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DEVELOPMENT AID AND PORTFOLIO FUNDS: TRENDS, VOLATILITY AND FRAGMENTATION

by

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PREFACE

This paper is part of a series of studies on development aid issues. It builds on unique databases, combining OECD official statistics on development aid and others on portfolio flows from bond and equity fund managers.

The objective is twofold: to contribute to the analysis of the aid industries on key issues related to aid volatility and fragmentation; to foresee the possibility to build in the future an aid efficiency index. For that purpose, this paper offers several options for measuring the fragmentation of aid. It follows a companion paper on aid herding where development aid was compared to portfolio fund flows.

In the present paper historical trends in official aid are presented and compared to private capital flows. It shows that official development assistance (ODA) used to be a major source of finance for developing countries but that it is now less important than both foreign direct investment and remittances. Above all trends underlined that aid flows are less volatile than private flows, with the exception of remittances.

The second part of the paper that follows investigates aid fragmentation, an issue that has also been emphasised by our colleagues of the OECD Development Assistance Committee and that we reinforce here with complementary analysis and methodologies. Here, both sides of the donor recipient relationship are studied. Donors have continuously increased the number of recipients in their portfolios. We are now in a situation where most donors have large portfolios, with lots of small partnerships, increasing from the donor perspective the difficulty to monitor and follow up on so many holdings in their portfolios.

Many new donors have entered the market but the main effect for recipients has been to increase the number of small disbursements, increasing the burden on their side too and the transaction costs for dealing with an increasing number of donors and projects.

When compared with portfolio funds, ODA portfolios are much more fragmented. The portfolio investors usually weigh a few countries heavily in their funds, such that they are quite concentrated, unlike aid donors. We might think that aid donors compensate for the bias of private fund managers, but no such evidence is found. The low aid concentration implies that countries are treated quite equally, and so aid is unlikely to compensate for private capital flows volatility.

In policy terms, the authors do not find any negative and significant correlation between aid volatility and capital flow volatility. These results reinforce the calls for a new stabilising role of ODA. In an environment of volatile capital flows, official aid can be used as an income

smoothing device and donors should be careful not to add to private investors' volatile investments.

This counter cyclical potential of ODA has been advocated in previous papers and research of the OECD Development Centre[1]. With this new piece we intend to contribute again to this debate and, hand in hand with our colleagues from the DAC, advocate also for reducing aid fragmentation in donors' portfolios.

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1.   See Cohen, D. *et al.* (2008).

RÉSUMÉ

Cet article présente une série de faits stylisés sur l'aide au développement et les flux de capitaux en direction des pays en développement. Leurs quantités et volatilités sont comparées. Il est établi que l'aide au développement n'est plus la plus importante source de financement pour ces pays, bien qu'elle le reste pour certaines régions. Par ailleurs l'expansion des flux de capitaux s'accompagne généralement d'un accroissement de volatilité qui s'ajoute à celle de l'aide, elle-même déjà considérée comme problématique. Les chocs négatifs de flux de capitaux ne s'accompagnent généralement pas de chocs positifs d'aide. Nous étudions la complémentarité de ces deux types de transferts et montrons que les pays qui reçoivent plus de flux de capitaux reçoivent moins d'aide, mais que cette conclusion ne vérifie pas à l'intérieur du pays où les variations d'aide et de capitaux ne sont pas corrélées. Nous utilisons pour compléter ces résultats une base de données des fonds d'investissement privés afin de relever les différences entre les décisions des investisseurs qui détiennent ces portefeuilles et celles des donateurs d'aide. Nous établissons que les flux d'actions sont plus volatiles que l'aide et qu'ils n'en sont ni un substitut ni un complément. Ces résultats renforcent les propositions pour un nouveau rôle stabilisateur de l'aide. Nous étudions ensuite les portefeuilles des donateurs d'aide et des fonds d'investissement pour contribuer au débat actuel sur la fragmentation de l'aide en établissant les tendances pour les 50 dernières années. Nous montrons que les donateurs d'aide ont constamment fragmenté leurs portefeuilles en donnant de l'aide à un nombre sans cesse croissant de pays, mais aussi en égalisant leurs allocations parmi ces pays. Les fonds d'investissement en action ont fait l'opposé au cours des dix dernières années en pondérant fortement quelques pays dans leurs portefeuilles. Ces observations complètent les résultats existants sur la nature progressive des flux d'aide et celle régressive des flux privés.

