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Bilateral Donors' Aid Allocation Decisions

A Three-dimensional Panel Analysis

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Abstract

The present paper adds to the already large existing literature on aid distribution as it runs an equation on bilateral aid allocation on a very rich dataset, covering 20 years (1980-99), 22 donors and 137 recipients, which permits a three-dimensional panel study (recipient-year-donor) and allows for comparisons between the different donors. Thanks to the length of the observation period, it is also possible to compare aid allocation policy in the 1980s and in the 1990s to test whether the collapse of the communist regime affected the donors' choices. Both the self-interest of donors, recipient needs and policy outcome variables are introduced. As a first result, the end of the cold war has reduced the bias towards former colonial links, to favour trade partners. Moreover, donors reward good economic policy outcomes since 1990. Second, aid is found generally progressive, for most donors. It appears also that most donors pay a great attention to political governance when making their aid decision.

Keywords: international aid allocation, panel, Tobit,

JEL classification: F35, C23, C24

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1 Introduction

Foreign aid has attracted a lot of interest in the literature on development finance. Most of the papers focus on the impact of aid on economic growth and social indicators, and on the debate whether aid really improves development conditions in the recipient countries. Corruption, inefficiencies, bureaucratic failures are the main factors explaining why aid does not always promote development. However, as pointed out by Alesina and Dollar (2000), the first aspects to look at are the criteria governing aid allocation policies. If aid responds only to strategic and political considerations, there is indeed no reason for aid to be effective in promoting growth or reducing poverty.

Several papers have addressed the issue of allocation of bilateral aid to recipient countries. The interest in this topic began in the mid-1950s with Behrman (1955/6). Broadly speaking, up to the work of McKinley and Little (1977, 1978a, 1978b, 1979) the analysis was rather anecdotal and based on simple empirical observation[1] (Gounder 1994). McKinley and Little have introduced econometrics in the debate on the factors influencing aid allocation and have structured the discussion around two alternative determinants: the 'recipient need' and the 'donor interest'. However, as shown by McGillivray (2002a), whenever all of these variables are relevant for the explanation of aid allocation, one needs to introduce them all together in the same model to avoid biases due to omitted variables. This gave rise to a generation of so-called 'hybrids' models. Econometric methods have also improved over time, but the literature has mainly concentrated so far on one donor for a given period of time (recently using panel data)[2], or several donors in cross section.[3]

Moreover, many papers do not take account of the truncated nature of the aid variable. Yet, running OLS on the amount of aid allocated generates biases (see McGillivray 2002a for an illustration). Indeed, as first documented by Dudley and Montmarquette (1976), the process of aid allocation entails two kinds of questions: whether to allocate aid to a given potential recipient and, in case of a positive answer, how much aid to give to this recipient. To evaluate such a process empirically, three estimation methods are available, which have similar, but not identical, econometric properties: either using a two-part model, a Heckman two-step procedure or running a Tobit regression. McGillivray and Oczkowski (1991, 1992) use a two-part model to estimate the Australian and British allocation of aid. Gang and Lehman (1990) run a Tobit model to study the allocation of American aid to Latin American countries. Tarp *et al.* (1998) apply the Heckman method to estimate a panel model of bilateral Danish aid allocation. Trumbull and Wall (1994) utilize the same procedure extended to multiple donors. They examine total official development aid (bilateral and multilateral, whoever the donor) for 86 recipient countries covering the 1984-89 period. They introduce both period and recipient fixed effects. To our knowledge, this is the only paper on several donors' aid allocation using panel data and correcting for the truncated nature of the dependent variable. The analysis is nevertheless limited to a short period of time and to a two-dimensional (recipient-year) panel, as the dependent variable is the total amount of aid received from the whole bilateral donor community. This aggregation is valid only

1 Except for Dudley and Montmarquette (1976).

2 Cf. in particular Tarp *et al.* (1998), Arvin and Drewes (2001) and Gounder (1994).

3 Cf. Alesina and Dollar (2000).

under the assumption that all donors are homogeneous which—according to the available studies of individual donors' aid allocation policies (see Tarp *et al.* 1998, for a survey)—seems to be wrong.

The present paper adds to the literature as it runs an equation on bilateral aid allocation on a very rich dataset, covering 20 years (1980-99), 22 donors and 137 recipients. This permits a three-dimensional panel study (recipient-year-donor) and allows for comparisons between different donors. Up to now, such a complete study has never been undertaken. Because of the length of the observation period, it also makes it possible to compare aid allocation policies in the 1980s and in the 1990s. This addresses the very interesting question of the change in the process of aid allocation after the end of the cold war.

The rest of paper is organized as follows. Section 2 gives some descriptive statistics on aid allocation and different influencing variables. Section 3 runs econometric estimates on the total three-dimensional panel and gives conclusions on the average donor behaviour. Section 4 assesses the question of the change in allocation behaviour between the 1980s and the 1990s. Section 5 runs separate regressions for the individual donors and test differences in their aid allocation policies. Section 6 provides a discussion of the robustness of our results, based on consideration of an alternative method of estimation. Section 7 concludes.

2 Descriptive analysis

Before going to the econometric analysis, we provide in this section a brief overview of our data, which suggests that both beneficiary needs and policy performance variables, on one hand, and self-interest variables, on the other hand, influence the aid allocation policies that are implemented by donors. A list of data sources is provided in Appendix 1.

Our sample is the largest and the most exhaustive available for the 1980 and 1990 decades. It covers 137 recipient countries and the 22 donors of the Development Assistance Committee (DAC) of the OECD. For each of the years from 1980 to 1999, we observe aid commitments received by each recipient from each DAC member. This means that we deal here with a three-dimensional (year x donor x recipient) panel database, of potentially close to 60,000 observations. The number of observations will, of course, depend on the availability of explanatory variables. Depending on the list of explanatory variables, we still have between approximately 14,000 and 42,000 observations.

We choose aid commitments rather than disbursements, because, as documented by McGillivray and White (1993), this variable better reflects the donor decisions. Indeed, donors have total control of the commitments, compared to disbursements which depend in part on the recipients' willingness and administrative capacity to get the money. Moreover, in what follows we usually consider aid per capita (i.e., aid commitment divided by the recipient population) as the dependent variable. In order to neutralize the effect of inflation, these flows are converted into US dollars per capita at 1985 prices, using the OECD GDP deflator index as a proxy for world inflation. There is an active debate on the choice between aid per capita and aid in level as the

endogenous variable (see McGillivray and Oczkowski 1992 and Neumayer 2003). Here, we opt for the per capita commitments as they allow us to test whether the small countries receive more international support per capita than the big ones. This would not be possible when considering aid volumes, as big countries receive more aid in absolute terms. Moreover, using aid levels as a dependent variable could lead to serious heteroscedasticity issues, since residuals would be probably, in absolute value, much bigger for large recipients than for small recipients. Given the econometric method used here, there is no simple way to correct such heteroscedasticity problems.

2.1 Beneficiary needs and policy performance variables

The most straightforward indicator of beneficiary needs is income per capita, measured at international prices. If aid is to be allocated on the basis of recipient needs, the poorest countries should receive more, and the richest countries less. Consequently, the expectation would be that aid policies mitigate the concentration of income distribution between recipient countries.

This can be graphically tested by considering the cumulative distribution curve of aid commitments when countries are ranked by income per capita, i.e., we rank countries by income per capita and then we compare the cumulative distribution of aid received by recipients against the cumulative distribution of their populations.[4] This curve is drawn in the following figures (Figures 1a to 1c), together with the Lorenz curve representing the cumulative distribution of incomes. Such graphs are drawn for 1980, 1990 and 1999. If aid allocation policies were redistributive, the curve representing the distribution of aid would be above the diagonal. On the whole sample, as suggested by Figures 1a to 1c, it is not. This suggests that, overall, aid policies are not necessarily geared toward assistance to the poorest countries. However, as is shown below, this conclusion is not robust.

As a matter of fact, two recipient countries play a major role in this result: India and China. Both are relatively poor, receive relatively few commitments for aid, and have very large populations. As a consequence, Figures 1a to 1c simply indicate that a citizen of India with, on average, one of the lowest GDP per capita, receives less assistance than most developing-country citizens. The same is true for China in 1980. However, since China grew very fast in the 1980s and 1990s, it is no longer true that the Chinese are, on average, among the poorest people in the world. This explains why in 1999 (Figure 1c), and to some extent in 1990 (Figure 1b), the redistributive impact of aid allocation is higher than in 1980 (Figure 1a).

An easy way to check this is to draw the same curves but exclude India and China. This is done in Figures 2a to 2c, indicating clearly that aid is progressive. It is, however, less progressive in the 1990s than in the 1980s. This is tested later in our econometric sections, based on the total sample including, of course, China and India, but without giving each recipient its population weight.

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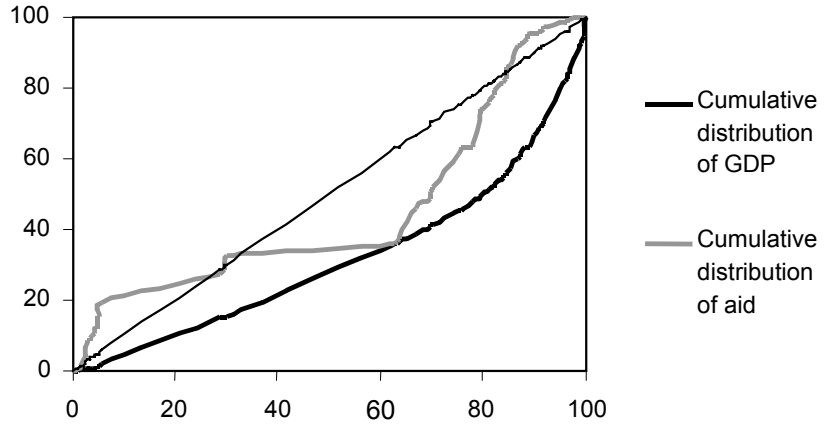
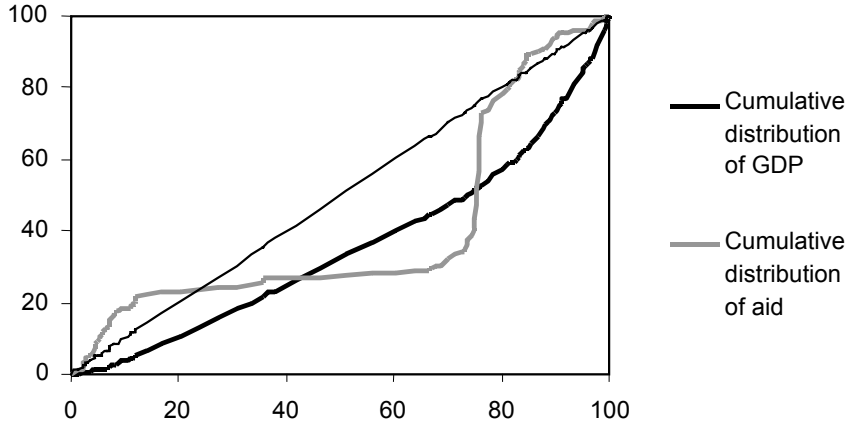
4 For a similar, but numerical instead of graphical, approach, see the discussion of the Suit's index in the survey by White and McGillivray (1995).

