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Early vs. Late in Aid Partnerships and Implications for Tackling Aid Fragmentation

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Early vs. Late in Aid Partnerships and Implications for Tackling Aid Fragmentation

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Abstract

Development aid donors disburse aid to many developing countries. This paper shows that whether a partnership is established early or late matters significantly for aid quantities. Donor countries allocate larger shares of their aid budgets to recipients that entered early in their portfolios. This effect is large compared to variations due to recipients' income differences, and matters even in the long run. Entry dates are weakly related to GDP per capita, but are influenced strongly by colonial past. On the other hand, colonial relationships explain only a small part of the observed variation in entry dates. These findings imply that donors, while continuously increasing their number of recipients, have allocated smaller aid quantities to new partnerships. This has direct consequences for aid fragmentation, with many donors disbursing small amounts to a recipient. I study a simple reform that eliminates "small" partnerships, but leaves unaffected donor aid budgets and developing countries receipts. The reform reshuffles only about 20 percent of all the aid disbursed in a year but drastically reduces fragmentation.

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1 Introduction

Developed countries have been disbursing foreign aid to developing countries for many years. Yet little is known about how aid partnerships evolve over time, whether or how donors shift priorities, or whether they keep a small core set of partners, or reach out to new partnerships as their aid budgets grow. Early on donors established a small number of partnerships and then consistently created new ones over time. Today, the biggest donors are providing development aid to virtually every developing country. The process of partnership building has taken place over years, with donors choosing some priority recipients and then allocating additional resources to others.

Each donor-recipient partnership, is therefore characterized by its creation date, or entry date (when the recipient enters a donor's portfolio). This paper studies aid partnerships over the period 1960-2006 and shows that whether this donor-recipient relationship begins earlier or later has a significant influence on the aid quantity attached to the partnership, measured as the share of the donor aid budget that the recipient gets. Donors provide relatively more aid to recipients they have contact with early on, even decades after the partnership was established. More precisely, a one standard deviation in entry dates (roughly seven years) has the same effect on aid share as does a GDP per capita larger by some 3000-7000 dollars, depending on the estimates. Put differently, a partnership created seven years later involves aid quantities smaller by 7 to 32 million dollars, depending on the estimates used. The observation that entry dates matter is robust after controlling for country pair characteristics such as colonial past, donor-recipient distance, and recipients' populations and incomes, suggesting that entry dates do not simply proxy for other variables. Only colonial relationship is a strong determinant of the timing of partnership creation. Income in the developing country is only weakly, and not robustly, related to entry dates. These results cast a new light on the aid allocation literature that aims to estimate the importance of various recipient and donor characteristics for

aid quantities (Alesina and Dollar (2000), Berthélemy and Tichit (2004)).

While favoring early entrant recipients, donors have also continuously expanded their recipient portfolios. The situation is such that today some donors are revising their allocation policies to take proliferation into account. For instance Sweden decided in 2007 to halve its number of recipients. Donors at the Accra High-Level Forum on Aid Effectiveness in 2008 debated about a new aid architecture that would re-organize aid partnerships in a more efficient way. The Donor Assistance Committee of the OECD observed in its annual report OECD (2009) that many developing countries share a common problem –too little aid, too many donors. The need to reform donor aid allocation across recipients raises questions about the exact mechanisms that should drive the reform. This paper evaluates the effect of a reform designed to decrease aid fragmentation, when aid comes from too many sources and is spread over too many partnerships.

Many donors today give aid to more than one hundred countries. In 1960, this number was lower than 20 on average. The observation that donors allocate fewer resources to late entrant recipients provides new insights on the development of aid fragmentation during the last decades. Emerging new actors, and expanding portfolios, has led to aid fragmentation. Developing countries are working with dozens of donors on projects often involving small aid quantities. They are also bearing large transaction costs due to multiplying or overlapping administrative procedures, meetings with donor missions, and conditions specific to each donor. Acharya et al. (2006) quote the example of Vietnam in 2002, a fairly representative recipient, where 25 official bilateral donors, 19 multilateral donors and about 350 international NGOs were involved in over 8000 projects. They argue that aid fragmentation creates direct transaction costs that absorb the often scarce attentions of senior government staff, as well as cause indirect transaction costs that create dysfunctional bureaucracy and political behaviors. Knack and Rahman (2007) also argue that aid fragmentation depletes bureaucracy of its best elements,

because donors practice poaching by hiring qualified staff to serve their own projects. They find that countries where aid is the most fragmented also have a lower level of bureaucratic quality. Djankov et al. (2009) find that aid is less efficient in countries where it is fragmented.

The detrimental effects of aid fragmentation are acknowledged by aid donors who have repeatedly pledged to reduce it at various international conferences such as the meetings in Monterrey in 2002 and Accra in 2008. The Paris Declaration, signed in 2005 by most aid donors and recipients, defines aid coordination as one of its goals. Frot and Santiso (2008) document trends in aid fragmentation since 1960. They find that fragmentation indeed has worsened, but that despite receiving aid from an ever-increasing number of donors, developing countries have been experiencing relatively stable levels of aid concentration. They infer from this observation that new partnerships must represent very small aid quantities. This conjecture is confirmed here. Fragmentation appears to be the product of two forces: portfolio expansion and donor bias toward early recipients. Since late partnerships receive smaller aid quantities, the implication is that donors are now holding highly fragmented portfolios with many small stakes in many countries.

This paper investigates the consequences of a simple reform of donor practices in order to evaluate how much these "small" partnerships create fragmentation. The analysis keeps aid budgets and receipts constant but eliminates small partnerships, using a criterion developed by OECD (2007) for identifying underfunded partnerships. The reform is based on the idea that donors reveal their priorities by allocating aid, and that they are allowed to keep only those partnerships important to them. Alternatively one can interpret the reform as one identifying, for each donor, recipients with whom the donor has a comparative advantage and as eliminating other partnerships. If implemented, such a reform would reshuffle around 20 percent of total aid allocated in a year, but would greatly reduce fragmentation. It shows that few partnerships, mainly late ones, are responsible for a large share of

fragmentation.

The remainder of the paper is organized as follows. After having defined two useful variables in Section 2, Section 3 tests whether entry dates affect aid shares, and then estimates their determinants. Section 4 applies the result that earlier recipients receive more aid to aid fragmentation, and describes a reform that would decrease fragmentation. Finally Section 5 concludes.

2 Definitions

2.1 Entry date

Entry dates start at zero and codify when, in the history of a donor-recipient pair, aid starts to be disbursed. More precisely, an entry date is defined as the difference between the year aid is disbursed for the first time and the maximum of the first year the donor disburses aid to any country and the first year the recipient enters the dataset. Three examples should clarify the definition.

Consider a donor and a recipient present since 1960, the donor first gives aid to the recipient in 1965. The entry date is $1965 - \max(1960, 1960) = 5$. Second, the same donor starts giving aid in 1992 to a recipient present from 1990.[1] Entry date is $1992 - \max(1960, 1990) = 2$. Third a donor, active since 1980, starts giving aid in 1981 to a recipient present since 1960. Entry date is $1981 - \max(1980, 1960) = 1$.