Mots clés: aide ; flux de capitaux ; flux de portefeuille ; volatilité ; fragmentation.

Classification JEL: F34; F35.

ABSTRACT

This paper presents stylised facts about development aid and capital flows to developing countries. It compares their volumes and volatilities and finds that foreign aid is not the major source of finance for these countries any more, though not for all regions. The expansion of private flows has usually come at the cost of an increased volatility that adds up to aid volatility, already considered to be an issue. We do not find any negative and significant correlations between aid shocks and capital flow shocks. Investigating complementarity between flows, we show that in a cross section of countries official development aid (ODA) and capital flows are substitutes but not within countries. On the other hand capital flows are complements both across and within countries. We also make use of a private funds database in order to underline the differences between portfolio investors to emerging markets and aid donors. To our knowledge this paper is the first to use such data in comparison with aid flows. We find that private portfolio equity is more volatile than ODA, and that it is neither a substitute nor a complement of ODA, both across and within countries. We argue that these results reinforce the calls for a new stabilising role of ODA. We then study aid donors and private funds portfolios to contribute to the current debate on aid fragmentation by providing trends for the last 50 years. We show that aid donors have constantly been fragmenting their portfolios by giving aid to an increasing number of countries, but also by making asset allocations more equal across countries. Private portfolio equity funds, on the other hand, have done the opposite for ten years and put a heavy weight on few countries in their portfolios. These observations complement the existing results about the progressive nature of aid flows and the regressive nature of private flows.

Keywords: aid; capital flows; portfolio flows; volatility; fragmentation.

JEL Classification: F34; F35.

I. INTRODUCTION

The financing of development has recently undergone substantial changes. Private capital flows have become increasingly important and now constitute the major source of finance for many developing countries (see on this trend and its policy implications for aid industry, Rodríguez and Santiso, 2007; Santiso, 2008). Aid does not have the prominent role in these countries it used to, though it stays important for others. At the same time the whole architecture of official aid flows is being revised. Donor countries have pledged not only to scale up aid commitments in order to reach the development targets defined by the Millennium Development Goals, but also to monitor aid effectiveness through the harmonisation of donors' policies.

There is indeed a growing concern that aid efficiency is undermined by fragmentation and a general lack of co-ordination among the donors community. Harmonisation, along with scaling up and predictability, is seen as a prerequisite for aid to deliver its promises. The Paris declaration, signed by donors in 2005, makes harmonisation and cooperation one of its main commitments by stipulating that donors' actions must be "more harmonised, transparent and collectively effective". By signing the declaration, donors commit to implement common arrangements and recognise that "excessive fragmentation of aid at global, country or sector level impairs aid effectiveness."

This paper first presents a historical description of official aid by focusing on comparisons between official aid and private capital flows. It shows that official development assistance (ODA) used to be a major source of finance for developing countries but that it is now less important than both foreign direct investment and remittances. There are however large differences between regions. Sub-Saharan Africa is clearly an outsider and still relies heavily on official aid. While other regions managed to benefit from the expansion of private flows and the integration of international financial markets that started in the nineties, Sub-Saharan Africa missed this opportunity.

We then present stylised facts about the volatility of these flows. Aid is usually considered to be too volatile and this has important consequences for recipients in terms of macro-economic cost (Kharas, 2008), the magnitude of the phenomenon being dependent on both aid and recipients institutional characteristics (Fielding and Mavrotas, 2008). In particular aid volatility prevents consumption smoothing and may trap recipients in poverty if they cannot finance projects that require sustained income flows (see Arellano *et al.* 2008) and may complicate the macro-economic management of recipient countries, particularly in African aid dependent countries (Adam *et al.*, 2008; Adam *et al.*, 2007). For sub-Saharan countries it has been found that aid fluctuates as much as 30 per cent from a trended average, whilst GDP fluctuates less than 10 per cent from a trended average, according to the findings of Vargas Hill (2005). Not only large

swings of aid outflows can be damaging but large aid inflows tend to have systematic adverse effects on a country's competitiveness (Rajan and Subramanian, 2006).

Bulíř and Hamann (2003) have assessed the volatility of aid compared with domestic revenues. They found that, in GDP percentages, aid is four times as volatile as domestic revenues. The results are even more striking for highly aid dependent countries where they found that aid is 7 times more volatile than domestic revenue. In a recent paper, Bulíř and Hamann (2006) pursued the analysis and found that aid volatility might be getting worse over time. They underlined that there was no evidence of any fundamental changes in the way official aid had been delivered in the past five years. If anything, aid volatility has worsened somewhat and the information value of long-term lending commitments has declined.