Figure 1
Lorenz curves of distribution of GDP and aid commitments

A: Year 1980



B: Year 1990



C: Year 1999

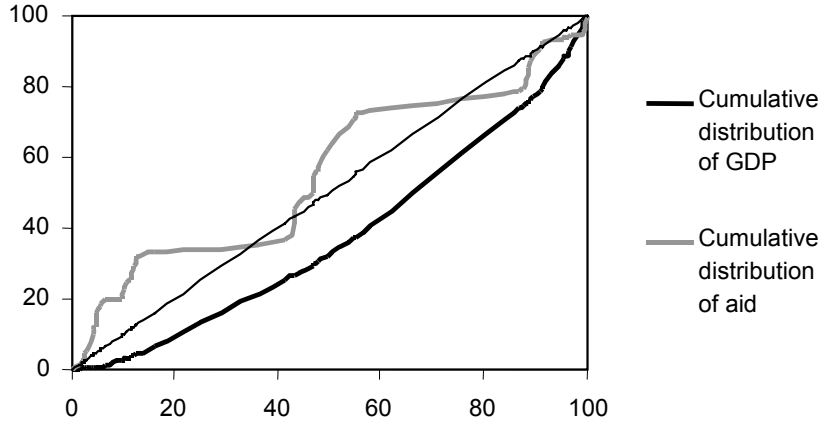
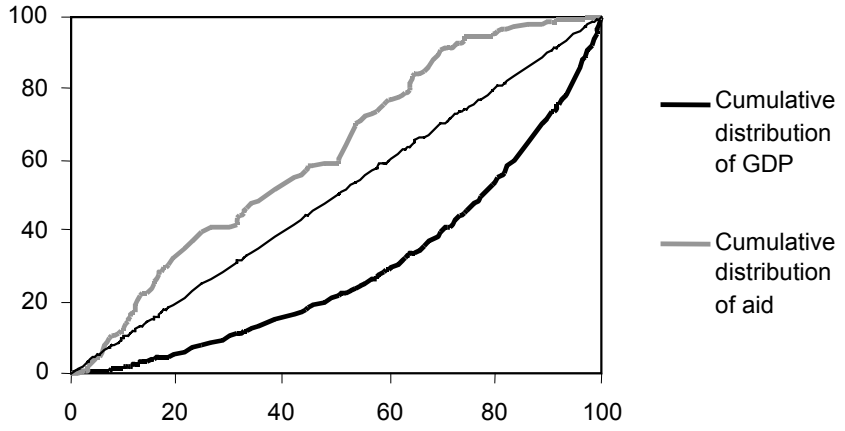
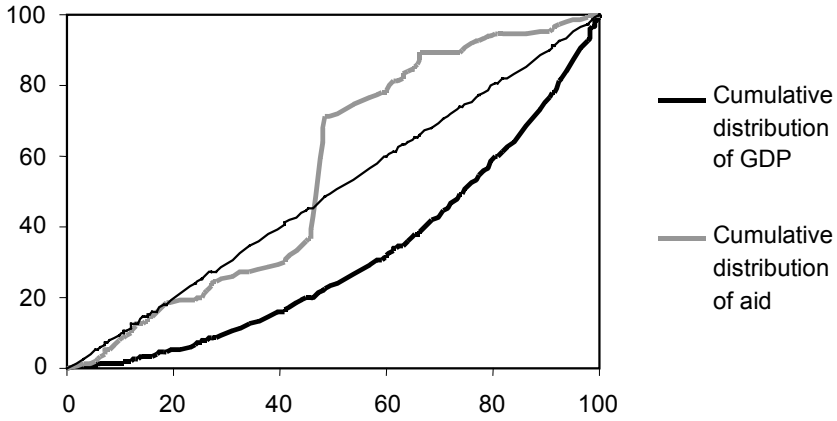


Figure 2
Lorenz curves of distribution of GDP and aid commitments (excluding China and India)

A: Year 1980



B: Year 1990



C: Year 1999

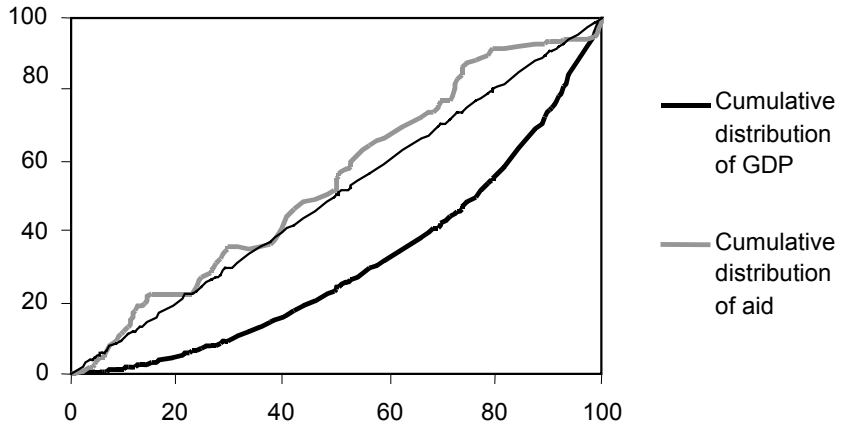
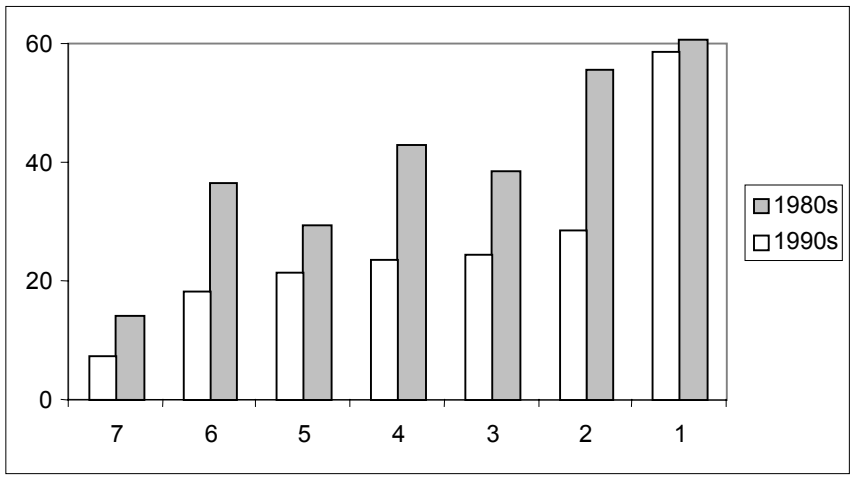


Figure 3
aid commitment per capita and political right and civil liberty index
(un-weighted averages)



Note: The Freedom House indices increase from 1 for democratic countries to 7 for dictatorships). Since we use a combination of two indicators (political rights and civil liberty), we have potentially 13 possible marks, but for simplification, we consider only the integer part of the average in this graph (for example, 3.5 is included in the category 3). We shall apply the same simplification in our econometric sections.

A consequence of these findings is also that aid may be dependent on the size of the recipient country, an observation found quite often in earlier literature. Countries like China and India receive little assistance partly because of their size. This might also be the case for Nigeria in Sub-Saharan Africa, for instance. Conversely, some of the smallest and least poor developing countries, such as Mauritius, Botswana and Namibia receive high levels of assistance per capita.

However, some of the biggest countries are also characterized by poor policies, as has been the case for Nigeria during most of the period. Conversely, good governance and good policymaking could be more common in small countries, which face less fractionalization. As a matter of fact, in our sample, 77 per cent of the small-sized countries (with a population of less than 2 million) have good levels of political rights and civil liberty (Freedom House) but these constitute only 37 per cent of the sample observations. Moreover, Figure 3 (where observations are not weighted by their population size) suggests that when political rights and civil liberty improve, recipients receive higher aid commitments.

The quality of economic and social policy is more difficult to measure. In this paper, we have chosen to use performance indicators. For the sake of double checking, in our econometric exercise we test a large set of several complementary economic and social indicators, but only a few of them will show up as significant explanatory variables of aid. Therefore, although we have tested more indicators (notably inflation, budget deficit, and the foreign exchange black market premium), we concentrate here on the four which lead at least partially to significant results:

i) aggregate growth rate (lagged one year in order to avoid simultaneity issues);
ii) flow of foreign direct investment (FDI) received;
iii) gross primary school enrolment; and
iv) infant mortality rate.

However, when considered individually, these indicators suggest that aid flows do not necessarily reward good policies. This is illustrated in Table 1, where we have tested Spearman rank correlations between aid commitments received by developing countries and their economic and social performance indicators. Only foreign direct investment seems to be positively and significantly correlated with aid commitments. This contrasts with the very significant correlation found with the civil liberty and political freedom index. These results are only indicative, since they do not take account of the overall context in which the performances are observed. In particular, poor countries, which tend to receive more aid because of their poverty, usually also have low social development indicators, such as primary enrolment rates and high infant mortality rates. In other words, social policy performance indicators may also be viewed by donors as a measure of need. We come back to this issue in the discussion of our econometric results, since only the empirical evidence can provide an answer to this question.

Table 1
Spearman rank correlation between aid per capita
and policy performance indicators of recipients

	1980s	1990s
Civil lib.+pol. freedom	-0.340***	-0.350***
growth[-1]	0.127	0.062
FDI	0.265***	0.187***
Primary enrlt	-0.155*	-0.114*
inf. Mortality	0.134	0.077

Note: *** = significant at 1% level;
** = significant at 5% level;
* = significant at 10% level.

2.2 Self-interest of donors

Given that performance seems to explain only partially aid allocation, it is tempting to look for more explanations of aid allocation policies in self-interest variables.

The first indicator that we introduce is the flow of bilateral trade with the recipient country, expressed as a percentage of donor GDP. This bilateral ratio describes the strength of commercial links between a donor and a recipient. A foreign assistance policy based on the self-interests of the donor will typically be biased toward countries that tend naturally to have more trade with the donor. There might be a simultaneity bias when aid is tied, since more tied aid will imply more imports from the donor. However, the risk is limited since we are working on aid commitment flows, and aid disbursements usually lag behind commitments, particularly for project loans or grants, which require building new equipment. Table 2 provides a test of Spearman rank correlation between bilateral aid commitments per capita and bilateral trade ratios. A positive correlation is found for the 1980s for all donors, although a large variance exists among donors. However, this correlation becomes non-existent in several countries in the 1990s. These results must, however, be considered with caution since trade flows are also correlated with country performance. Richer recipients tend to trade more, and they may receive less assistance. The same is true for larger recipients. Moreover, newcomers in the aid business (Greece, Portugal and Spain) tend to duplicate the self-interest behaviour observed in the 1980s. As a consequence, a positive correlation is still observed for a majority of the donors in the 1990s.

Finally, another indicator of the donors' self-interest may be found in the privileged relations with their former colonies, usually their political and commercial allies. Such specific links between the former colonies and the former ruling powers are only partially correlated with trade flows, since they may extend beyond trade links. Moreover, the former colonies are not necessarily significant traders, as the majority of them are in Sub-Saharan Africa.

Table 3 suggests that alliances based on historical-political ties play a major role in the aid allocation policies of France, United Kingdom and, in the 1990s, Spain and Portugal. A similar bias is observed in the aid policy of the United States with respect to its assistance to Egypt (and, of course, also to Israel, but since the latter is not a developing country, we have not included it in our database).

Table 2
Spearman correlation between bilateral trade ratios
and bilateral aid commitment per capita

Donor	1980s	1990s
Australia	0.311***	0.315***
Austria	0.371***	0.285***
Italy	0.328***	0.280***
New Zealand	0.411***	0.230**
Belgium	0.344***	0.220***
Finland	0.233***	0.209**
Sweden	0.265***	0.190**
France	0.376***	0.173**
Canada	0.157*	0.126
United Kingdom	0.292***	0.096
Denmark	0.126	0.090
Germany	0.080	0.052
Japan	0.206**	0.045
Switzerland	0.120	0.027
Ireland	0.157*	0.009
Norway	0.164*	0.008
Netherlands	0.082	-0.016
USA	0.167*	-0.070
Spain	–	0.494***
Greece	–	0.474***
Portugal	–	0.209**

Note: No results are shown for Luxembourg, for which trade data are incomplete throughout the 1990s.

Table 3
Aid commitment per capita and political alliances (1985 US$)

	Former colonies		Other countries	
Donor	1980s	1990s	1980	1990s
France	6.96	5.65	0.28	0.19
United Kingdom	0.60	0.34	0.09	0.11
(excl. India)	1.09	0.66	0.09	0.11
Spain	–	0.40	–	0.03
Portugal	–	0.29	–	ε
	Egypt		Other countries	
	1980s	1990s	1980.0	1990s
United States	25.11	28.98	1.04	0.58

3 The average donor behaviour

3.1 Estimation method

The majority of bilateral aid commitment flows are equal to zero, because donors tend to allocate aid only to specific targeted countries. Consequently, we deal with a censored variable, which implies that we need to implement a non-linear method of estimation suited to deal with censored data. In earlier literature, three different approaches have been utilized, which have similar but not entirely equivalent econometric properties, being both based on maximum likelihood methods:[5]

- A two-part model: in the first step, a probit model determines the probability of receiving assistance, and in a second, a linear model explaining aid commitments is estimated, based only on strictly positive observations. In this procedure, the choice of the recipient is independent from the amount of aid allocated to this country thereafter. This method suffers from the risk of introducing a selection bias in the second step, since the fact that a country receives strictly positive aid flows is not independent from the right-hand variables.
- A Heckman's two-step method: the procedure is the same as for the two-part model, except that in the second step, the inverse Mill's ratio obtained from the first step is introduced together with explanatory variables, in order to correct bias due to the endogenous nature of the allocation of positive amount of aid.
- A Tobit model, which estimates the aid commitments in only one step, takes account of the endogenous selection of the recipients. The difference with the Heckman's method is that the exogenous variables are supposed to have the same impact on the probability of receiving aid and on the amount of aid allocated thereafter.

We have chosen the third approach. Authors such as McGillivray suggest that the second procedure is more appropriate, since it does not constrain factors that determine the selection of a country as aid recipient or those that influence the amount of aid it receives to be the same. Given the large size of our database, and the complexity introduced by the three-dimensional nature of our panel, this approach is more easily implemented than the second one. Estimating a Heckman model in a panel model, where provision needs to be made for the possible existence of fixed effects, is not straightforward and is not available in standard econometric packages.[6] Moreover, there is a risk of loss of robustness of estimators in the Heckman procedure if, as it is our case, the lists of explanatory variables are the same in both equations being estimated.

