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Foreign Aid and Social Sector Spending in Developing Countries

by

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Foreign aid and public spending on health and education: a comparative analysis of impact and effectiveness

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Abstract

Foreign aid is of critical importance to achieving the international goal of providing basic social services to all mankind by 2015. If strategies for funding health and education are to be successful, understanding the link between aid and spending priorities in recipient countries is vital. Transfers might only have an income effect, and thus no impact on relative sectoral spending. We test this hypothesis of no influence by comparing the marginal effects of domestic public revenues and aid on public spending within the social sectors using data from a panel of recipient countries. We conclude that no influence is not the general pattern. In the aggregate, this is not due to success in targeting these sectors. Moreover, transfers from the large bilateral donors tend to reduce the priority given to social spending. However, the "soft" bilateral donors - those devoting more than 0.7% of their GNI to aid - succeeds in raising the budget share of the social sectors by using ear-marked aid. Our conjecture is that this is due to a combination of generous funding and differences relative to recipients in the prioritisation of specific projects in these sectors showing up in the aggregate data.

1. Introduction

Health and educational status are prime determinants of poverty levels, absolute as well as relative, both within and across countries. While much progress has been made in the last few decades, achieving the goal of adequate provision of such services to all mankind is still a long way away. According to UNESCO (2000), there are 880 million illiterate adults in the world. More than three-quarters of these live in populous developing countries such as India, China, and Brazil. In Africa, life expectancy at birth was on average only about 47 years in

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1999, compared to the world average of 66.5 years.[4] The AIDS-epidemic threatens to undo even what little progress has been made over the last decades. Indeed, the African average has declined since 1990.

The accumulation of human capital is today seen by many as one of the most important determinants of growth. In addition, access to education clearly has a major impact on income inequality. Due to the difficulty of financing educational investments through private borrowing, growth might be retarded and inequality perpetuated on a family basis without public intervention. Good health is an important facilitator of human capital accumulation, since child malnutrition might lead to cognitive deficiency. Gains in health status also improve the productivity of labour, the most important asset of the poor, as well as being a good in itself. Finally, it is commonly held that an educated and well-nourished population is a prerequisite for a well-functioning democracy.

The international community has put a lot of effort and resources into upgrading the social sectors of developing countries over the last few decades. For example, the World Bank is now both the largest international source of finance for projects in health, nutrition, and population, with average annual commitments of $1.3 billion, and the major external financier of education sectors in developing countries, with cumulative spending of $30 billion (World Bank 2002). A leading bilateral donor such as Norway aims at spending 10% of its aid budget on health and 15% on education. Moreover, with the adoption of the Millennium Development Goals in September 2000, one must expect the priority accorded to the social sectors to be upheld even though absolute aid flows are declining. The calculations of Devarajan, Miller, and Swanson (2002) suggest that reaching the targets for these sectors by 2015 necessitates additional spending in the order of $30-$55 billion.

In order for donor strategies for health and education to be successful, it is clearly important to have an understanding of the determinants of spending priorities in recipient countries. The research summarised in the next section demonstrates that aid is fungible to some extent, i.e., that funds cannot be perfectly earmarked. Resources targeted for the social sectors by a donor might therefore end up somewhere else. In this paper, we aim to contribute to the empirical literature on aid fungibility in two important ways. First of all, in contrast to previous work in

[4] These data are from the World Bank's World Development Indicators 2001.

this field we take into account the fact that donors and recipients interact strategically. More specifically, we base our empirical analysis on a game-theoretic model of budgetary allocations. Secondly, we also address the issue of whether there are systematic differences among donors in the extent to which they influence spending patterns in recipient countries. In particular, we try to assess the comparative performance of multilateral and bilateral donors with respect to the funding of education and health. To our knowledge this has not been done before. In sum, we seek to evaluate how the transfers of different donors impact on the budgetary priority attached to the social sectors in recipient countries using the most recent available data.

The remainder of the paper is organised as follows. In the next section we first discuss the issue of aid fungibility in more detail before we present a simple game-theoretic model encapsulating the main empirical results on the relationship between foreign aid and public spending in recipient countries. Section 3 is devoted to discussing the data and econometric issues, while the results are presented in section 4. Section 5 contains the major conclusion of this paper, namely, that the most generous donors have the greatest success in influencing social sector spending in recipient countries.

2. The role of foreign aid

The bulk of foreign aid is given to the governments of the recipient countries. One would therefore expect one effect of aid to be higher levels of public spending. However, recipients cannot in general be expected to increase their spending one for one. Inflows of aid might result in tax relief if governments decide to use the assistance to generate greater consumption of private goods instead of increasing public sector output of goods and services. Worse still, the money might end up in the pockets of corrupt officials. Even if the funds are spent within the public sector, they might be used for purposes other than those for which the aid was intended. That is, there is likely to be some crowding out as recipients reallocate funds that they would have spent for the purposes now financed by the donors to other categories of public spending.

The existing empirical literature indicates that the degree to which aid is fungible varies across countries and periods. For example, with respect to Indonesia during 1966-86 Pack and Pack (1990: 193) conclude that "most categorical aid was spent on the purposes for which it was intended by the donors." However, when investigating the same issue in the Dominican Republic for almost the same time period, they find that "[i]n no case does the increase in expenditure nearly equal the increase in categorical aid, indicating substantial diversion away from the intended expenditure patterns." (Pack and Pack 1993: 263) Similarly, using a cross-country sample, Feyzioglu, Swaroop, and Zhu (1998) find that concessional loans to agriculture, education, and energy are fully fungible whereas there is zero fungibility in the transport and communication sector.[5] And indeed, the degree to which aid is fungible should be expected to depend on the characteristics of the donors, the recipient, and the activity in question. Diversion of funds requires capability as well as the desire, so the extent to which priorities differ between recipient and donors and the recipient's administrative capabilities will affect the degree of fungibility (see Hagen 2000 and Pedersen 1997).

As we will see below, crowding out should be expected to be a smaller problem in highly aid dependent countries or sectors, because the higher the degree of donor financing the less government funds there is to divert to other purposes. Indeed, Boone (1996) finds that "…[i]n small countries, or countries where the aid/GNP ratio is extremely large (over 15% of GNP) […] aid does lead to higher investment." This contrasts with his general conclusion, namely, that "[t]he marginal propensity to consume is insignificantly different from one…", which, although perhaps too strong, indicates that aid, which has mostly been for investment, has been fungible. Moreover, some large-scale investment projects might be beyond the financial capacity of governments in poor countries so that these would not have been realised without external finance. All of these arguments suggest that the degree of fungibility is an empirical matter, which should be estimated taking into account the strategic nature of the interaction between donors and recipients. This has not been done in studies to date.[6] We will now present such a model, on which our empirical analysis will be based.

[5] For more empirical evidence on fungibility, see e.g. Devarajan, Rajkumar, and Swaroop (1999) and World Bank (1998), as well as the references cited in these works.
[6] For example, Feyzioglu, Swaroop, and Zhu (1998: 33) explicitly notes that "[w]e take [...] fungibility [...] as given, rather than deriving it from a game-theoretic framework."

A theoretical model of donor influence

The following simple budgetary game between a donor (*D*) and a recipient (*R*) incorporates the main results just discussed and forms the basis for our econometric model of aid fungibility.[7] For the sake of simplicity, we assume that both actors have Cobb-Douglas preferences over two publicly supplied goods. Let us denote the expenditure made on these goods by *h* (for health) and *r* (for the remainder of the public sector budget), with corresponding weights in the objective function of player *i* of S_i and $1\text{-}S_i$, respectively.[8] These will then also be the optimal shares for each good in the combined budget of *D* and *R* from actor *i*'s perspective. Assume that $S_D > S_R$ so that the donor wants a greater budgetary share for health than the recipient does.

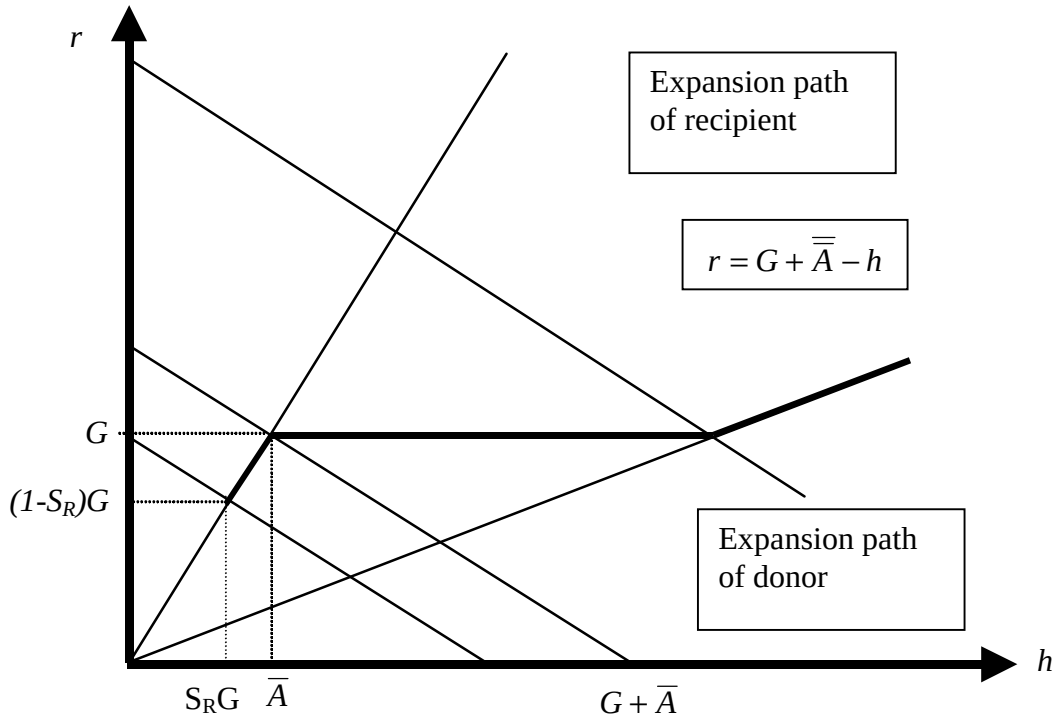
Each player has a fixed budget that might be allocated to spending on the two goods, whose prices are normalised to unity. Hence, quantities equal expenditures. Let *A* denote the total resources at *D*'s disposal and denote *R*'s budget by *G*. Each player will seek to spend its budget so that its "first-best" allocation $h_{i*}=S_iI$ and $r_{i*}=(1\text{-}S_i)I$ results, where $I=A+G$ is the sum total of available resources. At first thought, one would suspect that the outcome would depend on the order in which the players move. However, this is not the case; outcomes are the same regardless of whether one of the actors is a Stackelberg-leader or they move simultaneously. Outcomes only depend on the relative amount of budgetary resources. When the aid budget is relatively low, i.e., below $\overline{A} = \left(\frac{S_R}{1-S_R} \right) G$, the recipient is in full control because it can always add resources in anticipation of or response to the donor's funding strategy so that the outcome is that its most preferred budget split is achieved. Even if *D* should start out by choosing to allocate its total budget to health, *R* controls a large enough share of the resources available to make the end result $h= h_{R*}$ and $r= r_{R*}$.[9] In this case *R* can unilaterally ensure that $r= r_{R*} > r_{D*}$, and therefore $h=A+G- r_{R*}= h_{R*} < h_{D*}$ also.

For intermediate levels of *A*, *D* can acquire some influence by choosing the extreme action just mentioned. By assumption, the recipient can only add to the funds provided by the donor

[7] See Hagen (2002), where a more detailed analysis of the game is provided.
[8] We use the health sector to exemplify the priority sector from the donor's viewpoint, but it might as well have been education or other sectors with which we are not presently concerned.
[9] This may also be seen by rewriting the condition $A \leq \overline{A}$ as $1\text{-}S_R \leq S_G$, where S_G is the share of total resources controlled by *R*.

and not subtract.[10] Moreover, for any given *A* and *G* its interests are in strict conflict with *D*'s. Therefore, *R* will also choose to allocate its whole budget to the good it has the strongest preference for in relative terms, which is *r*. The end result is that each player funds the consumption of the good for which it seeks a higher budgetary share than the other player. Finally, when the aid budget is above a second critical level $\overline{\overline{A}} = \left(\frac{S_D}{1-S_D} \right) G$, the donor is in complete control. Even if *R* should choose an extreme budgetary allocation, *D* controls a large enough share of the available funds to ensure that $h = h_{D*}$. Thus, the final outcome is its most preferred allocation. These results are illustrated in figure 1.

