ISSN 1756-7904

INTERNATIONAL DEVELOPMENT
University of East Anglia

Working Paper Series

Aid fragmentation and donor transaction costs

Edward Anderson

2011

University of East Anglia

Working Paper 31

The School of International Development, University of East Anglia
Norwich, NR4 7TJ, United Kingdom

DEV Working Paper 31

Aid fragmentation and donor transaction costs

Edward Anderson

First published by the School of International Development in May 2011.

This publication may be cited as:
Anderson, E., 2011, Aid fragmentation and donor transaction costs, Working Paper 31, DEV Working Paper Series, The School of International Development, University of East Anglia, UK.

About the Author
Edward Anderson is a Lecturer in Development Studies in the School of International Development at the University of East Anglia, Norwich, UK.

Contact:
Email edward.anderson@uea.ac.uk
School of International Development
University of East Anglia
Norwich, NR4 7TJ
United Kingdom
Tel: +44(0)1603 593664
Fax: +44(0)1603 451999

ISSN 1756-7904

About the DEV Working Paper Series

The Working Paper Series profiles research and policy work conducted by the School of International Development and International Development UEA (see below). Launched in 2007, it provides an opportunity for staff, associated researchers and fellows to disseminate original research and policy advice on a wide range of subjects. All papers are peer reviewed within the School.

About the School of International Development

The School of International Development (DEV) applies economic, social and natural science disciplines to the study of international development, with special emphasis on social and environmental change and poverty alleviation. DEV has a strong commitment to an interdisciplinary research and teaching approach to Development Studies and the study of poverty.

International Development UEA (formerly Overseas Development Group)

Founded in 1967, International Development UEA is a charitable company wholly owned by the University of East Anglia, which handles the consultancy, research, and training undertaken by the faculty members in DEV and approximately 200 external consultants. Since its foundation it has provided training for professionals from more than 70 countries and completed over 1,000 consultancy and research assignments. International Development UEA provides DEV staff with opportunities to participate in on-going development work, practical and policy related engagement which add a unique and valuable element to the School's teaching programmes.

For further information on DEV and the International Development UEA, please contact:

School of International Development
University of East Anglia, Norwich NR4 7TJ, United Kingdom
Tel: +44 (0)1603 592329
Fax: +44 (0)1603 451999
Email: dev.general@uea.ac.uk
Webpage: www.uea.ac.uk/dev

Notes and acknowledgements
Three annexes containing additional empirical results are available at: https://www.uea.ac.uk/dev/publications/workingpapers. I am grateful for comments from Paul Clist and Arjan Verschoor.

Abstract

In recent years, the issue of aid fragmentation has come under increasing scrutiny. This paper uses econometric analysis to show that the fragmentation of bilateral donors' aid across many recipients tends to raise their administration costs. It then develops an aid allocation model to show how bilateral donors can become much more specialised in terms of which recipients they give aid to, but without affecting the total amount of aid received by each recipient. The combination of the econometric results and the model simulations suggests that bilateral donors could through greater specialisation reduce their administration costs by as much as US$2 billion per year. This does not amount to an overall case for more country specialisation by donors, but it does provide a clearer picture of the cost of the currently limited amount of specialisation.

1 Introduction

In recent years, the issue of aid fragmentation has come under increasing scrutiny (e.g. Easterly 2002, Acharya et al. 2006, Bigsten 2006, Roodman 2006, Knack and Rahman 2007, Djankov et al. 2009, Aldasoro et al. 2009, Frot 2009). Attention has focused in particular on the substantial costs that recipients face in having to deal with a large number of donors. Direct evidence of these costs (e.g. time used up by government officials in donor meetings) has proved hard to come by (see Amis et al. 2005), but there is quite a lot of indirect evidence. For example, Knack and Rahman (2007) find that aid fragmentation is associated with lower bureaucratic quality among countries receiving substantial amounts of aid, while Djankov et al. (2009) find that fragmentation makes aid less effective in terms of its impact on economic growth (similar findings are also reported by Kimura et al. 2007 and Annen and Kosempel 2007). The example of Marshall Aid in the late 1940s is also used as an illustration of how effective aid can be if provided by a single large donor rather than a multitude of different donors (e.g. Acharya et al. 2006, Knack and Rahman 2007).

It has also been argued that aid fragmentation imposes costs on donors, since it prevents them from exploiting economies of scale in their country operations (e.g. Rowlands and Ketcheson 2002). However, no evidence in support of this hypothesis has yet been provided. The first part of this paper aims to fill this gap in the literature. It does so by carrying out an econometric analysis of the determinants of bilateral donors' administration costs, using data contained in Table 5 of the OECD-DAC Annual Aggregates Database. The results of this analysis show that greater fragmentation of bilateral donors' aid across many recipients does tend to raise their administration costs, and that this effect is statistically significant and robust to the inclusion of a range of control variables and estimation methods. This new evidence on the costs of fragmentation for donors complements the existing evidence for recipients reported by Knack and Rahman (2007) and Djankov et al. (2009) among others.

One possible response to the problems caused by aid fragmentation is for donors to specialise more in terms of which recipients they give aid to.[1] Specialisation offers an opportunity to reduce transaction costs in aid delivery, by reducing both the number of countries in which donors operate and the number of donors that recipients have to deal with. In the words of Acharya et al. (2006: 17):

"… suppose the aid community took a broader regional or global approach, and tried seriously to reduce the numbers involved in each case? This would involve

[1] Country specialisation is only one possible response to the problem of aid fragmentation; other responses include greater 'harmonisation' among donors with operations in the same recipient countries. However, it is plausible that efforts to tackle the problems caused by fragmentation for recipients will make only limited progress if the number of donors operating in each country remains large (e.g. Acharya et al. 2006). Thus although country specialisation is not the only response to aid fragmentation, it is arguably a necessary response. Other possible responses are not examined in this paper.

encouraging donors to reduce the numbers of countries in which each operates, concentrate more on a smaller number of countries, and thus, without changing overall aid levels, change the aid environment in ways likely to reduce the major transactions costs".

More recently, a commitment to dialogue aimed at securing greater country specialisation by donors, in order to reduce excessive costs of aid delivery, was part of the so-called 'Accra Agenda for Action', agreed at the Third High Level Forum on Aid Effectiveness held in Accra in September 2008 (see OECD 2009: 42-43).

However, one of the problems with donor specialisation is that it could lead to an overall allocation of aid which is highly undesirable. If not adequately coordinated, donors could specialise in the same recipients, which would end up receiving much more aid in total than considered appropriate, given (say) levels of development and absorptive capacity, while other recipients would end up receiving much less. This problem is recognised by Acharya et al (2006: 14), who argue that "policy changes intended to reduce the problems of proliferation-fragmentation could run counter to other objectives, such as allocating according to poverty or some measure of likely ability to use aid well". It is also noted by Knack and Rahman (2007), Aldasoro et al (2009) and OECD (2009).[2]

If donors are to become more country specialised therefore, they must co-ordinate their specialisation decisions to ensure that each recipient receives the 'right' amount of aid in total. This type of donor co-ordination has been labelled 'complementary co-

[2] For example, Knack and Rahman (2007: 195) argue that the efficiency savings derived from greater country specialisation are "unlikely to be an effective public-relations response" by donors, if people are concerned that important development challenges are being under-funded as a result. Aldasoro et al (2009: 1) argue that decisions by donors to concentrate their aid on certain recipients can make aid more effective, "but only if donors concentrated on *different* recipient countries … rather than engaging with the same 'aid darlings'" (italics in original). The OECD (2009: 42) also notes the danger of "overconcentrating on donor 'darlings' and neglecting donor 'orphans'" in the context of cross-country specialisation by donors.

ordination' by Rowlands and Ketcheson (2002).[3] Co-ordinating allocation decisions can be difficult however, and – with the recent exception of Frot (2009) – donors have received little guidance as to how they might co-ordinate in this way. The second part of this paper therefore sets out a method by which donors can co-ordinate their allocation decisions, so that each donor becomes more specialised but each recipient receives the right amount of aid in total. This method involves the use of an aid allocation model. Aid allocation models have proved useful in the past, perhaps most notably by Collier and Dollar (2001, 2002) to show how a reallocation of the global aid budget could raise the rate of global poverty reduction. However, while the Collier-Dollar model determines the optimal total amount of aid to each recipient, it does not indicate how much of this total should be provided by any one particular donor. The same applies to the recent extension of the Collier-Dollar model by Wood (2008), as well as other allocation models (e.g. McGillivray and White 1994, Llavador and Roemer 2001). Thus although these models can be of considerable use in determining whether a recipient receives too little or too much aid in total, they are of little use in guiding donor specialisation.

By contrast, the model outlined in this paper determines the optimal allocation of aid between each bilateral donor and each recipient. It works by minimising a proxy for the total transaction costs incurred in transferring aid from donor to recipient countries, subject to the constraint that each recipient continues to receive the same amount of aid in total from all donors. Each donor's total aid budget is also assumed

---

[3] In particular, "[c]omplementary co-ordination suggests that donors coordinate their activities to achieve an overall distributional goal. With complementary co-ordination, any donor's individual allocation pattern may appear largely random. When taken collectively, however, the allocation pattern of all donors becomes "coherent" according to their mutually-defined objectives. …. In the extreme, complementary coordination could lead to perfect specialisation of donors. For example, Canada might become the key donor for only two or three sub-Saharan African states, while France may play the same role in five or six others." (Rowlands and Ketcheson 2002: 26). Complementary coordination can also occur at the sector level, when different donors specialise in providing aid to different sectors in the same recipient. In this paper however, the focus is on specialisation by country and not by sector.

fixed. The proxy for transaction costs is 'adjusted aid miles': the total distance that aid must travel from donors to recipients, with distance being scaled down in cases where donor and recipient share a common language. Since a large number of the optimal bilateral allocations implied by the model are zero, the model determines an optimal pattern of recipient country specialisation for each donor, based on its geographical location and language characteristics.