2.2 Normalized aid share

A simple way to rank developing countries within a donor's portfolio is to look at the share of the donor's aid budget that countries receive. But this

[1]For bilateral aid flows to be recorded, the recipient must enter the DAC list of recipients. Some countries, mainly former Soviet Republics and parts of ex-Yugoslavia, did not exist as independent entities before a certain date.

approach is not helpful in making comparisons over time, because as the number of a donor's partnerships increases, countries' aid budget shares must fall on average. A normalization must be imposed to make aid shares neutral with respect to portfolio size. Assume that in year t donor j has an aid budget of A_{jt} and allocates a_{ijt} to recipient i. Assume further that donor j created N_{jt} partnerships before year t. In other words $N_{jt} \equiv \#\{i/\exists\ t' \leq t\ a_{ijt'} > 0\}$. The normalized aid share for the partnership between donor j and recipient i in year t is defined as $w_{ijt} \equiv \frac{a_{ijt}}{A_{jt}} - \frac{1}{N_{jt}}$. It measures the gap between the actual aid share and the "egalitarian" aid share that recipients would get if the aid budget were split equally among recipients. w_{ijt} is not affected by changes in portfolio sizes whereas the non-normalized share $\frac{a_{ijt}}{A_{jt}}$ is.

3 Results

3.1 Donors' side

The key observation of this paper is that recipients entering early into a relationship with a donor get a larger share of the donor's aid budget.[2] Figure 1 illustrates very well this finding. Using OECD data on aid recipients, I group recipients into six cohorts based on entry dates: for recipients with an entry date of zero, then with entry dates between one and four, five and nine, 10 and 14, 15 and 19, and above 20. Figure 1 presents the average normalized share of recipients in each cohort in each year. Donors enter the market in different years, and sometimes exit the market. These changes make comparing the cohort averages difficult, so for Figure 1 I restrict the sample to donors that have been present from 1960 to 2006.[3]

[Figure 1 about here.]

[2]Aid is defined as gross aid net of debt relief. See the Appendix for a description of the data used in the paper.

[3]Portugal is present in 1960 and in 2006, but stays inactive for 20 years. For this reason it is not represented in Figure 1. See the Appendix for more details.

There is almost perfect stratification by cohorts, with earlier recipients getting, on average, larger aid shares. In particular the group of countries present from the first year (0 cohort) is favored clearly compared to other groups.[4] Though there is some convergence towards the expected normalized share of zero, curves are remarkably flat such that diversification has had little effect since 1980. If anything, the cohort 0 recipients actually saw their shares increase in the last years. Donors seem to choose a fixed normalized aid share for each recipient, regardless of new entries in their portfolios.

Figure 1 does not offer enough evidence that entry dates play a decisive role in determining aid shares. It could be that donors created partnerships that prioritized poor countries or heavily populated countries, and that these have received bigger aid shares because of these characteristics, and not because of their entry dates. In order to disentangle these different possible effects, the normalized aid share of each recipient is regressed on a set of controls. The following equation is estimated using OLS:

$$w_{ijt} = \alpha + \beta length_{ijt} + \gamma length_{ijt}^2 + \delta entry_{ij} + \boldsymbol{x_{ijt}}\boldsymbol{\varphi} + \varepsilon_{ijt} \qquad (1)$$

where $entry_{ij}$ is entry date, $length_{ijt}$ is the number of years the partnership has existed, $\boldsymbol{x_{ijt}}$ is a vector of controls including recipient GDP per capita, recipient population size, a dummy variable for whether donor and recipient shared a colonial relationship, and the distance between i and j, and ε_{ijt} is an error term uncorrelated with the independent variables. The variable $length_{ijt}^2$ enters the equation to allow for convergence among countries with different entry dates. Without this term equation (1) would imply completely flat lines in Figure 1. Though it may look like a good first approximation, it also seems that there is some convergence. The exact functional form of the

[4]This is partly because the 0 cohort in Figure 1 is composed of partnerships either created in 1960 or before 1960. No data are available before that date. If there were earlier data, we would expect the average normalized share of partnerships created between 1957 and 1960 to be slightly above the 1-4 cohort average, but below the average for partnerships created in 1952-1956.

dependence of the normalized share w_{ijt} to $entry_{ij}$ is debatable. Equation (1) assumes that it is linear. Figure 1 suggests something more complex, with a falling effect of entry dates on aid shares (curves get closer when one moves downward vertically). To capture such non-linearities I also estimate equation (1) by adding $entry_{ij}^2$ as a regressor.

Normalized shares have the property of being censored above and below. The lower bound is reached when no aid is disbursed, and in that case w_{ijt} is equal to the opposite of the inverse of the portfolio size; the upper bound corresponds to the situation where there is only one recipient in the portfolio, one that gets the whole aid budget. The latter corresponds to very few cases and therefore is unlikely to affect the results. On the other hand, many observations enter the former category, and these make the OLS estimates inconsistent. Because these cases happen when the donor decides to allocate no funds to a recipient in a year, the relevant model is a corner solution model. Because in this application censoring values vary from observation to observation (portfolio size is not a constant), we need to use a general censored normal regression model, instead of the standard censored Tobit model (see Wooldridge, 2002). The model becomes

$$
\begin{aligned}
w_{ijt}^* &= \alpha + \beta gap_{ijt} + \gamma gap_{ijt}^2 + \delta entry_{ij} + \boldsymbol{x_{ijt}\varphi} + u_{ijt} \\
w_{ijt} &= \begin{cases} -\dfrac{1}{N_{jt}} \text{ if } a_{ijt} = 0 \\ 0 \text{ if } a_{ijt} = A_{jt} \\ w_{ijt}^* \text{ otherwise} \end{cases} \\
u_{ijt}/(gap_{ijt}, entry_{ij}, \boldsymbol{x_{ijt}}) &\sim \text{Normal}(0, \sigma^2)
\end{aligned}
\tag{2}
$$

[Table 1 about here.]

Before presenting the results, I show summary statistics on the regression samples in Table 1. Donors are grouped into three categories. DAC donors are developed countries that are members of the Development As-

sistance Committee (DAC). Multilateral donors are institutions financed by many countries such as the World Bank, the European Commission, or the European Bank for Reconstruction and Development. Non-DAC donors are OECD countries whose activities are reported by DAC, but are not DAC members. Many small and relatively new donors enter this category (Hungary, Poland, Turkey). Most of these are observed over a short time span such that there is little variation in entry dates and length, making the estimation less precise. By construction the mean normalized share is zero, but because of some missing data the regression samples are very slightly biased towards positive shares. The average entry date in a DAC donor portfolio is seven years, and the standard deviation is about the same quantity, which implies a good deal of variation. For other categories the mean is lower but the standard deviations still imply that donors do not group their entries over a very short period of two or three years. GDP per capita, in constant 2000 dollars, and population data come from the World Development Indicators, while distance and the dummy for colonial relationship are from the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). Table 2 contains the estimation results. For each donor category estimation is first done using OLS, then a censored regression, and finally a censored regression including a quadratic term for entry date.

[Table 2 about here.]