In this section, we provide estimations based on the full dataset, i.e. assuming that all donors have the same behaviour. We have to take into account, however, the different size of the individual aid budgets. Moreover, these aid budgets vary over time. In order to consider these time- and donor-specific fluctuations, it is desirable to introduce fixed effects for each pair of donor and year. However, in a Tobit model estimated with the standard parametric maximum-likelihood method, if we introduced fixed-effects, they would be biased. Consequently, we estimate, instead, a random-effects model, where the random-effects depend on both the year of observation and the donor. Another

5 See Neumayer (2003)7 for an extended discussion.

6 At least, it is not available in Stata, which we have used.

possibility would have been to introduce recipient and donor random effects similar to Lloyd, Morrissey and Osei (2001). Nevertheless, as documented by these authors, time plays a very important role in the allocation of aid, so that we opt for introducing time rather than recipient effects.

The equation to be estimated is, therefore, written as follows:

$$y_{i,j,t}=Max(0,Bx_{i,j,t}+u_{i,j,t}+v_{j,t})$$

where *i* stands for the recipient, *j* for the donor and *t* for time, *y* is aid per capita, *x* is a vector of explanatory variables and *B* the vector of associated parameters, *u* and *v* are two independent normally-distributed random variables, the latter standing for the donor-year specific effects.

3.2 Explanatory variables

Most of our explanatory variables were already introduced in the previous section, and their definition and expected impact are rather straightforward. Therefore, they need only a few explanations.

3.2.1 Beneficiary needs and policy performance variables

- *RGDPcap* measures the GDP per capita of the recipient country in 1985 US dollars, at international (PPP) prices; its expected sign is negative;

- *Pop* measures the population of the recipient country, measured in millions; its expected sign is negative;

- *Growth[-1]* is the previous year aggregate growth rate of the recipient; it is an indicator of the performance of economic policies and its expected sign is positive;

- *FDI* is the flow of foreign direct investment of the recipient, expressed as percentage of its GDP; it is also an indicator of the performance of economic policies and its expected sign is positive;

- *Primary enrlt* is the gross primary enrolment rate of the recipient (in per cent) and is an indicator of the performance of social policies; its expected sign is positive;

- *Inf. mortality* is the infant mortality rate of the recipient (in ‰) and is also an indicator of the performance of social policies; its expected sign is negative;

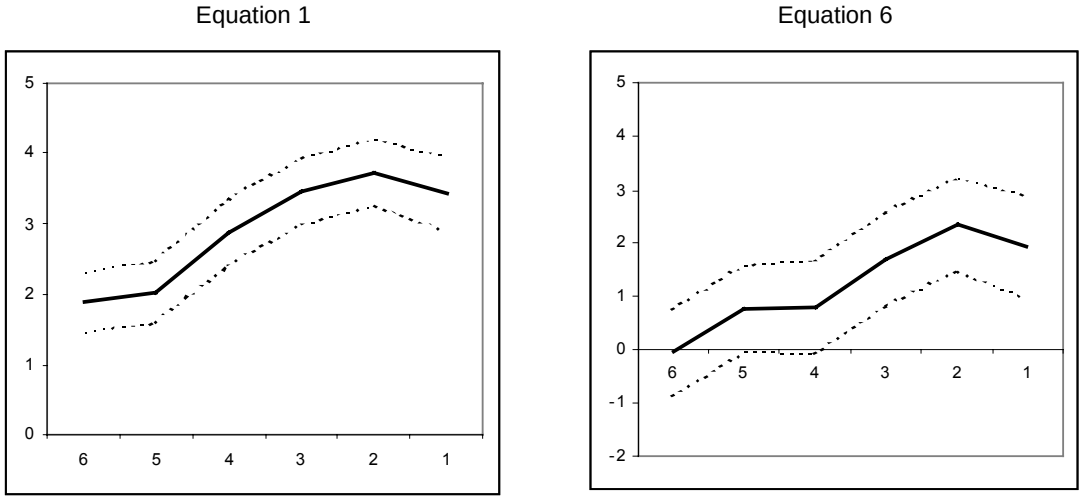
- *Aid_others* is the total aid commitments (per capita) provided by other bilateral donors. This variable, utilized for instance by Tarp *et al.* (1998), is introduced to test whether a donor on average takes note of aid allocations decided by other donors, which may happen if a given donor considers that other donors tend to give more aid to countries that deserve assistance. This variable must be considered with caution, because it may create a simultaneity bias. However, given the small size of its parameter, its introduction does not change the magnitude of the other parameters, which suggests that if there is a simultaneity bias, it is only of a small scale.

The index of civil liberty and political freedom (henceforth called *globfree*) needs specific treatment. This index is a polytomic dummy variable. Its size has no significance. Introducing this variable directly in the regression would introduce possible bias, since there is no reason, for instance, to assume that the marginal impact of a shift of this variable from 1 to 2 would be the same as the impact of a shift from 2 to 3, or half the impact of a shift from 1 to 3. The only proper treatment of this variable is to decompose it into as many dichotomic dummy variables as it has occurrences, and to introduce each and every one of these dummy variables in the regression. In principle, since we use an average of two indices (civil liberty, and political freedom), each with seven occurrences, we would have to deal with 13 occurrences. We propose, however, two simplifications which collapse the number of dummy variables taken into account to two.

First, we consider only the integer of the index, which means that we deal only with seven dummy variables (in fact six, since the last one is redundant with the intercept).

Second, we observe that the parameters obtained for the six dummy variables considered (d1 for the highest civil liberty and political freedom, d6 for the penultimate lowest) are, as expected, usually declining, but with some exceptions. We give two examples in Figure 4. We observe, however, that parameters obtained for d1 to d3 are always high, and parameters for d4 and d5 are also significantly positive, though at lower levels. Based on these observations, we regroup our six dummy variables into two: d1+d2+d3, which is equal to 1 when *globfree* is strictly below 4, and d4+d5 which is equal to 1 when *globfree* is above or equal 4, but strictly below 6. Of course, other ways of regrouping the occurrences of *globfree* would be possible, but for all regressions shown in Table 4, none predominates the one we have chosen.

Figure 4
Parameters obtained for disaggregated levels of *globfree*



Note: The bold lines represent estimates of parameters of d1 to d6. The dotted lines define the usual confidence intervals (± 2 standard errors).

3.2.2 Self-interest of donors

- *Trade* is the total bilateral trade flow (import+export) between the recipient and the donor, expressed as percentage of the donor GDP;

- *xxx_colo* is a dummy variable equal to 1 when the recipient is a former colony of donor xxx, and 0 otherwise;

- *USA_Egypt* is a dummy variable equal to 1 when the recipient is Egypt and the donor is USA, and 0 otherwise.

Results reported in Table 4 generally confirm our expectations. In what follows, we interpret the size of parameters in terms of the marginal impact of each variable on bilateral aid received. It must be kept in mind, however, that this interpretation is quantitatively valid only when one compares two recipients who receive strictly positive aid flows from a given donor in a given year (or a given recipient who receives positive aid flows from a given donor at two different dates). If one of these countries does not receive aid from this donor in this year, the marginal impact will be smaller. Moreover, computing such marginal impacts disregards the possible interactions among our explanatory variables. However, such an exercise is useful for assessing and comparing the magnitude of the impact of some policy changes on aid budgets.

3.3 Results

3.3.1 Beneficiary needs and policy performance variables

The income per capita has, as expected, a significantly negative impact on aid received. The quadratic term, when positive, does not change this result since it is associated with a very small parameter. In equations 5 and 6, an increase of GDP per capita by US$ 100 reduces aid provided by each individual donor by US$ 0.09.

The total impact is, however, much larger for a given recipient since a recipient usually receives commitments from more than one donor. On average a country receiving aid commitments in a given year receives assistance from close to 13 donors. This average number of 13 effective donors for a given recipient is more or less the same in the complete and in the reduced sample, and we use it throughout all this section whenever applicable. This number implies here that an increase of GDP per capita by US$ 100 reduces on average total bilateral aid received by US$ 1.2.

Population size has generally the expected negative sign. However, it is not always significant (see equations 2 and 4). Moreover, the size of its effect varies widely from one equation to the next. This may be due to a correlation between size and policies, as suggested in the previous section. Usually, the parameter of *pop* increases when we introduce performance variables. In the most complete equation (equation 6), an increase of size by one million reduces aid given by an average donor by US$ 0.006, and therefore total bilateral aid by US$ 0.1 (assuming again the number of bilateral contributors to be 13 donors). Except for very large countries, the quadratic term is, again, of second order, and does not change drastically the marginal impact of population on aid received per capita. For the largest countries (India and China) with a population around one billion, the quadratic term reduces significantly this impact, but does not reverse it.

Lagged growth has the expected positive sign in all regressions. However, in the most complete equation, this impact losses significance. This is not due to the shrinking of the sample imposed by missing observations for social data, since when we re-estimate equation 1 or 2 on the limited sample (14,317 observations), lagged growth has a very

Table 4
Estimation of the full-sample model

	Equation1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6
RGDPcap	-0.0004***	-0.0004***	-0.0001***	-0.0001**	-0.0009***	-0.0009***
	(-4.457)	(-4.862)	(-1.175)	(-2.009)	(-5.790)	(-5.795)
RGDPcap²	-4.88E-08***	-4.23E-08***	-6.82E-08***	-5.40E-08***	9.29E-09	9.29E-09
	(-4.824)	(-4.166)	(-5.798)	(-4.562)	(0.547)	(0.548)
Pop	-0.004***	-0.002	-0.004***	-0.002	-0.005***	-0.006***
	(-2.926)	(-1.614)	(-3.286)	(-1.159)	(-2.970)	(-2.958)
Pop²	2.72E-06**	1.15E-06	3.06E06	6.47E07	4.18E-06**	4.34E-06**
	(1.918)	(0.797)	(2.274)**	(0.470)	(2.146)	(2.171)
trade	490.4***	482.7***	425.7***	408.2***	190.0**	189.4***
	(12.751)	(12.578)	(11.896)	(11.449)	(4.164)	(4.148)
Fr_colo	11.54***	11.65***	11.49***	11.69***	12.15***	12.14***
	(24.055)	(24.105)	(24.99)	(24.351)	(19.674)	(19.629)
UK_colo	8.52***	8.46***	7.83***	7.74***	5.47***	5.47***
	(21.316)	(21.141)	(20.617)	(20.487)	(10.606)	(10.582)
Prt_colo	12.18***	12.15***	12.11***	12.06***	5.28**	5.29**
	(8.958)	(8.95)	(9.27)	(9.208)	(2.403)	(2.407)
Spa_colo	2.546***	2.701***	2.30***	2.54***	-1.32	-1.33
	(2.754)	(2.923)	(2.65)	(2.922)	(-0.829)	(-0.836)
USA_Egypt	25.61***	25.62***	25.28***	25.30***	48.5***	48.6***
	(12.211)	(12.234)	(12.796)	(12.787)	(18.478)	(18.474)
Globfree<4	1.81***	1.74***	1.27***	1.17***	2.06***	2.08***
	(12.235)	(11.771)	(8.705)	(8.026)	(9.403)	(9.265)
4<Globfree<6	0.68***	0.69***	0.46***	0.47***	0.82***	0.82***
	(4.744)	(4.852)	(3.388)	(3.439)	(4.032)	(4.046)
Growth[-1]	0.036***	0.037***	0.029***	0.029***	0.021	0.020
	(4.048)	(4.132)	(3.198)	(3.179)	(1.568)	(1.564)
FDI			0.002	-0.006	0.096***	0.099***
			(0.167)	(-0.565)	(3.307)	(3.311)
Primary					0.003	0.003
					(0.836)	(0.830)
Inf. mortality					-0.009***	-0.009***
					(-2.921)	(-2.936)
Aid_others		0.0062***		0.010***		-0.0009
		(5.382)		(7.943)		(-0.353)
intercept	-4.014***	-4.196***	-3.734***	-3.977***	-1.39**	-1.35**
	(-25.953)	(-26.402)	(-24.324)	(-24.98)	(-2.429)	(-2.320)
No. of obs	42,134	42,134	39,714	39,714	14,317	14,317
Censored	18313	18313	16667	16667	6068	6068
Rho	0.29	0.29	0.30	0.30	0.29	0.29

Notes: Method of estimation: Random-effects Tobit model (random-effect time x donor);
Rho = standard deviation of the random-effects/ standard deviation of residual;
t-statistics in brackets;
*** = significant at 1% level;
** = significant at 5% level;
* = significant at 10% level;
ll tests for random-effect specification passed at 1% level (not shown).

significant positive parameter (regression not shown). An inspection of data shows that lagged growth is significantly and positively correlated with FDI, which corresponds to the fact that foreign investors are sensitive to growth performances. Moreover, it is also significantly and positively correlated with primary enrolment: countries where policies favour education are also promoting growth, and the fact that growth is lagged here

does not change this relation much, since primary enrolment policies do not change fast. In any case, the impact of growth is moderate. Assuming a parameter around 0.036 (as in equations 1 and 2) would mean that a growth acceleration by 1 percentage point would increase total bilateral aid on average by less than US$ 0.5.