The results of the model show that bilateral donors could become much more country specialised than they are currently, without affecting the total amounts of aid received by each recipient. Depending on which particular version of the model is used, the largest number of recipients for any one bilateral donor is around 45, while the mean is around 26. The actual figures, using data for 2009, were 134 and 84 respectively. When combined with the econometric results from the first part of the paper, these results suggest that bilateral donors could reduce their administration costs by as much as US$2 billion per year through greater country specialisation. This figure is obtained by multiplying the reduction in fragmentation implied by the model for each bilateral donor with the estimated effect of fragmentation on donors' administration costs.

Of course, that donors could substantially reduce their transaction costs through greater specialisation does not amount to an overall case for more country specialisation by donors, even if the amounts of aid received by each recipient are unaffected. On the one hand, a lack of specialisation can provide certain benefits for recipients: for example, competition between donors with operations in the same countries may also drive improvements in their performance (e.g. Klein and Harford 2005). On the other hand, donors may simply place a high importance on having a 'global presence' in their aid programmes (e.g. Bigsten 2006). Nevertheless, by adding to the evidence of the costs of fragmentation, the results do allow donors to make a more considered judgement as to the desirability of having a 'global presence' in their aid portfolios, and provide an indication of how large the benefits of fragmentation must be for recipients if they are to outweigh the costs.

Two other points are worth noting at the outset. First, the model is applied to bilateral donors only, on the grounds that specialisation by multilateral donors is a more complex issue, arguably more likely to occur by sector within recipient countries than by recipient country. Second, the model outlined in this paper implicitly regards the current total amounts of aid received by each recipient to be the 'right' amounts. This is clearly contestable, since many features of current aid allocation patterns have been shown to be highly dubious, such as small country bias (e.g. Isenman 1976), and higher overall amounts for former colonies (e.g. Alesina and Dollar 2000). However, the question of how much each recipient should receive in total in a global aid allocation remains a controversial one. In the absence of any clear consensus on this issue, it makes sense to assess the potential for greater country specialisation by bilateral donors in the context of the existing amounts of aid received by each recipient in total, as opposed to the optimal amounts.[4]

The remainder of the paper proceeds as follows. Section 2 presents the econometric analysis of bilateral donors' transaction costs, using the data on donors' administration costs contained in the OECD-DAC aid database. Section 3 then outlines the proposed aid allocation model, and the implied patterns of recipient country specialisation when the model is applied to the 23 bilateral donors of the OECD-DAC. It also reports the estimated amounts by which aid fragmentation would fall for each donor and recipient if the specialisation patterns suggested by the model were adopted. Section 4 summarises the main results and implications for policy.

[4] There is however no reason why the model could not be applied in future work with some other total acting as the constraint on the recipient side: for instance, that each recipient receives the amount of aid implied by a 'poverty-efficient' allocation of the global aid budget. A 'poverty-efficient' allocation is an allocation of the total global aid budget that achieves the greatest global reduction in poverty (see Collier and Dollar 2001, 2002; Wood 2008).

2 Donor transaction costs

This section provides some new evidence of the effect of aid fragmentation on donors' transaction costs, to complement the existing evidence which relates to recipients. The analysis is carried out for bilateral OECD-DAC donors only, using the data on administrative costs contained in Table 5 of the OECD-DAC Annual Aggregates Database.[5]

2.1 The donor cost function

I begin with some definitions and notational issues. C_{ij} is the value of transaction costs incurred by donor i in giving aid to recipient j, and A_{ij} is the value of aid actually received by recipient j from donor i, not including transaction costs. A_i is total value of aid given by donor i which is actually received by recipients, C_i is the total value of the donor's transaction costs, T_i is donor's total aid budget, and s_i is the share of transaction costs in the donor's total budget. Thus:

$$A_i \equiv \sum_j A_{ij}\ ,\ C_i \equiv \sum_j C_{ij}\ ,\ B_i \equiv A_i + C_i\ ,\ s_i \equiv C_i / B_i\ .$$

By transaction costs I refer to all those costs incurred by a donor which are not received as resource transfers by recipient countries. The most obvious categories are the salary costs of donor staff, travel expenses (between head office and recipient country offices), plus various other costs (e.g. buildings and materials).[6] In the aid industry these costs are typically referred to as 'administrative costs' or perhaps 'overhead costs', but at a theoretical level the term 'transaction costs' is preferable. In

[5] There are 23 bilateral OECD-DAC donors: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Japan, Italy, Luxembourg, Netherlands, New Zealand, Norway, Portugal, South Korea, Spain, Sweden, Switzerland, the UK and the US.

[6] I assume that all of the donors' transaction costs can be attributed to at least one recipient country, at least in theory if not in practice. For example, the salary costs incurred in a donor's head office are unlikely to be distinguished by recipient country, since many head office employees spend part of their time working with one recipient and other parts with other recipients. In theory however, one could determine the proportion of time spent by each employee working on each recipient country.

economic theory, transaction costs are typically decomposed into search, bargaining and enforcement costs. This decomposition applies equally to aid transactions, although (for reasons of data availability) no attempt is made in this paper to analyse these different types of transaction costs separately.

I now turn to different forms that the donor's cost function might take. An obvious starting point, following McGillivray et al. (2002), is a function of the form:

$$C_i = cA_i^b \tag{1}$$

where $0 < b \le 1$. A value of *b* less than one implies that there are economies of scale in aggregate terms, i.e. total administrative costs rise less than proportionately with the total amount of aid given. By contrast, a value of *b* equal to one implies no economies of scale in aggregate terms: total costs rise proportionately with total aid given.

The implicit assumption underlying equation (1) is that donors' costs are independent of how they allocate aid across recipients; costs only depend on the total amount of aid given. A slightly different approach is to assume that economies of scale operate at the level of each country office, i.e. the costs of giving to each recipient rise less than proportionately with the amount of aid given to that recipient. In algebraic terms, the cost function is now given by:

$$C_{ij} = cA_{ij}^d \tag{2}$$

where $0 < d \le 1$. A value of *d* less than 1 indicates economies of scale at the (recipient) country level. Equation (2) implies that donor's overall costs will depend partly on the total amount of aid given, but also on the way in which aid is allocated: in particular, costs will be higher the more fragmented (or less concentrated) the donor's aid.[7] It is not possible to derive a specific form for this overall cost function

[7] Consider the following example to illustrate. There are two donors and two recipient countries, with cost parameters c=0.2 and d=0.7. Each donor gives a total of $200 million in aid. If each donor spreads

purely on the basis of equation (2), but one can instead write down a more general overall cost function of the form:

$$C_i = f(A_i, F_i) \quad (3)$$

where F_i is some measure of the fragmentation of the donor's aid. If there are economies of scale at the country level, the expectation is that $\partial C/\partial F > 0$.

The implicit assumption underlying equation (3) is that donors' costs are independent of which particular recipients they focus their aid on. An obvious extension is to allow for the converse possibility, i.e. costs do depend on the particular recipients donors concentrate on. In this case, we can re-express equation (2) as:

$$C_{ij} = c_{ij} A_{ij}^{d} \quad (4)$$

where

$$c_{ij} = f(x_{ij}^{k}) \quad (5)$$

and x_{ij}^{k} is a vector of characteristics (*k=1,…,K*) which affect the costs incurred by donor *i* in transferring resources to recipient *j*. The characteristics likely to affect these costs include characteristics of the recipient country and characteristics of the donor-recipient relationship. The former might include things like bureaucratic efficiency and the quality of travel and communication infrastructure, while the latter might include the geographical distance between donor and recipient, and whether or not the donor and recipient share a common language. The aggregate version of equation (4) can be written as:

---

their aid equally across recipients, their administration costs will each amount to around $10 million. By contrast, if each donor completely specialises in one recipient, their administration costs will each fall to around US$8 million.

$$C_i = f(A_i, F_i, X_i^k) \tag{6}$$

where X_i^k is a vector whose elements are the weighted average of each element in x_{ij}^k, with actual aid flows used as weights, i.e.:

$$X_i^k = \frac{1}{A_i} \sum_j A_{ij} x_{ij}^k \tag{7}$$

The next section provides empirical estimates of these cost functions, focusing in particular on equation (6).

2.2 Evidence from OECD-DAC data

In this section I present some empirical estimates of the cost functions outlined in Section 2.1 for OECD-DAC donors, using information contained in Table 5 of the OECD-DAC Annual Aggregates Database. This information relates to donors' total administrative costs, and is available on an annual basis stretching back to 1984 for some donors; the latest available year is 2009. The OECD-DAC Creditor Reporting System (CRS) provides disaggregated information on donors' administrative costs by recipient, but most donors do not report this information, and the figures which are reported are often so low as to be implausible. For these reasons, the analysis in this section relates only to donors' total administrative costs, i.e. C_i but not C_{ij}.