Columns (1), (4), and (7) show a negative and statistically significant effect of entry dates on aid shares. This effect is absent for non-DAC donors but as explained above, the lack of variation makes the non-DAC estimates imprecise. Partnership length, on top of entry date, also affects positively the recipient aid share, although with decreasing returns. An early recipient enjoys a larger aid share not only because it was chosen before others, but also because it has been in the portfolio for a longer time. This "experience" effect falls slowly with time such that there is convergence of aid shares.

As expected, countries with larger incomes or smaller populations receive smaller aid shares.

Looking at DAC donors, the colony and distance variables can be added to the set of controls. Column (4) indicates a very large effect of past colonial relationships, but including these two bilateral characteristics does not wipe out the effect of entry dates. A former colony of a donor country receives on average an aid share 2.84 percent larger than a non-colony's. That is equivalent to a nine year earlier entry date. Distance decreases aid shares, albeit a one standard deviation only reduces it by 0.04 percent. Results for multilateral donors are similar. These first estimates show that entry dates and partnership length matter even after controlling for country and pair characteristics. However, they ignore the censored nature of normalized aid shares.

Columns (2), (5), (8) and (11) replicate the same estimations using censored regression. Non-DAC donors excepted, the results are reinforced. The coefficients on entry dates almost double. Those on GDP per capita, colony and distance also increase. Finally columns (3), (6), (9) and (12) allow for a non-linear effect of entry dates. In all categories, apart again from non-DAC donors, the coefficient on the quadratic term is positive and significant, implying a negative and marginally increasing impact of entry date.

To understand better the importance of entry dates, consider a simple illustration using two hypothetical developing countries from the same portfolio. Assume that countries A and B are identical in all characteristics except that A's entry date is 0 and B's is 7 (roughly corresponding to a one-standard deviation). Two results are notable: first, the difference in A and B aid shares at different points in the portfolio history; second, how much higher A's GDP per capita would have to be for A and B aid shares to be equal at each of these points. These results tell us how much the combination of entry dates and partnership length matters, and if this effect is large compared to income differences. I assume that the two recipients A and B

are in the portfolio of a DAC donor, and so I use estimates for this category.

[Table 3 about here.]

Table 3 presents the difference in aid shares according to different models and estimation methods. The first three rows correspond to the four columns of Table 2 for DAC donors. The fifth row uses a polynomial of degree five in entry dates in order to improve the fit of the regression. The first row, first column of Table 3 indicates that in year 7, i.e. the first year both countries are present simultaneously in the portfolio, A's share is 0.63 percent higher than B's. In year 20 it is 0.38 percent larger. This quantity can be decomposed into two effects: an entry date effect of 0.22 percent and an experience effect of 0.16 percent. The entry date effect is constant over time, the experience effect implies convergence between the two aid shares. In year 50 the estimated coefficients actually imply that B receives more aid than A, despite its later entry. However the linearity in entry dates in equation (1) is a strong assumption and may fail to estimate precisely the effect of entry dates. Furthermore the censored nature of the data casts some doubts on the consistency of the OLS estimates. The second row uses the coefficients obtained with a censored regression. The gap between the A and B aid shares is now larger. Allowing for a quadratic term increases this difference again. Finally, trying to improve the fit of the regression by using a higher order polynomial leads to an even larger difference. Censored regressions also show that complete convergence takes many years.[5] In year 20, depending on the estimates used, A's share is 0.38 to 1.76 percent higher. These figures may seem small, but converted into dollars they represent between 6.9 and 31.7 million dollars.[6] These are considerable quantities for developing countries.

[5]The longest length in the sample is 48 years, so any prediction after this horizon only relies on shorter spans. We should be cautious in extrapolating the data to very long partnerships.

[6]Evaluated at the median aid budget rather than the mean, these quantities are 3.2 and 14.9 million dollars.

Still, these differences may be dwarfed by those implied by income. The second part of Table 3 shows that in fact they are not. In order for A and B to receive the same aid quantity in year 7, B's GDP per capita ought to be \$4827 to \$8462 lower. In year 20 the range is still of \$2934 to \$7192. These are very large numbers given that the mean GDP per capita in the sample is \$1623. Entry dates, combined with experience, matter excessively compared to income. A late and poor recipient is very unlikely to catch up with earlier recipients in terms of aid shares even if the earlier entrants are wealthier.

Even in the long run, controlling for recipients and pair characteristics does not remove the effect of entry dates on aid shares. In cash terms the effect is important and equivalent to very large income differences. It suggests that entry dates contain some information not captured by the more conventional variables such as incomes or colonial past, which were already known to be correlated with aid quantities, as shown by Alesina and Dollar (2000).

3.2 Recipients' side

Given the results described in the previous section, it is natural to expect developing countries to receive more support from donors with whom partnerships were created early on. Here, normalized aid shares are defined similarly, but now they represent fractions of a country's aid receipt. Either all donors are taken into account, or sub-categories. Included in the control variables are the donor's aid budgets because generous donors are expected to weight more, and, when available, the colonial and distance variables. Because these estimates are the mirror image of those for donor portfolios, and for the sake of brevity, I present only results using censored regressions with a quadratic term in entry dates.

[Table 4 about here.]

The conclusions are similar: early donors contribute more, though there is convergence among donors; aid falls with distance; and former colonial powers are largely over-represented in aid receipts. This last effect is very important, since the normalized aid share is 23.8 percent higher (for DAC donors) for former colonies. Donors with larger aid budgets weight more in aid receipts, but these aid budgets cannot explain in themselves, along with pair characteristics, the variation in aid shares. Table 5 presents results similar to those of Table 3, except that instead of computing the GDP equivalent it reports the aid budget equivalent. Consider again a simple example. A and B are two identical donors giving aid to the same recipient. A's entry date is zero, B's is seven. The difference in their aid shares is first calculated, and then the aid budget equivalent represents the quantity by which B's budget should be higher in order to make A's and B's shares equal.

[Table 5 about here.]

Table 5, again, shows a large and lasting effect of entry dates on aid shares. Using the quadratic specification, A's share is still 3.84 percent larger than B's in year 20. To weight as much as A, B should have an aid budget larger by $1.55 billion. This is a massive aid budget increase, since the mean budget in the sample is $2.02 billion for DAC donors.[7] These numbers indicate that unless B is a major donor, and given its late entry, it is very unlikely to weight more than A. The 3.84 percent in aid shares also represents $77.5 million on average, a very significant amount of money.