Figure 1: Equilibrium outcome as a function of relative budgets



In sum, it is only relative resource levels that matter for equilibrium outcomes.[11] Donors will have little influence in recipient countries where aid budgets are small relative to domestic

[10] One way of interpreting the model is thus that aid is given for projects producing goods, or even more specifically, as aid in kind. However, what is needed in order to generate the results reported here is only that the recipient cannot reallocate all of the funds devoted to a sector by the donor. Thus, to the extent that this condition is fulfilled, the model covers program aid as well.

[11] However, note that equilibrium strategies depend on the order of moves. For example, in the region of recipient dominance, the donor will spend its budget solely on health in order to increase the final allocation to that sector from h_{R*}-*A* to h_{R*} if it moves last, whereas its strategy is indeterminate if it moves first since it has no influence on the final allocation in this case.

resource levels. Their influence is weakly monotonically increasing in the relative resources at their disposal until aid budgets are so large in relative terms that they are in complete control because they want more consumption of both goods than recipients can generate from their own resources. Empirically, there is a positive correlation between income per capita and the size of the public sector and a negative correlation with aid. Fungibility defined in this sense must thus be expected to be lowest in poor recipient countries and in times of fiscal distress and highest in the richest ones and when public funds in the recipient country are plentiful. In other words, the degree of fungibility should be expected to vary across time and space, in line with the empirical results discussed above.

In terms of our empirical analysis, the following comparative statics results are important:

$$\begin{aligned} \frac{\partial \hat{x}_h}{\partial A} &= \frac{\partial \hat{x}_h}{\partial G} = S_R, A \leq \overline{A}; \\ \frac{\partial \hat{x}_h}{\partial A} = 1 \neq \frac{\partial \hat{x}_h}{\partial G} &= 0, A \in \left(\overline{A}, \overline{\overline{A}}\right] \\ \frac{\partial \hat{x}_h}{\partial A} &= \frac{\partial \hat{x}_h}{\partial G} = S_D, A > \overline{\overline{A}}. \end{aligned}$$

That is, a marginal increase in the donor's budget leads to the same change in health consumption as an increase in the government's own funds in the equilibria of regions one and three, whereas in the intermediate region the marginal effects are different. However, before we demonstrate how we test whether donors have influence over recipient country social spending, we discuss whether there is any reason to expect different types of donors to vary in terms of their impact.

Bilateral versus multilateral aid

Researchers have analysed the factors that determine aid allocations. They have found that colonial past and political alliances affect bilateral aid distributions (Alesina and Dollar 2000) and that bilateral aid does not reward sound macroeconomic policies while multilateral aid is responsive to policy (Burnside and Dollar 2000). Diverse motivations for giving aid are one reason why aid from various donors might differ in their impact on outcomes, and in particular, why multilateral aid may be more efficient. Firstly, it is often claimed that one advantage of multilateral aid relative to bilateral assistance is that multilaterals do not have a political agenda tied to their donations (see e.g. Cassen et al. 1994). While this claim is

probably too strong given the political character of the multilateral institutions, empirical results indicate that multilateral agencies do seem to be less influenced by the geo-political concerns that govern the aid agencies of large bilateral donors such as the US, Japan, and France (see e.g. Rodrik 1995). This must be expected to cause a better allocation of aid across countries in terms of the contribution to poverty alleviation and growth. Since the supply of social services is intimately linked with efforts at reducing poverty, one should perhaps expect multilateral institutions to focus more on this type of aid than the agencies of large donor countries.

Secondly, and similarly, while commercial concerns loom large in the calculations of some bilateral donors, the multilateral institutions do not have strong reasons for distributing aid in order to favour the economic interests of specific donor countries, and are most likely not the target of lobbying by business to the same extent that bilateral agencies are. This is probably why multilateral aid also seems to be tied to a lesser extent than bilateral flows: "…tied percentages of multilateral aid are generally quite small; smaller in any case than those of bilateral aid." (Jepma 1991: 37) It follows that on average the effectiveness of multilateral aid is likely to be higher than that of bilateral assistance. This could include a more efficient allocation across sectors, in particular to less emphasis on economic infrastructure, which often consists of projects that use imported inputs intensively, and more on the social sectors, where projects often rely mainly on local inputs, in particular labour.

Some donor countries such as the Nordic ones and the Netherlands seem in general to be motivated mainly by altruistic concerns (Alesina and Dollar 2000, Rodrik 1995). However, the literature on the Samaritan's Dilemma shows that it is difficult for altruistic donors not to end up carrying a higher share of the burden than originally intended and create aid dependence (see Svensson 2000 or Pedersen 1996, 2001).[12] This is because as long as aid is fungible to some extent recipients will adapt to the intentions of the donors and transfer their resources from activities favoured by donors to other tasks valued by themselves. Svensson (2000) has suggested delegating aid policy to an agency that does not prioritise the goals sought by donors, such as poverty alleviation, to the same extent. This will alleviate the

[12] This is also one of the reasons why *ex ante* conditionality does not work and why *ex post* conditionality may be very difficult to implement.

disincentives created by aid for recipient effort. From the perspective of countries such as Norway and Sweden, the World Bank might be such an institution, since many of the countries influential in the Bank puts more emphasis on foreign policy and commercial interests than the recipient needs that altruistic donors seek to fulfil. Paradoxically, it might therefore be the case that the World Bank could achieve more in the social sectors than the Nordic countries by eliciting greater recipient country effort. However, other multilateral agencies such as UNDP, which pursue much of the same agenda as the so-called "like-minded" countries, could face the same problems. Indeed, even within the Bank, there might be a distinction between the effects of the IBRD and the IDA, since the latter operate in poorer countries and on softer terms. Yet, whether these postulated differences are for real is ultimately an empirical issue; there are incentive problems within the Bank that generates a "disbursement imperative" (see Mosley, Harrigan, and Toye 1991).

Finally, donors might vary in terms of project design and implementation. Multilateral agencies such as the World Bank have much larger administrative resources than bilateral ones. Consequently, it could be that its projects are better designed than those conceived by bilateral donors, and that the monitoring of expenditure and progress in implementation is more stringent. It might also be the case that the World Bank has more leverage with recipients due to its size, the central role it plays in the donor community, in particular with respect to the structural adjustment programs that forms the basis of most country assistance programs, and the fact that recipient governments are members of the organisation. This could lead to the degree of fungibility of Bank funds being lower compared to bilateral and other multilateral assistance. Assessing the relative performance of bilateral and multilateral donors is one of the main goals of this paper.

3. Econometric model and data

The theoretical model in the previous section suggests that aid might be fully fungible in some recipient countries or periods but not in others. In countries where foreign aid is used for purchases of particular goods and services in quantities that are larger than those that the recipient country would choose in the case of an equivalent increase in general budget support, aid is not fully fungible. We are more likely to observe non-fungible aid-flows into

specific projects than at more aggregate levels. Within the health sector, for example, the treatment of HIV-patients might be given higher priority in a project funded by donors than it would be accorded if the same amount of funds had been given to the recipient government in the form of general budget support. Even though this might be the case for many sub-sectors within the health sector, it does not necessarily imply that aggregate health spending is larger than in the case where aid takes the form of general budget support. Thus, we will conduct a conservative test when we inquire whether the increase in total health and educational expenditures is larger when earmarked funding is used than when the general governmental budget is augmented.

We estimate a fixed effect model. Thus, we study within country variation in public spending over time. Our H_0 hypothesis is that the sectoral distribution of governmental spending does not depend on the composition of total governmental income. That is, the H_0 hypothesis is that aid and domestic public revenues have the same effect on, for example, health spending. As can be seen from the comparative statics results of the theoretical model, this implies that over time recipients do not move between the regions illustrated in figure 1. Recall that with Cobb-Douglas preferences the budget shares are constant (independently of prices), and we may write the regression model as $h = \beta_1 I$ and $r = (1 - \beta_1)I$, where β_1 is a constant to be estimated. For other objective functions, the *h*- and *r*-functions might be nonlinear, but if we allow *r* to represent a composite good that also includes the budget deficit, the two functions will always add up to *I*. We will for the most part estimate the simplest extension to the linear model, only adding an intercept. That is, we estimate the model $h = \beta_0 + \beta_1 I$, which implies $r = -\beta_0 + (1 - \beta_1)I$. Note that we only need to estimate one of these equations. As a control, we estimate both. Observe as well that any explanatory variable entering the *h*-function must also be represented in the *r*-function. Including an intercept, we allow for shifts in the *h*-function by adding more control variables.

Next, note that *I* is the sum of domestic income *G* and aid *A*, where *A* in turn is the sum over the amounts that various donors allocate to the recipient country. In the simplest version of the regression model we replace *I* by *G* + *A*. We then have $h = \beta_0 + \beta_1(G + A) = \beta_0 + \beta_1 G + \beta_1 A$. This model is only correct when H_0 is true. If we re-write the equation as $h = \beta_0 + \beta_1 G + \beta_2 A$, then H_0 may be seen to be the hypothesis that

$\beta_1 = \beta_2$.[13] Note that even though using the equality $I = G + A$ implies that we calculate G as a residual, we do not actually use a proxy for domestic public revenues. We could alternatively have estimated $h = \beta_0 + \beta_1 I + (\beta_2 - \beta_1)A$ instead of $h = \beta_0 + \beta_1 (I - A) + \beta_2 A$, and tested whether the coefficient on aid was significantly different from zero.

In terms of the theoretical model that we use, it should be clear from the previous section that H_0 will be true if countries tend to stay in a regime where either the donors or the recipient controls spending at the margin.[14] In some regressions, we distinguish between multilateral and bilateral aid. Furthermore, aid is allocated to different sectors. We split aid into commitments to health, education, and the remaining sectors. We may also combine the two dimensions. The six categories of aid will still add up to *A*. Replacing *A* by the various sub-categories, we add hypotheses, for example, the hypothesis that bilateral and multilateral aid committed to the health sector have the same marginal effect on public spending on health.

We use panel-data for the period 1973-1998. Our data on public spending is from the IMF's Governmental Finance Statistics (GFS)[15] and the data on aid is from the OECD-DAC's Creditor Reporting System (CRS)[16]. Control variables are for the most part from the World

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[13] Feyzioglu, Swaroop, and Zhu (1998) perform an analogous test based on their theoretical model, which does not take into account strategic interaction between recipients and donors.

[14] Note that the model we estimate, $h = \beta_1 G + \beta_2 A$, can be transformed into $h = \beta_1 (I - A) + \beta_2 A = \beta_1 I + (\beta_2 - \beta_1)A$, which in turn implies $\frac{h}{I} = \beta_1 + (\beta_2 - \beta_1)\frac{A}{I}$ $= \beta_1 + \hat{\beta}_2 \frac{A}{I}$. This equation we may write as $S_h = \beta_1 + \hat{\beta}_2 S_A$, where S_h is the budget share for health, or, more generally, the budget share for the set of goods that the donor prefers the most, while S_A is the income share of foreign aid. From a simple reformulation of the critical values illustrated in Figure 1, we know that the recipient determines S_h if S_A is smaller than the recipient's preferred budget share for this good. That is, we will have $S_h = S_R$ for $S_A < S_R$. Furthermore, the donor controls S_h if S_A is larger that the donors' preferred budget share, so we will have $S_h = S_D$ for $S_A > S_D$. In the intermediate case, where $S_R < S_A < S_D$, we have $h = A$ and $r = G$, and consequently $S_h = S_A$. As an alternative to our approach, where we test the hypothesis $\beta_1 = \beta_2$ by estimating the equation $h = \beta_0 + \beta_1 G + \beta_2 A$, we may thus rather estimate S_h as a partial-linear function of S_A. This would be a more direct test of the theoretical model. We have tried to estimate such a model, but the explanatory power of the model is very low, and we are not able to identify any effect of S_A on S_h in those regressions. This is most likely because we lose information by collapsing two variables into one.

[15] We have downloaded the data from the World Bank's Global Development Network webpage (at www.worldbank.org/research/growth/GDNdata.htm).

[16] Specifically, the data is from the OECD's International Development Statistics (IDS) 2001 CD-ROM.