The OECD database is not the only source of information on donor transaction costs. For example, Easterly and Pfutze (2008) have also looked at donors' transaction costs (what they call overhead costs), but obtained their data by consulting each donor's website and/or e-mailing them directly. The great advantage of the OECD database is that it gathers cost data for all donors into a single source, and contains costs estimates for many years which would otherwise be much more time consuming to collect. The disadvantage (in addition to the lack of country disaggregation noted already) is that the OECD database does not distinguish between different types of administrative costs (e.g. wages and salaries, travel expenses); by contrast, the figures obtained by Easterly and Pfutze (2008) do provide some distinctions along these lines. In the context of this paper however, this drawback is not that significant, since no attempt is made in this paper to analyse different types of aid transaction costs separately.

I begin by showing in Figure 1 and Table 1 some information on the share of administrative costs in the total aid budgets of each DAC donor.[8] Figure 1 shows that cost shares have tended to rise somewhat over time for all donors as a whole, from around 3% in 1990 to 5% in 2009. Table 1 shows that cost shares differ quite significantly between donors, with the most recent data (for 2009) showing a low of 2% for South Korea and a high of 11% for New Zealand.

I now turn to the econometric analysis of the determinants of donor transaction costs. For each donor and available year of data, I calculate three measures of the fragmentation of aid, namely a) the number of recipient countries receiving at least some aid, b) the Herfindahl index, defined as:

$$F_{it}^{H} = \sum_{j} \left(\frac{A_{ijt}}{A_{it}} \right)^{2} \tag{8}$$

and c) the Theil index, defined as:

$$F_{it}^{T} = \sum_{j} \left[\frac{A_{ijt}}{A_{it}} \cdot \ln\left(\frac{A_{ijt}}{A_{it}} \right) \right] \tag{9}$$

[8] The data on total aid budgets, which include administrative costs, are also taken from Table 5 of the OECD-DAC Annual Aggregates Database. These totals refer to total ODA bilateral commitments. They do not include the amounts that each DAC country gives to multilaterals. All value figures are expressed in constant 2008 US$. It is worth noting that the figures reported by Easterly and Pfutze (2008) for the ratio of administrative costs to donors' total aid budgets (Table 4 of their paper) are not always the same as the figures reported in Table 1. This is not unexpected, since the data were collected in different ways (see main text). There are also some donors which Easterly and Pfutze (2008) were not able to obtain cost estimates for, but which do nonetheless report administrative costs to the OECD-DAC (e.g. Germany, Sweden, France and Denmark), and which are therefore reported in Table 1 of this paper.

where the subscript t indicates a particular year (t=1,…,26). Both the Herfindahl and the Theil index have been used in the previous literature as measures of fragmentation; in what follows I do not include both indices in the same regression, but test the extent to which the results differ depending on which index is used. Note that higher values of the Herfindahl and Theil indices signify less fragmentation and more concentration of a donor's aid.

I also calculate three variables likely to feature in the vector of recipient and/or donor-recipient characteristics X_i^k. The first of these is the weighted average of the distance from each donor to its recipients, i.e.:

$$X_{it}^{D} = \frac{1}{A_{it}} \sum_{j} A_{ijt} d_{ij} \tag{10}$$

where d_{ij} is the geographical distance (in miles, as the crow flies) between the capital cities of donor i and recipient j. The second measure is the share of the donor's aid which goes to recipients with which it shares a common language, i.e.:

$$X_{it}^{L} = \frac{1}{A_{it}} \sum_{j} A_{ijt} l_{ij} \tag{11}$$

where l_{ij} is a dummy variable equal to 1 if donor i and recipient j share a common language, and 0 otherwise. The language data are taken from the CEPII database.[9] The third measure is the weighted average per capita GDP of the recipients the donor gives aid to, i.e.:

$$X_{it}^{Y} = \frac{1}{A_{it}} \sum_{j} A_{ijt} y_{jt} \tag{12}$$

[9] This is available at http://www.cepii.fr/anglaisgraph/bdd/distances.htm. Two language variables are available in this dataset: one based on whether two countries share a common official language, the other based on whether a language is spoken by at least 9% of the population in both countries. I use both variables and test the sensitivity of results.

where y_{jt} is per capita GDP (in constant US$, at purchasing power parity exchange rates) in recipient j in year t. This variable is designed to capture a range of recipient country characteristics (e.g. quality of bureaucracy, transport infrastructure) that might affect transaction costs.

For estimates of A_{ij}, I use either total gross disbursements or total commitments by each donor to each recipient contained in Tables 2a and 3a of the OECD-DAC database respectively, and test the sensitivity of results to the aid measure used. I also use the sum of reported disbursements (or commitments) to each recipient as the measure of A_i, i.e. the total amount of aid a donor transfers to recipients.[10] Following OECD (2007), I exclude from the analysis any reported values of A_{ij} less than US$250,000 (in 2008 prices), on the grounds that entries of this size typically do not induce transaction costs. For the dependent variable, I use either total administrative costs (in logarithms) or the share of administrative costs in the donor's total budget (in per cent). Descriptive information on each of the variables used in the analysis is shown in Table 2.

The two main specifications used in the analysis are therefore:

$$\ln C = \beta_0 + \beta_1 \ln A + \beta_2 N + \beta_3 F + \beta_4 \ln X^D + \beta_5 X^L + \beta_6 \ln X^Y + \upsilon \quad (13)$$

$$s = \alpha_0 + \alpha_1 \ln A + \alpha_2 N + \alpha_3 F + \alpha_4 \ln X^D + \alpha_5 X^L + \alpha_6 \ln X^Y + \upsilon \quad (14)$$

where N is the number of recipients, F is either the Theil or Herfindahl measure of fragmentation, and X^L is one of the two measures of common language (see footnote 9). The hypotheses are that $\alpha_1, \alpha_3, \alpha_5 . \beta_3, \beta_5 < 0$, $\alpha_2, \alpha_4, \beta_2, \beta_4 > 0$, and $0 < \beta_1 < 1$. Five different estimation methods are used, namely ordinary least squares (OLS), random effects, fixed (donor) effects, fixed effects with a correction for autocorrelation, and

[10] The value of A_i calculated in this way excludes disbursements to groups of developing countries (classified in Table 2a as "regional" disbursements), as well as those classified as "Developing countries unspecified".

first differencing. All regressions include individual dummy variables for each time period (year).

The results of the econometric analysis are reported in Table 3. The results shown are those when using aid disbursements, the Theil measure of fragmentation and the first of the two language variables. The results of the Breusch-Pagan test suggests that random effects model (column 2) is to be preferred over OLS (column 1), while the results of the Hausman test suggest that the fixed effects model (column 3) is to be preferred over the random effects model. The estimated autocorrelation coefficient is also relatively large (0.6 in panels A and B respectively), indicating that the fixed effects model which corrects for autocorrelation (column 4) is to be preferred over the standard fixed effects model. There is however no simple way of choosing between the results of the fixed effects models and the first differencing model (column 5) (Wooldridge 2009: 488); thus where the results of these models differ substantially there must remain some uncertainty about the results.

With this caveat in mind, the main results may be summarised as follows. First, the coefficient on total aid is almost always between zero and one (in the upper panel) and negative (in the lower panel), and statistically significant. This is fairly strong evidence of economies of scale for donors in the aggregate, i.e. total administrative costs rise less than proportionately with the total amount of aid given. Second, the coefficient on the Theil fragmentation measure is always negative and statistically significant when using the preferred estimation methods (columns 4 and 5). This is fairly strong evidence that there are also economies of scale for donors at the country level, i.e. the costs of giving to a recipient rise less than proportionately with the amount of aid given to that recipient. The size of the coefficients obtained in columns 4 and 5 suggest that a donor which raises its Theil index by 1.5 points – roughly, this corresponds to moving from the 10th to the 90th percentile in the range of values in the regression sample – would reduce its total administrative costs by between 37 and 48 per cent, or the share of administrative costs in its total budget by between 1.4 and 2.3 percentage points.

Third, the estimated coefficient on average distance to recipients is typically positive, as expected, but it is statistically significant only in the lower panel in either of the preferred methods (columns 4 and 5). The results are therefore somewhat inconclusive as regards the effects of distance to recipients on donors' transaction costs. Fourth, the estimated coefficient on common language is also typically positive, which is not as expected, although it is not statistically significant in either of the preferred specifications. Finally, the estimated coefficients on the number of recipients and the average GDP per capita of recipients are typically not statistically significant.

The main results shown in Table 3 are qualitatively similar when using the Herfindahl index of fragmentation, the second of the two language variables, and aid commitments (for details see Annex 1, available on request). One difference is that the unexpected positive impact of a common language is statistically significant in some specifications. There is no obvious explanation for this result. Another is that the negative impact of fragmentation tends to be smaller when using aid commitments rather than disbursements, although the effect remains statistically significant in the majority of cases. Overall therefore, the econometric analysis clearly suggests therefore that aid fragmentation imposes costs on donors. This finding can be added to the existing evidence showing the costs of fragmentation for recipients (e.g. Knack and Rahman 2007, Djankov et al. 2009). There is some evidence that the average distance to recipients also raises donors' transaction costs, but this is clearly less conclusive, and there is no evidence that a common language reduces donors' transaction costs. There is however other more indirect evidence that geographical proximity and a common language reduce donors' transaction costs; this is discussed in the next sub-section.