FDI has the expected positive sign and is highly significant in equations 5 and 6. Again, the divergence of these results with equations 3 and 4, where FDI is not significant, corresponds to the positive correlation between lagged growth and FDI. If a country attracts new FDI flows equal to 1 per cent of its GDP, this would increase the aid flows it receives from the bilateral aid community by US$ 1.2. This is not at all a small complement, given that such FDI flows are equivalent on average to US$ 7.2 (at 1985 prices).

The social policy outcome variables, primary enrolment rate and infant mortality rate, have the expected signs, respectively, positive and negative. Primary enrolment significance is very low, but again this is linked to its correlation with lagged growth. The same regression as in equation 6, estimated without the lagged growth variable, exhibits a doubling of the parameter for primary enrolment, which becomes significant at the 1 per cent level (regression not shown). According to equation 6 parameters, a decrease of infant mortality rate by 10‰, corresponds to an increase of total bilateral aid received by about US$ 1.2. Of course, the various dimensions of poverty are interrelated and social achievements such as higher primary enrolment or lower infant mortality may be correlated with an alleviation of monetary poverty, which on average reduces aid flows. There is no mechanical relation between income per capita and social achievements but in some circumstances this may partially explain why some countries, like Mauritius, have continuously obtained a high level of aid per capita despite their relatively high income per capita.

Civil liberty and political freedom have a strongly positive and significant impact on aid flows. Overall, countries which have an average mark better than 4 (34 to 40 per cent of the sample) receive from the bilateral donor community US$ 27 more than those with a mark equal or worse than 6, and US$ 16 more than those with a mark between 4 and 5.5. Countries with a mark between 4 and 5.5 still receive US$ 11 more than those with the worst marks. These numbers are quite large, and suggest that the best way for a developing country to obtain better assistance from the donor community is to adopt democratic institutions.

Finally, aid received from other donors has only a marginal and unequally significant impact. It is even negative in equation 6. Moreover, introducing this variable does not change the magnitude of the impact of other variables. Therefore, there is no clear evidence of coordination among donors.

3.3.2 Self-interest of donors

Bilateral trade has a strong and significantly positive impact on aid allocation. Its magnitude depends however quite a lot on the equation specifications. Part of this large variance of its estimates observed in Table 4 comes from changes in sample size. We show below that its impact is increasing over time (contrary to what could be suggested by our simple univariate descriptive statistics in the previous section). Since the sample available for estimating the most complete equations (equations 6 and 7) contains less recent data that the full complete sample, this may explain part of the decline. As a matter of fact, equation 2 re-estimated on the small sample exhibits a parameter for

trade equivalent to the estimate reported in equation 6 (regression not shown). However, the magnitude of the effect of trade intensity on aid commitments is rather small in all cases, because bilateral trade flows between DAC members and developing countries are small: on average, bilateral trade intensity ratios represent only 0.04 per cent of donor GDPs, equivalent to US$ 200 million. On average, an increase by US$ 100 million in the bilateral trade between a given donor and a given recipient will only increase the donor aid flow to the recipient by US$ 0.04 per capita, given the parameter reported in equation 6. This is equivalent to US$ 1.2 million, given an average recipient population of 30 million. These numbers suggest that the magnitude of aid flows that may be stimulated by trade relations, although significant, is quite small.

Former colonial links have a much bigger impact on aid flows. Although parameters vary among equations, magnitudes are consistently high. According to equation 6 estimates, France gives on average an extra US$ 12 per capita in aid flow to its former colonies. For United Kingdom, we get the much smaller number of US$ 5 per capita, but this is still a rather large amount. The privileged assistance policy enjoyed by Egypt from the United States provides the country with an even bigger aid bonus of US$ 49 (but only 26 in equations 1 to 4). Such numbers are quite consistent with descriptive data discussed earlier.

Estimates for the colonial dummies of Portugal and Spain are less consistent, but this is due to lack of information in the sample available to estimate equation 6. According to DAC data, these two countries have started providing aid only recently (in the 1990s), which means that the estimates for their former colonial relationship dummies are computed only on the 1990s data. The small sample available to estimate equation 6 has too few data available for the 1990s to allow for a robust estimation of these parameters. Similar problems are encountered when re-fitting equation 2 on this sample (regression not shown). Equations 1 to 4 may provide better estimates of these parameters, and suggest that past colonial links result in aid bonuses of about US$ 12 per capita for former Portuguese colonies and US$ 2 for former Spanish colonies.

4 Changes over time

One of the advantages of the large database that we have assembled is that it gives the possibility of discussing the evolution of aid policies over the past two decades. In this section, we address two questions:

- What has been the impact of donor policy changes on the evolution of aid volumes over time?

- Did donors behave differently during the 1990s decade after the end of the cold war?

Observing raw data suggests that aid volumes have declined over the period under review. However, we want to know whether this decline is simply the result of changes in budgetary allocation policies in donor countries, or of changes in the beneficiary specific characteristics or in their policies and performance.

Since we have introduced time random-effects (interacted with donor random-effects), the residuals of our equation contain information on such changes in aid volumes that

are 'autonomous', i.e. that do not depend on the observable characteristics of the recipients. Therefore, in order to assess the autonomous changes in aid volumes, we propose to aggregate, on a yearly basis (both on donors and on recipients) the residuals of our regression.

More precisely, an easily computable measure of the estimator of the dependent variable is:

$$\hat{y}=Max(0,Bx)$$

Where x is the vector of explanatory variables and B the matrix of corresponding estimated parameters. However, it should be kept in mind that this is a biased estimator of y since:

$$E(y|x=x_0)=\int Max(0,Bx_0+\varepsilon)f(\varepsilon)d\varepsilon>Max(0,\int(Bx_0+\varepsilon)f(\varepsilon)d\varepsilon)=Max(0,Bx)$$

Therefore, the corresponding computed residual, $y-\hat{y}$, is an overestimation of the true one. In order to obtain the true residuals, it would be necessary to compute the above integral with stochastic simulations for all observations. However, this is unnecessary for our exercise. For a given donor, j, the aggregated computed residual (aggregated over recipients indexed by the i's) is equal to:

$$\sum_i y_{i,j,t}-\sum_i Max(0,Bx_{i,j,t})=\sum_i Max(0,Bx_{i,j,t}+u_{i,j,t}+v_{j,t})-\sum_i Max(0,Bx_{i,j,t})$$

Taking into account the fact that, by definition, $v_{j,t}$ is independent of $x_{i,j,t}$ and of $u_{i,j,t}$, this expression is increasing with $v_{j,t,}$ simply because $Max(0,a+z)$ is an increasing function of z, whatever the value of a. Therefore, if this donor is reducing its aggregate aid effort (which means that its $v_{j,t}$ is decreasing over time), the aggregated computed residual will be declining as well. If we aggregate these expressions among all donors, again the aggregated computed residual will increase if donors have a common drift in their $v_{j,t}$.

Therefore, in order to test whether the observed decline in total aid budgets is due to a reduction of aid efforts by donors instead of a change in our explanatory variables, we propose to use this imperfect, but easily computed, measure of residuals.

Moreover, not all recipients have the same population. Thus, in computing the aggregates, we need to weight each observation by the corresponding recipient population. Therefore, we compute :

$$\sum_j\sum_i p_{i,j,t}y_{i,j,t}-\sum_j\sum_i p_{i,j,t}Max(0,Bx_{i,j,t})$$

$$=\sum_j\sum_i p_{i,j,t}Max(0,Bx_{i,j,t}+u_{i,j,t}+v_{j,t})-\sum_j\sum_i p_{i,j,t}Max(0,Bx_{i,j,t})$$

which is again decreasing if donors have a common downward drift in their aid efforts.

Figure 5
Comparison of aggregate residuals for the 1980s and the 1990s
(in US$ billions at 1995 prices)

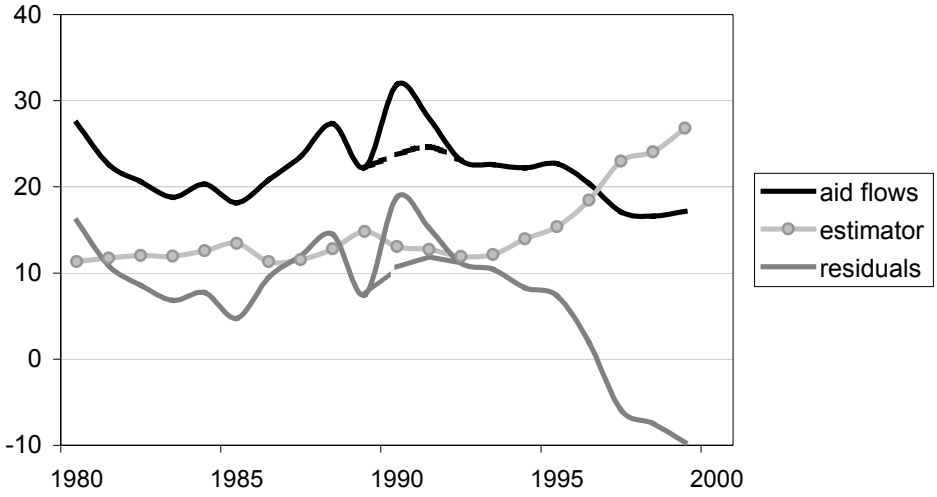


Figure 5 illustrates the results when each recipient residual is weighted by its population. A caveat is that social data, which are necessary to estimate the full model (equation 6), are not available on a yearly basis for a large number of countries. Therefore, residuals are computed here with equation 2, instead of equation 6, in order to be able to obtain a sufficiently complete timeseries of residuals.

Figure 5 is quite explicit. First, the aggregate estimator is slowly but surely increasing over time, which means that the observed declining trend of aid budgets cannot be explained by recipient policies and performance. The aggregate residual presents moreover a steep downward drift in the second half of the 1990s decade, which is responsible for the accelerated decline of aggregate aid flows; part of this decline has been mitigated by improvements in recipient policies, but the end result has been a dramatic decline of US$ 14.8 billion (on average 6.7 per cent a year) in total bilateral aid budgets over the 1990s.

The peak year of 1990 is, however, biased by a substantial increase of aid commitment by the US to Egypt in the context of the Gulf War, and much of the peak (US$ 8.2 billion out of US$ 9.3) reflects this. If this effect is cleaned out, the steady decline of aid budgets starts in 1989, i.e., at the end of the cold war, whereas it had a flat trend between 1980 and 1988. Therefore, the decline in aid budgets attributable to the end of the cold war should be calculated from 1988 instead of 1990. With this correction, total aid budgets have fallen by 'only' 4 per cent a year (see dotted line in Figure 5).

Therefore, whatever the way we assess it, our results suggest that a major outcome of the end of the cold war has been the strong decline in aid commitments of bilateral donors. Part of this decline is due to aid transfers to transition economies, since our database covers only 'Part I' recipients of the DAC, i.e. it includes only the poorest transition economies. However, this substitution effect explains only a minor part of the decline. Throughout the 1993-99 period, annual aid commitments to 'Part II'

Table 5
Comparison of the full-sample model for the 1980s and the 1990s

	1980s	1990s	1990s-1980s
RGDPcap	-0.00139***	-0.0012***	0.0001
	(-7.014)	(-4.555)***	(0.31)
RGDPcap²	2.68E-08	6.04E-08**	3.36E-08
	(1.132)	(1.938)	(0.922)
Pop	-0.011***	-0.003	-0.01**
	(-4.057)	(-1.048)	(-1.97)
Pop²	1.01E-05***	9.54E-07	-9.146E-06**
	(3.462)	(0.330)	(-2.414)
Trade	106.79**	514.27***	407.48***
	(2.112)	(4.599)	(3.36)
Fr_colo	14.15***	10.87***	-3.28**
	(16.176)	(11.300)	(-2.53)
UK_colo	5.28***	4.39***	-0.89
	(5.245)	(6.357)	(0.728)
Prt_colo		6.44***	
		(2.600)	
Spa_colo		0.141	
		(1.29)	
USA_Egypt	23.79***	79.92***	56.13***
	(6.899)	(20.038)	(10.64)
Globfree<4	3.18***	1.48***	-1.7***
	(10.120)	(4.495)	(3.794)
4<Globfree<6	1.59***	0.36	-1.228**
	(5.712)	(1.189)	(-3.036)
Growth[-1]	-0.021	0.070***	0.092***
	(-1.279)	(3.154)	(3.277)
FDI	0.475***	0.0078	-0.467***
	(7.251)	(0.227)	(6.309)
Inf.mortality	-0.0117***	-0.0157***	-0.004
	(-3.291)	(-3.826)	(-1.034)
Primary	-0.0043	0.0098*	0.014**
	(-0.977)	(1.815)	(2.215)
Aid_others	-0.0129***	-0.0007	0.0126**
	(-3.730)	(-0.066)	(2.269)
Intercept	-0.859	-0.859	
	(-1.383)	(-1.383)	
No. of obs	14,317	14,317	
Censored	6,068	6,068	
Rho	0.28	0.28	

Notes: Method of estimation: Random-effects Tobit model (random-effect time x donor);
Rho = standard deviation of the random-effects/ standard deviation of residual; t-statistics in brackets;
*** = significant at 1% level;
** = significant at 5% level;
* = significant at 10% level;
All tests for random-effect specification passed at 1% level (not shown).

transitional economies have been about US$ 2.0 billion, i.e. only 20 per cent of the autonomous decline of aid budgets observed during the 1990s decade.