Bank's World Development Indicators (WDI)[17]. As is discussed in more detail below, we also use various indicators to categorize the countries into sub-groups.

Aid is measured in current USD. We calculate the share in GDP by using data on GDP in current USD from the WDI-2001 cdrom. Moreover, like Burnside and Dollar (2000), we employ a measure of "effective aid" by using information on the grant component of each transaction to turn the data on loans into "grant equivalents". Since our focus is on the issue of whether donors affect the spending priorities of recipient governments, we have excluded data on aid that is directed to NGOs. Emergency assistance is also excluded on the grounds that i) it is to a large degree spent abroad by the donors and so does not involve the recipient government to the same extent as long-term development assistance; ii) it is given when countries are in distress due to e.g. natural disasters, and we are mainly interested in the pattern that exists when the situation is not exceptional. We summarize the individual transactions by purpose to generate aggregate aid flows directed to the health and education sectors as well as a composite of other kinds of aid. In order to ensure that the aid and spending data are compatible, we include foreign funding of population policies and reproductive health measures in the category "aid to the health sector".

We have data on aid in percent of GDP for 168 recipient countries. The number of countries for which we have some information on government finance is 124, with 120 countries reporting spending on health and 119 countries reporting spending on education. We have information on both aid and health and educational spending for 96 countries. When we include other control variables, the number of countries in the regressions is reduced to 94. The panel of 94 countries by 26 years is not balanced. On average there are 12.4 observations per country, with 43 countries having less than 10 observations, 25 countries having 10-19 observations, and 26 countries having data for 20 or more years. There is no tendency for late or early reports, the average year of the observations in the regressions is 1985.6, while for the full panel the average year is (1998+1973)/2 = 1985.5.

The observations in the final unbalanced panel do not necessarily constitute a random sample. In principle we thus may have a selection bias. However, any country specific error-term will

[17] That is, with the exception of the democracy indicator from Freedom House, they are from the World Bank's WDI-2001 CD-ROM. We have downloaded the Freedom House data from http://www.freedomhouse.org/ratings/index.htm.

vanish in the fixed effect regression, and there will be no selection bias with respect to country specific effects. We may still have selection bias with respect to the observations within countries. If we had a theory for this selection process, we could have formulated a selection model with the purpose of estimating consistent parameters for the regression models. However, any such selection model would be very speculative. The most likely identifying variables would be indicators of economic development, which would imply that we should expect more information in later periods. But as concluded above, we find no such tendency in the data, and in line with other cross-country analyses in the literature, we report the results of standard fixed-effect models. A final argument in favour of our approach is the fact that the sample of 91 countries includes the majority (57%) of the 168 aid receiving countries. Thus, even though one may argue that the selection is not completely random, we still find it correct to estimate a fixed-effect model instead of a random-effect model.

Although we do not expect a selection bias with respect to the sample countries, the estimated regression model is still only valid for the particular sample. The excluded countries may potentially be different in terms of the relationship between aid and social spending. We therefore compare, in table 1, descriptive statistics to see whether the countries in our regression sample differ substantially from other aid recipients for which we have some data. For each variable in table 1, we first calculate the within country average over all years and then we report the between country average of the country averages. Note that this means that the summary statistics for the sample countries are calculated over all the years for which we have some information on them, regardless of whether these observations are used in the main regressions or not. Also note that when we compare statistics for the public spending variables, we include all countries not in the main regressions for which we have some data, whether or not they receive aid. This is because otherwise there would be very few countries to compare with.[18] For the other variables we only include the countries receiving aid.

Regarding the background characteristics, the countries in the data-set are not very different from the other aid-receiving countries. The most notable difference is in terms of population density (*popdens*), with the sample countries on average having much smaller values for this

[18] This is readily apparent from tables 2 and 3. In the first two regressions in each table, we only use GFS-data. The number of countries is then 99. When we include aid variables, we lose 3 countries (Myanmar, South Africa, and Tanzania), and adding the control variables means that Ethiopia and Liberia drop out too. There are only 4 countries (Djibouti, Gabon, Moldova, and Namibia) for which we have some GFS-data, but no information pertaining to spending on health and education.

variable. The medians are almost identical, though. The 94 countries in the main regressions are also somewhat more democratic than those in the comparison group, as the average value of *autoc* is lower. They also have more arable land per capita (*arabla*). In terms of GDP per capita (*gdpcap*) they are more homogenous than the countries that are not in the sample. While the mean GDP per capita is in the same range for the two groups of countries, the standard deviation is larger and the median is smaller for the latter group, with both statistics indicating heterogeneity. Regarding public spending, the countries in the regression sample have lower levels of total spending in GDP. They spend more on education, but less on health. This might reflect a systematic positive effect of foreign aid on educational spending, which is a hypothesis to be tested below.

When it comes to foreign aid, the countries in the regression sample *receive* more aid, while less aid is *committed* to these countries. Note that there is no data available on the sectoral distribution of aid disbursements to a recipient from different donors. However, there exists data on aid commitments by donor, recipient, and sector. We would like to see whether allocating aid to specific sectors influences the relative levels of government spending, and we are thus forced to use the commitment data in the regressions. Of course, recipients might respond in different ways to donor pledges of funds and actual resource transfers. Indeed, we do find indications of the marginal effect of funds committed being different from that of disbursements at the aggregate level. Since the reaction of recipients to the commitments made by donors is an interesting issue in its own right, we proceed with investigating this matter with the caution that our data does not allow us to draw conclusions about the direct effects of aid.

Table 1 lists the specific control variables that we use. Any variable that may influence governmental preferences for or the relative costs of different types of public spending might be included as control variables. Theory does not offer much guidance here. The empirical regularity known as Wagner's Law (that public spending rises more than proportionally with income), suggests that richer countries will spend a greater share of their income on public education and health than poorer countries. The support for Wagner's Law is somewhat mixed, and even if an aggregate relationship exists it need not hold for all sub-categories of public spending. Still, this is an empirical matter, so we include per capita GDP in the regressions in order to uncover any link to the budgetary shares of health and education spending. Population density and the share of the population in rural areas are reasonable

proxies for the costs of providing public services, with less densely populated and more rural countries presumably having higher costs per unit of output. The variables will be significant if the cost effect is stronger in social services than in other sectors. Poor countries with more arable land per capita might be less dependent on agricultural imports. If food markets are imperfect, endowments of food could have an impact on nutritional status and thus the need for health spending. Finally, there is often a significant element of redistribution involved in the provision of social services. The demand for such redistribution might conceivably be stronger in more democratic countries. We therefore include the autocracy index from Freedom House.[19]

4. Results

As discussed in the previous section our H_0-hypothesis is that foreign aid has the same effect as domestic funds on public spending on health and education in the countries receiving aid. In the simplest version we test the hypothesis $\beta_1 = \beta_2$ based on the model $h = \beta_0 + \beta_1 G + \beta_2 A$. The hypothesis remains the same when we add control variables and split foreign aid according to the purpose of the commitments and the donor. In the fixed-effect regression models, $G + A$ is represented by total public spending, and A is, with one exception, represented by aid commitments. In tables 2 and 3, we present the basic results for health and education, respectively. We add control variables and interaction effects and we also study sub-samples of countries. In table 4, we split foreign aid according to purpose. We compare multilateral and bilateral aid in tables 5 (health) and 6 (education), both in the aggregate and in terms of the decomposition of commitments into targeted and non-targeted aid. Table 7 shows the results for both health and education spending when aid is even more finely detailed by donor. Since some of our sub-samples are fairly small, the feasible number of explanatory variables is probably approaching its limit here. The fact that many observations on aid are zero or very small when highly disaggregated commitment variables are used also suggests that quite a few of these variables will not be significantly different from zero. Moreover, in exploratory regressions not reported we find that except for what we

[19] This is the indicator most commonly used in empirical work in both economics and political science, and is also known as Gastil's index. See Gastil (1991) for a description of this measure.

term the soft bilateral donors, the coefficients of targeted aid from various donors are rarely simultaneously significant and significantly different from the coefficient on domestic governmental income. In table 8, we therefore restrict the number of aid variables to six, namely, targeted and non-targeted aid from the multilateral donors, the soft bilaterals, and other bilateral donors.

Aggregate aid and social sector spending

Let us now discuss the results in tables 2 and 3. If we compare columns 1 and 2 for each table we receive confirmation that as long as the *h*-function is estimated, we do not have to estimate the *r*-function: the sum of the two columns adds up to total expenditure. Columns 3 and 4 present the basic model $h = \beta_0 + \beta_1 G + \beta_2 A$, estimated by data on aid disbursements in column 3 and aid commitments in column 4. We see that the marginal impact of disbursements on the budgetary share of health spending is smaller than that of domestic funds. For commitments, it is the other way around. Only the latter difference is significant, though. With respect to spending on education the marginal impact of aid is not significantly different from that of other types of governmental revenues regardless of whether we use disbursements or commitments. From now on, we only use the latter.

The results in column 5 of these two tables demonstrate that the marginal contributions of domestic funds and aid commitments to health and education spending are not linear. Spending on both health and education are concave functions of domestic funds, while they are convex functions of foreign aid. Since the effects of domestic funds dominate, spending on these sectors is a concave function of total expenditure, which means that on average health and education are considered necessary public goods by the governments in the aid-receiving countries. In the remaining regressions we will add interaction effects and control variables to be able to explain more of the variation in public spending.[20]

When we add control variables in columns 6 and 7 and compare the results to those in column 4, we again find that foreign aid has a stronger marginal effect on health spending than revenues generate domestically. For education there is a smaller relative parameter for aid in column 6 and a larger one in column 7, with the former being significantly different from the

[20] The quadratic terms turn out to be not significantly different from zero when control variables are included, so we henceforth omit them.

coefficient of domestic revenues. Since we are estimating a budget share model, we expect the share of other sectors to decline when the share of the health sector increases with foreign aid. Hence, a small relative parameter for the marginal effect of aid on education is consistent with a large parameter for health. In other words, if foreign aid is not fully fungible in one sector in the sense that donors influence the share of public spending being devoted to that sector in recipient countries, the budget shares of other sectors will change too.

Regarding the control variables, we note that the budget share of health shifts upwards with *gdpcap* whereas it has no effect on the share of spending on education. Recall from the previous section that as long as it is included in the health-share function, we should not exclude an explanatory variable from the function for the budgetary share of education. That the health share increases while that of education is not significantly affected simply implies that the share of expenditures outside the social sectors goes down when per capita income rises. For the share of the population living in the rural areas (*ruralpop*), it is the other way around: a higher share shifts the budget share of education downwards, with no impact on the ratio of health spending to GDP. This indicates that in the aggregate the cost of education is relatively high in the rural sector whereas there is no such relative price effect in the health sector. Apparently the other proxy for the relative cost of supplying public services, *popdens*, is too coarse to have any influence in the aggregate sample. However, as discussed below, this variable has explanatory power in some of the sub-samples. Since including an irrelevant variable has no adverse effects on the reliability of the other estimates, we keep it for the sake of comparability across samples. Higher values of *arabla* shifts the budget share for education upwards and tends to shift the budget share for health downwards. The latter result suggest that the health status of the population might indeed be better in poor countries having more agricultural land, thus attenuating the need for public spending in this field. When it comes to *autoc*, health spending is a U-shaped function of it, which indicates that democratic as well as autocratic countries spend more on health. The same kind of relationship surfaces with respect to educational spending, c.f. column 6 in table 3, but is not significant.

In the seventh columns of the first two regression tables we add interaction effects to the specification employed in the previous columns. That is, we test whether domestic funds and foreign aid have stronger effects on public spending on health and education in less autocratic countries. In table 2, both interaction effects are significant whereas in the case of education it is only with respect to the impact of aid that the nature of the political regime matters. As a

higher value of *autoc* corresponds to a less democratic regime, donors seeking to strengthen the priority attached to social spending would evidently benefit from targeting more democratic recipients. While this is an interesting result, we exclude the interaction effects in the following, the reason being that among the links connecting political regime status, aid, and social spending, the one between the latter two is our main concern.

In columns 8-11 of tables 2 and 3 we report regressions with the specification used in the sixth columns of those tables for sub-samples of countries. The first sub-sample consist of the aid recipients in our full sample that are currently designated as low-income countries by the World Bank. The last three sub-samples split countries according to geographic region: Africa, Asia, and Latin-America. More precisely, these are the countries in our sample that are members of the African, Asian, and Inter-American Development Bank, respectively.[21] We have chosen this split because we have data for aid from the regional development banks (RDBs). Since the operations of these institutions are confined to the member countries, we need to look at their "spheres of influence" in order to gauge whether they have any impact on the spending patterns of the governments there.