2.3 The effects of language and distance: indirect evidence

There is some more indirect evidence on the effect of a common language and distance on donors' transaction costs, from two main sources. The first is econometric studies of donors' aid patterns. For example, Dollar and Levin (2006) find that the distance from donor to recipient has a negative and statistically significant impact on aid flows for 15 out of the 22 DAC donors included in their sample.[11] Clist (2009) also finds evidence of a negative and statistically significant effect of distance on bilateral aid flows (controlling for various other factors including language, historical and commercial ties) for three out of seven bilateral donors analysed, although only in the second stage of a two-stage estimation procedure. Frot (2009) also finds evidence of a negative and statistically significant effect of distance on bilateral aid flows for DAC donors, and also on the probability of an aid partnership being 'significant', for both DAC and non-DAC donors.[12] There may of course be various reasons why donors tend to give less aid to countries which are located further away, but it is plausible that this tendency is at least partly due to the negative impact of distance on donors' transaction costs.

Donors also tend to give relatively more aid to former colonies. For example, Alesina and Dollar (2000) found that six out of nine DAC donors with former colonies gave significantly more aid to those countries; similar evidence is reported by Dollar and Levin (2006). Again, there are various reasons why donors tend to give more aid to former colonies, but it is plausible that this tendency is at least partly due to the fact that donors often share a common language with former colonies, and that having a common language reduces donors' transaction costs. This is reinforced by the results

---

[11] In six other cases the impact of distance was not statistically significant, while in one (Belgium) the effect was positive and statistically significant. Their regressions control for a set of recipient country characteristics (namely population, per capita GDP and governance) and other characteristics of the donor-recipient relation (namely common colonial heritage and commercial (trade) linkages).

[12] A significant aid partnership is defined as one in which the share of the donor's aid in the recipient's total aid exceeds the share of the donor's total aid in the global aid total.

of Clist (2009), who finds that a common language tends to have a positive and statistically significant impact on bilateral aid flows, even when controlling for former colonial status.

The second source of indirect evidence is large literature on so-called ‘gravity models’ of international trade. This literature consistently finds that distance exerts a strong negative impact on trade flows between countries, while having a common language has a strong positive impact (e.g. Frankel and Rose 2002, Disdier and Head 2008). Once again we cannot necessarily attribute these results to the impact of common language and distance on commercial transaction costs, but it is plausible that they at least partly reflect this link. Moreover, since aid is after all a transaction (if not a commercial one), it is also plausible on this basis that a common language and distance also affect aid transaction costs.

There is therefore some evidence – albeit indirect, and for that reason not conclusive – that distance between donor and recipient raises transaction costs, while sharing a common language reduces costs. This suggests that if donors are to pursue greater specialisation in their allocation decisions, it makes sense for certain donors to concentrate on certain recipient countries; the question of who specialises with how is not an arbitrary matter. This implication is taken up further in the next section.

3 Donor specialisation

This section sets out a method by which a group of bilateral donors can co-ordinate their allocation decisions, so that each donor becomes more specialised but each recipient continues to receive the same amount of aid in total. It involves the use of a bilateral aid allocation model. Section 3.1 presents the model. Section 3.2 then shows the results of applying the model to a pair of donors (the UK and Australia), while Section 3.3 shows the results of applying the model to all 23 bilateral donors of the OECD-DAC.

3.1 A bilateral aid allocation model

The model set out in this section is designed to minimise the total transaction costs incurred in transferring aid from donor to recipient countries, subject to the constraint that each recipient receives the right amount of aid in total. Transaction costs cannot be observed directly, so some proxy must be used. The proxy proposed here is the total 'adjusted aid miles' between donors and recipients: the total distance that aid must travel from donors to recipients, with distance being scaled down in cases where the donor and recipient share a common language. In algebraic terms, this is given by:

$$M = \sum_i \sum_j A_{ij} d_{ij}^* \qquad (15)$$

where d_{ij}^* is the adjusted distance between donor *i* and recipient *j*, defined as:

$$d_{ij}^* = (1 + \alpha l_{ij}) \times d_{ij} \qquad (16)$$

where α is the scaling factor ($\alpha < 0$). The value of α is unknown, but an estimate can be derived from the literature on international trade. For example, the results of Frankel and Rose (2002) suggest that sharing a common language is equivalent, in terms of its impact on the value of trade between two countries, to a reduction in geographical distance of between one third and one half. This implies a value of α somewhere between -0.33 and -0.50.[13] Since this is only an estimate, I carry out sensitivity analysis to test the extent to which the results of the model differ

[13] These numbers are derived as follows. Frankel and Rose (2002: Table 1, column 3) report coefficients on the log of distance and a common language of -1.06 and 0.56 respectively. These coefficients imply that having a common language is equivalent to a reduction in distance by 0.53 log points. A reduction in distance by 0.53 log points is in turn equivalent to a proportional reduction in distance by 41%. If we use the upper and lower bounds of the confidence intervals of the two coefficients, then by the same method we find that a common language is equivalent to a reduction in distance of between 0.39 and 0.68 log points, or between 33% and 50% in proportional terms.

depending on what particular value of α is used. I also test the sensitivity of results to an alternative logarithmic specification for adjusted distance, namely:

$$d_{ij}^{*} = \ln(d_{ij}) + \gamma l_{ij} \tag{17}$$

where $\gamma = \ln(1+\alpha) < 0$. The advantage of this formula for adjusted distance is discussed shortly below.

The use of adjusted aid miles as a proxy for total transaction costs can be justified for two reasons. First, there is at least indirect evidence that geographical distance and a common language both affect transaction costs between donors and recipients. Some direct evidence that distance from recipients raises donors' transaction costs was presented in Section 2.2, and it is plausible (although not shown here) that distance (from donors) also raises recipients' transaction costs. Indirect evidence that geographical distance and a common language affect transaction costs comes from econometric studies of bilateral aid flows and from the results of so-called gravity models of international trade, as discussed in Section 2.3.

Second, while adjusted aid miles does not directly take into account the effects of fragmentation on donors' transaction costs, the use of this proxy means that the optimal allocation implied by the model will involve a substantial amount of country specialisation by each donor, and therefore a large reduction in fragmentation from existing levels. The reason is that the formula for adjusted aid miles (equation 15) is a linear function of aid flows, and in optimisation problems the linear functional form strongly favours solutions involving specialisation.[14] To illustrate, imagine that there are two donors (A and B) and two recipient countries (X and Y), and that all four countries share a common language. Donors A and B have fixed aid budgets of $50 and $100, and it is agreed that recipient countries X and Y should both receive $75 of

[14] A comparison may be drawn here with the simple Ricardian model of international trade, with linear production technology. Under free trade, this model implies each country will specialise completely in the production of one particular sector.

aid in total. Donor A is 1 mile nearer to recipient X than donor B, and donor B is 1 mile nearer to recipient Y than donor A (Figure 2a). Despite the small differences in distances, the optimal allocation involves complete specialisation by Donor A in recipient country X (Figure 2b).

One might consider it strange to base patterns of country specialisation on very small differences in distances. One reason is that donors face adjustment costs in adjusting aid allocations (e.g. closing down some country offices and relocating staff to other countries). Would it really make sense to incur these costs to reduce aid miles very slightly? There are two responses to this question. The first is that if donors' portfolios are initially very fragmented, then the optimal allocation will imply (for reasons explained above) a substantial reduction in fragmentation. The (possibly small) reduction in aid miles provides therefore only part of the benefits from shifting to the optimal allocation. To return to the previous example, if the initial bilateral allocation is that shown in Figure 2c, the gains in shifting to the allocation shown in Figure 2b come in the form of economies of scale for Donor A (which gives aid to one less recipient) and lower transaction costs for recipient Y (which receives aid from one less donor), and not only the small reduction in aid miles.

Of course, if donors are already specialised, but in the 'wrong' countries (from the point of view of minimising aid miles), then shifting to the 'right' pattern of specialisation could involve substantial adjustment costs for little other than a small reduction in aid miles. This would be the case if the initial allocation in the previous example was given by Figure 2d; in such cases, shifting to the optimal allocation may not make sense. However, when the model is applied to the actual patterns of aid allocation by OECD-DAC donors, the optimal allocation does involve substantial reductions in fragmentation for each donor, as well as a reduction in aid miles. Applications of the model in practice do not, in other words, simply shift OECD-DAC donors from one pattern of specialisation to another.

The other problem with basing patterns of country specialisation on possibly small differences in distance relates to other possible determinants of transaction costs. For example, if donor A is only 1 mile nearer to recipient X than donor B, surely it would be better to base the pattern of specialisation on something other than distance? The obvious response would be to develop a proxy for transaction costs which takes into account a wider set of influences than just distance and language. This may be possible in further work. In this paper however, I rely on adjusted aid miles as the proxy for transaction costs on the grounds that there is good evidence that distance and language both affect transaction costs, that data on these measures are widely available, and that – via the gravity model literature – it is possible to combine the two variables (distance and language) into a single indicator ('adjusted distance') in a non-arbitrary way.

It is however possible to overcome some of the limitations with adjusted aid miles as a proxy for transaction costs by applying the model to clusters of donors rather than to individual donors. By a donor cluster I refer to two or more donors which are located close together and which share similar language characteristics. Australia and New Zealand constitute one obvious donor cluster. Japan and South Korea represent another cluster: they are also located relatively close together, and while not having the same language they share the characteristic that neither shares a common language with almost all recipient countries. Applied in this way, the model generates a 'first-round' pattern of country specialisation for each donor cluster, on the basis of its location and language characteristics, but leaves open the possibility for donors within each cluster to agree a 'second-round' pattern of specialisation based on other considerations. This way of applying the model also prevents small differences in location between donors (e.g. between Australia and New Zealand, or Japan and South Korea) from affecting the optimal allocation.