The end of the cold war may have also changed the structural behaviours of donors, and trends in the residual estimates, therefore, provide only a partial picture of the recent evolution. In Table 5, we provide a test of structural breaks in the parameter of our model from the 1980s to the 1990s. This test is performed on equation 6, with of course

no estimation for the dummies for former Portuguese and Spanish colonies in the first decade, when no positive commitments are observed. This test suggests a number of significant changes in parameters, but the overall picture is rather mixed, both for beneficiary needs and policy performance variables and for the self-interest variables of the donors.

4.1 Beneficiary needs and policy performance variables

The decrease of the parameter for the recipient income per capita suggests that donors take less notice of beneficiary needs in the 1990s. This is consistent with our observation in section 2 of a shrinking of the redistributive impact of aid policies among recipients over time. This change, however, is not significant. Similarly, changes in the parameters for social policy outcome variables are not significant, which, however, may be due to the relative scarcity of information on social data in the 1990s.

As for economic performances, mixed results are obtained. Lagged growth, which has a negative parameter in the 1980s, becomes positive and significant in the 1990s, suggesting that donors give more recognition for good economic policies in the 1990s than in the 1980s. This is consistent with the current policy statements by several donors, who tend to increasingly adopt selectivity policies. However, a reverse change is observed for FDI, which is non-significant in the 1990s but has a large positive and significant parameter in the 1980s. Given the instability of estimates observed for the parameter of FDI, the latter result must, however, be interpreted with caution.

Concerning political attitudes of the recipients, we obtain a significant decrease in the size of parameters for our civil liberty and political freedom variables. In the context of the cold war, adopting democratic institutions was often synonymous with joining the western bloc. This may provide an explanation for the result observed.

4.2 Self-interest of donors

The size of parameters for colonial dummies decreases from the 1980s to the 1990s. This is consistent with the assumption that the end of the cold war would have reduced the role of patronage policies by some donors. For USA and Egypt, the estimated parameter becomes much higher. This is due to the big, but short-lived, increase of aid that Egypt received in 1990-91 in recognition of its attitude during the Gulf War. Overall, aid given to Egypt by the Americans was large in the 1980s, following the Camp David Peace Accord with Israel, but its trend declined afterward, despite the Gulf War peak. In 1999, American aid to Egypt was only one-sixth of what it was in 1980.

Conversely, the size and significance of the parameter for bilateral trade intensity increases quite a lot from the 1980s to the 1990s. This suggests that aid is still influenced by the self-interest of donors, but in a different manner: while in the 1980s it was based on politics and history, it is influenced more by donors' pragmatic considerations about commercial interests. This is observed, for instance, in France, which has started giving assistance to countries beyond its traditional clientele, in order to try to create better links to countries with greater commercial potential.

5 Comparisons among donors

In this section, we attempt the same comparison exercise by donor instead of by decade, based on equation 6. Despite the large size of our database, an overall comparison of behaviour by donor proves to be difficult, due to the scarcity of observations with complete information. New donors (Greece, Portugal and Spain) as well as Luxembourg do not have enough uncensored data to allow an estimation of equation 6. Among the remaining 18 donors, seven (Australia, Denmark, Finland, Ireland, New Zealand, Norway, Sweden) have uncensored data for about 50 per cent or less of the recipients with complete information, leaving about 300 or less observations for parameter estimation. Another three countries (Austria, Belgium and Switzerland) have positive aid commitments for only two-third to three-quarters of available observations. Because of the relatively small size of their aid budgets, these donors tend to specialize on a limited number of recipients. In this sense, they behave differently from other donors in a significant way, but this also implies that estimations of their behavioural parameters may lack robustness.

Our principal goal here, however, is to test parameter differences among donors, instead of producing an aid allocation equation for each and every donor. To this end, we estimate an equation for each donor where explanatory variables are those included in equation 6 together with the same variables multiplied by a dummy for this donor. This equation may be written as follows, to test parameter differences between a donor j_0 and other donors:

$$y_{i,j,t}=Max(0,Bx_{i,j,t}+\beta_{j_0}1_{j=j_0}x_{i,j,t}+u_{i,j,t}+v_{j,t})$$

This equation provides both donor-specific parameter estimates ($B+\beta_{j_0}$) and a direct test of differences of individual parameters between the considered donor and the group of other donors (based on estimates of β_{j_0} and their associated pseudo-students). In Table 6, we report (for all 18 donors for whom data availability was sufficient to perform the tests) the sign and significance level of donor-specific parameters obtained from this estimation procedure, while Table 7 provides tests of heterogeneity of parameters between each donor and the average other donors. Numerical results are provided in Appendix 2.

5.1 Beneficiary needs and policy performance variables

Although the impact of GDP per capita is, as expected, significantly negative for most donors, its magnitude varies a lot among donors. It has the wrong sign for Australia, Canada, Germany, United Kingdom and Unites States, and significantly so for the latter. Considering the quadratic terms does not change the overall picture, given that their magnitude is of second order. This suggests that these donors take less note of the income poverty of the recipients. This does not necessarily mean, however, that they do not care about poverty in the potential recipient countries when making their aid allocation decisions. All of them, with the exception of United States, exhibit a significantly higher than average parameter for infant mortality, which could mean that they care more about non-monetary dimensions of poverty than about its monetary component. This is true in particular for Germany, which increases its aid commitment to potential recipients by US$ 0.04 when they have infant mortality rates higher by 1‰

(with a significant parameter), while other donors provide on average the same increase of aid for a reduction of income per capita by US$ 40.

The previous analysis suggests that considering the infant mortality rate as a social policy performance variable, which would positively influence aid allocation policies, may be wrong in some circumstances, when considered by donors as a major indicator of recipient needs. This seems to be the case not only for Germany but also for Italy and, although with non-significant parameters, for Australia, Canada, Denmark, France, Netherlands and United Kingdom. Similar results show up with respect to primary school enrolment, which has a significantly negative, instead of positive, parameter for Australia and Belgium, and a negative (although non-significant) parameter for Austria, Finland, Switzerland and the US.

Comforting results are obtained with respect to the dummy variables for civil liberty and political freedom, which have significantly positive parameters for most of the donors. The US and Australia value democracy more than other donors, with a democracy bonus 5 and 7.5 times, respectively, higher than for the average donor. According to our parameter estimates, being democratic (as compared to dictatorial) brings close to US$ 8 more American aid per capita, and US$ 11 more in Australian aid. Two donors—France and Belgium—go in the other direction with negative (although most of the time non-significant) parameters for the democracy dummies. These two donors have consistently given large amounts of aid to several African non-democratic recipients whom they have financially supported for most of the period under review, although such biases have receded in the 1990s (regression not shown). Everything being equal, France has given the same amount of assistance to democracies and dictatorial regimes, and significantly less (about US$ 2) to potential recipients with medium marks. Belgium has granted slightly more aid to dictatorships than to other potential recipients.

Finally, the analysis of economic performance variables leads to somewhat mixed results. Few donors have significantly positive parameters for either FDI or lagged growth, or both. The most striking result is a significantly negative parameter of the United States for both lagged growth and FDI. It seems that American assistance has been geared rather exclusively to countries with good civil liberty and political freedom, whatever their economic performances. The United States may have also given support to post-conflict countries with improving political behaviours, but with initially slow growth and investment attractiveness.

5.2 Self-interest of donors

Dummy variables for past colonial links already took account of the differences among donors regarding their self-interest behaviours. Tables 6 and 7 complement this with respect to the impact of the trade intensity variable. Overall, the results reported there suggest a wide diversity of aid allocation policies. Australia, Austria and New Zealand give more assistance to their trading partners. The same is true, although with less significance, for a number of small donors, such as Belgium, Denmark, Finland, Italy and Japan. Conversely, it seems that large donors (except Japan) do not care about allocating more assistance to their trading partners. Small donors tend to specialize their aid policies geographically, which makes sense because they cannot provide assistance to all potential recipients, and they do so by targeting their trading partners.

Table 6
Estimated parameters by donor

	RGDPcap	RGDPcap²	Pop	Pop²	trade	globfree <4	4<globfree <6	growth[-1]	FDI	Primary enrlt	Inf. mortality	Aid_others
Australia		---	---	+++	+++	+++	+++		+++	---		
Austria					++	+	++				-	
Belgium	---				++					-	---	--
Canada					++	+	++				-	
Denmark	-					++	+++	++				
Finland			+	-	+							
France							---	-	++	+++		
Germany			--	++	-					++	+++	++
Ireland	---					++	+			+		-
Italy	--	+++	--		+					++	+++	--
Japan					++	++		+	+++	+	-	
Netherlands												+
New Zealand	--		+++	---	+++	+++			++		---	
Norway	--					++		+				
Sweden										+++	--	++
Switzerland	--										---	
UK		-			--	++		++	+			+++
USA	+++	---	---	+++		+++	+++	---	--		---	+++

Table 7
Differences of parameters with others, by donor

	RGDPcap	RGDPcap²	Pop	Pop²	trade	ılobfree	<4< globfree <6	growth[-1]	FDI	Primary enrlt	Inf. mortality	Aid_others
Australia	+	---	---	++	+++	+++	+++		+++	---	++	
Austria					+				-			
Belgium						---	---			--	---	--
Canada	+++									+++	+++	
Denmark							+	+			++	
Finland			+++	--								
France					--	---	---			++	+	
Germany					--					++	+++	+++
Ireland			+							+		--
Italy		+++								++	+++	--
Japan									++	+		
Netherlands					-				--		++	+
New Zealand			+++	---	+++	+					---	
Norway			+									
Sweden			+			--				++		++
Switzerland			+	-		---	-	++	--			
UK	+++	-			---			++			++	+++
USA	+++	---	---	+++	--	+++	++	---	---		-	+++

Notes to Tables 6 and 7: Method of estimation: Random-effects Tobit model (random-effect time x donor); +++ (---) = significant positive (negative) at 1% level; ++ (--) = significant positive (negative) at 5% level; + (-) = significant positive (negative) at 10% level.

22

6 Alternative method

It might be possible that our results depend on the method of estimation used. A number of authors consider the two-step method to be more valid than a Tobit estimation, since it does not assume that explanatory variables affect the same way the probability of getting aid and the amount of aid received.

Table 8
Estimation of the Probit model

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6
RGDPcap	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	(-22.419)	(-21.408)	(-20.047)	(-17.953)	(0.000)	(-9.589)
RGDPcap²	1.17E-08***	8.95E-09***	1.61E-08***	1.12E-08***	7.95E-09***	8.91E-09***
	(8.667)	(6.486)	(8.944)	(6.154)	(0.000)	(2.628)
Pop	0.001***	0.001***	0.001***	0.001***	0.001***	0.000***
	(28.983)	(23.608)	(26.599)	(21.265)	(12.219)	(9.553)
Pop²	-7.33E-08***	-6.17E-08***	-6.79E-08***	-5.60E-08***	-5.20E-08***	-4.26E-08***
	(-26.949)	(-22.115)	(-24.601)	(-19.788)	(-11.255)	(-8.987)
Trade	83.9***	88.9***	76.4***	80.7***	33.1***	27.8***
	(12.778)	(6.591)	(11.145)	(11.819)	(3.315)	(2.858)
Fr_colo	7.40	7.54	7.58	8.07	8.28	7.89
	…	…	…	…	…	…
UK_colo	0.48***	0.62***	1.06***	1.19***	9.34	9.23
	(3.516)	(4.077)	(6.493)	(7.514)	…	…
Prt_colo	1.59***	1.58***	1.67***	1.55***	1.08***	1.20***
	(8.538)	(8.540)	(8.786)	(8.543)	(3.171)	(3.499)
Spa_colo	0.84***	0.77***	0.88***	0.72***	0.48*	0.47*
	(6.750)	(6.274)	(7.127)	(5.713)	(1.918)	(1.905)
USA_Egypt	6.58	6.96	6.65	7.24	7.15	6.88
	…	…	…	…	…	…
Globfree<4	0.18***	0.23***	0.14***	0.17***	0.35***	0.45***
	(8.020)	(9.928)	(5.958)	(7.142)	(7.595)	(9.438)
4<Globfree<6	0.20***	0.20***	0.16***	0.15***	0.26***	0.29***
	(9.315)	(0.023)	(6.990)	(6.586)	(6.112)	(6.716)
Growth[-1]	0.012***	0.012***	0.012***	0.012***	0.014***	0.014***
	(9.181)	(8.975)	(7.673)	(7.719)	(5.227)	(5.225)
FDI			-0.021***	-0.019***	-0.034***	-0.021***
			(-12.263)	(-10.993)	(-5.546)	(-3.534)
Primary					0.001*	0.001
					(1.868)	(1.577)
Inf. mortality					-0.001	-0.001**
					(-1.039)	(-1.994)
Aid_others		-0.003***		-0.003***		-0.005***
		(-18.324)		(-15.685)		(-9.340)
Intercept	0.306***	0.424***	0.428***	0.482***	0.425***	0.699***
	(13.709)	(17.883)	(17.088)	(17.664)	(3.435)	(5.531)
No. of obs	42,134	42,134	39,714	39,714	14,317	14,317
Rho	0.5545	0.5627	0.5793845	0.5192	0.6145	0.6296

Notes: Method of estimation: Random-effects Probit model (random-effect time x donor);
t-statistics in brackets;
*** = significant at 1% level;
** = significant at 5% level;
* = significant at 10% level.