Starting with the health regressions, the most important thing to note is that the marginal impact of aid is greater than the coefficient on domestic funds in two of the sub-samples and smaller in the other two. The ones that are significantly different are also evenly split between higher and smaller relative coefficients. The results indicate that in Latin America a marginal increase in aid has twice the impact on the budget share of health compared to a corresponding increase in other types of revenues. The situation in Asia is the reverse. When it comes to the control variables, we see that *popdens* and *ruralpop*, which were not significant in the full sample, are in most sub-samples different from zero at conventional levels of significance. The signs of *autoc* and its square tend to be the same as in the main sample, but is only significant in the poor and the Asian countries. *Arabla* continues to be significantly negative, except in Africa.

[21] We assign countries to geographical regions using data from the Global Development Network Database. We then use information from Culpeper (1997) to create samples corresponding to the membership area of the RDBs. More specifically, to arrive at our African sub-sample, we add the North African countries in our sample to those located south of the Sahara. The Asian one includes the sample countries in South Asia and East Asia and the Pacific, as well as Kazakhstan and Tajikistan. Table A2 in the appendix contains a complete list of recipient countries as well as information on whether they belong to any of the sub-samples.

Turning to education, the results confirm that there seems to be important differences in the impact of aid in the sub-samples compared to the full sample. The coefficients are always significantly different from the one for domestic revenues. In the low-income countries, Africa, and Asia, aid has a significantly smaller impact on the budgetary share of education than a similar increase in public revenues generated domestically. Here too, Latin America stands out as a region where donors influence spending priorities significantly in the direction of a greater share for social spending. As was the case for health, the coefficient is about twice as large as the one for internal funds, which in turn is much smaller than in the full sample. The sign pattern for the other variables is not too different from that of column 6, but the significance of the coefficients vary somewhat. *Popdens,* which is not significant in the full sample, is significant and negative in Latin America, suggesting that these countries tend to spend relatively less on education as the cost of providing public services comes down with increases in the population. The budget share of education is decreasing in *gdpcap* in low-income countries, whereas *ruralpop* and *arabla* are not significant in Asia, a region where it must be admitted that with the exception of our main variables of interest the regression equation fares rather poorly. The results for the sub-samples tend to confirm that variations in the degree of democracy does not seem to affect the prioritisation of educational spending. Still, observe that in Africa both political parameters are significant and the relationship looks like an inverted U. That is, moving from the most and the least democratic regimes towards the intermediate range results in a higher budgetary share for education.

Summing up the results with regards to our main hypothesis of aid being indistinguishable from other types of public funds, the regressions using aggregate aid consistently reject it. If we include the sub-samples, we may reject the hypothesis in eight out of ten regressions using the basic specification. The results are strongest in the education sector, where the coefficient on aid is significantly different from the one on domestic revenues in all of these regressions. However, only in Latin America this works in the direction of raising the budgetary share of education spending. With regards to health, in Asia the marginal impact of aid is only 50% of that of domestic revenues. On the other hand, both in the full sample and in Latin America foreign economic assistance changes the priority the recipient governments attach to this sector in an upward direction. Thus, another important conclusion is that the effects of aid vary across recipients. This is what we expected given the theoretical model outlined in section 3. Interpreting the result that $\beta_1 \neq \beta_2$ in the light of the comparative statics results shown there, and bearing in mind that in estimating a fixed-effects model we are studying the

impact of changes in explanatory variables from their country means on the deviations of the budgetary shares of health and education from their country means, we may say that over time recipients have moved between regimes. Thus, donors have influenced budgetary priorities in recipient countries, at least during parts of our sample period.

Targeted transfers: results for aggregate aid

We now turn to table 4, where the question of whether targeted aid has a greater impact in the aggregate than general budgetary support is taken up with respect to both health and education spending. Looking at the results, we see that in general, the answer is no. As we shall soon see, the use of aggregate aid masks important differences between different donors. Leaving that qualification aside for the moment, it is evident that the fact that we just found that the marginal impact of aid is significantly different from that of domestic funds in the education sector is not due to the effects of targeting. The coefficient on aid earmarked for education spending is in fact only significantly different from zero in low-income countries and even there it is not significantly different from that of public revenues generated internally. The above result was wholly due to non-targeted aid having very different effects from those of domestic funds. In four out of five regressions, the difference between the coefficients are significant in a statistic sense. In three of these, aid has the smallest impact of the two types of government funds. We also see that the strong result for Latin America was wholly due to the impact of foreign transfers not intended for the education sector working to increase the share of government spending aimed at that sector. The same is the case in the health sector, not only in Latin America but also in the full sample. One possible explanation for these results is that in certain circumstances foreign aid alleviates foreign exchange or credit constraints. This could be a direct effect of receiving monetary transfers in foreign currencies or an indirect consequence due to the recipients becoming more creditworthy in private capital markets. If the social sectors are particularly vulnerable to cutbacks when recipients are credit-constrained or face severe debt problems, inflows of foreign aid will counteract these effects. The fact that Latin America was particularly hard hit by the debt crisis of the 1980s, which was triggered by the events in that region, makes this interpretation plausible. So do the summary statistics presented in table 1. For example, on average, aid earmarked for the health sector constitutes a meagre 0.19% of GDP in recipient countries compared to the total average of almost exactly 4%. Since it would be the total amount of foreign exchange or financial resources made available that would matter in the presence of

binding foreign exchange or credit constraints, only aid flows not intended for the social sectors would have a sizeable effect in such environments.

The low-income countries and recipients in the African region represent interesting contrasts to this pattern. At the margin, aid committed to this sector is two to three times more powerful than domestic funds in terms of raising the budget share of health in these country groups. Interestingly, the four largest values of total aid to the health sector in the full sample are all from low-income countries and two of these are from the African region. These findings are thus consistent with our theoretical model, which predicts that donors will be more influential when their donations are larger relative to the resources that recipient governments possess. Finally, we note that the results regarding the control variables are very much in line with those reported previously.[22] In order to keep the discussion within reasonable limits, we will concentrate on the results with respect to the aid variables from now on. Except when sizeable changes take place, we will therefore not comment on the other variables in the following.

Multilateral vs. bilateral aid

Tables 5 and 6 compare the effects of multilateral and bilateral aid commitments. The comparison is first done in the aggregate. Thereafter, we split the variables according to the purposes of aid. Starting with table 5, we see that the main reason why the marginal impact of aid is distinct from that of domestic funds when it comes to health spending is that bilateral aid commitments has a significantly different effect. At conventional levels of significance, the coefficients on multilateral aid must generally be considered the same as those on public revenues generated domestically. Bilateral aid has a significantly distinct effect in four of the five first columns in the table, though the parameters are not significantly different from zero in two of these cases. Looking back at the results in table 2, we see that in the full sample and in Latin America the relative sizes of the coefficients of bilateral aid and domestic revenues are almost identical to those of total aid and the latter. In the aggregate aid was not distinguishable from domestic funds in low-income countries. The results in the first half of table 5 reveal that this was due to neither multilateral nor bilateral aid having a significantly different effect. The situation with respect to aggregate aid is the same in Africa. However,

[22] *gdpcap*, which is significant in column 3, was only borderline insignificant (10.7%) in the corresponding regression in table 2 (column 9); and *ruralpop*, which was significant at the 10% level in column 11 of table 2, is just outside of conventional levels of significance (10.2%) in column 5.

here the result is due to multilateral and bilateral aid having very different effects. This is also the case in Asia, and explains why we find that there $\beta_1 \neq \beta_2$ when we use aggregate aid.

In the last five columns of table 5, we investigate whether ear-marking assistance matters. The answer is somewhat inconclusive. The multilaterals have little success in targeting their aid to the health sector. In fact, the coefficients of this variable are not significant in the majority of the regressions. Worse still is the fact in the only sample where it is both significant and significantly different from the coefficient of locally generated public revenues, Latin America, multilateral aid to the health sector has a huge negative impact on the share of such spending. We do not have a good explanation for this result, but one possibility is that the multilaterals have responded to periods of low budgetary shares of health spending by committing themselves to high levels of assistance targeted at this sector. That is, causality might in this case run in the opposite direction. If this is true, however, the behaviour of bilateral donors is radically different as the coefficient on targeted aid is positive, albeit not significantly different from zero.

The bilaterals have more success in the full sample, where their transfers have five times the impact of domestic funds when targeted at the health sector. Similarly, in the sample of low-income recipients, targeted bilateral aid has an effect on the budget share of health that is three times that of other types of public revenues. Comparing columns 2 and 7, we thus see that the reason why aggregate bilateral aid does not have a distinct impact in poor countries is that non-targeted assistance from these donors has a coefficient that is almost identical to that of domestic funds.

Moving on to table 6, it is clear that overall donors have very little success when using ear-marked money in the social sectors. None of the ten coefficients of assistance targeted at education spending are simultaneously significant and significantly different from the corresponding parameters for domestic funds. The fact that non-targeted bilateral aid always has a statistically distinct effect may, however, indicates that the bilaterals are able to prevent assistance intended for other sectors from leaking into the education sector. Supporting this supposition is the fact that six of the eight parameters that are significant in both respects are lower than the coefficients on domestic revenues, with only Latin America standing out in this

respect.[23] While being somewhat speculative, this interpretation of the results is also supported by previous research that has found that the degree of fungibility varies across sectors, c.f. our summary of the literature in section 3.

The influence of different multilateral and bilateral donors

In table 7 we take our investigation of the relative merits of bilateral and multilateral aid a step further by looking at the impact on social spending of specific donors such as the World Bank, the RDBs, and various bilateral donors.[24] One limitation of the aid data of the DAC is that they do not include UN agencies such as the UNDP or the WHO. Thus, on the multilateral side we can only look at the multilateral development banks as well as the EU.

We have data for 20 bilateral donors. More specifically, we have data for all member countries of the DAC except Greece and Ireland.[25] Of course, the level of interesting detail achievable is limited by the data. Even for the largest donor in the world in terms of absolute volume, the US, 37% of the observations that we have on the ratio of its aggregate aid to recipient GDP are zero. To avoid filling a table with non-significant coefficients, we therefore divide the bilaterals into seven groups. Each of the five largest donors, those that donate more than 4 billion USD, are shown separately. These are the US, the UK, France, Germany, and Japan. What we term the "soft" bilaterals - the donors that transfer more than 0.7% of their GNI in 2000 - are also separated out. This group consists of the Scandinavian countries, the Netherlands, and Luxembourg.[26] These donors constitute a meaningful separate category not merely because they are the most generous ones; it is well-known that they are also very similar in other respects, such as giving aid more for altruistic reasons than geo-political or commercial ones (c.f. Alesina and Dollar 2000). Finally, the other bilateral donors are lumped together in one group.[27]

[23] The fact that Latin America is different suggests that the interpretation offered with respect to the strong effects of non-targeted aggregate aid in that region - that it was due to credit-constraints or severe debt burdens - is reasonable.
[24] The full list of donors is in table A2 in the appendix.
[25] Note that this means that Portugal and Spain appear as both donors and recipients in our data.
[26] It should be noted that aid from Luxembourg is truly negligible, as there is only one transaction attributed to this country in the CRS.
[27] As the group "other bilateral donors" is very heterogeneous in table 7, we do not discuss the results with respect to this variable here. Similarly, the category "other multilateral donors" consists of IFAD in the full sample and in the group of low-income recipients whereas the two RDBs belonging to the other regions are added in each of the regional sub-samples, and so the results with respect to this variable are not that interesting either.

Studying the results that table 7 contains, we first note that there is a slight tendency for the coefficients of domestic revenue to drop compared to table 2, most notably in Africa and the low-income countries.[28] Turning to the effects of transfers from different multilateral donors on health spending, we see that aid from the World Bank is always significant, but it is only in Latin America that the impact can be distinguished from that of domestic public funds.[29] We do not expect aggregate aid from the RDBs to matter. Yet, the only regression where the parameter is significantly different from zero is that for the low-income countries, which is a group that span the geographical sub-samples that we have created in order to look at the impact of these institutions. Thus, the AfDB has no effect on the budgetary share of health in Africa, the AsDB enjoys as little success among its members, and aid from the IADB does not matter to the priority accorded to this category of public spending in Latin America.[30] The EU stands out as the multilateral actor making a difference. In the full sample and in the low-income countries a marginal increase in its aggregate aid has about twice the effect of a corresponding gain in domestic revenues. In Africa, the same comparison yields a ratio of 3:1.