I now turn to the logarithmic specification of adjusted distance (equation 17). This formula is preferable if transaction costs are thought to rise less than proportionately with distance, which is plausible. For example, much of the cost of air travel is made up of the time wasted getting in, through and out of airports. These 'fixed' costs mean that the cost of air travel per mile travelled declines as distance travelled rises. The environmental costs of air travel also display this feature, since a large amount of fuel is used up in simply getting planes off the ground. If costs do rise less than proportionately with distance, use of the non-logarithmic formula (equation 16) can cause problems. To illustrate, consider the following example. Donor A is very close to recipient X, while donors A and B are both quite far from recipient Y (see Figure 3). The non-logarithmic formula implies that donor A should specialise in recipient Y, despite being very close to recipient X. By contrast, the logarithmic formula implies that donor A should specialise in recipient X, which makes more sense if transaction costs do rise less than proportionately with distance.

I now turn to the constraints in the model. The total amounts of aid transferred by each donor provide one set of constraints, although the total budgets of each donor, which includes transaction costs, are not held fixed. The total amounts of aid received by each recipient provide the other set of constraints. As discussed in the introduction, each recipient's existing amount of aid is implicitly treated as the 'right' amount. This is simply to focus attention on the question of how much each donor should provide to each recipient, without also having to consider the difficult question of how much each recipient should receive in total. However, there is no reason why the model could not be applied in future work with some other total acting as the constraint on the recipient side, as long as the total amount of aid transferred by all donors equals the total amount received by all recipients.

To summarise, the model takes the following form:

$$\text{Minimise} \quad M = \sum_i \sum_j A_{ij} d^*_{ij} \tag{18}$$

$$\text{Subject to} \quad \sum_j A_{ij} = \overline{A}_i, \ \sum_i A_{ij} = \overline{A}_j, \ A_{ij} \geq 0 \tag{19}$$

where $\overline{A}_i$ and $\overline{A}_j$ are the existing total amounts of aid given and received by each donor and recipient respectively. The solution to the model is a set of optimal values for A_{ij}. Simulations are carried out using six different versions of the model, corresponding to the two formulae for adjusted distance (equations 16 and 17) and three possible values of the adjustment factor α (-0.25, -0.50 and -0.75). A final point worth noting is that the model does not allow a specific formula for the optimal allocation between each donor and recipient to be derived algebraically; the only way to derive these values is to run the model using a suitable computer software programme (e.g. GAMS, MATLAB). This contrasts with the Collier and Dollar (2001, 2002) and Wood (2008) aid allocation models, which do allow a specific formula for the optimal allocation to be derived algebraically.

3.2 An illustration: the UK and Australia

The allocation model outlined above can be applied to all donors, but it can also be applied to smaller groups of donors: this is of interest if not all donors are willing to co-ordinate their aid allocation decisions. In this section I show the results of the model when it is applied to just two donors, the UK and Australia. The analysis is carried out using data on gross disbursements in 2009, when the two countries gave a total of $7.2 billion to 119 recipient countries.[15]

The baseline (i.e. 2009) levels of relevant variables for each donor are shown in the upper panel of Table 4. Australia's aid programme covered 57 countries and had fragmentation indices of 0.10 (Herfindahl) and -2.89 (Theil). Each aid dollar travelled an average of 3,929 miles, and 36 percent of aid went to English-speaking recipients. The UK's aid programme covered 106 countries, with fragmentation indices of 0.05 (Herfindahl) and -3.45 (Theil). Each aid dollar travelled an average of 4,051 miles, and 41 percent of aid went to English-speaking recipients. The results of the

[15] This does not include overseas territories, which I exclude from the analysis. As in the previous section, I also exclude any bilateral aid flows amounting to less than US$250,000 (in 2008 prices).

simulation are summarised in the lower panel of Table 4. The optimal allocation involves Australia reducing its country coverage by about a half: from 57 to around 30 countries; the UK also reduces its coverage, from 106 to 91 countries. The Herfindahl and Theil measures rise for both donors, although more substantially for Australia than the UK. There is also a reduction in aid miles, of around 14% for Australia and 4% for the UK.

In terms of the pattern of country specialisation, the model implies that Australia would direct over 90% of its aid toward the East Asia and Pacific region (up from 78% in 2009), while the UK would substantially reduce its own aid to that region (from 8% in 2009 to around 4%). This re-allocation would involve Australia taking over the UK's country programmes in Cambodia, Indonesia and Vietnam, which amounted in 2009 to $37 million, $81 million and $107 million respectively, although the UK would continue its aid to China, which amounted to $164 million in 2009. The large reduction in country coverage by Australia is simply a reflection of the increased concentration of its aid portfolio on the East Asia and Pacific region. In total, around 12% of the combined aid budget of the two donors would need to be re-allocated to achieve this specialisation pattern.

We can get some idea of the likely efficiency savings if the UK and Australia were to adopt the specialisation pattern suggested by the model, by making use of the regression results in Section 2.2. Using the coefficient estimates in column (4) of the upper panel of Table 3, the fall in fragmentation for each donor would reduce administration costs by around 19% in Australia, and around 3% in the UK. This is equivalent to a saving of around $22 million per year for Australia and $13 million per year for the UK. To these gains we might add the more uncertain benefits associated with the reductions in aid miles, particularly for Australia.

These headline results are very similar when using other identical when setting α equal to -0.25, and only slightly different when setting α equal to -0.75. The amount of aid that would need to be reallocated in shifting from one optimal pattern to another is no more than 2% of the total aid of the two donors. Overall therefore, the results show that even when applied among to a single pair of donors, the model is able to identify opportunities for gains from donor specialisation, without affecting the total amount of aid that recipients receive. Although in this case the benefits accrue mainly to one donor (Australia), co-operation of the other (the UK) is still necessary if those benefits are to be realised.

3.3 The global version

I now show the results when the model is applied to all DAC donors. Following the discussion in Section 3.1, I define six donor clusters, namely:

- Australia and New Zealand
- Japan and South Korea
- the US and Canada
- the UK and Ireland
- Belgium, Luxembourg and France
- Austria, Denmark, Finland, Germany, Greece, Italy, Netherlands, Norway, Sweden and Switzerland.

These donor clusters are all treated as single donors in the model.[16] Spain and Portugal are not placed into clusters on the grounds that their language characteristics are somewhat unique; they are therefore included in the model as individual donors. In addition, I artificially assign the same geographic location to all 17 European donors. This means that any differences in country specialisation between the European donors in the model (the three European donor clusters, plus

[16] The total aid budget of each cluster is simply the sum of each individual donor's total aid budget within the cluster. I also use the (unweighted) average distance from each donor within the cluster to each recipient, and the (unweighted) average proportion of people within the cluster who share a common language with each recipient, to calculate the adjusted distance from each cluster to each recipient. The first of the two language variables is used throughout.

Spain and Portugal) only occur due to differences in their language characteristics. I also exclude Iraq and Afghanistan from the recipient countries included in the model, on the grounds that they are somewhat special cases. This leaves a total of 142 recipient countries, which in 2009 received a total of US$61 billion (gross disbursements, 2008 prices).[17]

Relevant information for each individual donor in 2009 is shown in the upper panel of Table 5. The number of recipients ranges from 17 (Portugal) to 134 (Japan), with an average (mean) of 84. The Herfindahl index ranges from a low of 0.03 in Spain to a high of 0.16 in Portugal, while the Theil index ranges from a low of -4.91 in Germany to a high of -2.12 in Portugal. Average aid miles range from a low of 759 for Greece to a high of 5,920 for the US; the average for all 23 donors is 4,314 miles. The share of aid going to recipients with a common language ranges from zero (for ten donors) to a high of 81% for Portugal. The share of aid from all 23 donors going to recipients with which donors share a common language is 31%.

The results of the model simulation are shown in the lower panel of Table 5. These correspond to the logarithmic formula for adjusted distance, the first of the two language variables, and an adjustment factor of -0.5; sensitivity analysis is discussed shortly below. The results are again shown by individual donor, although note that the results for each donor within a cluster are identical.[18] Clearly, the model implies a substantial reduction in country coverage for each donor: the largest number of recipients is now 43 (the US and Canada), and the mean number of recipients is 27.

---

[17] I also exclude overseas territories from the model. Note also that the US$ 60 billion figure does not include bilateral aid which was unallocated by individual recipient country, nor aid which was channelled via multilaterals.

[18] For donors within a cluster, the assumption is that the optimal allocation to each recipient from the cluster as a whole is divided among the donors according to their total aid budgets. For example, if there are two donors in a cluster, with total budgets of 100 and 50, then the first donor gives 2/3 of the optimal allocation to each recipient, while the other donor gives 1/3. This assumption implies that the number of recipients and the Herfindahl and Theil indices for each donor within a cluster are identical to the values of these variables for the cluster as a whole. Greater country specialisation by donors within a cluster may be possible, but is not assumed here.

One donor (Portugal) is completely specialised. The reduction in country coverage is associated with increases in the Herfindahl and Theil indices (i.e. reductions in fragmentation) for virtually all donors (the one exception is Greece). There is also a 45 per cent rise in aid going to recipients with which donors share a common language, and a 21 per cent fall in aid miles.

