ratio, grant element and aid level, 1970–2004.

Country	(a)	(b)	(c)	Country	(a)	(b)	(c)	Country	(a)	(b)	(c)
Afghanistan	86	n/a	10	Grenada	56	47	8	Palau	100	n/a	54
Albania*	75	64	12	Guatemala*	64	31	2	Panama*	60	25	1
Algeria*	59	22	1	Guinea	52	58	11	Papua New Guinea	90	38	12
Angola	85	45	4	Guinea-Bissau	79	64	41	Paraguay*	48	33	2
Argentina*	50	15	0	Guyana	42	52	16	Peru*	60	24	1
Armenia	67	68	10	Haiti*	74	67	8	Philippines*	48	34	2
Azerbaijan	67	56	3	Honduras*	50	41	8	Rwanda*	81	76	19
Bangladesh	57	71	5	India*	35	46	1	Samoa	80	69	25
Belize	68	33	7	Indonesia*	31	37	2	SaoTome & Princ.	73	61	59
Benin*	69	67	10	Iran*	79	20	0	Senegal*	69	57	12
Bhutan*	89	56	16	Iraq	73	n/a	1	Serbia & Mont.	97	n/a	5
Bolivia*	55	44	8	Jamaica	49	26	4	Seychelles	80	29	11
Bosnia & Herz.	89	64	21	Jordan*	78	38	15	Sierra Leone*	64	66	15
Botswana*	80	40	7	Kazakhstan	75	32	1	Solomon Islands	85	68	24
Brazil*	51	16	0	Kenya*	63	57	7	Somalia	83	63	37
Burkina Faso*	77	65	13	Kiribati	98	n/a	39	South Africa*	93	29	0
Burundi*	76	68	19	Korea, Dem. Rep	89	n/a	n/a	Sri Lanka*	41	63	6
Cambodia*	85	73	11	Kyrgyz Rep.	49	60	12	St. Kitts and Nevis	57	46	5
Cameroon*	58	46	5	Lao PDR	68	78	14	St. Lucia	64	39	5
Cape Verde	83	66	26	Lebanon	85	31	3	St Vincents	61	43	8
Central African Rep	81	63	13	Lesotho*	80	63	18	Sudan*	74	51	5
Chad*	77	66	12	Liberia	77	43	23	Suriname	91	n/a	9
Chile*	75	22	0	Macedonia, FYR	72	45	4	Swaziland*	66	42	6
China*	35	34	0	Madagascar*	63	62	10	Syrian Arab Rep.*	67	49	5
Colombia*	61	18	1	Malawi*	61	69	20	Tajikistan	63	62	9
Comoros	78	63	23	Malaysia*	41	25	1	Tanzania*	72	64	19
Congo, Dem. Rep.	74	50	8	Maldives	68	57	13	Thailand*	45	33	1
Congo, Rep.*	68	45	7	Mali*	71	69	17	Timor-Leste	100	n/a	57
Costa Rica*	59	21	2	Marshall Islands	92	n/a	46	Togo*	67	61	11
Cote d'Ivoire	59	37	5	Mauritania*	65	58	24	Tonga	86	61	22
Croatia	89	26	0	Mauritius*	58	36	3	Tunisia*	44	34	4
Cuba	75	n/a	n/a	Mayotte	99	n/a	n/a	Turkey*	41	25	1
Djibouti	81	57	22	Mexico*	56	16	0	Turkmenistan	72	29	1
Dominica	59	51	14	Micronesia	97	n/a	41	Uganda*	63	62	10
Dominican Rep.*	50	31	2	Moldova	73	51	6	Uruguay*	66	17	0
Ecuador*	53	26	1	Mongolia	42	70	11	Uzbekistan	66	33	1
Egypt, Arab Rep.*	64	40	7	Morocco*	50	33	3	Vanuatu	92	61	23
El Salvador*	62	35	4	Mozambique	80	70	31	Venezuela, RB*	76	14	0
Equatorial Guinea	84	61	18	Myanmar	56	62	n/a	Vietnam	64	62	4
Eritrea	79	73	30	Namibia	91	n/a	4	Yemen, Rep.*	63	62	5
Ethiopia*	71	66	10	Nepal	67	74	8	Zambia*	67	54	16
Fiji*	92	25	3	Nicaragua*	57	43	14	Zimbabwe	83	39	3
Gabon*	70	23	3	Niger*	77	65	14				
Gambia, The*	63	67	21	Nigeria	68	28	1				
Georgia	70	62	6	Oman*	64	29	1				
Ghana*	48	66	9	Pakistan*	32	48	4				

Notes: (a) Total grant ratio (b) Total grant element (c) Gross aid/GDP *Included in empirical analysis.
Source: Own calculations based on OECD/DAC (2007), Grant element from GDF (2007)