If we look at the bilaterals, it is evident that their contributions to the determination of the budgetary share of health are rarely distinguishable from those of the recipient governments. Among the large bilateral donors, aid commitments from Germany and Japan never passes our criterion of double significance. France and the UK record one such "success" each. However, these coefficients are both negative, implying that their involvement tends to reduce the share of public spending devoted to health.[31] One possible explanation for negative coefficients is the one put forward in connection with the results for targeted multilateral aid

[28] As can be seen, the parameters of the control variables are somewhat sensitive to the use of such a detailed specification of aid, at least compared to the basic regressions in tables 2 and 3. Most notably, *popdens* is now not significant in the health regression for Africa, while in the education regression for Latin America, *gdpperca* is now significant and so is the parameter of *autoc* (the significance of *autoc* squared has also increased compared to column 11 of table 3).

[29] Since there are only thirty-five transactions recorded for the IBRD in the CRS, there is little to be gained from separating the IBRD and the IDA. Hence, we create a variable for World Bank aid, which is mostly assistance from the IDA.

[30] The RDBs' split between "banks" and "funds" mirrors the distinction between the IBRD and the IDA in the World Bank, i.e., the terms are generally more concessional for transfers from the funds than from the banks. However, given the tiny number of transactions that these institutions are responsible for in our data - out of more than 244000 transactions, the AfDB in total is responsible for about 1100, while the IADB and the AsDB have recorded about 800 each for their two arms combined - there is no point in treating these separately. In addition, we are using "grant equivalents", and thus turn different degrees of subsidisation into differences in levels of commitments. Hence, in these regressions we add together the donations of the development banks proper and their associated funds.

[31] With a large negative parameter for its Asian aid that is significant at the 10.2% level, the US seems to fit this pattern too.

in table 5, namely, that causality may run from spending shares to aid commitments instead of the other way around. Another is that an extensive use of matching grants in other sectors may draw resources out of the health sector.[32] We do not know of any studies documenting the relative use of such transfer mechanisms across sectors or donors, but investigating this issue should be an important topic for future research on the impact of foreign assistance on the public expenditure patterns in recipient countries.

Finally, the results in columns 1 and 2 of table 7 make it clear that the last donor category, the soft bilaterals, achieve results that are quite similar to those of the EU. At almost twice the size of the coefficient of domestic income, the impact of their aid in low-income countries is nearly identical to those of the EU. In the full sample the transfers of the soft bilaterals are even more powerful than the EU, with a coefficient three times that of public revenues generated domestically. In contrast to the EU, these donors do not make a distinct impact in Africa, but on the other hand they push the budget share of health spending in Latin America up at a rate that is two and a half times that of funds that the governments there come up with.

The latter half of table 7 records the results for educational spending. Recall from table 6 that in the aggregate we found a doubly significant effect of multilateral aid in the full sample only. Here we see that this is mainly due to the fact that aid from the EU and the RDBs in combination have twice the effect of non-aid public revenues. The same actors also turn up strongly in Latin America, but here their pledges of support work in opposite directions, explaining why we found no significant difference between aggregate multilateral aid and domestic funds in table 6. Bilateral aid on the other hand, was significant and significantly different from domestic funds in all samples except the African one when viewed in combination. The detailed categorization employed here reveals that aggregation masks the wide variety of effects that different bilateral donors have on educational spending. As was the case for health spending, if significant at all the impact of German aid is the same as that of revenues generated internally, with one notable exception. The aggregate aid of the soft bilaterals falls into this category too, only making a difference in Latin America, albeit much

[32] Matching grants are conditional grants where donors pledge to cover, say, z% of the costs of a certain project or program, on the condition that the recipient comes up with the remainder. Hence, if donors stay firm in their demand for cost-sharing, the recipient government either has to generate more revenues or transfers resources from other projects or programs in order to finance its part. Unless other donors increase their general budgetary support, in the short-run it is probably more likely that the government of a poor country must cut back spending in other areas in order to generate the necessary funds.

less so than the Germans. The fact that French aid has a relative parameter of more than seven underlines the strongly positive impact of aid on social spending in Latin America that we have seen in previous tables. The US and France has a huge negative impact in Asia, which they had when we looked at health too (c.f. columns 4 and 9). Japan's only claim to distinction also occurs in Asia, where, however, its commitments has a much smaller effect on the budgetary share of education that the revenues the governments of its neighbouring states raise themselves. Aid from the UK works to reduce the budgetary share of education spending in three out of our five samples: the low-income countries, the African countries, and our total of 94 recipient countries combined.

In sum, the message of table 7 is that when it comes to significantly tilting the distribution of governmental expenditure in the direction of the social sectors, the EU and the soft bilateral donors stand out. On the other hand, the large bilateral donors such as France, the UK, and the US, when influential, tends to cause a decline in the budgetary share of social sector spending. These results might reflect systematic differences in the priority accorded to the social sectors by the donors. For example, the mean value of the soft bilateral's total aid in GDP is 0.33%, whereas it is 0.42% for the US.[33] Yet the mean values of aid to the social sectors are quite similar. For the former donor group the numbers are 0.024% (health) and 0.018% (education), compared to 0.020 for US aid to both health and education. Although the soft bilaterals are larger than the UK and France in terms of the mean value of their aid/GDP ratios, the differences with respect to the mean values of aid to the social sectors are many times the aggregates ones. It is therefore not surprising to find that if we split the aid from the donors shown in table 7 into targeted and non-targeted flows, transfers from the large donors targeted at health and education rarely pass the hurdle of being "doubly significant". The same is the case for ear-marked transfers from the EU.[34] Once again, instead of presenting an unwieldy table full of insignificant aid parameters, we restrict the detail provided by donor. We thus

[33] These are the mean values of the observations in the education sample, and so might differ somewhat from a mean of country means calculation such as that used in table 1.

[34] These regressions, which are available upon request, also indicated that the performance of the RDBs might appear more favourable if aid is disaggregated into targeted and non-targeted flows. Yet these results were not that robust. If the RDBs are separated from other multilateral donors, but the specification is identical to that of table 8 in other respects, the only cases of doubly significant RDB parameters are for health spending in Latin America (strongly negative) and for education spending in low-income recipients.

generate a final set of result shedding light on whether the impact that the soft bilaterals appears to have is due to their success in making ear-marked money stick.

Success in targeting aid: the soft bilaterals vs. other donors

Table 8 shows the results for a three by two split of aid into targeted and non-targeted multilateral aid as well as bilateral aid from the soft donors and the rest of the bilateral ones. Concentrating on the parameters of the ear-marked commitments, it is immediately apparent that the performance of the soft bilaterals is very different from that of other donors, and in particular the other bilateral ones. The effects of targeted bilateral assistance exclusive of the commitments of the soft donors is never both significant and significantly different from those of domestic funds. It is in fact not even significantly different from zero in a single regression. The fact that bilateral health aid is doubly significant in columns 6 and 7 of table 6 is thus mainly due to the impact of the soft donors. In the full sample, their targeted aid has exactly five times the impact on the budget share of health that the recipient governments' own resources have, and in the low-income the ratio is 3:1. Moreover, the weak results for aggregate ear-marked bilateral aid to the education sector shown in table 7 hide the fact that the soft bilaterals do seem to make a difference. In the full sample, the relative parameter value is above six. The ratio is somewhat smaller in the low-income countries and in Africa, though it is still larger than five. The strongest result is in Latin America, where the targeted aid of this donor group has seventy-eight times the impact on the share of education spending that domestic revenues have. Even if we reduce this point estimate by one standard deviation and increase that of domestic funds by one standard deviation, aid from the soft bilaterals still has more than thirty times the effect of the latter type of public revenues.

In sum, in six out of ten regressions the economic assistance from the soft bilaterals is many times more powerful in increasing the priority given to public expenditure in the social sectors than a similar gain in the funds that recipient governments raise themselves. While one should probably not place too much emphasis on the exact figures, the pattern is clear. What factors may be responsible for these strong results? As already mentioned, one reason is probably that these donors spend a considerable share of their fairly substantial overall donations in these sectors. The smaller commitments of other donors may not make a difference because recipient governments would in any case spend more in these sectors than they receive in aid from these actors. But this is probably not the full story, because our theoretical model demonstrates that what matters is whether donors control more resources than any specific

recipient. It thus may also be the case that the soft donors conduct their aid operations in a manner that is sufficiently distinct from that of other donors to show up in the aggregate. It is well-known that these donors tend to target the poorest countries, but so does the IDA, and as we have seen transfers from the World Bank, which is mainly funded by the IDA, seldom affect budget priorities in the recipient countries. Perhaps these donors aim their funds at recipients where the social sectors would not otherwise be accorded the priority that they attach to such spending? Unfortunately, these questions cannot be answered with data at the level of aggregation that we use here, but they suggest the importance of conducting more detailed studies of how different donors operate.[35]

5. Conclusions

The notion that foreign aid is fully fungible and so is spent, at the margin, in the same manner as any other funds that the recipient governments control seems to be widespread. For example, the World Bank (1998: 80) argues that "donors should take it for granted that their financing is fungible because that is reality." Our results, based on a game-theoretic model, challenge this commonly held view. We conclude that some donors seem to influence the spending priorities of recipients. Perhaps surprisingly, bilateral donors appear to be more potent in this sense than multilateral ones. However, this potency does not always result in greater priority being attached to the social sectors. In fact, the involvement of the large bilateral donors tends to reduce the ratios of health and education spending to GDP. As the targeted aid of the bilaterals is rarely a distinct determinant of the budget share of social spending, their impact may in general be working through indirect channels, for example, by alleviating foreign exchange constraints. However, the "soft" bilateral donors - the donors that spend the largest fraction of their national income on foreign aid - seem to have considerable success in increasing spending in the social sectors using earmarked funds. This conclusion is based on the finding that an increase in targeted aid from these donors has a much stronger effect on health and educational spending in most recipient countries than an identical increase in domestic public revenues. There are two possible interpretations of this result. One is that it is due to the concentration of these donors' development assistance in the poorest

[35] Ideally, we would have liked to use more disaggregated categories of health and education spending, but the GFS-database does not contain this kind of data for a large enough number of recipient country-years.

recipient countries. A second possible interpretation is that these donors allocate more aid to many specific projects in the social sectors than the recipients would have allocated by themselves and that this shows up in the aggregate data. We cannot distinguish directly between these two competing interpretations, but the fact that aid from the IDA, which is also targeted at the poorest countries, does not generate similar results favours the latter hypothesis. Future research on aid and public spending should investigate the different modes of governance that donors use in their interactions with recipients as a step towards uncovering the micro-level determinants of the degree of donor influence.