We can get some idea of what the pattern of country specialisation implied by these results looks like by examining the results by recipient country regions. This is done in Table 6. The headline results are as follows:

- Australia and New Zealand specialise almost completely in East Asia and the Pacific (96%, up from 83% in 2009);
- Japan and South Korea also specialise almost completely in East Asia and Pacific (95%, up from 50%);
- the US and Canada end operations in East Asia and Pacific (down from 7%), Eastern Europe and Central Asia (down from 7%) and the Middle East (down from 10%);
- the European donors remain fairly non-specialised across regions, but end operations in East Asia and Pacific (down from 12%) and substantially reduce operations in Latin America and the Caribbean (3%, down from 10%).

As a result of these changes, the European donors significantly increase the share of their aid to Eastern Europe and Central Asia (from 8% to 14%) and the Middle East and North Africa (from 12% to 19%). The overall shares of the European donors' aid going to Sub-Saharan Africa to South Asia, by contrast, remain fairly stable.

In terms of specialisation among the European donors, the French-speaking cluster (Belgium, France and Luxembourg) specialises more heavily in West and Central Africa (76% of their total aid, up from 49%). The UK and Ireland, by contrast, specialise more heavily in East and Southern Africa (75%, up from 48%). Spain increases operations in North Africa (53%, up from 13%) and West and Central

Africa (22%, up from 13%), and remains the only European donor with operations in Latin America. Portugal specialises in West and Central Africa (82%, up from 34% in 2009). The other 10 European donors end their operations in West and Central Africa and instead specialise more heavily in Eastern Europe and Central Asia (30%, up from 13%) and the Middle East and North Africa (23%, up from 6%).

As in Section 3.2, we can get some idea of the efficiency savings if the DAC donors were to adopt the specialisation patterns suggested by the model, by making use of the regression results in Section 2.2. Using the coefficient estimates in column (4) of the upper panel of Table 3, the rise in the Theil indices shown in Table 5 would reduce donors' administration costs by around one third (34 per cent), equivalent to an annual saving of US$1.9 billion (in 2008 prices). This sum is perhaps an upper estimate: if we use the rise in the Herfindahl instead, the implied reduction in donors' administration costs is 12 percent, equivalent to an annual saving of US$ 600 million.[19] Even so, we should also consider the more uncertain but still plausible benefits associated with the 45 per cent rise in aid going to countries with which donors share a common language, and the 21 per cent reduction in aid miles.

The headline results from Tables 5 and 6 broadly apply when using the non-logarithmic formula for adjusted distance, other values of the scaling factor, and the second language variable (for details see Annexes 2 and 3, available on request). In all cases, the results imply a substantial reduction in the number of recipients for all donors – the largest number of recipients for any one bilateral donor is between 42 and 50, while the average (mean) is between 25 and 27 – and large corresponding rises in the Herfindahl and Theil indices for almost all donors. The implied fall in donor's administration costs lies between 32 and 35 per cent when using the Theil measure, and between 11 and 12 per cent when using the Herfindahl measure. The

[19] The equivalent coefficient on the Herfindahl measure of fragmentation is -2.1 (details available on request).

increase in aid going to recipients with which donors share a common language ranges from 29 to 70 per cent, while the reduction in aid miles varies from 15 to 24 per cent.

There are, not surprisingly, some differences in the implied patterns of country specialisation. For example, when using a high adjustment factor for language, Spain specialises almost completely in Latin America, and Portugal also continues operations in that region. To compensate, the French-speaking cluster increases their operations in North Africa. Alternatively, using a low adjustment factor for language implies much lower aid to South Asia from the UK and Ireland. Overall, the amount of aid that would need to be reallocated in shifting from the optimal pattern with $\alpha = -0.25$ to that with $\alpha = -0.75$ is around 20% of the total amount being allocated. Similarly, around 15% would have to be re-allocated in shifting from the optimal pattern implied by the logarithmic formula for adjusted distance to the non-logarithmic formula. These are clearly not insignificant amounts, indicating that further research aimed at quantifying more precisely the relative importance of distance and a common language on transaction costs, and the precise form of the relationship between distance and transaction costs, would be beneficial.

Despite this caveat, the overall implication of the model – namely, that donors could through greater country specialisation substantially reduce their own transaction costs, without affecting the total amount of aid received by any one recipient – clearly is robust to sensitivity analysis. Moreover, we should also consider the potential benefits for recipients, as the model also implies a substantial reduction in the number of bilateral donors operating in each recipient. In 2009, the vast majority of the 142 recipients included in the model received their aid from at least three of the eight donor clusters; the median number was six (see Table 7). However, if DAC donors were to adopt the specialisation patterns suggested by the model, the vast majority of recipients would receive their aid from just one donor cluster. Although this could still mean 10 individual donors in the case of the ‘other Europe’ cluster, in most cases it means just two individual donors. In addition, ‘second-round’ specialisation of the sort described in Section 3.1 could reduce these figures further.

4 Conclusion

This paper aims to contribute to the literature on aid fragmentation by highlighting the effects of fragmentation on donors’ transaction costs, to complement existing evidence relating to recipients. It does this in two main ways. First, the econometric analysis in Section 2 shows that the fragmentation of donors’ aid across many recipients tends to raise their transaction costs, and that this effect is statistically significant and robust to a range of control variables and estimation methods. Second, the allocation model outlined in Section 3 shows how bilateral donors can become much more country specialised, on the basis of their geographical location and language characteristics, without affecting the total amount of aid received by each recipient. Depending on which version of the model is used, the largest number of recipients for any one bilateral donor implied by the model is between 42 and 50, while the average (mean) is between 25 and 27. The actual figures, using data for 2009, were 134 and 84 respectively.

When combined, the results in Sections 2 and 3 suggest that bilateral donors could reduce their administration costs by as much as US$2 billion per year through greater country specialisation. This figure is obtained by multiplying the reduction in fragmentation for each donor implied by the model (from Section 3) with the estimated effect of fragmentation on donors’ administration costs (from Section 2). To this figure, we might also add other more uncertain, but nonetheless still plausible benefits implied by the model, in the form of large increase (between 29 and 70 per cent) in the amount of aid going to recipients with which donors share a common language, and a large decrease (between 15 and 24 per cent) in total aid miles.

The results in this paper do not amount to an overall case for more country specialisation by donors. On the one hand, a lack of specialisation can provide certain benefits for recipients: for example, it may prevent a single large donor from having excessive influence on domestic policy, and can make aid flows less volatile (Rowlands and Ketcheson 2003). Competition between donors with operations in the same countries may also drive improvements in their performance (e.g. Klein and Harford 2005).[20] Acharya et al. (2006: 14) also argue that there are benefits from donor competition, and that there is a need to find “the right balance” between competition and co-ordination. These benefits may outweigh the higher transaction costs associated with fragmentation. On the other hand, donors may simply place a high importance on having a ‘global presence’ in their aid programmes, and be prepared to incur higher transaction costs in order to achieve this presence. In the words of Bigsten (2006: 21), “[d]onors often say that they would like to concentrate their aid on fewer countries, but this has not in fact happened. The importance of a global presence weighs more heavily than aid efficiency.”[21] Nevertheless, by adding to the evidence of the costs of a lack of specialisation, the results do allow donors to make a more considered judgement as to the desirability of having a ‘global presence’ in their aid portfolios, and provide an indication of how large the benefits of fragmentation must be for recipients if they are to outweigh the costs.

[20] Although it is worth noting that Klein and Harford (2005) have some sympathy for the argument that donors need to co-ordinate their activities in order to limit wasteful competition, since aid is a quasi-market at best.

[21] Canada has been cited as a specific example where a highly fragmented aid allocation can be attributed to the country’s self-image as a global actor (Rowlands and Ketcheson 2002: 30).

References

Acharya, A., de Lima, A. and Moore, M. (2006). Proliferation and fragmentation: transactions costs and the value of aid. *Journal of Development Studies* 42(1): 1-21.

Aldasoro, I., Nunnenkamp, P. and Theile, R. (2009). Less aid proliferation and more donor coordination? The wide gap between words and deeds. Working Paper 1516, Kiel Institute for the World Economy, Kiel.

Amis, P., Green, L. and Hubbard, M. (2005). Measuring aid costs: what has been learnt and what still needs to be done. *Public Administration and Development* 25: 373-378.

Annen, K. and Kosempel, S. (2007). Foreign aid, donor fragmentation and economic growth. Department of Economics, University of Guelph.

Bigsten, A. (2006). Donor coordination and the uses of aid. Department of Economics, Göteborg University, Sweden.

Clist, P. (2009). 25 years of aid allocation practice: comparing donors and eras. CREDIT Research Paper 09/11, Centre for Research in Economic Development and International Trade, University of Nottingham.

Collier, P. and Dollar, D. (2001). Can the world cut poverty in half? How policy reform and effective aid can meet international development goals. *World Development* 29(11): 1787-1802.

Collier, P. and Dollar, D. (2002). Aid allocation and poverty reduction. *European Economic Review* 46: 1475-1500.

Disdier, A-C. and Head, K. (2008). The puzzling persistence of the distance effect on bilateral trade. *Review of Economics and Statistics* 90(1): 37-48.

Dollar, D. and Levin, V. (2006). The increasing selectivity of foreign aid, 1984-2003. *World Development* 34(12): 2034-2046.

Easterly, W. (2002). The cartel of good intentions: the problem of bureaucracy in foreign aid. *Journal of Policy Reform* 5(4): 223-250.

Easterly, W. and Pfutze, T. (2008). Where does the money go? Best and worst practices in foreign aid. *Journal of Economic Perspectives* 22(2): 29-52.