Appendix 2. Data sources

Variable	Explanation	Source
Grant ratio	Grants as a share of gross aid: 201 Grants / (201 Grants + 204 Loans extended)	OECD/DAC 2007
Bilateral grant ratio	Bilateral grants as a share of bilateral gross aid	OECD/DAC 2007
Multilateral grant ratio	Multilateral grants as a share of multilateral gross aid	OECD/DAC 2007
Grant element	The average grant element for all new public and publicly guaranteed loans to official creditors. (commitment data)	GDF 2007
Real GDP per capita	PPP converted GDP per capita in constant 2000 US dollars.	PWT6.2
Growth	Real GDP per capita growth	WDI 2007
Political rights and civil liberties	An index which takes values from 1 (highest level of freedom) to 7 (lowest level of freedom)	Freedom House 2007 (Gastil)
Trade openess	(Export + Import) / GDP	WDI 2007
Export growth	Variation in export growth - standard deviation of the growth rate of export value	WDI 2007
Number of peace years	Number of consequtive years without any active conflicts	UCD/PRIO 2007
Coup events	Includes successful, attempted, plotted, and alleged coup events reported in Keesings Record of World Events	PolityIV 2007
Present value of debt	Present value of public and publicly guaranteed long-term external debt	Dikhanov 2006
Debt service payments	Total debt service paid (% of GDP / % of exports)	GDF 2007
Inflation	The consumer price inflation (expressed as Ln(1+Inflation)	WDI 2007
Total aid	Gross aid: 201 Grants + 204 Loans extended from all donors	OECD/DAC 2007
Bilateral aid	Gross aid: 201 Grants + 204 Loans extended from bilateral donors	OECD/DAC 2007
Multilateral aid	Gross aid: 201 Grants + 204 Loans extended from multilateral donors	OECD/DAC 2007
Population	Population, total	WDI 2007

Appendix 3. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Total grant ratio	1618	0.61	0.20	0.12	1
Bilateral grant ratio	1618	0.70	0.22	0.11	1
Multilateral grant ratio	1617	0.53	0.28	0.06	1
Total grant element	1564	0.42	0.23	-0.28	0.88
Ln(Real GDP per capita)	1618	7.94	0.84	6.04	10.07
GDP per capita growth	1618	0.04	0.04	-0.12	0.31
Political rights & civil liberties	1618	4	1.56	1	7
Openness	1618	0.63	0.35	0.09	2.20
Export growth variation	1618	0.06	0.08	-0.24	0.64
Number of peaceyears	1618	15	14	0	56
Coup events	1618	0.09	0.19	0	1
Present value of debt/GDP	1618	0.39	0.47	0.01	7.53
Debt service payments/GDP	1618	0.05	0.04	0.00	0.32
Ln(1+Inflation)	1618	0.20	0.43	-0.07	4.33
Ln(Gross ODA/capita)	1618	3.11	1.14	-0.45	6.39
Ln(Bilateral gross ODA/capita)	1618	2.73	1.15	-1.28	6.35
Ln(Multilateral gross ODA/capita)	1617	1.65	1.39	-2.32	5.13
Ln(Total population)	1618	2.37	1.50	-0.79	7.15

Appendix 4. Correlation coefficients

	Total grant ratio	Bilateral grant ratio	Multilateral grant ratio	Total grant element	Ln(Real GDP per capita)	GDP per capita growth	Political rights & civil liberties
Total grant ratio	1.00						
Bilateral grant ratio	0.83	1.00					
Multilateral grant ratio	0.49	0.06	1.00				
Total grant element	0.07	0.32	-0.30	1.00			
Ln(Real GDP per capita)	0.00	-0.26	0.41	-0.72	1.00		
GDP per capita growth	-0.15	-0.15	-0.06	-0.05	0.03	1.00	
Political rights & civil liberties	-0.03	0.00	-0.05	0.27	-0.39	-0.01	1.00
Openness	0.08	0.02	0.22	0.00	0.21	0.17	-0.07
Export growth variation	-0.04	-0.04	0.02	-0.03	0.04	0.43	0.01
Number of peaceyears	0.10	0.10	0.02	-0.04	0.16	0.01	-0.18
Coup events	0.01	0.08	-0.09	0.15	-0.23	-0.18	0.19
Present value of debt/GDP	0.10	0.12	-0.02	0.14	-0.09	-0.20	0.02
Debt service payments/GDP	-0.08	-0.15	0.11	-0.19	0.28	-0.19	-0.14
Ln(1+Inflation)	0.01	0.01	0.00	-0.15	0.11	-0.25	-0.13
Ln(Gross ODA/capita)	0.16	0.23	-0.11	0.42	-0.28	-0.01	0.09
Ln(Bilateral gross ODA/capita)	0.19	0.16	0.01	0.32	-0.17	0.01	0.07
Ln(Multilateral gross ODA/capita)	0.11	0.37	-0.40	0.56	-0.49	-0.04	0.11
Ln(Total population)	-0.33	-0.35	-0.11	-0.09	-0.05	0.06	0.03

	Openness	Export growth variation	Number of peaceyears	Coup events	Present value of debt	Debt service payments	Ln(1+ Inflation)
Openness	1.00						
Export growth variation	0.06	1.00					
Number of peaceyears	0.18	0.03	1.00				
Coup events	-0.03	-0.12	-0.10	1.00			
Present value of debt/GDP	0.13	0.00	0.05	0.01	1.00		
Debt service payments/GDP	0.23	-0.11	0.16	-0.05	0.35	1.00	
Ln(1+Inflation)	-0.20	-0.02	0.00	0.06	0.38	0.05	1.00
Ln(Gross ODA/capita)	0.44	-0.04	0.18	0.07	0.33	0.09	-0.11
Ln(Bilateral gross ODA/capita)	0.46	-0.04	0.18	0.03	0.32	0.14	-0.10
Ln(Multilateral gross ODA/capita)	0.26	-0.06	0.14	0.13	0.27	-0.06	-0.10
Ln(Total population)	-0.54	0.10	-0.21	-0.08	-0.11	-0.02	0.07

	Ln(Gross ODA)	Ln(Bilateral gross ODA)	Ln(Multilateral gross ODA)	Ln(Total population)
Ln(Gross ODA/capita)	1.00			
Ln(Bilateral gross ODA/capita)	0.97	1.00		
Ln(Multilateral gross ODA/capita)	0.83	0.70	1.00	
Ln(Total population)	-0.41	-0.41	-0.38	1.00

Note: Correlation coefficients refer to observations included in the empirical analysis.