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Table 1: Descriptive statistics

Variable	Sample countries mean*, *median*	Other countries mean*, median	Explanation (unit)	Source
healtgfs (*h*):	1.95, *1.59*	2.97, *2.28*	Governmental expenditures, health	GFS-IMF
	(1.46) N=94	(2.23) N=26	(% in GDP)	
educagfs (*e*):	3.59, *3.55*	2.95, *3.13*	Governmental expenditures, education	GFS-IMF
	(1.81) N=94	(1.76) N=25	(% in GDP)	
expengfs (*I*):	28.48, *28.33*	33.34, *35.26*	Governmental expenditure	GFS-IMF
	(11.48) N=94	(10.69) N=30	(% in GDP)	
aid1 (*A*):	4.01, *1.49*	5.41, *3.04*	Aid commitments	CRS-DAC-OECD
	(5.26) N=94	(6.54) N=74	(% in GDP)	
aid2 (*A*):	2.16, *0.66*	1.00, *0.48*	Aid received	GFS-IMF
	(3.74) N=89	(1.50) N=27	(% in GDP)	
netexp1 (*G*):	24.60, *26.13*	29.14, *31.30*	Governmental expenditure, net aid commitments	Diff: I – Aid1
	(13.96) N=94	(6.53) N= 7	(% in GDP)	
netexp2 (*G*):	26.01, *26.95*	32.61, *34.06*	Governmental expenditure, net aid	Diff: I – Aid2
	(11.07) N=89	(9.46) N=27	(% in GDP)	
aidmulti	1.41, *0.34*	1.85, *0.79*	Multilateral aid commitments	CRS-DAC-OECD
	(2.05) N=94	(2.60) N=74	(% in GDP)	
aidbi	2.60, *1.08*	3.56, *2.29*	Bilateral aid commitments	CRS-DAC-OECD
	(3.42) N=94	(4.45) N=74	(% in GDP)	
aidhealth	0.19, *0.05*	0.25, *0.15*	Total aid committed to the health sector	CRS-DAC-OECD
	(0.30) N=94	(0.34) N=74	(% in GDP)	
aideduc	0.26, *0.08*	0.46, *0.11*	Total aid committed to the education sector	CRS-DAC-OECD
	(0.20) N=94	(1.04) N=74	(% in GDP)	
gdpcap:	2883.19, *1536.33*	3035.65, *942.67*	GDP per capita in constant 1995 USD	WDI
	(3478.14) N=94	(5470.38) N=61	($1000)	
ruralpop:	53.34, *53.26*	58.44, 63.68	Rural population	WDI
	(22.08) N=94	(21.99) N=73	(%)	
arabla:	0.30, *0.23*	0.22, *0.18*	Cropped land per capita	WDI
	(0.28) N=94	(0.17) N=69	(100 ha)	
popdens:	155.01, *49.57*	372.91, *49.78*	Population density	WDI
	(496.54) N=94	(1949.76) N=72	($10/km^2$)	
autoc:	3.97, *4.05*	4.80, *5.29*	Index for political rights	Freedom house
	(1.53) N=94	(1.70) N=69	(1 is most democratic, 7 is the least)	

* Unweighted mean of country means (standard deviation for the reported mean in parenthesis).

Table 2: Fixed-effect regressions for public spending on health

	1	2	3	4	5	6	7	8	9	10	11
Indepvars:	Other expenditure		Aid dis-bursements					Low income	Africa	Asia	Latin America
expenditure	0.970***	0.030***									
(% in GDP)	*(0.003)*	*(0.003)*									
domestic			0.048***	0.027***	0.065***	0.041***	0.058***	0.054***	0.043***	0.047***	0.055***
(% in GDP)			*(0.004)*	*(0.003)*	*(0.006)*	*(0.003)*	*(0.008)*	*(0.005)*	*(0.004)*	*(0.006)*	*(0.007)*
aid			0.030***	0.043***	0.044***	0.052***	0.080***	0.060***	0.037***	0.024***	0.103***
(% in GDP)			*(0.011)*	*(0.006)*	*(0.010)*	*(0.006)*	*(0.015)*	*(0.006)*	*(0.006)*	*(0.009)*	*(0.012)*
domestic (squared)					-0.0004***						
					(0.0000)						
aid (squared)					0.0006***						
					(0.0002)						
gdpcap						0.044*	0.047**	-1.186***	0.198	-0.009	0.051
($1000)						*(0.023)*	*(0.023)*	*(0.252)*	*(0.122)*	*(0.46)*	*(0.089)*
popdens						-0.003	-0.003	-0.025*	-0.041**	0.000	0.250***
(10/km-sq)						*(0.002)*	*(0.002)*	*(0.015)*	*(0.018)*	*(0.004)*	*(0.069)*
ruralpop						-0.008	-0.009	-0.067***	-0.035***	0.009	0.034*
(%)						*(0.006)*	*(0.006)*	*(0.010)*	*(0.010)*	*(0.009)*	*(0.019)*
arabla						-0.014***	-0.013***	0.027***	0.008	-0.047***	-0.020*
(100ha)						*(0.004)*	*(0.005)*	*(0.006)*	*(0.006)*	*(0.015)*	*(0.011)*
autoc						-0.325***	-0.202*	-0.312*	-0.086	-0.443***	-0.028
(index)						*(0.095)*	*(0.078)*	*(0.165)*	*(0.204)*	*(0.159)*	*(0.200)*
autoc						0.038***	0.036***	0.049***	0.020	0.062***	-0.007
(squared)						*(0.012)*	*(0.012)*	*(0.018)*	*(0.022)*	*(0.019)*	*(0.026)*
domestic*autoc							-0.004**				
							(0.002)				
aid*autoc							-0.007***				
							(0.003)				
constant	-1.016***	1.016***	0.595***	1.060***	0.369***	1.971***	1.481***	5.107***	2.603***	1.104*	-1.785
	(0.074)	*(0.074)*	*(0.109)*	*(0.083)*	*(0.118)*	*(0.357)*	*(0.413)*	*(0.837)*	*(0.836)*	*(0.624)*	*(1.305)*
R-sq-within	0.9910	0.0923	0.1494	0.0806	0.1317	0.1592	0.1645	0.4808	0.3722	0.2749	0.2808
N-obs	1374	1374	961	1214	1214	1168	1168	336	296	266	360
N-countries	99	99	93	96	96	94	94	32	26	16	28

Standard errors in parentheses. * Significantly different from 0 at the 10% level. ** Significantly different from 0 at the 5% level. *** Significantly different from 0 at the 1% level. Bold aid parameters are significantly different from the corresponding parameter for domestic income at the 10% level. Underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 5% level. Doubly underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 1% level.

Table 3: Fixed-effect regressions for public spending on education

	1	2	3	4	5	6	7	8	9	10	11
Indepvars:	Other expenditure		Aid dis-bursements					Low income	Africa	Asia	Latin America
expenditure	0.948***	0.052***									
(% in GDP)	*(0.003)*	*(0.003)*									
domestic			0.066***	0.046***	0.116***	0.059***	0.064***	0.079***	0.061***	0.142***	0.030***
(% in GDP)			*(0.005)*	*(0.004)*	*(0.007)*	*(0.004)*	*(0.010)*	*(0.010)*	*(0.009)*	*(0.010)*	*(0.006)*
aid			0.081***	0.043***	0.034***	**0.048*****	0.077***	0.055***	0.036**	0.087***	0.063***
(% in GDP)			*(0.014)*	*(0.008)*	*(0.012)*	*(0.007)*	*(0.019)*	*(0.011)*	*(0.015)*	*(0.015)*	*(0.009)*
domestic					-0.001***						
(squared)					*(0.000)*						
aid					0.001***						
(squared)					*(0.000)*						
gdpcap						-0.010	0.015	-1.050**	0.226	-0.003	-0.112
($1000)						*(0.029)*	*(0.029)*	*(0.495)*	*(0.281)*	*(0.076)*	*(0.069)*
popdens						0.002	0.002	-0.006	0.051	0.003	-0.195***
(10/km-sq)						*(0.003)*	*(0.003)*	*(0.030)*	*(0.042)*	*(0.006)*	*(0.054)*
ruralpop						-0.030***	-0.030***	-0.131***	-0.151***	-0.010	-0.054***
(%)						*(0.008)*	*(0.008)*	*(0.020)*	*(0.024)*	*(0.016)*	*(0.015)*
arabla/cap						0.016***	0.015***	0.070***	0.089***	-0.028	0.012
(100ha)						*(0.006)*	*(0.006)*	*(0.012)*	*(0.014)*	*(0.025)*	*(0.009)*
autoc						-0.106	-0.075	0.279	0.966**	-0.001	-0.228
(index)						*(0.117)*	*(0.134)*	*(0.325)*	*(0.471)*	*(0.267)*	*(0.157)*
autoc						0.017	0.019	-0.037	-0.104**	0.002	0.046**
(squared)						*(0.014)*	*(0.014)*	*(0.034)*	*(0.050)*	*(0.031)*	*(0.020)*
domestic*autoc							-0.001				
							(0.002)				
aid*autoc							-0.007*				
							(0.004)				
constant	-2.094***	2.094***	1.701***	2.368***	1.151***	3.201***	3.049***	9.458***	7.507***	0.944	6.334***
	(0.096)	*(0.096)*	*(0.135)*	*(0.105)*	*(0.146)*	*(0.442)*	*(0.508)*	*(1.646)*	*(1.686)*	*(1.043)*	*(1.019)*
R-sq-within	0.9841	0.1583	0.1977	0.1215	0.2193	0.1927	0.1950	0.3242	0.2976	0.4797	0.2930
N-obs	1377	1377	962	1217	1217	1171	1171	336	296	266	363
N-countries	99	99	93	96	96	94	94	32	26	16	28

Standard errors in parentheses. * Significantly different from 0 at the 10% level. ** Significantly different from 0 at the 5% level. *** Significantly different from 0 at the 1% level. Bold aid parameters are significantly different from the corresponding parameter for domestic income at the 10% level. Underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 5% level. Doubly underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 1% level.

Table 4: Aggregate aid by purpose, health and education

	Health expenditure					Education expenditure				
	1	2	3	4	5	6	7	8	9	10
		Low income	Africa	Asia	Latin America		Low income	Africa	Asia	Latin America
Domestic	0.040***	0.053***	0.041***	0.046***	0.055***	0.059***	0.078***	0.061***	0.143***	0.030***
(% in GDP)	*(0.003)*	*(0.005)*	*(0.004)*	*(0.006)*	*(0.007)*	*(0.004)*	*(0.010)*	*(0.009)*	*(0.010)*	*(0.006)*
Aid, health	0.100**	**0.116****	0.121***	0.066	-0.152					
(% in GDP)	*(0.047)*	*(0.033)*	*(0.039)*	*(0.056)*	*(0.221)*					
Aid, education						0.020	0.125*	0.104	0.042	0.064
(% in GDP)						*(0.047)*	*(0.067)*	*(0.083)*	*(0.062)*	*(0.133)*
Other aid	**0.050****	0.055***	0.029***	0.023**	0.110***	0.049***	0.051***	0.030*	0.093***	0.063***
(% in GDP)	*(0.006)*	*(0.006)*	*(0.007)*	*(0.009)*	*(0.013)*	*(0.008)*	*(0.012)*	*(0.016)*	*(0.017)*	*(0.010)*
gdpcap	0.044*	-1.187***	0.218*	-0.008	0.052	0.010	-1.113**	0.221	-0.009	-0.112
($1000)	*(0.023)*	*(0.251)*	*(0.121)*	*(0.046)*	*(0.089)*	*(0.029)*	*(0.498)*	*(0.282)*	*(0.077)*	*(0.070)*
popdens	-0.003	-0.027*	-0.046**	0.000	0.249***	0.002	-0.006	0.054	0.003	-0.195***
(10/km-sq)	*(0.002)*	*(0.015)*	*(0.018)*	*(0.003)*	*(0.069)*	*(0.003)*	*(0.030)*	*(0.043)*	*(0.006)*	*(0.054)*
ruralpop	-0.007	-0.066***	-0.034***	0.009	0.031	-0.030***	-0.132***	-0.150***	-0.012	-0.054***
(%)	*(0.006)*	*(0.010)*	*(0.010)*	*(0.009)*	*(0.019)*	*(0.008)*	*(0.020)*	*(0.024)*	*(0.016)*	*(0.015)*
arabla	-0.014***	0.027***	0.007	-0.047***	-0.019*	0.016***	0.069***	0.089***	-0.027	0.012
(100ha)	*(0.004)*	*(0.006)*	*(0.006)*	*(0.015)*	*(0.011)*	*(0.006)*	*(0.012)*	*(0.014)*	*(0.025)*	*(0.009)*
autoc	-0.323***	-0.308*	-0.063	-0.438**	-0.031	-0.109	0.288	1.007**	-0.007	-0.229
(index)	*(0.094)*	*(0.165)*	*(0.203)*	*(0.160)*	*(0.200)*	*(0.117)*	*(0.325)*	*(0.474)*	*(0.267)*	*(0.158)*
autoc	0.038***	0.048***	0.017	0.061***	-0.007	0.018	-0.038	-0.109**	0.003	0.046**
(squared)	*(0.012)*	*(0.017)*	*(0.022)*	*(0.019)*	*(0.026)*	*(0.014)*	*(0.034)*	*(0.051)*	*(0.031)*	*(0.020)*
constant	1.963***	5.126***	2.582***	1.093*	-1.705	3.205***	9.527***	7.375***	0.993	6.334***
	(0.357)	*(0.834)*	*(0.830)*	*(0.586)*	*(1.307)*	*(0.442)*	*(1.647)*	*(1.938)*	*(1.046)*	*(1.024)*
R-sq-within	0.1600	0.4862	0.3835	0.2766	0.2838	0.1930	0.3267	0.2994	0.4809	0.2930
N-obs	1168	336	296	266	360	1171	336	296	266	363
N-countries	94	32	26	16	28	94	32	26	16	28

Standard errors in parentheses. * Significantly different from 0 at the 10% level. ** Significantly different from 0 at the 5% level. *** Significantly different from 0 at the 1% level. Bold aid parameters are significantly different from the corresponding parameter for domestic income at the 10% level. Underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 5% level. Doubly underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 1% level.