Frankel, J. and Rose, A. (2002). An Estimate of the Effect of Common Currencies on Trade and Income. *Quarterly Journal of Economics* 117(2): 437-466.

Frot, E. (2009). Early vs. late in aid partnerships and implications for tackling aid fragmentation. SITE Working Paper No.1, Stockholm School of Economics.

Isenman, P. (1976). Biases in aid allocation against poorer countries and larger countries. *World Development* 4: 631-641.

Klein, M. and Harford, T. (2005). *The Market for Aid*. International Finance Corporation, Washington D.C.

Knack, S. and Rahman, A. (2007). Donor fragmentation and bureaucratic quality in aid recipients. *Journal of Development Economics* 83: 176-197.

Llavador, H. and Roemer, J. (2001). An equal opportunity approach to the allocation of international aid. *Journal of Development Economics* 64: 147-171.

McGillivraay, M. and White, H. (1994). Development criteria for the allocation of aid and the assessment of donor performance. CREDIT Research Paper 94/7, University of Nottingham.

McGillivraay, M., Leavy, J. and White, H. (2002). Aid principles and policy: an operational basis for the assessment of donor performance. In Arvin, B. (ed.), *New Perspectives on Foreign Aid and Economic Development*. Praeger, London.

OECD (2007). Towards better division of labour: concentration and fragmentation of aid. OECD Development Centre, OECD, Paris.

OECD (2009). Development Co-operation Report 2009. *OECD Journal on Development*, 10(1).

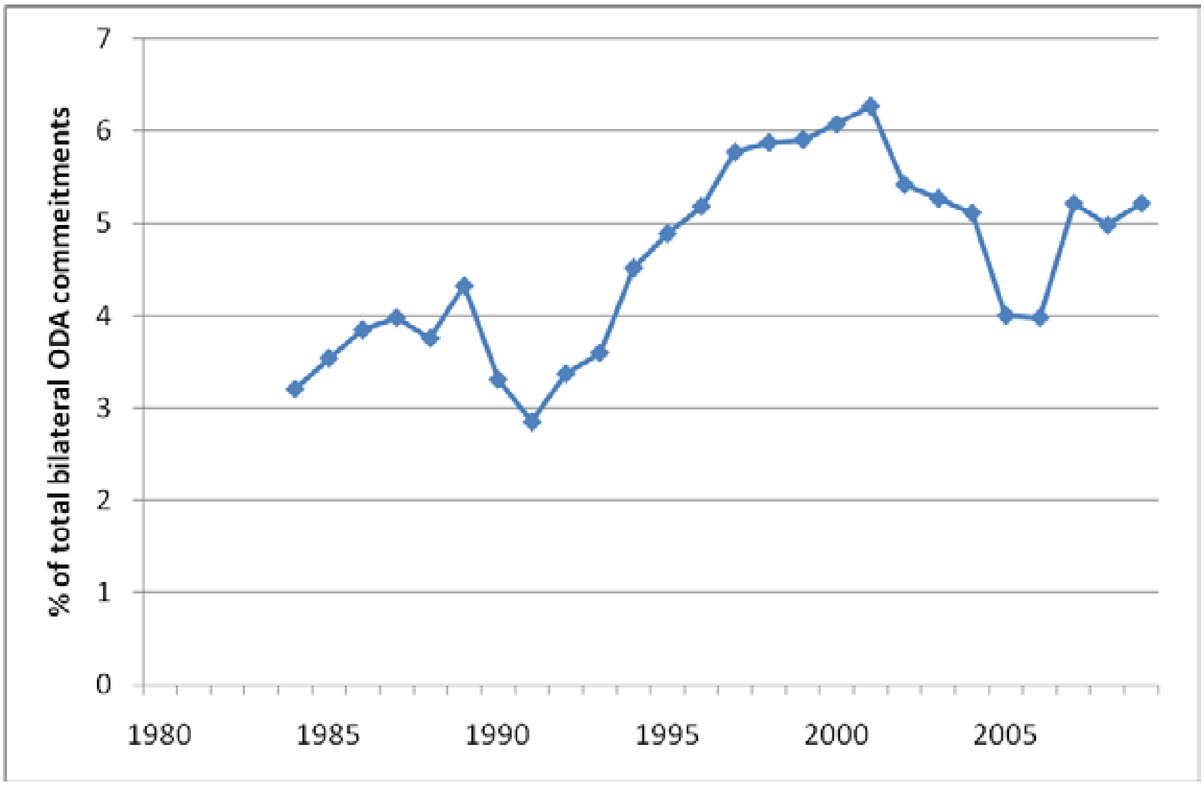
Roodman, D. (2006). Aid project proliferation and absorptive capacity. Working Paper 75, Center for Global Development, Washington D.C.

Rowlands, D. and Ketcheson, I. (2002). Multilateral aid coordination by the international financial institutions: an examination of Canadian development assistance to sub-Saharan Africa. In Arvin, B. (ed.), *New Perspectives on Foreign Aid and Economic Development*. Praeger, London.

Wood, A. (2008). Looking ahead optimally in allocating aid. *World Development* 36(7): 1135-1151.

Wooldridge, J. (2009). Introductory Econometrics: A Modern Approach. South-Western.

Figure 1. Administrative costs of OECD-DAC donors, 1984-2009



Source: OECD-DAC (2011), Table 5

Figure 2. Distance and specialisation: a hypothetical example

a: Donor-recipient distances (miles)

	Recipient X	Recipient Y
Donor A	999	1000
Donor B	1000	999

b: The optimal allocation

	Recipient X	Recipient Y	Totals
Donor A	50	0	50
Donor B	25	75	100
Totals	75	75	150

c: The initial allocation: no specialisation

	Recipient X	Recipient Y	Totals
Donor A	25	25	50
Donor B	50	50	100
Totals	75	75	150

d: The initial allocation: ‘wrong’ specialisation

	Recipient X	Recipient Y	Totals
Donor A	0	50	50
Donor B	75	25	100
Totals	75	75	150

Notes: In obtaining the optimal allocation, the constraints are that the total aid levels of donors A and B are 50 and 100, and that each recipient receives an aid inflow of 75.

Figure 3. The logarithmic formula for adjusted distance

a: Donor-recipient distances (miles)

	Recipient X	Recipient Y
Donor A	100	9000
Donor B	1000	10000

b: The optimal allocation, non-logarithmic distance

	Recipient X	Recipient Y	Totals
Donor A	0	50	50
Donor B	75	25	100
Totals	75	75	150

c: The optimal allocation, logarithmic distance

	Recipient X	Recipient Y	Totals
Donor A	50	0	50
Donor B	25	75	100
Totals	75	75	150

Notes: In obtaining these optimal allocations, the constraints are the same as in Figure 2.

Table 1. Administrative costs of OECD-DAC donors, 2009

Donor	Total administration costs, US$ million	Total bilateral ODA, US$ million	Administration costs as a share of total ODA (%)
Australia	115	2,438	4.7
Austria	42	553	7.6
Belgium	97	1,975	4.9
Canada	292	4,089	7.1
Denmark	156	2,019	7.7
Finland	83	1,304	6.4
France	453	9,405	4.8
Germany	300	9,701	3.1
Greece	24	302	7.9
Ireland	48	747	6.5
Italy	72	1,166	6.2
Japan	653	13,282	4.9
South Korea	31	1,615	1.9
Luxembourg	20	279	7.3
Netherlands	348	5,497	6.3
New Zealand	26	244	10.6
Norway	245	3,605	6.8
Portugal	19	321	5.9
Spain	208	4,685	4.4
Sweden	245	3,370	7.3
Switzerland	160	1,734	9.2
United Kingdom	455	9,009	5.0
United States	1,476	29,374	5.0
Total	5,569	106,714	5.2

Source: OECD-DAC (2011), Table 5

Table 2. Descriptive statistics

Variable	Label	Mean	St Dev.	Min	Max
Total administration costs (US$ million, log units)	ln C	4.33	1.49	-1.39	7.42
Share of administration costs in total aid budget (%)	s	5.55	2.76	0.08	23.86
Total gross ODA disbursements (US$ million, log units)	ln A	7.04	1.50	0.23	10.05
Number of recipients	N	81	33	2	145
Herfindahl index	F^H	0.08	0.08	0.02	0.78
Theil index	F^T	-3.26	0.62	-4.12	-0.53
Average distance to recipients (miles, log units)	ln X^D	8.24	0.33	6.21	8.88
Share of aid to recipients with common language* (%)	X^L (I)	26	28	0	94
Share of aid to recipients with common language** (%)	X^L (II)	29	31	0	100
Average per capita GDP of recipients (US$ PPP, log unit)	ln X^Y	7.78	0.41	6.53	9.25

Notes: The sample includes all 23 bilateral DAC donors, and stretches from 1984 to 2009, although not all donors report administrative costs for every single year. There are 511 donor-year observations in total; * based on whether two countries share a common official language; **based on whether a language is spoken by at least 9% of the population in both countries.