Table 9
Estimation of the linear aid allocation model on positive observations

	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5	Equation 6
RGDPcap	0.001***	0.001***	0.001***	0.001***	0.000***	0.000*
	(6.797)	(5.251)	(8.718)	(6.151)	(-2.158)	(-1.777)
RGDPcap²	-1.32E-07***	-9.22E-08***	-1.53E-07***	-9.84E-08***	-5.30E-09	-4.01E-09
	(-7.952)	(-5.558)	(-10.155)	(-6.511)	(-0.253)	(-0.192)
Pop	-0.003***	-0.002***	-0.002***	-0.001***	-0.002***	-0.001***
	(-13.188)	(-8.271)	(-14.982)	(-8.349)	(-7.730)	(-6.231)
Pop²	2.37E-07***	1.56E-07***	2.00E-07***	1.17E-07***	1.41E-07***	1.18E-07***
	(11.540)	(7.445)	(12.970)	(7.474)	(6.492)	(5.307)
Trade	154.6***	91.4*	178.8***	99.3***	74.8	81.8*
	(2.638)	(1.567)	(4.027)	(2.256)	(1.368)	(1.498)
Fr_colo	12.33***	13.04***	12.10***	12.91***	12.31***	12.51***
	(19.645)	(20.871)	(24.529)	(26.548)	(18.343)	(18.629)
UK_colo	6.80***	6.28***	6.39***	5.75***	3.77***	3.64***
	(13.945)	(12.948)	(15.859)	(14.534)	(6.811)	(6.577)
Prt_colo	3.82*	3.82*	3.83***	3.81***	1.75	1.74
	(1.597)	(1.610)	(2.115)	(2.134)	(0.467)	(0.465)
Spa_colo	-1.69	-0.99	-1.22	-0.58	-0.12	0.03
	(-1.034)	(-0.608)	(-0.971)	(-0.470)	(-0.038)	(0.008)
USA_Egypt	27.09***	27.36***	25.25***	25.74***	48.82***	48.87***
	(9.580)	(9.743)	(11.980)	(12.340)	(17.827)	(17.863)
Globfree<4	1.01***	0.82***	1.07***	0.85***	1.62***	1.38***
	(4.375)	(3.566)	(5.996)	(4.772)	(6.238)	(5.228)
4<Globfree<6	-0.51***	-0.38*	-0.13	-0.06	0.22	0.13
	(-2.339)	(-1.752)	(-0.750)	(-0.368)	(0.906)	(0.553)
Growth[-1]	-0.037***	-0.036***	-0.012	-0.013	-0.021	-0.018
	(-2.607)	(-2.603)	(-1.015)	(-1.111)	(-1.281)	(-1.144)
FDI			0.109***	0.085***	0.312***	0.274***
			(7.572)	(5.999)	(7.767)	(6.711)
Primary					-0.003	-0.003
					(-0.727)	(-0.675)
Inf. mortality				***	-0.010***	-0.009***
					(-2.685)	(-2.471)
Aid_others		0.040***		0.045		0.015***
		(18.235)		(23.391)		(4.622)
Intercept	1.740***	0.664***	0.963***	-0.027	3.056***	2.525***
	(8.169)	(3.026)	(5.516)	(-0.151)	(4.554)	(3.714)

Notes: Method of estimation: Random-effects linear model (random-effect time x donor); t-statistics in brackets;
*** = significant at 1% level;
** = significant at 5% level;
* = significant at 10% level.

We have estimated the probit model, which determines the probability of receiving aid, using the same explanatory variables as before and the same assumptions concerning the random specific effects. The results are reported in Table 8. Overall, results are not much different than in the Tobit estimation, insofar as the sign of parameters are the same, with only two exceptions:

- Aid received from other donors now has a significantly negative sign, while we concluded from the Tobit estimate that this variable has no robust impact on the amount of aid received; however, such a result is difficult to interpret.

- The FDI received also has a significantly negative sign. Again, this is a variable on which we concluded to a lack of robustness of our estimates, and interpreting its negative sign here is not straightforward.

A second issue we have with the probit estimation reported here is that it has not been possible to estimate the standard deviation of the parameters for the dummy *USEgypt* and *Frcolo* and, to a certain extent, *Gbcolo*. This is a numerical problem, linked to the fact that the qualitative information conveyed by the existence or absence of aid is not sufficient to allow a full estimation.

Overall, despite some differences with the Tobit, this experiment suggests that the probit does not contradict our results, and when it does so, it is not clear that the results provided by the probit are more credible than those obtained with the Tobit.

The second exercise that we attempted consists of estimating aid received based on strictly positive observations. Then there is no truncation, and we can estimate a linear model. Again, we have done so by using the same list of explanatory variables as before and applying the same assumptions concerning the random-specific effects. Results are reported in Table 9.

As we could expect, these estimates have quite different properties from the Tobit estimates. We know that, in theory, there is a selection bias in this estimation. This bias shows up for several variables:

- There is a positive and significant impact of GDP per capita, instead of a negative effect; this result has no logical interpretation, since it would imply that the richer a recipient country is, the bigger are its aid receipts;

- The dummies for democracy have much small parameters than in the Tobit estimation, and even negative parameters in some equations for the dummy for medium levels of democracy (which would imply that authoritarian regimes get more aid than semi-democratic regimes); and

- Lagged growth has always a negative sign, which would mean that bad economic policies are rewarded.

All in all, these results cast some doubt on the accuracy of a linear estimation.

7 Conclusion

The database that we have assembled provides a wealth of information and analysis on aid allocation policies implemented by bilateral donors over the 1980s and 1990s decades. Our analysis identifies a number of variables, describing both recipients' needs and performances, as well as the donors' self-interests, which have influenced assistance policies. Given the amount of information available, we have also been able to compare aid policies before and after the end of the cold war, and among donors. Our conclusions are as follows:

- Aid budgets have faced an autonomous declining trend at a rate of more than 6 per cent a year, in real terms, since the end of the cold war;

- Overall, aid is progressive, although with a declining intensity over time;

- Although with a declining intensity, the best way to attract bilateral assistance is to go democratic. This is particularly true with regard to the American and Australian assistance;

- Post-colonial traditional links still have a strong, but declining over time, influence on aid allocation policies of the former colonial ruling countries;

- Trade linkages have conversely a growing impact, although still with a small magnitude;

- Small donors, who need to specialize because of the small size of their aid budgets, tend to target their trading partners more than big donors, with the exception of Japan;

- On average, donors condition their assistance on positive social performances of the recipients, particularly after the end of the cold war, but some donors prefer to provide aid to countries with the biggest social needs;

- Good economic performances have on average been rewarded by donors in the 1990s.

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Appendix 1: List and sources of variables

Variable	Definition	Source
Aidcap	Total real ODA (OA) Commitments divided by the population of the recipient country	OECD Development Aid Committee database (international development statistics)
Aid_others	Total of AIDCAP given by other donors to the recipient country	Authors own calculation
RGDPcap	Real GDP Per Capita in constant dollars (international prices, base year 1985) of the recipient countries	Penn World Tables
Pop	Population expressed in millions, total	World Bank's Global Development Finance & World Development Indicators
Growth[-1]	GDP growth (annual %) of the recipient lagged one period	World Bank's Global Development Finance & World Development Indicators
FDI	Foreign Direct Investment (% GDP of the recipient)	World Bank's Global Development Finance & World Development Indicators
Inf. mortality	Infant mortality rate (per 1,000 live births)	World Bank's Development Finance & World Development Indicators
Primary enrlt	School enrolment, primary (% gross).	World Bank's Global Development Finance & World Development Indicators
Trade	Sum of bilateral imports and exports (corrected for the OECD inflation) in % of donor's GDP	OECD trade database
xxx_colo	Dummy variable equal to 1 when the recipient is a former colony of the donor, and 0 otherwise.	Authors own estimates
USA_Egypt	Dummy variable equal to 1 when the recipient is Egypt and the donor is USA, and 0 otherwise	Authors own estimates
Globfree	Mean of civil liberties and political right indexes, ranging from 1 (most free countries) to 7 (less free countries)	Freedom House website

Appendix 2: Comparison of estimations by donor

	Others	Australia	Australia-Others	Others	Austria	Austria-Others
GDPcap	-0.0009***	0.0007	0.0016*	-0.0010***	-0.0009	0.0001
	(-5.680)	(0.771)	(1.772)	(-5.882)	(-1.314)	(0.031)
GDPcap²	1.8E-08	-3.87E-07***	-4.05E-07***	9.39E-09	6.07E-08	5.13E-08
	(1.056)	(-3.313)	(-3.439)	(0.542)	(0.820)	(0.678)
Pop	-0.004**	-0.040***	-0.036***	-0.007***	0.006	0.013
	(-1.928)	(-4.868)	(4.284)	(-3.264)	(0.701)	(1.431)
Pop²	2.55E-06	2.43E-05***	2.175E-05**	5.03E-06**	-7.38E-06	-1.24E-05
	(1.270)	(2.907)	(2.534)	(2.451)	(-0.860)	(-1.407)
Trade	85.93*	3572.11***	3486.17***	185.19***	1018.38**	833.18*
	(1.872)	(12.212)	(11.773)	(4.032)	(2.187)	(1.780)
1<Globfree<4	1.5610***	11.6223***	10.0613***	2.1235***	1.5908*	-0.5327
	(6.967)	(11.512)	(9.758)	(9.225)	(1.640)	(-0.538)
4<Globfree<6	0.6758***	3.4895***	2.8137***	0.7833***	1.7667**	0.9835
	(3.323)	(3.695)	(2.921)	(3.747)	(2.023)	(1.100)
Growth (-1)	0.0146	0.0186	0.0039	0.0205	0.0318	0.0114
	(1.090)	(0.517)	(0.000)	(1.489)	(0.517)	(0.173)
FDI	0.0227	1.1726***	1.1499***	0.1122***	-0.1367	-0.2489*
	(0.741)	(9.231)	(8.802)	(3.661)	(-1.056)	(-1.870)
Primary	0.0060*	-0.0479***	-0.0539***	0.0035	-0.0075	-0.0110
	(1.662)	(-3.372)	(-3.763)	(0.942)	(-0.561)	(-0.812)
Infant mort.	-0.0087***	0.0065	0.0152**	-0.0094***	-0.0140*	-0.0046
	(-2.768)	(0.787)	(1.916)	(-2.931)	(-1.849)	(-0.640)
Aidothers	0.0011	-0.0116	-0.0127	-0.0006	-0.0063	-0.0057
	(0.431)	(-1.022)	(-1.095)	(-0.220)	(-0.565)	(-0.500)
USEgypt	48.5049***			48.6327***		
	(18.939)			(18.501)		
Frcolo	12.1869***			12.1133***		
	(19.986)			(19.486)		
GBcolo	5.5431***			5.4394***		
	(11.156)			(10.559)		
Portcolo	5.3374**			5.3234**		
	(2.486)			(2.419		
Spacolo	-1.1759			-1.3144		
	(-0.757)			(-0.826)		
Intercept	-1.3725**	-1.3725**		-1.2976**	-1.2976**	
	(-2.411)	(2.411)		(-2.223)	(-2.223)	
No. of obs	14,317	654		14,317	654	
Censored	6,068	305		6,068	225	
Rho	0.2963	0.2963		0.2968	0.2968	

Appendix 2 continues

Appendix 2 (continued)