Table 5: Multilateral vs. bilateral aid and spending on health

	1	2	3	4	5	6	7	8	9	10
		Low income	Africa	Asia	Latin America		Low income	Africa	Asia	Latin America
domestic	0.041***	0.054***	0.042***	0.045***	0.055***	0.040***	0.053***	0.041***	0.044***	0.051***
	(0.003)	*(0.005)*	*(0.004)*	*(0.006)*	*(0.007)*	*(0.003)*	*(0.005)*	*(0.004)*	*(0.006)*	*(0.007)*
aidmulti	0.040***	0.055***	**0.057****	0.042***	0.084***	0.038***	0.050***	0.047***	0.039**	**0.109****
(all/other)	*(0.011)*	*(0.009)*	*(0.009)*	*(0.015)*	*(0.031)*	*(0.012)*	*(0.010)*	*(0.011)*	*(0.015)*	*(0.033)*
aidmulti						0.004	0.078	0.094*	-0.203	-0.646**
(health)						*(0.075)*	*(0.050)*	*(0.051)*	*(0.318)*	*(0.329)*
aidbi	0.059***	0.061***	0.011	0.009	0.106***	**0.055****	0.057***	0.008	0.008	0.096***
(all/other)	*(0.008)*	*(0.007)*	*(0.011)*	*(0.013)*	*(0.013)*	*(0.008)*	*(0.008)*	*(0.011)*	*(0.013)*	*(0.017)*
aidbi						0.199***	0.164***	0.141	0.062	0.258
(health)						*(0.070)*	*(0.053)*	*(0.119)*	*(0.057)*	*(0.303)*
gdpcap	0.046**	-1.161***	0.147	-0.013	0.051	0.047**	-1.136***	0.173	-0.013	0.057
($1000)	*(0.023)*	*(0.257)*	*(0.122)*	*(0.046)*	*(0.089)*	*(0.023)*	*(0.256)*	*(0.123)*	*(0.046)*	*(0.089)*
popdens	-0.003	-0.026*	-0.034*	0.001	0.246***	-0.003	-0.029*	-0.040**	0.001	0.240***
(10/km-sq)	*(0.002)*	*(0.015)*	*(0.018)*	*(0.004)*	*(0.069)*	*(0.002)*	*(0.015)*	*(0.019)*	*(0.004)*	*(0.069)*
ruralpop	-0.007	-0.066***	-0.034***	0.008	0.033*	-0.007	-0.065***	-0.032***	0.008	0.032*
(%)	*(0.006)*	*(0.010)*	*(0.010)*	*(0.009)*	*(0.019)*	*(0.006)*	*(0.010)*	*(0.010)*	*(0.009)*	*(0.019)*
arabla	-0.015***	0.027***	0.006	-0.048***	-0.020*	-0.015***	0.026***	0.006	-0.049***	-0.020*
(100ha)	*(0.004)*	*(0.006)*	*(0.006)*	*(0.015)*	*(0.011)*	*(0.004)*	*(0.006)*	*(0.006)*	*(0.015)*	*(0.011)*
autoc	-0.316***	-0.293*	-0.100	-0.484***	-0.030	-0.310***	-0.269	-0.068	-0.468***	-0.020
(index)	*(0.095)*	*(0.169)*	*(0.201)*	*(0.161)*	*(0.200)*	*(0.095)*	*(0.169)*	*(0.203)*	*(0.162)*	*(0.200)*
autoc	0.037***	0.047***	0.022	0.067***	-0.007	0.037***	0.044	0.018	0.065***	-0.008
(squared)	*(0.012)*	*(0.018)*	*(0.014)*	*(0.019)*	*(0.026)*	*(0.012)*	*(0.018)*	*(0.022)*	*(0.019)*	*(0.026)*
constant	1.933***	5.036***	2.615***	1.266**	-1.719	1.911***	4.934***	2.537***	1.280**	-1.602
	(0.358)	*(0.816)*	*(0.825)*	*(0.631)*	*(1.311)*	*(0.334)*	*(0.850)*	*(0.830)*	*(0.632)*	*(1.301)*
R-sq-within	0.1604	0.4813	0.3918	0.2822	0.2817	0.1636	0.4890	0.3979	0.2867	0.2932
N-obs	1168	336	296	266	360	1168	336	296	266	360
N-countries	94	32	26	16	28	94	32	26	16	28

Standard errors in parentheses. * Significantly different from 0 at the 10% level. ** Significantly different from 0 at the 5% level. *** Significantly different from 0 at the 1% level. Bold aid parameters are significantly different from the corresponding parameter for domestic income at the 10% level. Underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 5% level. Doubly underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 1% level.

Table 6: Multilateral vs. bilateral aid and spending on education

	1	2	3	4	5	6	7	8	9	10
		Low income	Africa	Asia	Latin America		Low income	Africa	Asia	Latin America
domestic	0.058***	0.079***	0.060***	0.135***	0.030***	0.058***	0.077***	0.058***	0.136***	0.030***
	(0.004)	*(0.009)*	*(0.009)*	*(0.010)*	*(0.006)*	*(0.004)*	*(0.010)*	*(0.009)*	*(0.010)*	*(0.006)*
aidmulti	**0.082****	0.079***	0.080***	0.147***	0.065***	0.089***	0.078***	0.079***	0.156***	0.066***
(all/other)	*(0.014)*	*(0.018)*	*(0.022)*	*(0.024)*	*(0.024)*	*(0.015)*	*(0.019)*	*(0.024)*	*(0.026)*	*(0.025)*
aidmulti						0.006	0.061	0.053	0.080	0.007
(education)						*(0.059)*	*(0.083)*	*(0.100)*	*(0.081)*	*(0.149)*
aidbi	0.028***	0.040***	-0.020	0.039*	0.063***	0.030***	0.035**	-0.024	0.045**	0.058***
(all/other)	*(0.010)*	*(0.014)*	*(0.025)*	*(0.022)*	*(0.010)*	*(0.010)*	*(0.015)*	*(0.025)*	*(0.023)*	*(0.012)*
aidbi						0.015	0.220**	0.171	**-0.007**	0.337
(education)						*(0.070)*	*(0.112)*	*(0.144)*	*(0.080)*	*(0.343)*
gdpcap	0.004	-1.207**	0.116	-0.017	-0.112	0.004	-1.189**	-0.111	-0.023	-0.112
($1000)	*(0.029)*	*(0.501)*	*(0.281)*	*(0.075)*	*(0.069)*	*(0.029)*	*(0.505)*	*(0.281)*	*(0.076)*	*(0.070)*
popdens	0.002	-0.001	0.067	0.004	-0.194***	0.002	-0.000	0.066	0.004	-0.196***
(10/km-sq)	*(0.003)*	*(0.030)*	*(0.042)*	*(0.006)*	*(0.054)*	*(0.003)*	*(0.030)*	*(0.042)*	*(0.006)*	*(0.054)*
ruralpop	-0.030***	-0.135***	-0.147***	-0.011	-0.054***	-0.030***	-0.135***	-0.149***	-0.013	-0.053***
(%)	*(0.008)*	*(0.020)*	*(0.023)*	*(0.015)*	*(0.015)*	*(0.008)*	*(0.020)*	*(0.023)*	*(0.016)*	*(0.015)*
arabla	0.016***	0.071***	0.085***	-0.030	0.012	0.016***	0.072***	0.090***	-0.028	0.012
(100ha)	*(0.006)*	*(0.012)*	*(0.014)*	*(0.025)*	*(0.009)*	*(0.006)*	*(0.012)*	*(0.014)*	*(0.025)*	*(0.009)*
autoc	-0.132	0.160	0.936***	-0.133	-0.229	-0.136	0.184	0.922**	-0.138	-0.215
(index)	*(0.117)*	*(0.331)*	*(0.465)*	*(0.265)*	*(0.157)*	*(0.117)*	*(0.331)*	*(0.469)*	*(0.267)*	*(0.159)*
autoc	0.020	-0.025	-0.100***	0.018	0.046**	0.020	-0.029	-0.101**	0.018	0.044**
(squared)	*(0.014)*	*(0.035)*	*(0.050)*	*(0.031)*	*(0.020)*	*(0.014)*	*(0.035)*	*(0.050)*	*(0.031)*	*(0.021)*
constant	3.309***	9.913***	7.532***	1.473	6.327***	3.310***	9.880***	7.696***	1.525	6.271***
	(0.441)	*(1.662)*	*(1.907)*	*(1.039)*	*(1.024)*	*(0.442)*	*(1.661)*	*(1.925)*	*(1.047)*	*(1.031)*
R-sq-within	0.1995	0.3308	0.3172	0.4998	0.2930	0.2009	0.3369	0.3222	0.5018	0.2946
N-obs	1171	336	296	266	363	1171	336	296	266	363
N-countries	94	32	26	16	28	94	32	26	16	28

Standard errors in parentheses. * Significantly different from 0 at the 10% level. ** Significantly different from 0 at the 5% level. *** Significantly different from 0 at the 1% level. Bold aid parameters are significantly different from the corresponding parameter for domestic income at the 10% level. Underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 5% level. Doubly underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 1% level.