We contribute to this debate by showing that aid flows are less volatile than private flows, with the exception of remittances. We also do not find any negative and significant correlation between aid shocks and capital flow shocks. Donors do not seem to take into account the variations in capital flows when allocating aid. On the one hand these results reinforce the calls for a new stabilising role of ODA. In an environment of volatile capital flows, official aid can be used as an income smoothing device and donors should be careful not to add to private investors' volatile investments. Aid would alleviate capital account pressures and help in some cases to restore private investors' confidence after a shock. It would also ensure that the government is able to carry on its development efforts. Borensztein *et al.* (2008) have already made such a call after having established that aid is not counter-cyclical to GDP. On the other hand such an insurance device poses moral hazard issues. Private flows are expected to respond to institutional quality, governance, domestic economic conditions, and business environment quality. These characteristics are, at least to some extent, controlled by the government. Insurance through ODA would reduce the incentives for the government to create and sustain suitable conditions for foreign investors. Aid must not indirectly reward bad policies. Ideally we should be able to distinguish between unexpected, external capital flow shocks and domestic policy choices and test whether aid responds to the former and/or the latter. This is beyond the scope of this paper and we simply document the relative neutrality of aid with respect to capital flow swings, leaving this issue to future research.

This paper improves on equity and bond portfolio data compared to previous studies. Bond and equity data from the World Bank are missing for a substantial number of countries. Measurements and misreporting are additional issues that make these data less reliable than those for official flows. In order to alleviate these issues we make use of portfolio bond and equity investment funds data from the Emerging Portfolio Research Fund (EPFR). Time coverage is shorter but data are collected directly from equity and bond investment funds, instead of being derived from Balance of Payments statistics. Using this unique original dataset we show that ODA reaches many more countries than private portfolio investments, but that funds also invest in countries that, as a group, represent a disproportionate amount of global ODA. Private funds and official donors do not act as substitutes. We also find that the portfolio equity fund bias towards relatively large ODA recipients fell substantially in the last decade. This shift is the result of a change in portfolio choices, investing more in Asia, while aid donors did the opposite, increasing aid to Africa.

The second part of the paper provides an overview of donor and private fund portfolios. We focus in particular on their size, and on their level of fragmentation. ODA fragmentation is receiving increasing attention in academia and among policy makers. The Development Assistance Committee (OECD 2008) has recently released a report to document the degree of aid fragmentation. It argues that there exists considerable scope for an improved division of labour between donors. Acharya *et al.* (2006) identify donors that are aid proliferators. Knack and Rahman (2007) find that fragmentation adversely affects the bureaucratic quality of aid recipients. Djankov *et al*. (2008) study the consequences of fragmentation and find that it makes aid inefficient and worsens corruption.

We start by providing some basic facts about the market for aid. It is rather a pretty narrow market from the point of view of donors if we compare their number with those of portfolio investment funds operating in emerging countries. As claimed by Kharas (2007) multilateral aid agencies are around 230, OECD DAC bilateral aid members are 22, to which could be added another dozen of non DAC donors from emerging countries. All in all we hardly reach 300 institutions involved in the aid market while portfolio equity funds operating in emerging markets are estimated to be more than 1 300. We show that few donors represent a large share of global aid, and that their market share has only very slightly fallen in the last decades despite the multiplication of the number of donors. Put in another words, the aid industry is dominated by a few market actors, with large portfolios. This phenomenon is also present in emerging and bond markets as shown by Santiso (2003).

We then measure the dispersion of aid allocation at the donor level. We find the number of recipients in their aid portfolios, and we then compute an aid concentration index for each portfolio. According to these two measures, donors have gradually fragmented their aid allocation over the past years. They have reached increasing numbers of countries. We show that many donors have added new countries to their portfolios without affecting much their portfolio concentration. It has been done by giving to these countries small aid shares. Donors have expanded their number of partnerships but without spending much on their new recipients. We extend the analysis of Acharya *et al*. (2006) in several dimensions. First, they focus on the very short time period 1999-2001 and average these three years to end up with a single observation per donor. We use the whole available information from 1960 to 2006 and are therefore able to describe the evolution of aid dispersion. Second, we present results for different donor types (bilateral, multilateral, and non-DAC bilateral) to underline differences in allocation policies and for each donor. Third, Acharya *et al*. (2006) recognise that there are two distinct dimensions to take into account when measuring dispersion: the number of recipients, which we refer to as "portfolio size" and concentration. They combine these two dimensions in single measure by using the Theil index. It makes it difficult to estimate to what extent a low value is due to size or concentration. We keep them separated and propose a two-dimensional approach.