3.3 Entry date determinants

The creation of a partnership is influenced by a number of variables affecting both donors and recipients. Donors are likely to select priority countries where they have some commercial, strategic, or political interests, and where

[7] The median is 0.98 billion dollars.

they already have a good knowledge of the political and social environment, but they will also likely choose countries where needs are the most severe. I test a small set of variables for their influence on entry dates: GDP per capita likely influences choices, with donors giving aid in priority to poor countries; population might explain entry dates, with big countries getting more attention; other expected factors are past or ongoing colonial relationship and geographical distance from the donor. To use GDP of the year the partnership is created, even in constant terms, would overstate the influence of income because late partnerships are likely to be characterized by higher incomes because of an increasing global trend. Ideally we would like to control for the recipient GDP in the first year the aid system is created when donors make their initial choices. Unfortunately donors and recipients begin giving and receiving in various years. A satisfactory alternative is to control for GDP in the first year the recipient is present.[8] Most developing countries have existed since 1960, but new countries emerged also after 1990 with the breakups of the Soviet Union and Yugoslavia. These "newer" countries contribute a downward bias of the effect of GDP. Because of global growth, their incomes are relatively high and they usually have early entry dates. For this reason a dummy variable indicating whether the recipient was present in 1960 is added to the set of controls. Equation (3) is estimated using OLS:

$$entry_{ij} = \alpha + \beta pop_i + \gamma GDP_i + \delta colony_{ij} + \phi distance_{ij} + \psi new_i + v_{ij} \quad (3)$$

where pop_i is the recipient population in its first year of presence, GDP_i is the recipient income per capita in the first year of its presence, $colony_{ij}$ is a dummy variable for the pair having ever shared a colonial relationship, $distance_{ij}$ is the distance between donor and recipient, new_i is a dummy

[8]There is no perfect solution to the problem, however. The solution proposed here shrinks the sample size because GDP data in 1960 is incomplete, and it implicitly assumes that donors only present in later periods face a situation where relative incomes are those of 1960. In order to compensate for this last point I also ran regressions using the year the donor starts to be active as the reference year for the pair. Results were very similar.

for the recipient entering the sample after 1960, and v_{ij} is an error term.[9] The first column of Table 6 indicates that donors establish partnerships with wealthier countries later. However, GDP per capita is measured in thousands of dollars so the effect is very small. Columns (2), (3) and (4) focus on each donor category and include pair specific characteristics when available. I find that income does not have a robust effect on entry dates; coefficients are smaller and not precisely measured. In any case, income has a limited impact on the date of partnership creation. Population (measured in millions), though significant, affects this date even less. Distance (in thousand kilometers) also has a small impact. Four thousand kilometers explain only one additional year in entry date. On the other hand, "new" countries have the favor of bilateral donors, but not of multilateral agencies. Most of these "new" countries became aid recipients after the end of the Cold War, and it is not surprising that donors moved quickly in order to contribute to their stabilization. Former colonies were usually the first recipients of foreign aid. Effects are large and very significant, with donors initiating partnerships with their former colonies on average 4.61 years ahead of other partnerships.

[Table 6 about here.]

Table 6 shows that donors did not consider income a priority motivation for creating partnerships. This finding may come as a surprise given the current discourse on aid as a tool for poverty reduction. On the other hand, recall that most partnerships were created between the 1960's and late 1970's when such priorities were less compelling. Donors also may have found it optimal to move first to countries where their local knowledge was good enough to ensure a minimum level of efficiency. These were not necessarily the poorest countries, but most often were former colonies. Out of the 22

[9]Entry dates are discrete numbers, so a Poisson regression might be more suitable to estimate equation (3). Results using this alternative technique are very similar and so are not presented here.

DAC donors, seven did not have any colonies.[10] Estimating equation (3) for these seven donors only yields a coefficient on GDP of 0.96, with a standard error of 0.21, such that it is significantly different from zero at the one percent level.

4 Application to aid fragmentation

4.1 Significant partnerships

Aid fragmentation arises in a situation where donors give aid to many countries, and in small quantities. It raises administrative costs for both partners and multiple missions that otherwise could be pooled to increase efficiency. The results above have implications for our understanding of why aid fragmentation became so widespread and why it has worsened continuously since the beginning of aid history. Frot and Santiso (2008) documented trends in fragmentation and showed how portfolio sizes expanded while portfolio concentration remained fairly constant since the 1980's. To explain the stability in concentration, they suggest that expansion has not been met with credits and that new portfolio entries have received limited aid flows. The preceding section corroborates this idea: late partnerships involve significantly smaller disbursements. As portfolio size grew dramatically, fragmentation spread, with recipients facing more donors yet smaller disbursements.

The DAC measures donor fragmentation as the proportion of partnerships where the donor weighs less than its global aid share. Formally, if total global aid in a given year is X, and donor j disburses D_j then its global share w_j is $\frac{D_j}{X}$. This global share is compared to the donor share for each recipient. If recipient i receives total aid X_i, and donor j disburses x_{ij} then its share w_{ij} is $\frac{x_{ij}}{X_i}$. When $w_{ij} < w_j$ the recipient is not significant for the donor. A simple fragmentation measure for a donor is the fraction of its recipients that are

[10] These are Canada, Denmark, Finland, Ireland, Luxembourg, Norway, Sweden, and Switzerland.

not significant, i.e. where the donor share is smaller than the donor global share. The advantage of this measure is to emphasize the recipients that are under-weighted by the donor.

A quick illustration of the mechanism of fragmentation is provided by Figure 2. As in Figure 1, I use only data for donors that have been present from 1960 to 2006, to avoid disruptions and changes due to entry and exit. Three curves are plotted: current portfolio size is the number of partnerships with strictly positive disbursements during the year; total portfolio size is the number of partnerships created up to a given year, regardless of the disbursement during the current year; and number of significant partnerships. The latter has been relatively stable for many years, while the former has surged. Portfolio expansion has not implied the creation of new, significant partnerships but has worsened fragmentation. A donor from this group was on average involved in 120 partnerships in 2006, of which 45 only, or around 37 percent, were significant. Using data from all donors yields a slightly larger proportion of 40 percent in 2006.

[Figure 2 about here.]

This observation corresponds to the results of Section 2.1. Late recipients are unlikely to be significant because they are characterized by smaller aid shares. Table 7 confirms this prediction by estimating the probability for a partnership to be significant, depending on its date of entry and the usual set of controls.

[Table 7 about here.]

Consider again recipients A and B with a seven year difference in entry dates and assume that they both have the average GDP per capita and population. Using coefficients from the first column, A has a 39 percent probability of being significant when it starts receiving aid, while B only has a 28 percent probability. In year 20 A is still 12 percent more likely than

B to be a significant recipient (using column 2 coefficients yields the same difference in probabilities, assuming A and B are at the average distance from the donor and are not former colonies). Column (2) confirms the large premium associated with being a former colony. Quite interestingly GDP per capita does not influence significantly the probability for a partnership to be significant. It does only for non-DAC donors, but with a positive sign such that rich countries are more likely to be part of significant partnerships.

4.2 A simple reform

Recent evidence by Knack and Rahman (2007) and Djankov et al. (2009) that aid fragmentation decreases aid efficiency, and a better reporting of its magnitude and evolution (Acharya et al. (2006), OECD (2007), and Frot and Santiso (2008)) have led the donor community to issue calls to tackle it. The Paris Declaration states that donors should seek to reduce fragmentation, and OECD (2009) explains that it requires a better division of labor among donors. Cross-country division of labor would avoid multiple donor missions that spread aid thinly across developing countries. Donors may have to delegate authority to achieve such division of labor and accept that in a country more prominent donors are in charge of managing aid disbursements. If the need to reform is often advocated, the precise details of reforms are rarely spelled out. This section, and the following, aim to fill this gap by proposing a reform based on a simple criterion and evaluates its consequences on fragmentation. My goal is to contribute to the current discussion about aid fragmentation and to show what it would take in terms of division of labor to significantly reduce fragmentation.