Table 7: Aggregate aid from selected donors, health and education

	Health expenditure					Education expenditure				
	1	2	3	4	5	6	7	8	9	10
		Low income	Africa	Asia	Latin America		Low income	Africa	Asia	Latin America
domestic	0.039***	0.048***	0.037***	0.042***	0.054***	0.055***	0.068***	0.054***	0.140***	0.036***
	(0.003)	*(0.005)*	*(0.004)*	*(0.006)*	*(0.008)*	*(0.004)*	*(0.010)*	*(0.009)*	*(0.010)*	*(0.006)*
aidwba	0.048**	0.047**	0.034*	0.084***	0.297***	-0.013	0.014	0.012	0.002	0.135
	(0.025)	*(0.018)*	*(0.019)*	*(0.031)*	*(0.115)*	*(0.030)*	*(0.037)*	*(0.046)*	*(0.051)*	*(0.087)*
aidrdb	0.007	0.038**	0.029	**-0.007**	0.000	0.121***	0.079**	0.085*	0.193***	**0.116****
(all/resp.)	*(0.021)*	*(0.017)*	*(0.020)*	*(0.029)*	*(0.064)*	*(0.026)*	*(0.033)*	*(0.047)*	*(0.048)*	*(0.049)*
aideu	0.086***	0.097***	0.104***	0.054*	0.028	0.114***	0.114***	0.099**	0.155***	-0.486***
	(0.023)	*(0.018)*	*(0.018)*	*(0.029)*	*(0.215)*	*(0.028)*	*(0.037)*	*(0.042)*	*(0.047)*	*(0.162)*
aidothmul	-0.121	0.007	0.030	-0.317***	-0.058	0.558***	0.600***	0.800**	0.665***	-0.080
	(0.125)	*(0.109)*	*(0.133)*	*(0.118)*	*(0.533)*	*(0.154)*	*(0.216)*	*(0.316)*	*(0.197)*	*(0.406)*
aidsoft	0.111***	0.091***	0.066***	-0.050	0.123***	0.043**	0.046	0.004	**0.020**	**0.075*****
	(0.018)	*(0.017)*	*(0.022)*	*(0.037)*	*(0.030)*	*(0.022)*	*(0.034)*	*(0.053)*	*(0.062)*	*(0.023)*
aidgermany	0.033	0.051**	0.031	0.007	0.358	0.082**	0.080**	0.062	0.168	**0.351****
	(0.029)	*(0.020)*	*(0.019)*	*(0.072)*	*(0.232)*	*(0.036)*	*(0.039)*	*(0.045)*	*(0.119)*	*(0.177)*
aidfrance	-0.020	0.004	0.060	-0.653***	0.118	0.009	-0.057	-0.031	-0.478**	**0.260****
	(0.056)	*(0.045)*	*(0.041)*	*(0.140)*	*(0.152)*	*(0.070)*	*(0.089)*	*(0.099)*	*(0.233)*	*(0.116)*
aiduk	0.000	-0.021	-0.057**	0.051	0.119	-0.069*	-0.087*	-0.133**	0.060	-0.071
	(0.032)	*(0.026)*	*(0.024)*	*(0.044)*	*(0.194)*	*(0.040)*	*(0.051)*	*(0.057)*	*(0.073)*	*(0.148)*
aidusa	0.052**	0.074***	-0.006	-0.174	0.068*	0.047*	0.031	-0.088	-0.458***	0.032
	(0.021)	*(0.021)*	*(0.027)*	*(0.106)*	*(0.040)*	*(0.026)*	*(0.041)*	*(0.064)*	*(0.176)*	*(0.030)*
aidjapan	0.023	0.054**	-0.002	0.042**	0.079	-0.017	0.044	-0.015	0.082***	0.052
	(0.022)	*(0.022)*	*(0.066)*	*(0.017)*	*(0.164)*	*(0.027)*	*(0.043)*	*(0.156)*	*(0.029)*	*(0.125)*
aidothbil	0.048*	-0.008	-0.073***	0.135***	0.091	0.010	0.029	-0.004	**0.042**	0.064
	(0.025)	*(0.025)*	*(0.027)*	*(0.035)*	*(0.061)*	*(0.031)*	*(0.049)*	*(0.064)*	*(0.057)*	*(0.047)*
gdpcap	0.045*	-1.147***	0.104	-0.020	0.046	0.004	-1.295**	0.041	-0.022	-0.114*
($1000)	*(0.023)*	*(0.255)*	*(0.118)*	*(0.043)*	*(0.090)*	*(0.029)*	*(0.504)*	*(0.280)*	*(0.072)*	*(0.068)*
popdens	-0.003	-0.018	-0.033*	0.001	0.224***	0.002	0.012	0.058	0.004	-0.172***
(10/km-sq)	*(0.002)*	*(0.015)*	*(0.018)*	*(0.003)*	*(0.072)*	*(0.003)*	*(0.030)*	*(0.043)*	*(0.006)*	*(0.055)*
ruralpop	-0.009	-0.063***	-0.031***	0.008	0.029	-0.031***	-0.132***	-0.143***	-0.006	-0.052***
(%)	*(0.006)*	*(0.010)*	*(0.010)*	*(0.009)*	*(0.020)*	*(0.007)*	*(0.020)*	*(0.024)*	*(0.015)*	*(0.015)*
arabla	-0.014***	0.028***	0.007	-0.044***	-0.021*	0.018***	0.074***	0.084***	-0.013	0.011
(100ha)	*(0.005)*	*(0.006)*	*(0.006)*	*(0.014)*	*(0.011)*	*(0.006)*	*(0.012)*	*(0.014)*	*(0.024)*	*(0.009)*
autoc	-0.295***	-0.292*	-0.203	-0.476***	-0.049	-0.146	0.011	0.612	-0.192	-0.309**
(index)	*(0.094)*	*(0.172)*	*(0.203)*	*(0.158)*	*(0.204)*	*(0.116)*	*(0.341)*	*(0.483)*	*(0.261)*	*(0.155)*
autoc	0.035***	0.045**	0.030	0.063***	-0.003	0.021	-0.011	-0.069	0.018	0.056***
(squared)	*(0.012)*	*(0.018)*	*(0.022)*	*(0.019)*	*(0.026)*	*(0.014)*	*(0.036)*	*(0.051)*	*(0.031)*	*(0.020)*
constant	2.016***	4.920***	2.791***	1.295**	-1.320	3.391***	10.149***	8.301***	1.060	6.113***
	(0.357)	*(0.833)*	*(0.807)*	*(0.604)*	*(1.373)*	*(0.439)*	*(1.649)*	*(1.921)*	*(1.002)*	*(1.043)*
R-sq-within	0.1792	0.5251	0.4619	0.3881	0.2936	0.2225	0.3729	0.3597	0.5676	0.3419
N-obs	1168	336	296	266	360	1171	336	296	266	363
N-countries	94	32	26	16	28	94	32	26	16	28

Standard errors in parentheses. * Significantly different from 0 at the 10% level. ** Significantly different from 0 at the 5% level. *** Significantly different from 0 at the 1% level. Bold aid parameters are significantly different from the corresponding parameter for domestic income at the 10% level. Underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 5% level. Doubly underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 1% level.

Table 8: Aid from the soft bilateral donors by purpose, health and education

	Health expenditure					Education expenditure				
	1	2 Low income	3 Africa	4 Asia	5 Latin America	6	7 Low income	8 Africa	9 Asia	10 Latin America
domestic	0.040***	0.053***	0.040***	0.045***	0.050***	0.058***	0.079***	0.060***	0.136***	0.029***
	(0.003)	*(0.005)*	*(0.004)*	*(0.006)*	*(0.008)*	*(0.004)*	*(0.010)*	*(0.009)*	*(0.010)*	*(0.006)*
aidmulti (hlth/educ)	0.042	0.108**	0.154***	-0.170	-0.699**	0.000	0.074	0.059	0.088	0.010
	(0.076)	*(0.052)*	*(0.057)*	*(0.314)*	*(0.332)*	*(0.059)*	*(0.085)*	*(0.104)*	*(0.083)*	*(0.149)*
aidhmulti (other)	0.040***	0.053***	0.051***	0.049***	**0.108****	0.095***	0.084***	0.093***	0.156***	0.070***
	(0.012)	*(0.010)*	*(0.012)*	*(0.015)*	*(0.035)*	*(0.015)*	*(0.020)*	*(0.025)*	*(0.027)*	*(0.026)*
aidsoft (hlth/educ)	**0.199****	**0.155****	0.023	0.053	-0.327	0.374***	0.413***	**0.345****	0.160	2.075**
	(0.090)	*(0.059)*	*(0.208)*	*(0.068)*	*(0.640)*	*(0.141)*	*(0.149)*	*(0.172)*	*(0.371)*	*(0.968)*
aidsoft (other)	0.101***	0.089***	0.050**	-0.108***	0.126***	0.048**	0.030	**-0.021**	**0.020**	0.041
	(0.018)	*(0.017)*	*(0.021)*	*(0.041)*	*(0.033)*	*(0.022)*	*(0.031)*	*(0.048)*	*(0.069)*	*(0.025)*
aidothbil (hlth/educ)	0.128	0.087	0.067	-0.002	0.647	**-0.093**	-0.005	-0.263	**-0.015**	0.140
	(0.116)	*(0.131)*	*(0.140)*	*(0.102)*	*(0.506)*	*(0.078)*	*(0.162)*	*(0.273)*	*(0.081)*	*(0.358)*
aidothbil (other)	0.035***	0.043***	-0.009	**-0.021**	**0.086****	0.018	0.039*	-0.029	0.048**	0.035
	(0.011)	*(0.010)*	*(0.013)*	*(0.014)*	*(0.024)*	*(0.013)*	*(0.020)*	*(0.029)*	*(0.024)*	*(0.022)*
gdpcap ($1000)	0.044*	-1.148***	0.157	-0.011	0.054	0.002	-1.160**	-0.119	-0.021	-0.111
	(0.023)	*(0.256)*	*(0.122)*	*(0.045)*	*(0.089)*	*(0.029)*	*(0.504)*	*(0.281)*	*(0.076)*	*(0.070)*
popdens (10/km-sq)	-0.003	-0.026*	-0.036*	0.000	0.223***	0.003	-0.002	0.067	0.004	-0.180***
	(0.002)	*(0.015)*	*(0.018)*	*(0.003)*	*(0.070)*	*(0.003)*	*(0.030)*	*(0.042)*	*(0.006)*	*(0.056)*
ruralpop (%)	-0.008	-0.066***	-0.035***	0.010	0.027	-0.031***	-0.133***	-0.145***	-0.012	-0.049***
	(0.006)	*(0.010)*	*(0.010)*	*(0.009)*	*(0.020)*	*(0.008)*	*(0.020)*	*(0.024)*	*(0.016)*	*(0.016)*
arabla (100ha)	-0.014***	0.028***	0.008	-0.052***	-0.019*	0.016***	0.070***	0.081***	-0.029	0.013
	(0.004)	*(0.006)*	*(0.006)*	*(0.015)*	*(0.011)*	*(0.006)*	*(0.012)*	*(0.015)*	*(0.025)*	*(0.009)*
autoc (index)	-0.304***	-0.272	-0.069	-0.575***	-0.011	-0.139	0.168	0.942**	-0.167	-0.231
	(0.094)	*(0.169)*	*(0.201)*	*(0.163)*	*(0.200)*	*(0.117)*	*(0.331)*	*(0.468)*	*(0.277)*	*(0.159)*
autoc (squared)	0.036***	0.043**	0.017	0.078***	-0.008	0.020	-0.026	-0.101**	0.022	0.045**
	(0.012)	*(0.018)*	*(0.021)*	*(0.019)*	*(0.026)*	*(0.014)*	*(0.035)*	*(0.050)*	*(0.033)*	*(0.021)*
constant	1.978***	5.010***	2.718***	1.422**	-1.286	3.357***	9.861***	7.505***	1.533	6.042***
	(0.358)	*(0.850)*	*(0.825)*	*(0.623)*	*(1.347)*	*(0.441)*	*(1.655)*	*(1.926)*	*(1.057)*	*(1.065)*
R-sq-within	0.1704	0.4970	0.4137	0.3147	0.2966	0.2085	0.3453	0.3313	0.5025	0.3026
N-obs	1168	336	296	266	360	1171	336	296	266	363
N-countries	94	32	26	16	28	94	32	26	16	28

Standard errors in parentheses. * Significantly different from 0 at the 10% level. ** Significantly different from 0 at the 5% level. *** Significantly different from 0 at the 1% level. Bold aid parameters are significantly different from the corresponding parameter for domestic income at the 10% level. Underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 5% level. Doubly underlined aid parameters are significantly different from the corresponding parameter for domestic income at the 1% level.

Table A1: List of recipients in main regression sample

Africa	Asia	Latin America	Others
Benin*	Bhutan*	Argentina	Bahrain
Burkina Faso*	India*	Bahamas	Belarus
Burundi*	Indonesia*	Barbados	Bulgaria
Cameroon*	Kazakhstan	Belize	Croatia
Central African Rep.*	Korea S.	Bolivia	Cyprus
Chad*	Malaysia	Brazil	Czech Rep.
Congo Dem. Rep.*	Maldives	Chile	Estonia
Congo Rep.*	Mongolia*	Colombia	Greece
Cote d'Ivoire*	Nepal*	Costa Rica	Hungary
Egypt	Pakistan*	Dominica	Iran
Guinea-Bissau*	Singapore	Dominican Rep.	Israel
Lesotho*	Sri Lanka	El Salvador	Kuwait
Madagascar*	Tajikistan*	Guatemala	Latvia
Mali*	Thailand	Guyana	Malta
Mauritania*	Tonga	Haiti*	Poland
Mauritius	Vanuatu	Honduras*	Portugal
Morocco		Jamaica	Romania
Niger*		Mexico	Russia
Rwanda*		Nicaragua*	Slovakia
Senegal*		Panama	Slovenia
Seychelles		Paraguay	Spain
The Gambia*		Peru	Syria
Togo*		St. Kitts & Nevis	Turkey
Tunisia		St. Lucia	Yemen*
Zambia*		Suriname	
Zimbabwe*		Trinidad & Tobago	
		Uruguay	
		Venezuela	

* denotes low-income countries.

Table A2

Bilateral	Multilateral
Australia	African Development Bank[1)]
Austria	African Development Fund[1)]
Belgium	Asian Development Bank[2)]
Canada	Asian Development Bank Special Fund[2)]
Denmark	EC
Finland	IBRD[3)]
France	IDA[3)]
Germany	IFAD
Italy	Inter-American Development Bank[4)]
Japan	Inter-American Development Bank Special Fund[4)]
Luxembourg	
The Netherlands	
New Zealand	
Norway	
Portugal	
Spain	
Sweden	
Switzerland	
UK	
USA	

Notes. 1) Merged in the regressions. 2) Merged in the regressions. 3) Merged in the regressions. 4) Merged in the regressions.