	Others	Belgium	Belgium-Others	Others	Canada	Canada-Others
GDPcap	-0.0009***	-0.0013**	-0.0004	-0.0010***	0.0004768	0.0015***
	(-5.507)	(-1.97)	(-0.6325)	(-6.178)	(0.842)	(2.587)
GDPcap²	6.70E-09	5.26E-08	4.59E-08	1.51E-08	-7.50E-08	-9.01E-08
	(0.386)	(0.67)	(0.5745)	(0.857)	(-1.226)	(-1.425)
Pop	-0.006***	0.005	0.011	-0.005***	-0.013*	-0.0081
	(-3.123)	(0.566)	(1.2570)	(-2.668)	(-1.666)	(-0.970)
Pop²	4.89E-06**	-6.38E-06	-1.127E-05	3.88E-06**	1.25E-05	8.62E-06
	(2.382)	(-0.732)	(-1.2610)	(1.885)	(1.519)	(1.020)
Trade	181.4065***	195.0755**	13.6690	199.27***	-129.5056	-328.7787
	(3.19)	(2.332)	(0.1414)	(4.321)	(-0.364)	(-0.917)
1<Globfree<4	2.2835***	-1.3046	-3.5881***	2.07***	2.0874**	0.0173
	(9.902)	(-1.384)	(-3.7081)	(8.950)	(2.393)	(0.000)
4<Globfree<6	0.9527***	-1.2950	-2.2478***	0.783***	1.4583*	0.6750
	(4.548)	(-1.533)	(-2.5904)	(3.723)	(1.857)	(0.837)
Growth (-1)	0.0183	0.0829	0.0646	0.023*	-0.0266	-0.0506
	(1.333)	(1.333)	(1.0149)	(1.727)	(-0.492)	(-0.906)
FDI	0.1096***	-0.1165	-0.2261	0.104***	0.0129	-0.0910
	(3.584)	(-0.782)	(-1.4866)	(3.371)	(0.106)	(-7.280)
Primary	0.0043	-0.0220*	-0.0263**	0.0012	0.0320***	0.0307***
	(1.167)	(-1.658)	(-1.9621)	(0.336)	(2.692)	(2.548)
Infant mort.	-0.0084***	-0.0306***	-0.0222***	-0.0122***	0.0351***	0.0473***
	(-2.594)	(-4.044)	(-3.0871)	(-3.789)	(5.214)	(7.474)
Aidothers	0.0004	-0.0306**	-0.0309**	-0.0013	0.0032	0.0046
	(0.139)	(-2.447)	(-2.4249)	(-0.493)	(0.322)	(0.436)
USEgypt	48.5980***			48.6***		
	(18.52)			(18.520)		
Frcolo	12.2503***			12.21***		
	(19.905)			(20.058)		
GBcolo	5.4304***			5.47***		
	(10.274)			(9.973)		
Portcolo	5.2538**			5.33**		
	(2.384)			(2.426)		
Spacolo	-1.4118			-1.31		
	(-0.887)			(-0.828)		
Intercept	-1.7364**	-1.7374**		-0.90**	-0.90 **	
	(-2.967)	(-2.967)		(-1.555)	(-1.555)	
No. of obs	14,317	654		14,317	654	
Censored	6,068	209		6,068	70	
Rho	0.29	0.29		0.29	0.29	

Appendix 2 continues

Appendix 2 (continued)

	Others	Denmark	Denmark-Others	Others	Finland	Finland-Others
GDPcap	-0.00089***	-0.00163*	-0.0007	-0.0009***	-0.00015	0.00079
	(-5.457)	(-1.744)	(0.781)	(-5.754)	(-0.167)	(0.883)
GDPcap²	6.29E-09	-1.22E-08	-1.8E-08	1.17E-08	-1.41E-07	-1.527E-07
	(0.365)	(-0.094)	(0.141)	(0.677)	(-1.23)	(-1.323)
Pop	-0.0064***	0.0029	0.009	-0.0071***	0.016*	0.023***
	(-3.16)	(0.323)	(1.000)	(-3.511)	(1.86)	(2.608)
Pop²	4.75E-06**	-3.11E-06	-7.86E-06	5.50E-06***	-1.63E-05*	-2.18E-05**
	(2.319)	(-0.342)	(0.843)	(2.682)	(-1.855)	(-2.417)
Trade	191.88***	592.76	400.88	188.82***	590.88*	402.06
	(4.19)	(0.93)	(0.624)	(4.099)	(1.642)	(1.109)
1<Globfree<4	2.045***	2.635**	0.5901	2.097***	1.596	-0.5013
	(8.925)	(2.428)	(0.529)	(9.141)	(1.393)	(-0.424)
4<Globfree<6	0.7365***	2.4648***	1.7283*	0.7819***	1.5012	0.719
	(3.535)	(2.568)	(1.766)	(3.751)	(1.488)	(0.700)
Growth (-1)	0.0159	0.14302**	0.1271*	0.0206	0.0224	0.0018
	(1.164)	(2.112)	(1.838)	(1.502)	(0.517)	(0.00)
FDI	0.10889***	-0.12603	-0.2349	0.10713***	-0.11890	-0.22603
	(3.573)	(-0.744)	(1.364)	(3.512)	(-0.684)	(-1.281)
Primary	0.00322	0.00106	-0.0022	0.00337	-0.00732	-0.01069
	(0.868)	(0.073)	(0.141)	(0.907)	(-0.488)	(-0.700)
Infant mort.	-0.01036***	0.00708	0.0174**	-0.00919***	-0.0107	-0.00150
	(-3.226)	(0.946)	(2.429)	(-2.855)	(-1.407)	(-0.200)
Aidothers	-0.00095	0.000446	0.0014	-0.00016	-0.01577	-0.01560
	(-0.356)	(0.036)	(0.100)	(-0.061)	(-1.178)	(-1.145)
USEgypt	48.6123***			48.649***		
	(18.504)			(18.515)		
Frcolo	12.1869***			12.146***		
	(19.798)			(19.575)		
GBcolo	5.5182***			5.4569***		
	(10.53)			(10.596)		
Portcolo	5.4640**			5.3193**		
	(2.49)			(2.417)		
Spacolo	-1.3216			-1.3665		
	(-0.828)			(-0.858)		
Intercept	-1.3731**	-1.3731**		-1.3681**	-1.3681**	
	(-2.354)	(-2.354)		(-2.334)	(-2.334)	
No. of obs	14,317	654		14,317	654	
Censored	6,068	361		6,068	319	
Rho	0.3017	0.3017		0.2958	0.2958	

Appendix 2 continues

Appendix 2 continues

	Others	France	France-Others	Others	Germany	Germany-Others
GDPcap	-0.0009***	-0.0006	0.0003	-0.0010***	0.0001	0.0010
	(-5.215)	(-1.037)	(0.529)	(-5.813)	(0.128)	(1.761)
GDPcap²	-2.44E-09	4.78E-08	5.02E-08	8.58E-09	-3.4E-08	-4.27E-08
	(-0.137)	(0.814)	(0.825)	(0.486)	(-0.565)	(-0.686)
Pop	-0.006***	-0.007	-0.002	-0.005**	-0.018**	-0.013
	(-2.789)	(-0.889)	(-0.200)	(-2.471)	(-2.12)	(-1.480)
Pop²	4.18E-06**	6.12E-06	1.94E-06	3.52E-06*	1.69E-05**	1.34E-05
	(2.034)	(0.729)	(0.224)	(1.714)	(2.044)	(1.575)
Trade	204.8679***	-326.274	-531.14**	208.533***	-620.41*	-828.943**
	(4.427)	(-1.222)	(-1.960)	(4.538)	(-1.884)	(-2.494)
1<Globfree<4	2.2137***	-0.3960	-2.6097***	2.1498***	0.8428	-1.3070
	(9.53)	(-0.455)	(-2.910)	(9.29)	(0.981)	(-1.473)
4<Globfree<6	1.0021***	-2.1590 ***	-3.1612***	0.8440***	0.6349	-0.2091
	(4.753)	(-2.781)	(-3.945)	(4.014)	(0.811)	(-0.265)
Growth (-1)	0.0292**	-0.0901 *	-0.1193	0.0222*	0.0038	-0.0184
	(2.105)	(-1.707)	(-2.186)	(1.602)	(0.071)	(-0.332)
FDI	0.0821***	0.2650 **	0.1829	0.0975***	0.0987	0.0012
	(2.643)	(2.207)	(1.473)	(3.165)	(0.819)	(0.000)
Primary	0.0017	0.0314 ***	0.0297**	0.0017	0.0263**	0.0245**
	(0.458)	(2.682)	(2.496)	(0.468)	(2.252)	(2.069)
Infant mort.	-0.0087***	0.0035	0.0122*	-0.0121***	0.0395***	0.0516***
	(-2.706)	(0.489)	(1.794)	(-3.754)	(4.939)	(6.844)
Aidothers	-0.0009	0.0105	0.0114	-0.0027	0.0261**	0.0288***
	(-0.323)	(1.005)	(1.058)	(-1.004)	(2.456)	(2.636)
USEgypt	48.5069***			48.5921***		
	(18.353)			(18.486)		
Frcolo	13.0717***			12.1265***		
	(17.179)			(19.527)		
GBcolo	5.4770***			5.4590***		
	(10.935)			(10.489)		
Portcolo	5.3427**			5.3700**		
	(2.425)			(2.448)		
Spacolo	-1.1837			-1.3538		
	(-0.742)			(-0.85)		
Intercept	-1.4685**			-0.9687*		
	(-2.512)			(-1.662)		
No. of obs	14,317	654		14,317	652	
Censored	6,068	29		6,068	17	
Rho	0.3062	0.3062		0.3003	0.3003	

Appendix 2 continues

Appendix 2 continues

	Others	Ireland	Ireland-Others	Others	Italy	Italy-Others
GDPcap	-0.0009***	-0.0022***	-0.0013	-0.0009***	-0.0013**	-0.0004
	(-5.319)	(-2.76)	(-1.643)	(-5.618)	(-2.027)	(-0.574)
GDPcap²	4.27E-09	9.26E-08	8.83E-08	3.46E-10	1.86E-07***	1.85E-07***
	(0.248)	(0.971)	(0.911)	(0.02)	(2.647)	(2.577)
Pop	-0.007***	0.011	0.018*	-0.005***	-0.017**	-0.012
	(-3.315)	(1.179)	(1.844)	(-2.592)	(-1.998)	(-1.349)
Pop²	5.06E-06**	-9.97E-06	-1.50E-05	3.84E-06*	1.35E-05	9.66E-06
	(2.471)	(-1.056)	(-1.556)	(1.878)	(1.563)	(1.086)
Trade	197.77***	-150.60	-348.37	175.32***	465.27*	289.95
	(4.307)	(-0.329)	(-0.755)	(3.779)	(1.783)	(1.095)
1<Globfree<4	2.0729***	2.3678**	0.2950	2.1136***	1.4856	-0.6280
	(9.062)	(2.136)	(0.265)	(9.189)	(1.598)	(-0.656)
4<Globfree<6	0.7958***	1.6319*	0.8361	0.8236***	0.9894	0.1657
	(3.827)	(1.656)	(0.831)	(3.941)	(1.181)	(0.200)
Growth (-1)	0.0204	0.0351	0.0147	0.0225*	-0.0014	-0.0239
	(1.491)	(0.517)	(0.224)	(1.637)	(-0.024)	(-0.387)
FDI	0.1014***	0.0368	-0.0647	0.1031***	0.0004	-0.1026
	(3.323)	(0.242)	(-0.412)	(3.371)	(0.003)	(-0.721)
Primary	0.0021	0.0258*	0.0237*	0.0018	0.0290**	0.0273**
	(0.569)	(1.772)	(1.616)	(0.479)	(2.227)	(2.066)
Infant mort.	-0.0093***	-0.0076	0.0017	-0.0110***	0.0191***	0.0301***
	(-2.882)	(-0.941)	(0.224)	(-3.428)	(2.625)	(4.367)
Aidothers	0.0004	-0.0324*	-0.0328**	0.0003	-0.0229**	-0.0232**
	(0.162)	(-2.331)	(-2.324)	(0.109)	(-1.907)	(-1.887)
USEgypt	48.5997***			48.5496***		
	(18.503)			(18.543)		
Frcolo	12.1556***			12.1912***		
	(19.637)			(19.931)		
GBcolo	5.4868***			5.4659***		
	(10.683)			(10.269)		
Portcolo	5.3019**			5.3485**		
	(2.41)			(2.436)		
Spacolo	-1.3689			-1.2681		
	(-0.859)			(-0.799)		
Intercept	-1.3858**	-1.3858**		-1.1525**	-1.1525**	
	(-2.375)	(-2.375)		(-1.981)	(-1.981)	
No. of obs	14,317	654		14,317	652	
Censored	6,068	395		6,068	102	
Rho	0.2966	0.2966		0.2951	0.2951	