We also draw comparisons with the equity and bond private portfolio funds from the EPFR data. Those are shown to invest much more disproportionately in fewer countries than aid donors do, and more markedly so in the recent years. We again underline that aid donors should take these results into account and, given the relatively high concentration of private fund portfolios, should take care not to increase further the inequalities it induces.

We run a parallel fragmentation analysis for recipient countries. The number of donors a developing country receives aid from (its recipient portfolio size) has continuously risen for the last 45 years, and the trend has not slowed down recently. We also measure donor concentration in each recipient using Hirschman-Herfindahl index to complement the results on portfolio size. Fragmentation can be measured along these two dimensions (size and concentration) and we show how donors expanded their portfolios to the point of managing many small partnerships. We confirm our earlier results on donor portfolios by finding that the average recipient portfolio size has been following a steady increasing trend, but that on the other hand recipient portfolio concentration has been relatively stable. These two observations imply together that the portfolio expansion has allowed only minor actors to come in, leading to more fragmentation for little benefits. These results tend to support the approach initiated by the Paris declaration signed in 2005 that takes fragmentation seriously. While it is too early to observe its effects, it is however troubling that the calls for co-ordination that preceded it during various international summits have not been followed by a clear policy reversal.

II. HISTORICAL TRENDS IN OFFICIAL AND PRIVATE FLOWS

Data

ODA data comes from the Development Assistance Committee (DAC) database on aid. It provides comprehensive data on aid flows from the main bilateral and multilateral donors to over 180 aid recipients, for the period 1960-2006. From 2005, DAC decided to not collect data on countries it did not classify as "developing" (Part II countries in the DAC classification). We focus on developing countries and so drop these observations, unless explicitly mentioned. Data are in 2005 constant dollars.

Private capital flows data comes from the World Development Indicators (WDI) from the World Bank. We use four different variables: foreign direct investment, net inflows; portfolio investment, bonds; portfolio investment, equity; workers' remittances and compensation of employees, received. All variables are converted in 2005 constant dollars using the US deflator provided by DAC in order to allow an appropriate comparison. The WDI data covers fewer developing countries than the DAC data and only for the period 1970-2006. It typically excludes some small countries. An additional issue is that some variables are not reported for a substantial number of countries in many years. This is especially the case for bond and equity data. We use pair-wise comparisons as much as possible to have comparable samples.

The Emerging Portfolio Fund Research (EPFR) data tracks country and regional weightings, in percentage terms of total assets, and average weightings by investment manager. These two quantities are of interest to draw comparisons with ODA. The share of total flows a country receives can be compared with its ODA share. As this neglects the portfolio dimension of allocation, the manager weighting is defined as the average weight of the recipient in all portfolios. It indicates how much, on average, a manager invests in a country. These weights describe a (virtual) average portfolio. We can compute the exact same weights for ODA and so compare these two portfolios. The EPFR database is unique and tracks both equity and portfolio flows with particular emphasis to investments allocated to emerging countries. It became a standard database used mostly by investment banks in order to track asset allocations and portfolio flows and, to some extent, also by fund managers in order to benchmark and compare their own asset allocation and strategies with their peers. As far as we know comparing ODA allocation and portfolio asset allocation, based on EPFR data, has never been done before.

There are in fact two EPFR datasets, for equity and for bonds. Both report monthly data. Equity data is available from 1995-12-30 to 2007-12-31, and bond data from 2002-03-31 to 2007-12-31. We focus on "Global emerging market funds" that invest in all emerging market regions of the world. This is only a subsample of the full dataset that includes funds investing only in some

regions, or in developed and emerging markets. We are doing so for three reasons. First, we only have bond data for these funds. Second, we believe ODA donors can be best thought as "global" as they invest in all regions. Third, other types of funds usually invest a very large share of their portfolio in developed countries. In terms of quantity invested, the global emerging market funds are those with the highest investment ratio in non-developed countries. They constitute therefore the category most similar to aid donors. They offer the most comprehensive data on equity investments, and so by focusing on them we do not underestimate the number of countries that benefit from equity investments.