Late partnerships involve smaller aid shares, likely to be below the global donor share. These partnerships are less important to donors, and so the key idea of the proposed reform is to eliminate them. Donors are only to keep partnerships that are significant to them. The money spent on non-significant recipients is returned and spent on the significant recipients. The

reform, therefore, forces donors to focus on their core set of activities. New aid allocations are not determined explicitly but I assume that no slack money is reinvested in non-significant recipients because the donor has revealed that these were not priority projects. Further, developing countries receive exactly the same aid quantity as before. Donors' aid budgets are left unchanged. Since the reform simply shifts money around, leaving donors and recipients indifferent in terms of aid allocated or received, it is rather innocuous. The reform relies on the idea that donors reveal their comparative advantages and that they should not be allowed to give aid when these are too low if fragmentation is to be avoided. Similarly to trade based on comparative advantages, no donor can be in a situation where it is not allowed to keep any partnerships. Any donor must have some significant partnerships in its portfolio.

Formally the reform is described as follows. Using the notations introduced in Section 4.1, recipient i is significant to donor j if and only if $\frac{x_{ij}}{X_i} \geqslant \frac{D_j}{X}$. Define $S = \left\{(i,j) : \frac{x_{ij}}{X_i} \geqslant \frac{D_j}{X}\right\}$, the set of significant partnerships. Denote by y_{ij} the allocations after the reform. The following conditions are imposed:

$$y_{ij} = 0 \text{ if } (i,j) \notin S \tag{4}$$

$$y_{ij} \geqslant x_{ij} \text{ if } (i,j) \in S \tag{5}$$

$$\sum_j y_{ij} = X_i \tag{6}$$

$$\sum_i y_{ij} = D_j \tag{7}$$

The first condition is central to the reform. It eliminates non-significant partnerships. The second condition states that no donor should reduce its allocation to a significant recipient. It ensures that after the reform a significant recipient remains significant, and that the reform does not create new non-significant partnerships. The third condition imposes that developing countries receive the same aid quantity, and the fourth that donors'

aid budgets are constant. Unfortunately the existence of y_{ij}'s that satisfy all these conditions cannot be ensured. Ignoring condition (5), the problem is to solve a linear system, but it typically has many more equations than unknowns.[11] There is an infinite number of solutions, but the existence of at least one that satisfies equation (5) is not necessary. To drop (5) is not feasible because the point of the reform is to cut out non-significant recipients and (5) prevents the creation of new ones. Dropping (5) would also imply that donors may have to decrease their allocations to recipients they value the most, which goes against the spirit of the reform. On the other hand condition (7) can be relaxed by allowing pooling of resources across donors. The slack funds created by equation (4) that have to be reinvested in order to meet the receipts condition (6) could, instead of being returned to donors, be pooled in a common fund. They would then be reallocated to satisfy (6). An alternative but equivalent idea is that the slack funds are pooled and then redistributed to donors. Condition (6) would be violated because some donors may disburse more or less than their aid budget. The idea of pooling resources is a point of discussion in the donor community, for instance by using Sector Wide Approaches (SWAp) where a lead donor acts as the main representative with the partner government (see for instance OECD, 2006). Under such a scheme, one donor would manage the resources of others for a particular project in a given country. OECD (2009) argues that, in practical terms, to deal with fragmentation "may involve donor countries pooling their resources, or nominating the donor country with the greatest relevant expertise to take the lead in delivering aid". The reform proposed here relies on this type of argument and practical arrangement.

If all the conditions can be met, then pooling is not needed for the reform to be implemented. If not, then pooling ensures that a solution exists.[12] I

[11] For instance in 2006 there were 1826 significant relationships, but only 212 equations (6) and (7).

[12] Note that "full" pooling is usually not required. Donors may have to put only a fraction of their slack funds in the common pool for the reform to be feasible.

do not solve for the post-reform allocations y_{ij}'s, because there is usually an infinite number of solutions (with or without pooling). Additional constraints would have to be imposed to narrow down the set of solutions. But the y_{ij}'s are not required: the donor DAC measure of fragmentation, and donor and recipient portfolio sizes can still be computed.

4.3 Consequences

The reform does not involve a massive reallocation of funds because significant recipients represent a large share of donor aid budgets, usually more than 80 percent. It typically requires the reallocation of 15-20 percent of all funds. Figure 4 puts into perspective total aid and total aid to significant recipients.

[Figure 3 about here.]

Given the small share of reallocated transfers the reform might have a limited impact on portfolio size and fragmentation. Figure 4 presents the average donor portfolio size before and after the reform in each year.

[Figure 4 about here.]

The reform has dramatic consequences for portfolio size. The average post-reform donor portfolio size is at its maximum around 35, while it has been above twice that level for many years. Portfolio size, following the reallocation of around 20 percent of aid, has been more than halved. The gap between the before and after curves is expanding, meaning that the reform would today have bigger effects than it would have in the past, because of worsening aid fragmentation. By construction there are no non-significant partnerships (the DAC measure of fragmentation for donors).

I now turn to the consequences for recipients. As is the case for donors, dropping the non-significant partnerships usually involves relatively small

changes in aid amounts. Significant partnerships represent, on average, between 90, in the 1960's, to 83 percent after 1990, of their total aid allocation. Figure 5 plots the average recipient portfolio size before and after the reform. Similarly to Figure 4 it appears that sizes would be reduced a lot, usually by more than half. Recipients would deal, on average, with slightly more than ten donors, instead of almost thirty. The benefits are large compared to the relatively limited reallocations. The reform only shuts down around 15 percent of the existing partnerships, but its effects are strong because it is precisely these partnerships that are creating most of the fragmentation.

[Figure 5 about here.]

Late partnerships are less likely to be significant and must be more affected by the reform. Figure 6 shows that this is indeed the case. Plotting the average entry date in the group of significant (or post-reform) and non-significant partnerships, along with the average entry date for all partnerships (or pre-reform). Entry dates for post-reform partnerships are on average 3 years smaller than for those eliminated. It confirms that late partnerships contribute disproportionately to aid fragmentation.

[Figure 6 about here.]

This simple exercise shows the large extent to which non-significant partnerships are contributing to fragmentation. The reshuffling of 20 percent of disbursements, changing neither donor aid budgets nor recipient allocations, would more than halve portfolio sizes and eliminate all non-significant partnerships. Donors would be able to focus better on recipients they choose to value, reflecting their primary interests. Such a reform also emphasizes how even a partial pooling of resources could reduce fragmentation.

5 Conclusion

This paper spotlights an overlooked property of aid allocation: donors are disbursing consistently larger aid quantities to countries that entered early in their portfolios. I show that this effect does not disappear in the long run, and that it is large compared to effects of other variables. Entry dates are not explained by income differences. Though entry dates are strongly related to colonial past, their effect on aid quantities is not explained solely by this characteristic. I infer therefore that entry dates reveal some information about partnership creation and modalities that is not captured by the more conventional determinants.