Appendix 2 continues

Appendix 2 continues

	Others	Japan	Japan-Others	Others	Netherlands	Netherlands-Others
GDPcap	-0.0009***	-0.0006	0.0004	-0.0009***	-0.0006	0.0003
	(-5.697)	(-1.057)	(0.700)	(-5.582)	(-1.18)	(0.510)
GDPcap²	9.81E-09	-1.67E-08	-2.65E-08	6.16E-09	2.74E-08	2.124E-08
	(0.555)	(-0.291)	(-0.447)	(0.348)	(0.466)	(0.346)
Pop	-0.006***	-0.005	0.001	-0.006***	-0.003	0.003
	(-2.976)	(-0.626)	(0.100)	(-2.924)	(-0.381)	(0.316)
Pop²	4.68E-06**	8.15E-07	-3.86E-06	4.41E-06**	1.49E-06	-2.92E-06
	(2.269)	(0.099)	(-0.458)	(2.143)	(0.175)	(-0.332)
Trade	182.432***	318.65**	136.2185	217.70***	-52.28	-269.99*
	(3.818)	(1.895)	(0.781)	(4.526)	(-0.363)	(-1.780)
1<Globfree<4	2.0873***	2.0419**	-0.0453	2.1399***	1.1274	-1.0124
	(8.956)	(2.414)	(-0.000)	(9.248)	(1.272)	(-1.109)
4<Globfree<6	0.8123***	1.1048	0.2925	0.8167***	0.8653	0.0486
	(3.843)	(1.436)	(0.374)	(3.881)	(1.09)	(0.000)
Growth (-1)	0.0162	0.0916*	0.0754	0.0241*	-0.0132	-0.0373
	(1.164)	(0.517)	(1.378)	(1.74)	(0.517)	(-0.678)
FDI	0.0820***	0.3589***	0.2769**	0.1121***	-0.1777	-0.2897**
	(2.635)	(3.02)	(2.254)	(3.652)	(-1.239)	(-1.977)
Primary	0.0019	0.0216*	0.0197*	0.0029	0.0051	0.0022
	(0.517)	(1.854)	(1.661)	(0.786)	(0.434)	(0.173)
Infant mort.	-0.0088***	-0.0123*	-0.0035	-0.0097***	0.0024	0.0122**
	(-2.738)	(-1.85)	(-0.566)	(-3.003)	(0.367)	(1.949)
Aidothers	-0.0018	0.0109	0.0128	-0.0018	0.0160*	0.0178*
	(-0.664)	(1.101)	(1.241)	(-0.653)	(1.566)	(1.685)
USEgypt	48.7689***			48.5621***		
	(18.195)			(18.502)		
Frcolo	11.9837***			12.1842***		
	(18.2)			(19.936)		
GBcolo	5.4439***			5.5021***		
	(10.924)			(10.274)		
Portcolo	5.4261**			5.2979**		
	(2.457)			(2.411)		
Spacolo	-1.1531			-1.3146		
	(-0.721)			(-0.824)		
Intercept	-1.1362**	-1.1362**		-1.4249**	-1.4249**	
	(-1.942)	(-1.942)		(-2.435)	(-2.435)	
No. of obs	14,317	654		14,317	654	
Censored	6,068	19		6,068	61	
Rho	0.3089	0.3089		0.2969	0.2969	

Appendix 2 continues

	Others	New Zealand	NZ-Others	Others	Norway	Norway-Others
GDPcap	-0.0009***	-0.0019**	-0.0010	-0.0009***	-0.0017**	-0.0008
	(-5.42)	(-2.411)	(-1.265)	(-5.437)	(-1.914)	(-0.90)
GDPcap²	6.07E-09	7.21E-08	6.60E-08	7.02E-09	-1.00E-08	-1.702E-08
	(0.352)	(0.84)	(0.755)	(0.407)	(-0.085)	(-0.14)
Pop	-0.007***	0.027***	0.035***	-0.007***	0.008	0.014*
	(-3.64)	(2.935)	(3.643)	(-3.387)	(0.873)	(1.62)
Pop²	5.88E-06***	-3.01E-05***	-3.6E-05***	5.09E-06**	-6.08E-06	-1.12E-05
	(2.873)	(-3.159)	(-3.695)	(2.48)	(-0.685)	(1.23)
Trade	154.52***	842.08***	687.56***	230.72***	-140.35	-371.07
	(3.296)	(3.636)	(2.910)	(4.724)	(-0.53)	(-1.38)
1<Globfree<4	2.0361***	4.1270***	2.0909*	2.0868***	2.1813**	0.0945
	(8.924)	(3.25)	(1.625)	(9.092)	(2.083)	(0.10)
4<Globfree<6	0.8313***	1.3700	0.5387	0.8233***	0.9212	0.0980
	(4.017)	(1.115)	(0.436)	(3.948)	(0.983)	(0.10)
Growth (-1)	0.0178	0.0943	0.0765	0.0170	0.1077*	0.0906
	(1.307)	(1.261)	(1.005)	(1.243)	(0.517)	(1.37)
FDI	0.0890***	0.2845**	0.1954	0.1069***	-0.1294	-0.2363
	(2.907)	(2.001)	(1.345)	(3.507)	(-0.75)	(-1.35)
Primary	0.0030	0.0080	0.0049	0.0025	0.0137	0.0112
	(0.824)	(0.483)	(0.300)	(0.669)	(0.969)	(0.78)
Infant mort.	-0.0077**	-0.0444***	-0.0367***	-0.0096***	-0.0047	0.0049
	(-2.409)	(-4.484)	(-3.780)	(-3.004)	(-0.609)	(0.67)
Aidothers	-0.0014	0.0073	0.0087	-0.0009	0.0008	0.0016
	(-0.531)	(0.579)	(0.678)	(-0.324)	(0.063)	(0.14)
USEgypt	48.5844***			48.5995***		
	(18.478)			(18.495)		
Frcolo	12.0921***			12.1345***		
	(19.483)			(19.635)		
GBcolo	5.5121***			5.4890***		
	(10.8)			(10.635)		
Portcolo	5.3453**			5.2589**		
	(2.423)			(2.393)		
Spacolo	-1.2956			-1.4195		
	(-0.814)			(-0.89)		
Intercept	-1.4396**	-1.4396**		-1.3622**	-1.3622**	
	(-2.464)	(-2.464)		(-2.332)	(-2.332)	
No. of obs	14,317	652		14,317	654	
Censored	6,068	452		6,068	343	
Rho	0.2958	0.295		0.2971	0.2971	

Appendix 2 continues

Appendix 2 continues

	Others	Sweden	Sweden-Others	Others	Switzerland	Switzerland-Others
GDPcap	-0.0009***	-0.0012	-0.0003	-0.0009 ***	-0.0012**	-0.0003
	(-5.55)	(-1.486)	(-0.374)	(-5.566)	(-1.919)	(-0.490)
GDPcap²	7.69E-09	-9.00E-09	-1.67E-08	9.24E-09	8.32E-09	-9.2E-10
	(0.447)	(-0.087)	(-0.458)	(0.532)	(0.114)	(-0.000)
Pop	-0.006***	0.009	0.015*	-0.007***	0.010	0.016*
	(-3.156)	(0.96)	(1.612)	(-3.301)	(1.093)	(1.800)
Pop²	4.67E-06**	-6.54E-06	-1.12E-05	5.21E-06***	-1.11E-05	-1.63E-05*
	(2.285)	(-0.712)	(-1.192)	(2.54)	(-1.281)	(-1.833)
Trade	200.08***	-458.45	-658.54	189.49***	167.10	-22.39
	(4.36)	(-0.922)	(-1.319)	(4.129)	(0.39)	(-0.000)
1<Globfree<4	2.1823***	-0.5208	-2.7031**	2.2555***	-0.7252	-2.9807***
	(9.527)	(-0.495)	(-2.022)	(9.76)	(-0.804)	(-3.214)
4<Globfree<6	0.8317***	0.2406	-0.5911	0.9157***	-0.5132	-1.4289*
	(3.996)	(0.257)	(-0.616)	(4.358)	(-0.642)	(-1.738)
Growth (-1)	0.0193	0.0582	0.0389	0.0211	0.0291	0.00801**
	(1.404)	(0.517)	(0.616)	(1.526)	(0.517)	(0.141)
FDI	0.1048***	-0.0143	-0.1191	0.1129***	-0.2513	-0.3642**
	(3.432)	(-0.095)	(-0.775)	(3.697)	(-1.488)	(-2.121)
Primary	0.0015	0.0367***	0.0351**	0.00358	-0.00614	-0.0097
	(0.416)	(2.531)	(2.400)	(0.962)	(-0.496)	(-0.775)
Infant mort.	-0.0092***	-0.0160**	-0.0068	-0.008761***	-0.0213***	-0.0125
	(-2.867)	(-2.043)	(-0.906)	(-2.73)	(-3.089)	(-1.929)
Aidothers	-0.0024	0.0265**	0.0289**	-0.0002	-0.0125	-0.0123
	(-0.873)	(2.253)	(2.396)	(-0.076)	(-1.085)	(-1.039)
USEgypt	48.5881***			48.6434***		
	(18.488)			(18.489)		
Frcolo	12.1182***			12.1690***		
	(19.7)			(19.315)		
GBcolo	5.5172***			5.3971***		
	(10.659)			(10.594)		
Portcolo	5.3972**			5.2964 **		
	(2.457)			(2.405)		
Spacolo	-1.2801			-1.4169		
	(-0.802)			(-0.889)		
Intercept	-1.3391**	-1.3391 **		-1.5374 ***	-1.5374***	
	(-2.301)	(-2.301)		(-2.634)	(-2.634)	
No. of obs	14,317	654		14,317	654	
Censored	6,068	382		6,068	176	
Rho	0.3030	0.3030		0.2968	0.2968	

Appendix 2 continues

Appendix 2 continues

	Others	UK	UK-Others	Others	USA	USA-Others
GDPcap	-0.0010***	0.0006	0.0017***	-0.0010***	0.0018***	0.0029***
	(-6.349)	(1.1)	(2.888)	(-6.447)	(2.592)	(4.015)
GDPcap²	1.79E-08	-9.89E-08*	-1.17E-07*	3.01E-08*	-4.3E-07***	-4.6E-07***
	(-1.019)	(-1.648)	(-1.879)	(1.772	(-5.039)	(-5.306)
Pop	-0.005**	-0.010	-0.005	-0.003	-0.047***	-0.044***
	(-2.495)	(-1.125)	(-0.548)	(-1.359)	(-5.479)	(-5.030)
Pop²	3.50E-06**	1.08E-05	7.30E-06	1.55E-06	3.98E-05***	3.82E-05***
	(-1.708)	(1.243)	(0.819)	(0.767)	(4.496)	(4.217)
Trade	211.327***	-722.72**	-934.047***	206.826***	-363.995	-570.821**
	(-4.61)	(-1.99)	(-2.551)	(4.523)	(-1.471)	(-2.269)
1<Globfree<4	2.1193***	2.0366**	-0.0827	1.6507***	7.8989***	6.2482***
	(-9.174)	(2.346)	(-0.100)	(7.253)	(9.284)	(7.127)
4<Globfree<6	0.8846***	0.4491	-0.4355	0.6801***	2.7010***	2.0210**
	(4.218)	(0.567)	(-0.529)	(3.29)	(3.439)	(2.498)
Growth (-1)	0.0146	0.1291**	0.1145**	0.0385***	-0.2601***	-0.2985***
	(1.054)	(2.441)	(2.095)	(2.814)	(-4.928)	(-5.476)
FDI	0.0945***	0.2224*	0.1279	0.1169***	-0.2844**	-0.4013***
	(3.062)	(1.841)	(1.025)	(3.864)	(-2.366)	(-3.237)
Primary	0.0036	0.0018	-0.0018	0.0029	-0.0064	-0.0092
	(0.959)	(0.151)	(-0.141)	(0.776)	(-0.511)	(-0.728)
Infant mort.	-0.0098***	0.0021	0.0120**	-0.0091***	-0.0202***	-0.0112*
	(-3.07)	(0.323)	(1.918)	(-2.866)	(-3.059)	(-1.794)
Aidothers	-0.0042	0.0578***	0.0619***	-0.0006	0.0432***	0.0438***
	(-1.538)	(5.363)	(5.587)	(-0.226)	(3.22)	(3.206)
USEgypt	48.5233***			50.5145***		
	(18.524)			(19.277)		
Frcolo	12.1002***			12.0963***		
	(19.867)			(19.807)		
GBcolo	4.1462***			5.4592***		
	(6.502)			(10.85)		
Portcolo	5.2401**			5.2113**		
	(2.389)			(2.408)		
Spacolo	-1.2584			-1.0827		
	(-0.792)			(-0.687)		
Intercept	-1.1873**	-1.1873**		-1.2283**	-1.2283**	
	(-2.042)	(-2.042)		(-2.144)	(-2.144)	
No. of obs	14,317	654		14317	654	
Censored	6,068	29		6068	86	
Rho	0.2962	0.2962		0.3024	0.3024	

Notes to Appendix 2 on overleaf.

Notes to Appendix 2:

Method of estimation: Random-effects Tobit model (random-effect time x donor);

For each regression the 'Others' column provides parameter estimates for the group of all donors except one (whose estimates are provided in the next column) ; the third column test differences of parameters between the specified donor and other donors. All parameters are estimated together;

Rho = standard deviation of the random-effects/ standard deviation of residual;

t-statistics in brackets;

*** = significant at 1% level;
** = significant at 5% level;
* = significant at 10% level.

All tests for random-effect specification passed at 1% level (not shown)