We formatted the EPFR data to make it as comparable as possible to the DAC aid data. First we converted it in yearly data by taking averages. Second, we dropped observations for countries not classified as developing by DAC (Austria, Greece and Portugal that are included in some emerging markets asset class by portfolio bond holders or equity investors). Third, many emerging markets are classified as "Part II countries" by DAC. ODA data for these countries has not been collected since 2005, as they are not considered to be developing countries anymore. It implies that no comparison with ODA can be made after 2005 for these countries. We therefore create two variables, a country weight that takes into account all countries and so is available for comparisons with ODA data only until 2004, and one that considers only part I countries. Given these modifications, we rescaled all the weights such that their sum is always equal to one.

Quantity

We first present some background results to put into perspective the relative importance of the different flows we study in this section. Net ODA has soared in the past decades, from $ 29 billion in 1960 to 103 in 2006 (in 2005 constant terms). That represents a change of 255 percent, or an average yearly increase of 2.8 per cent. This large increase is however to be put into perspective with other flows: net FDI inflows, for example, increased by 2175 per cent between 1970 and 2006, an average yearly increase of 9 per cent. At the same time it overtook ODA as the major source of funding for developing countries. Figure 1 illustrates this trend.

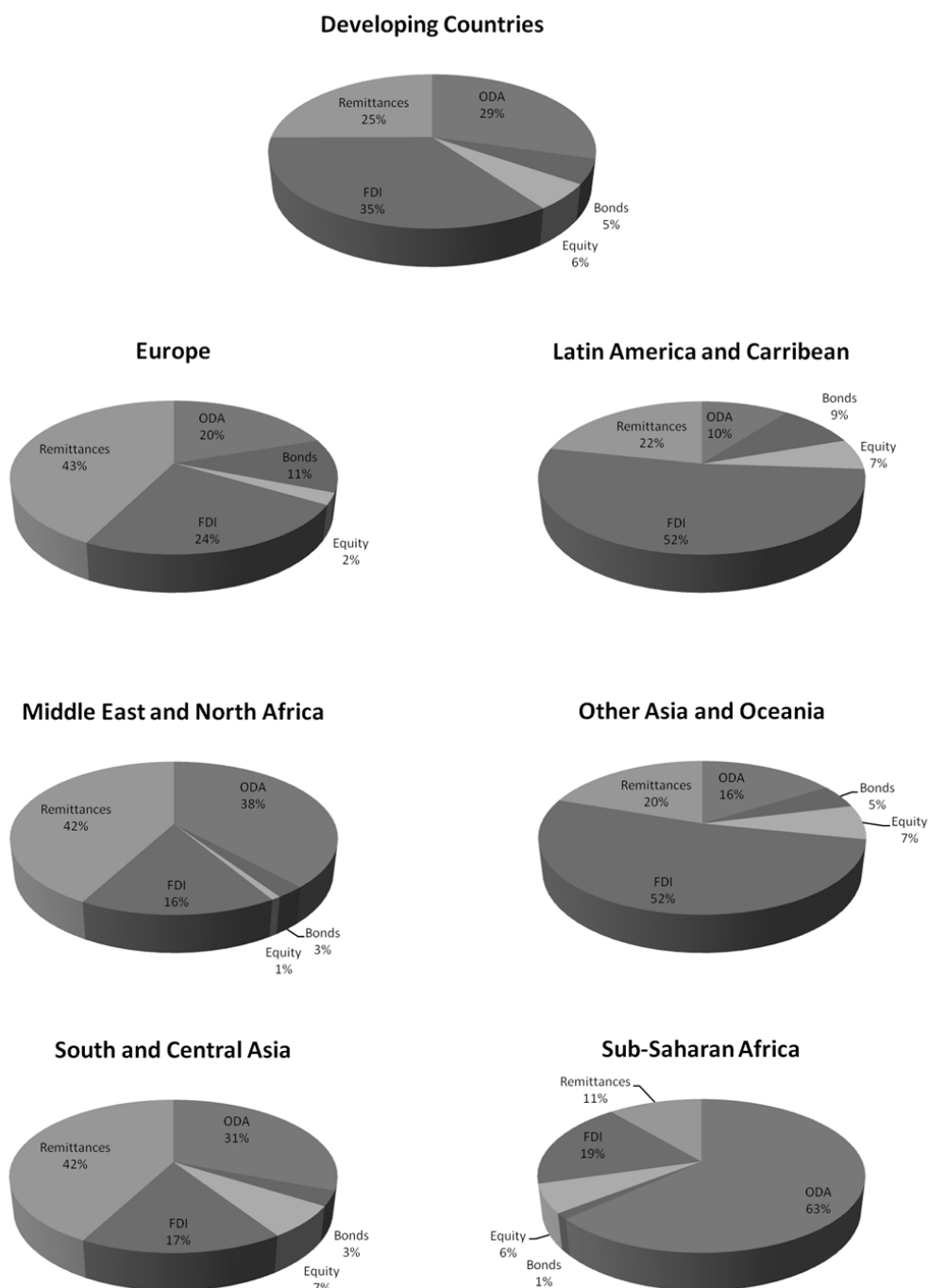Figure 1: **Net flows to developing countries**
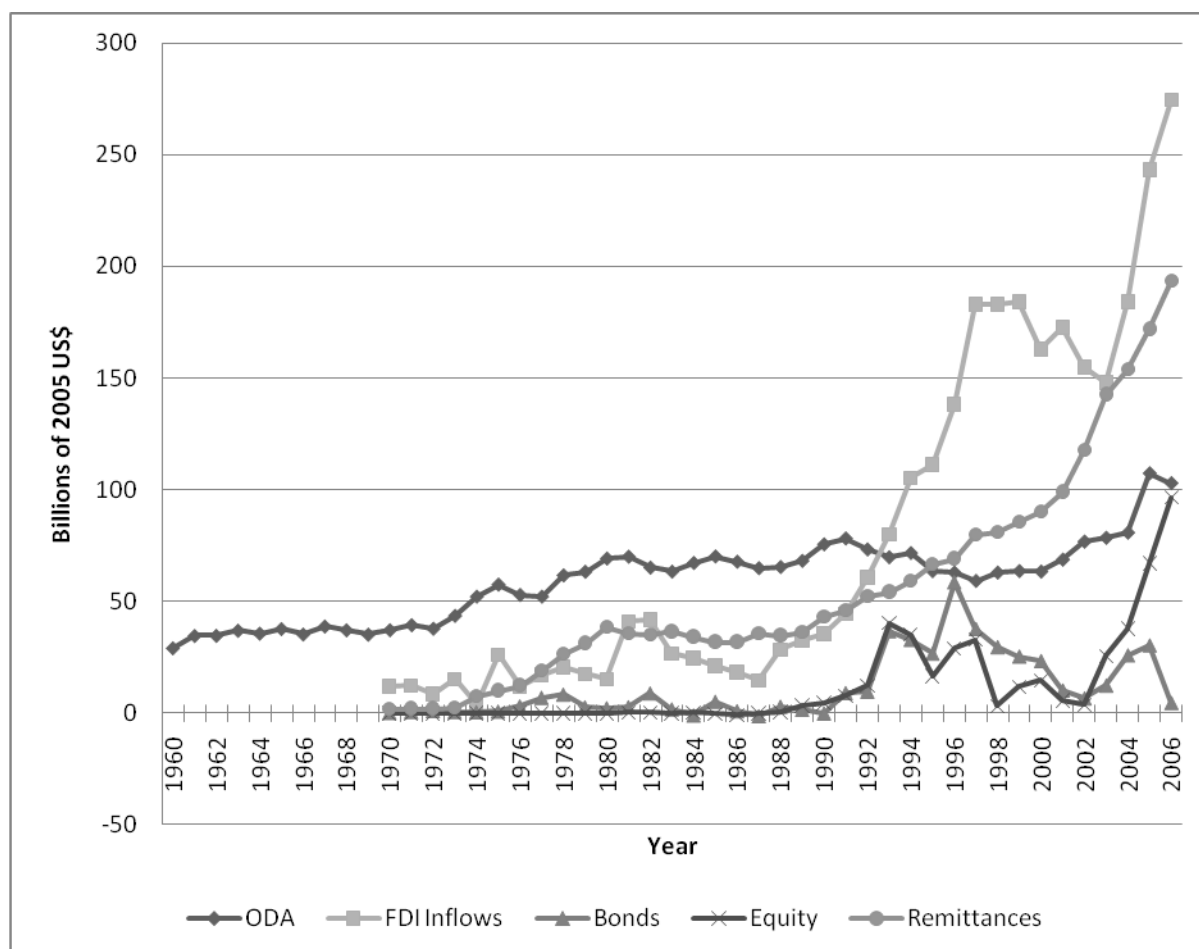
Source: Authors based World Bank and OECD data.