Donors' decision to give less aid to late recipients, coupled with the sheer expansion in the number of their partnerships, has direct consequences on aid fragmentation. Many partnerships represent only small aid quantities, and contribute disproportionately to fragmentation. A simple reform that eliminates these partnerships would reallocate around 20 percent of all the money disbursed, but would greatly reduce fragmentation. Its implementation is financially neutral: aid budgets and receipts are constant.

The proposed reform is more an intellectual exercise than a practical proposal, and it is unlikely that donors would subscribe to it. Donors are usually reluctant to lose control of their aid budgets, and this would impose constraints on how much pooling could be done. Recipients, for their part, may fear that they would experience a fall in their aid receipts, even though the reform is designed to prevent this outcome. Yet, despite its practical limitations the reform discussed here shows the potential benefits of moving aid policy in its direction. The recent calls for coordination among donors and for sector-wide approaches, with donors financing specific sectors by pooling resources, are encouraging signs.

Appendix

Aid is defined as gross aid net of debt relief. Data comes from the Development Database on Aid compiled by the Development Assistance Committee at the OECD. Donor recipient flows come from Table2a. Gross aid net of debt relief is obtained by subtracting "Net debt relief" from "ODA, Gross disbursements" and adding "Offsetting entries for debt relief". Debt relief is omitted because often it dramatically increases aid to a country in the year it is granted. For instance, gross aid to Nigeria jumped from $651 million in 2004 to $6.6 billion in 2005, and to $12.2 billion in 2006. However most of this money was debt relief and it does not reflect a long-term trend. Nigeria's net of debt relief aid actually was $842 million in 2005, and $1.05 billion in 2006. Such large variations, though recorded in aid figures, are artificial and would introduce disproportionate changes in aid shares. Gross, instead of net, aid is used as net figures can be negative and aid shares would not be properly defined. Aid is in 2006 constant US dollars.

Entry dates are defined as described in Section 2.1, but an additional modification is made for Portugal. According to DAC, Portugal disbursed aid from 1960 to 1967, and then from 1989 to 2006, but not in between. Because of this very long period of inactivity, entry dates are re-defined after 1989 as if Portugal were a new donor. Results are robust if this modification is not made.

GDP per capita and population data come from the World Development Indicators of the World Bank. GDP per capita is in constant 2000 US dollars.

Distance and colonial relationship are provided by the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII). The distance variable is defined as "simple distance (most populated cities)". The colony variable is "1 for pairs ever in a colonial relationship".

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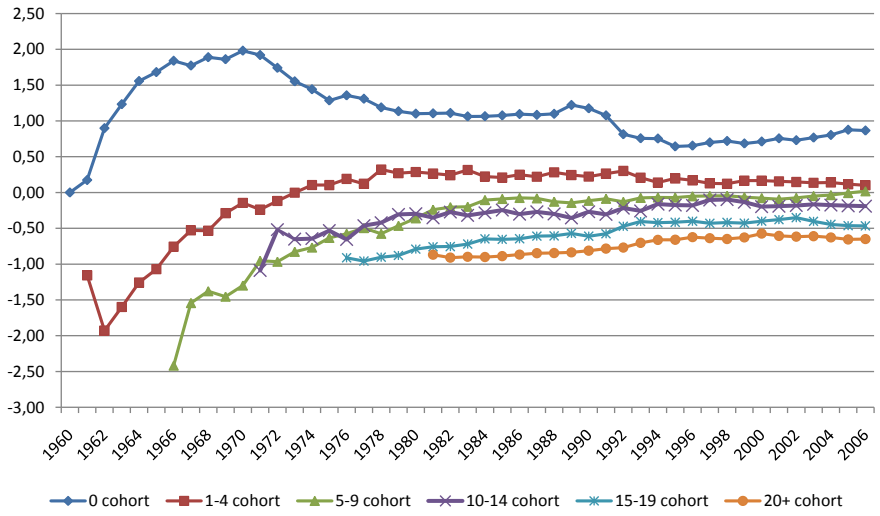