Table 3. Econometric results

	1. OLS	2. Random effects	3. Fixed effects	4. Fixed effects, AR(1)	5. First differencing
Panel A: Dependent variable = ln C					
ln A (disb.)	0.662**	0.645**	0.536**	0.375**	0.240*
	0.04	*0.08*	*0.10*	*0.09*	*0.13*
N	0.007**	0.006	-0.002	-0.002	0.000
	0.00	*0.00*	*0.00*	*0.00*	*0.00*
F^T	-0.119	-0.182	-0.402**	-0.438**	-0.309**
	0.07	*0.13*	*0.08*	*0.10*	*0.13*
ln X^D	0.909**	0.869**	0.862	-0.080	-0.103
	0.16	*0.17*	*0.56*	*0.13*	*0.27*
$X^{L\,(1)}$	0.001	0.001	0.009	0.006	0.003
	0.00	*0.00*	*0.01*	*0.00*	*0.00*
ln X^Y	0.027	0.071	0.058	-0.006	0.044
	0.09	*0.20*	*0.17*	*0.11*	*0.11*
Sample size	511	511	511	488	473
R^2	0.84	0.84	0.76	0.00	0.05
F-test, years	0.95	0.83	0.02	0.26	0.71
F-test, donors	-	-	0.00	0.00	-
LM test	-	0.00	-	-	-
Hausman test	-	-	0.00	-	-
Rho	-	-	-	0.61	-
Panel B: Dependent variable = s					
ln A (disb.)	-0.800**	-0.847*	-1.273**	-2.081**	-1.214
	0.22	*0.34*	*0.25*	*0.37*	*0.69*
N	0.000	-0.001	-0.032	-0.004	-0.011
	0.01	*0.02*	*0.02*	*0.02*	*0.01*
F^T	-0.928*	-0.938	-1.401**	-0.938*	-1.504**
	0.40	*0.56*	*0.43*	*0.39*	*0.51*
ln X^D	2.300**	2.360*	4.256*	1.312*	1.575
	0.66	*1.07*	*1.92*	*0.50*	*1.35*
$X^{L(1)}$	0.009*	0.010	0.061*	0.022	0.019
	0.00	*0.01*	*0.02*	*0.02*	*0.02*
ln X^Y	-0.376	-0.051	0.995	0.215	0.761
	0.39	*0.85*	*0.60*	*0.44*	*0.56*
Sample size	511	511	511	488	473
R^2	0.26	0.25	0.19	0.01	0.17
F-test, years	0.20	0.16	0.00	0.69	0.89
F-test, donors	-	-	0.00	0.00	
LM test	-	0.00	-	-	-
Hausman test	-	-	0.00	-	-
Rho	-	-	-	0.62	-

Notes: Robust standard errors are shown in italics below each coefficient (except in column 4 where standard errors are unadjusted). ** indicates statistical significance at the 1% level, while * indicates statistical significance at the 5% level. All regressions include dummy variables for each year.

Table 4. The two-donor model (Australia and UK): headline indicators

	Total aid ($ m)	Country partners	Herfindahl index	Theil index	Average aid miles	Aid to recipients with common language (%)	Admin. costs ($ m)
Baseline							
Australia	1,810	57	0.095	-2.889	3,929	36	115
UK	5,409	106	0.046	-3.453	4,051	43	456
Model							
Australia	1,810	30	0.123	-2.492	3,410	35	93
UK	5,409	91	0.052	-3.285	3,875	44	443

Notes: The results shown are those obtained when using the non-logarithmic formula for adjusted distance, the first of the two language variables, and a scaling factor of -0.5. Results are very similar using the non-logarithmic formula, the other language variable and alternative scaling factors. The administration costs implied by the model are calculated using the change in the Theil index and the regression results in the upper panel of column (4) of Table 3.

Table 5. The global model: headline indicators

	Total aid ($ m)	Country partners	Herfindahl index	Theil index	Average aid miles	Aid to recipients with common language (%)	Admin. costs ($ m)
Baseline (2009)							
Australia	1,653	55	0.109	-2.779	3,591	51	115
Austria	351	73	0.039	-3.588	2,392	0	42
Belgium	997	79	0.059	-3.435	3,853	62	97
Canada	1,844	117	0.031	-3.882	5,667	62	292
Denmark	1,312	77	0.043	-3.490	4,029	0	156
Finland	429	83	0.052	-3.450	3,978	0	83
France	7,692	120	0.141	-3.091	3,219	68	453
Germany	5,806	116	0.027	-4.121	3,670	0	300
Greece	177	39	0.153	-2.541	759	0	24
Ireland	544	60	0.071	-3.083	4,397	66	48
Italy	810	93	0.037	-3.768	2,864	0	72
Japan	9,987	134	0.066	-3.457	4,147	0	653
Korea	537	67	0.047	-3.477	4,132	0	31
Luxembourg	229	62	0.052	-3.345	3,521	40	20
Netherlands	1,965	75	0.037	-3.572	4,082	6	348
New Zealand	139	36	0.091	-2.851	3,569	75	26
Norway	1,548	93	0.037	-3.685	4,105	0	245
Portugal	272	17	0.158	-2.119	3,025	81	19
Spain	3,555	112	0.025	-4.009	3,765	33	208
Sweden	1,526	96	0.031	-3.809	3,783	0	245
Switzerland	889	95	0.046	-3.836	3,324	33	160
United Kingdom	4,982	104	0.049	-3.416	4,105	60	455
United States	13,793	127	0.027	-4.015	5,920	40	1,476
All 23 donors	61,037	142			4,314	31	5,569

Table 5 (cont.)

	Total aid ($ m)	Country partners	Herfindahl index	Theil index	Average aid miles	Aid to recipients with common language (%)	Admin. costs ($ m)
Model							
Australia	1,653	15	0.142	-2.049	2,629	63	83
Austria	351	39	0.063	-2.978	1,926	0	32
Belgium	997	18	0.174	-2.266	3,300	100	58
Canada	1,844	43	0.063	-3.248	5,482	70	221
Denmark	1,312	39	0.063	-2.978	2,358	0	125
Finland	429	39	0.063	-2.978	2,356	0	68
France	7,692	18	0.174	-2.266	3,168	100	315
Germany	5,806	39	0.063	-2.978	2,336	0	182
Greece	177	39	0.063	-2.978	1,385	0	29
Ireland	544	6	0.239	-1.601	4,148	100	25
Italy	810	39	0.063	-2.978	1,887	0	51
Japan	9,987	12	0.173	-2.022	2,373	0	347
Korea	537	12	0.173	-2.022	1,857	0	16
Luxembourg	229	18	0.174	-2.266	3,223	100	13
Netherlands	1,965	39	0.063	-2.978	2,464	0	268
New Zealand	139	15	0.142	-2.049	3,450	63	18
Norway	1,548	39	0.063	-2.978	2,591	0	180
Portugal	272	3	0.466	0.000	1,493	82	7
Spain	3,555	13	0.162	-2.184	2,238	26	93
Sweden	1,526	39	0.063	-2.978	2,415	0	170
Switzerland	889	39	0.063	-2.978	2,217	3	110
United Kingdom	4,982	6	0.239	-1.601	3,881	100	205
United States	13,793	43	0.063	-3.248	5,373	65	1,053
All 23 donors	61,037	142			3,387	44	3,668

Notes: The results shown are those when using the logarithmic formula for adjusted distance, the first of the two language variables, and a scaling factor of -0.5 (see text for sensitivity analysis).

Table 6. The global model: allocation by region (% of total)

	ESA	WCA	EAP	SA	EECA	ME	NA	LAC
Baseline								
Australia-New Zealand	5	0	83	9	0	2	0	0
Japan-South Korea	9	4	50	18	7	2	3	7
US-Canada	38	13	7	7	7	10	3	15
Europe	27	23	12	9	8	5	7	10
- Belgium-France-Lux.	13	49	13	1	4	4	12	5
- Portugal	34	34	13	0	6	4	8	1
- Spain	15	13	7	3	6	4	13	38
- UK-Ireland	48	11	9	24	2	3	1	2
- Other Europe	30	14	13	10	13	6	4	11
All DAC donors	26	16	19	10	7	6	5	11
Model								
Australia-New Zealand	4	0	96	0	0	0	0	0
Japan-South Korea	0	0	95	5	0	0	0	0
US-Canada	34	14	0	16	0	0	0	36
Europe	31	23	0	9	14	10	9	3
- Belgium-France-Lux.	24	76	0	0	0	0	0	0
- Portugal	0	82	0	0	0	0	18	0
- Spain	0	22	0	0	0	0	53	26
- UK-Ireland	75	0	0	25	0	0	0	0
- Other Europe	28	0	0	12	30	23	8	0
All DAC donors	26	16	19	10	7	6	5	11

Notes: The results shown are those when using the logarithmic formula for adjusted distance, the first of the two language variables, and a scaling factor of -0.5 (see text for sensitivity analysis). ESA=East and Southern Africa; WCA=West and Central Africa; SA=South Asia; EAP=East Asia and Pacific; EECA=Eastern Europe and Central Asia; ME=Middle East; NA=North Africa; LAC=Latin America and Caribbean. The classification of recipient countries into these regions follows the World Bank scheme, except that Turkey is reclassified here as Eastern rather than Western Europe (none of the other 142 recipient countries are in Western Europe).

Table 7. The global model: number of DAC donors per recipient

	Baseline	Model
Donor clusters		
10th percentile	3	1
25th percentile	5	1
Median	6	1
75th percentile	7	1
Individual donors		
10th percentile	3	2
25th percentile	9	2
Median	15	2
75th percentile	19	10

Notes: These results refer to the 142 recipient countries included in the model. Results are shown using the logarithmic formula for adjusted distance, the first of the two language variables, and a scaling factor of -0.5. Results using the non-logarithmic formula and alternative scaling factors are very similar.