Both FDI and remittance flows to developing countries became larger than those of ODA in the nineties. The sheer development of these two flows has not been mirrored by equity and bond flows yet, although these have also been on the rise and equity was only $6 billion short of ODA in 2006. These characteristics differ widely across regions. Sub-Saharan Africa stands out as the region where ODA is much more important than any other flow. Figure 2 decomposes the average net flows to each region in its components and compares them. For instance the 20 per cent share of ODA in Europe means that in an average year during the period 1970-2006, 20 per cent of the net flow to Europe was made of aid.

Africa is a continent where aid flows dominate: they represent 63 per cent of the inflows received over the period 1970-2006 by Sub Saharan countries, against less than 19 per cent for FDI, 11 per cent for remittances and a meagre 7 per cent for bond and equity portfolio flows (in fact nearly allocated to a single country that is South Africa). This long term perspective masks however some changes in the very last years with an increasing amount of private flows allocated now to Sub Saharan Africa. Foreign Direct Investment reached the record values of 17.3 of $16.7 billion in 2005 and 2006 respectively (in constant terms). Remittances flows as well as portfolio flows have been also on the rise. That said Sub Saharan Africa remains the region

where aid is the most important. In Latin America, as shown in the charts below, ODA hardly reaches 10 per cent of the total inflows. South and Central Asia falls in between, ODA representing 31 per cent of the total inflows.

Figure 2: **Flows to developing countries 1970-2006, shares by region**

Developing Countries

Europe

Latin America and Carribean

Middle East and North Africa

Other Asia and Oceania

South and Central Asia

Sub-Saharan Africa

Source: Authors based World Bank and OECD data.

As already mentioned, one of the striking observations unveiled by the regional breakdown is the marked difference between Sub-Saharan Africa and the rest of the world. ODA on average represents 63 per cent of the net flows to the region and remittances are not a large source of finance. At the global level the shares of ODA and FDI are similar but this again hides large regional disparities: Europe and East Asia rely a lot on FDI, while other regions essentially receive external finance from aid and remittances. Figure 2 ignores the volumes associated to these decompositions. Table 1 provides these data, at the global and regional levels. We present the results by decade and for 2006, the last year for which we have data on all the flows.

The rows for Developing Countries merely confirm the conclusions of Figure 1. It also shows how ODA stagnated in the nineties during the exact period where FDI soared. The regional decomposition offers new insights. All the regions benefited from the increasing flows of external finance, but with large discrepancies. Sub-Saharan Africa and Other Asia and Oceania were very similar in the sixties and the seventies. They diverged dramatically after this period to the point of having very little in common nowadays. The sub-table for ODA shows how this flow actually stayed at a rather stable level in all the regions since the seventies, except in Sub-Saharan Africa. A large share of the increase in ODA during the last 40 years has been absorbed by this region.

Table 1: **Average yearly net flows, by decade and region, 2005 $ billions**

	1960-69	1970-79	1980-89	1990-99	2000-06	2006
ODA						
Developing Countries	35.41	49.71	67.08	68.02	82.58	102.90
Europe	2.32	1.04	1.23	2.88	4.71	4.89
Latin America and Caribbean	4.56	4.31	6.15	7.10	6.73	6.73
Middle East and North Africa	5.00	11.76	11.98	9.55	11.86	16.30
Other Asia and Oceania	6.50	8.49	8.75	10.51	8.54	7.66
South and Central Asia	8.81	8.78	10.17	7.88	9.71	11.13
Sub-Saharan Africa	6.89	9.84	19.14	20.47	26.36	39.00
FDI						
Developing Countries		14.46	26.40	112.52	191.39	274.31
Europe		0.18	0.26	2.01	11.13	29.53
Latin America and Caribbean		7.21	10.43	45.98	68.97	68.45
Middle East and North Africa		0.97	6.29	3.64	9.96	27.26
Other Asia and Oceania		3.01	5.91	49.55	72.30	101.71
South and Central Asia		0.53	1.39	5.93	15.06	30.67
Sub-Saharan Africa		2.56	2.11	5.41	13.97	16.68
Bonds						
Developing Countries		2.34	2.27	26.56	16.13	4.45
Europe		0.00	0.61	2.15	2.96	4.71
Latin America and Caribbean		1.83	-0.25	16.07	3.01	-16.47
Middle East and North Africa		0.17	0.10	0.56	2.65	0.54
Other Asia and Oceania		0.31	1.48	6.15	3.53	5.37