Figure 1: Average normalized share, by cohort

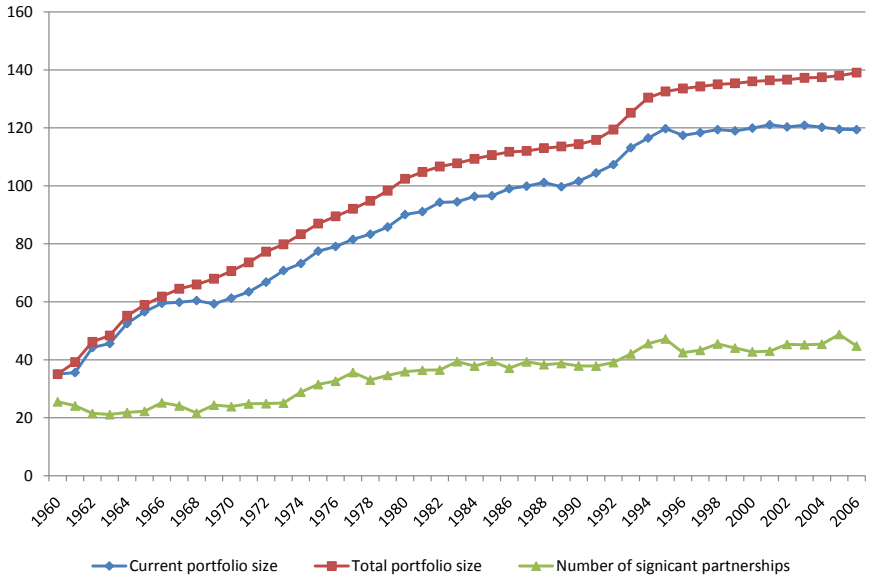

Figure 2: Average portfolio size and number of significant partnerships

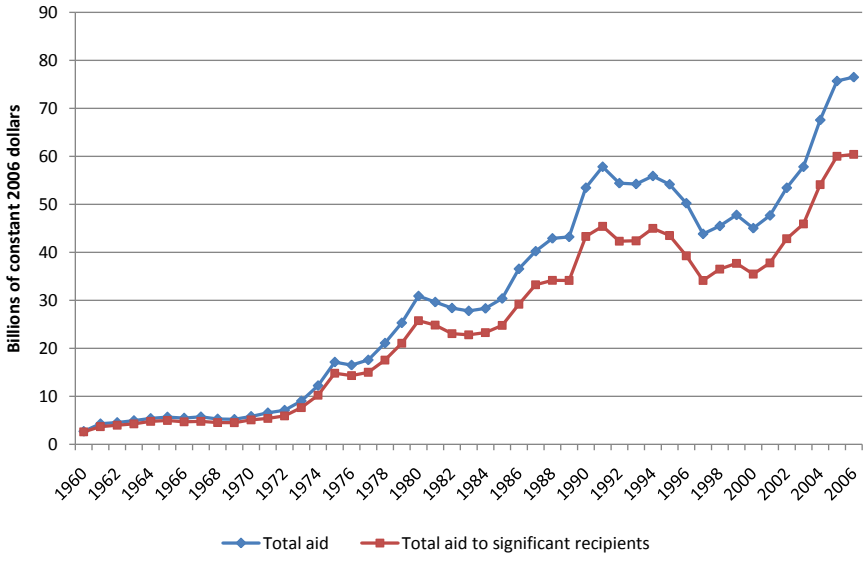

Figure 3: Total aid to all and significant recipients

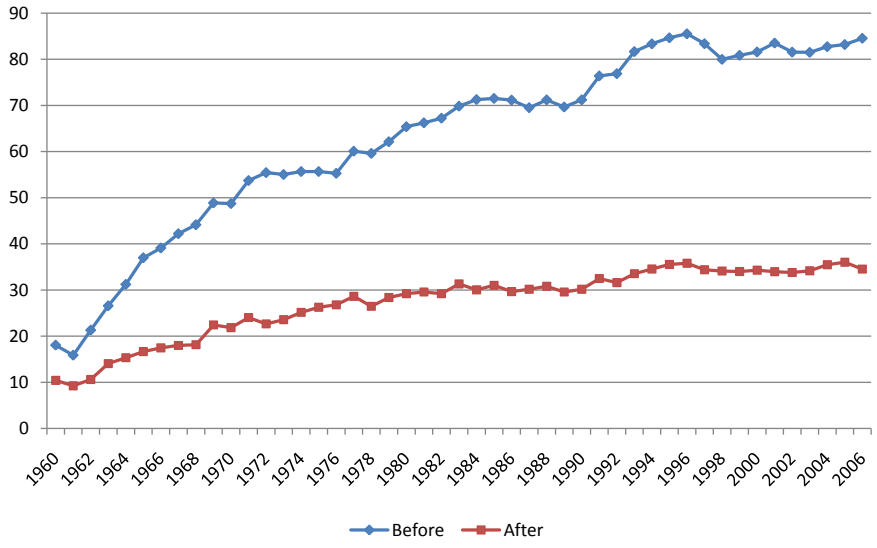

Figure 4: Average donor portfolio size

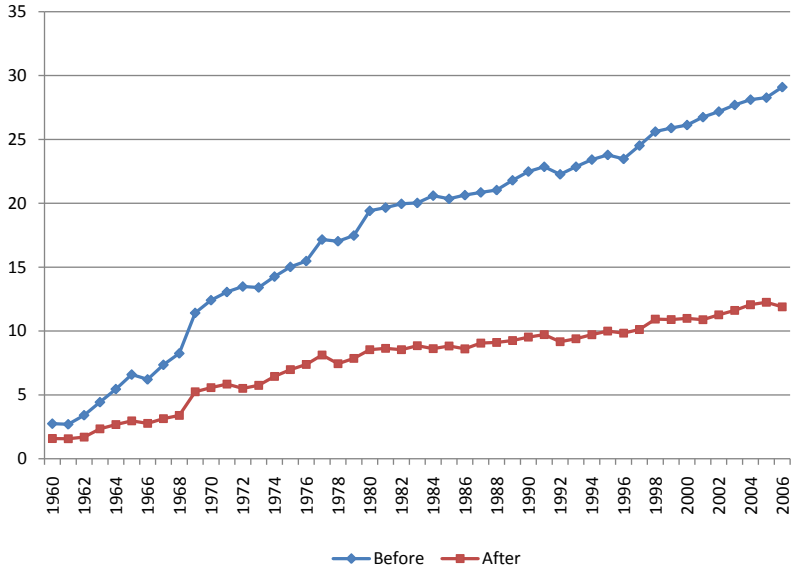

Figure 5: Average recipient portfolio size

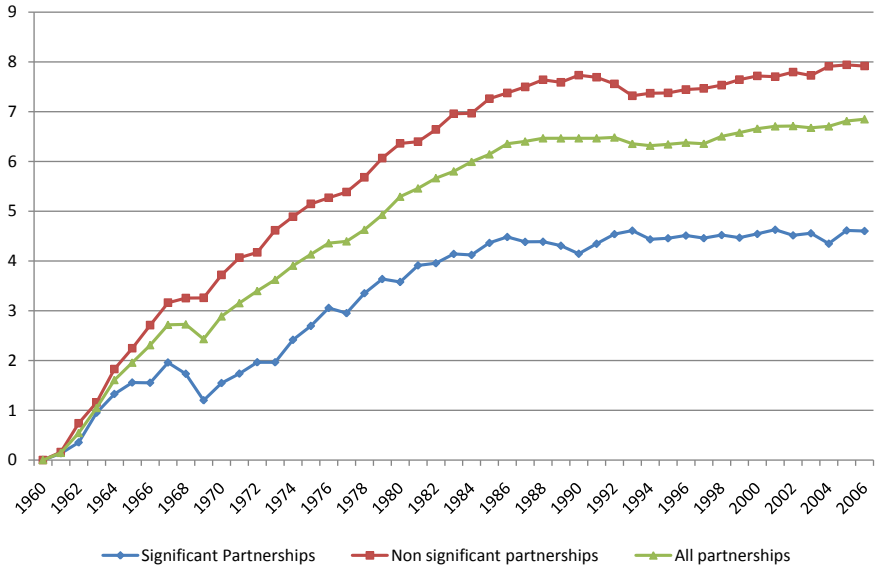

Figure 6: Average entry date

Table 1: Summary Statistics

	Sample	Mean	Standard deviation
Normalized share, percentage	All donors	0.02	3.38
	DAC donors	0.03	3.31
	Multilateral donors	0.04	3.19
	Non-DAC donors	-0.24	4.72
Length	All donors	16.11	11.43
	DAC donors	17.48	11.92
	Multilateral donors	15.53	10.54
	Non-DAC donors	3.88	6.22
Entry date	All donors	5.7	6.81
	DAC donors	7.03	7.28
	Multilateral donors	3.65	5.49
	Non-DAC donors	3.88	6.22
Population, millions		34.84	130.87
GDP per capita, constant 2000 thousand dollars		1.62	1.95
Distance, thousand km		7.83	3.68

Table 2: Aid share and entry date, donors' side

	All Donors			DAC Donors			Multilateral Donors			Non-DAC Donors		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	OLS	Censored	Censored	OLS	Censored	Censored	OLS	Censored	Censored	OLS	Censored	Censored
Length	0.052***	0.053***	0.061***	0.069***	0.087***	0.098***	0.030***	0.019	0.021	0.12***	-0.0020	-0.0040
	(0.0063)	(0.011)	(0.011)	(0.0084)	(0.013)	(0.012)	(0.0096)	(0.016)	(0.017)	(0.030)	(0.15)	(0.13)
Length, squared	-0.00094***	-0.00078***	-0.00094***	-0.0014***	-0.0015***	-0.0018***	-0.00054**	-0.00025	-0.00032	-0.0046***	0.00027	0.00023
	(0.00014)	(0.00025)	(0.00025)	(0.00018)	(0.00027)	(0.00026)	(0.00024)	(0.00044)	(0.00044)	(0.0012)	(0.0097)	(0.0079)
Entry date	-0.039***	-0.074***	-0.15***	-0.031***	-0.064***	-0.15***	-0.028***	-0.052**	-0.11***	-0.019	-0.066	-0.13
	(0.0049)	(0.011)	(0.025)	(0.0055)	(0.0097)	(0.021)	(0.0078)	(0.022)	(0.038)	(0.026)	(0.11)	(0.40)
Population	0.0043***	0.0045***	0.0044***	0.0042***	0.0045***	0.0044***	0.0057***	0.0059***	0.0059***	0.0010	0.0014*	0.0014*
	(0.00069)	(0.00069)	(0.00067)	(0.00077)	(0.00069)	(0.00069)	(0.0015)	(0.0015)	(0.0016)	(0.0011)	(0.00084)	(0.00078)
GDP per capita	-0.15***	-0.28***	-0.28***	-0.13***	-0.24***	-0.25***	-0.19***	-0.33***	-0.33***	-0.11***	-0.11	-0.11
	(0.015)	(0.034)	(0.034)	(0.019)	(0.041)	(0.040)	(0.031)	(0.079)	(0.082)	(0.031)	(0.084)	(0.080)
Entry date, squared			0.0038***			0.0036***			0.0034***			0.0030
			(0.00082)			(0.00078)			(0.0012)			(0.025)
Colony				2.84**	3.11	3.01				0.68**	1.17***	1.24***
				(1.08)	(2.11)	(2.00)				(0.21)	(0.41)	(0.48)
Distance				-0.068***	-0.097***	-0.099***				-0.079**	-0.067	-0.064
				(0.021)	(0.035)	(0.035)				(0.024)	(0.14)	(0.14)
Constant	-0.14***	-0.34***	-0.22***	0.091	-0.021	0.14	-0.047	-0.064	0.0061	0.040	-0.48	-0.38
	(0.047)	(0.085)	(0.084)	(0.18)	(0.26)	(0.26)	(0.069)	(0.14)	(0.15)	(0.30)	(0.52)	(0.58)
Observations	120601	120601	120601	70636	70636	70636	40091	40091	40091	5497	5497	5497
R^2	0.055	0.017	0.017	0.102	0.030	0.031	0.083	0.021	0.021	0.014	0.0025	0.0026

Standard errors clustered at the donor level in parentheses for all regressions and bootstrapped with 2000 replications for censored regressions. Aid share is expressed as a percentage. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Difference in aid shares and GDP per capita equivalent

Length in years	7	15	20	30	40	50
Difference between aid shares in percentages						
OLS	0.63	0.48	0.38	0.19	0.00	-0.19
Censoring	0.98	0.81	0.70	0.49	0.28	0.06
Censoring, degree 2 polynomial in entry date	1.45	1.25	1.13	0.88	0.62	0.37
Censoring, degree 5 polynomial in entry date	2.07	1.88	1.76	1.52	1.28	1.04
GDP per capita equivalent, in 2000 US dollars						
OLS	4827	3662	2934	1478	22	-1435
Censoring	4045	3340	2900	2019	1138	257
Censoring, degree 2 polynomial in entry date	5809	5007	4505	3502	2499	1495
Censoring, degree 5 polynomial in entry date	8462	7680	7192	6215	5238	4261

Estimates are for two recipients in a DAC donor portfolio.

Table 4: Aid shares and entry dates, recipients' side

	(1) All donors	(2) DAC donors	(3) Multilateral donors	(4) Non-DAC donors
Length	0.20***	0.49***	0.14***	1.48***
	(0.020)	(0.034)	(0.046)	(0.34)
Length, squared	-0.0037***	-0.0095***	-0.0053***	-0.041***
	(0.00048)	(0.00077)	(0.0013)	(0.013)
Entry date	-0.46***	-0.39***	-0.59***	-1.14**
	(0.046)	(0.075)	(0.12)	(0.54)
Entry date, squared	0.0070***	0.0026	0.0071	0.020
	(0.0018)	(0.0031)	(0.0060)	(0.022)
Aid budget	1.75***	2.47***	4.90***	-0.23
	(0.064)	(0.11)	(0.21)	(0.86)
Colony		23.8***		8.76*
		(1.91)		(5.08)
Distance		-0.68***		0.23
		(0.080)		(0.29)
Constant	-4.28***	-5.11***	-6.10***	-15.1***
	(0.18)	(0.72)	(0.36)	(2.70)
Observations	140818	82177	46312	6209
Pseudo R^2	0.027	0.058	0.024	0.004

Censored regressions. Bootstrapped standard errors with 2000 replications clustered at the recipient level in parentheses. Aid share is expressed as a percentage. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Difference in aid shares and aid budget equivalent

Length in years	7	15	20	30	40	50
Difference between aid shares in percentages						
Censoring, degree 2 polynomial in entry date	5.56	4.50	3.84	2.51	1.18	-0.14
Censoring, degree 5 polynomial in entry date	8.12	7.09	6.46	5.18	3.90	2.63
Aid budget equivalent, in 2006 billion US dollars						
Censoring, degree 2 polynomial in entry date	2.25	1.82	1.55	1.02	0.48	-0.06
Censoring, degree 5 polynomial in entry date	3.35	2.92	2.66	2.13	1.61	1.08

Estimates are for two DAC donors.

Table 6: Entry date determinants

	(1) All donors	(2) DAC donors	(3) Multilateral donors	(4) Non-DAC donors
Population	-0.0024***	-0.0050***	-0.0010	-0.0016**
	(0.00063)	(0.0011)	(0.00095)	(0.00066)
GDP per capita	0.42***	0.29*	0.40	0.23
	(0.14)	(0.16)	(0.29)	(0.43)
New country	-3.17***	-4.40***	-0.55	-3.91**
	(0.59)	(0.83)	(0.80)	(1.66)
Colony		-4.61***		-1.96
		(1.23)		(2.12)
Distance		0.23*		-0.16
		(0.12)		(0.17)
Constant	5.59***	5.91***	2.98***	7.05**
	(0.62)	(1.23)	(0.71)	(3.06)
Observations	3617	1814	1206	425
Adjusted R^2	0.042	0.109	0.007	0.031

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. OLS regressions. Standard errors clustered at the recipient level in parentheses.

Table 7: Probability of being a significant partnership

	(1) All donors	(2) DAC donors	(3) Multilateral donors	(4) Non-DAC donors
Length	0.013**	0.031***	-0.012	-0.036
	(0.0052)	(0.0067)	(0.0085)	(0.023)
Length, squared	-0.00024*	-0.00055***	0.00035	0.00056
	(0.00013)	(0.00013)	(0.00025)	(0.00091)
Entry date	-0.046***	-0.036***	-0.028***	-0.057***
	(0.0053)	(0.0051)	(0.0080)	(0.019)
GDP per capita	-0.023	-0.019	-0.047	0.088***
	(0.018)	(0.024)	(0.035)	(0.019)
Population	-0.00048***	-0.00022	-0.00058**	-0.00036
	(0.00015)	(0.00016)	(0.00028)	(0.00023)
Colony		1.39***		0.18
		(0.15)		(0.12)
Distance		-0.052***		-0.052***
		(0.014)		(0.013)
Constant	-0.22***	-0.28*	0.23***	-0.084
	(0.071)	(0.15)	(0.079)	(0.15)
Observations	120588	70623	40091	5497
Pseudo R^2	0.04	0.11	0.02	0.07

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Probit regressions. Standard errors clustered at the donor level in parentheses.