South and Central Asia	-0.00	0.35	1.00	2.92	10.18
Sub-Saharan Africa	0.04	-0.04	0.63	1.06	0.13
Equity					
Developing Countries	0.03	0.41	19.36	35.91	96.52
Europe	0.00	0.00	0.39	0.94	2.60
Latin America and Caribbean	-0.00	0.11	10.80	4.31	11.11
Middle East and North Africa	0.00	0.08	0.25	0.76	1.92
Other Asia and Oceania	0.00	0.39	2.22	18.01	53.28
South and Central Asia	0.00	0.01	2.37	7.18	12.96
Sub-Saharan Africa	0.03	-0.18	3.33	4.71	14.66
Remittances					
Developing Countries	11.29	34.85	63.52	138.31	193.38
Europe	3.36	3.41	5.84	7.10	7.89
Latin America and Caribbean	0.93	4.75	14.22	37.79	55.48
Middle East and North Africa	4.11	10.85	16.73	20.38	25.91
Other Asia and Oceania	0.87	3.88	10.58	35.39	51.23
South and Central Asia	2.61	9.57	12.43	30.52	42.80
Sub-Saharan Africa	0.85	2.39	3.72	7.12	10.08

Source: Authors based World Bank and OECD data.

Private flows represent a new important source of finance to developing countries. However Table 1 underlines that all regions have not equally benefited from them. Cogneau and Lambert (2006) have shown that ODA actually acts as a compensatory transfer for countries who do not have access to other flows. ODA is progressive while FDI and remittances are more regressive transfers. Regardless of distributional concerns, official flows are expected to be less volatile and so to provide a safe and rather constant source of income, while private capital flows may be subject to sudden changes (on volatility of private capital flows see in particular Nunnenkamp, 2001). For instance FDI to Latin America fell by more than 50 per cent between 1999 and 2003, and bonds to Other Asia and Oceania fell by more than 90 per cent between 1997 and 1998 after having increased by more than 200 per cent between 1991 and 1997. Portfolio equity and bond flows tend to be also pretty volatile as documented by several studies focusing on emerging markets, in particular the ones realised by Wang (2007), Bekaert and Harvey (2000; 2003), Bekaert *et al*. (2002), and Froot and Donohue (2002).

Volatility

Aid volatility is usually considered to be too high, and is known to be higher than for domestic revenues. A direct consequence of volatility is that recipient governments find it difficult to plan ahead. This is even more complicated when aid is not only volatile but also unpredictable. Two IMF and World Bank economists also underlined that even when disbursed aid is problematic because frequently unpredictable: in a recent paper Celasun and Walliser (2008) show that between 1990 and 2005, there is a significant absolute difference between aid

promised and aid given, equal to 3.4 per cent of each sub-Saharan African nation's GDP (in the case of countries like Sierra Leone the swings have been equivalent to 9 per cent of GDP).

Agénor and Aizenman (2007) show that aid volatility may have permanent costs in terms of output and growth, and may create a poverty trap. Large projects require sustained capital inputs and a sudden shortfall may seriously jeopardise their achievement. This is especially true for recipients where ODA represents a large share of their total revenue. For instance in 2007 grants represented 30 per cent of the total tax revenue in Tanzania. The figure reached 47 per cent in Rwanda. For these countries shocks to aid supply correspond to significant variations in their revenues. Arellano *et al*. (2008) find that a fall in aid volatility would imply significant welfare gains. Borensztein *et al*. (2008) explain that aid is volatile and fails to smooth economic shocks. They call for a new role for aid as a stabilising financial instrument. Our study of volatility contributes to this debate by investigating the relative volatilities of official and private flows. In face of the increasing role of capital flows for developing countries, as documented in the preceding section, the need for a counter-cyclical instrument that shields against the high volatility of these new flows is becoming even more pressing.

Volatility of a quantity is defined as its coefficient of variation (the standard deviation of the quantity divided by the mean of its absolute value). The normalisation avoids finding larger volatilities for larger flows. It is calculated for each recipient and then averaged over all the developing countries in the sample. Table 2 gives the volatility of each flow for the period 1960-2006 (for private flows it is measured on the period 1970-2006). We read in the first row and first column that total ODA has a volatility of 0.78 which means that its standard deviation is on average 78 per cent of its mean. It confirms the result that aid is quite volatile for developing countries, in line with the findings of previous studies already mentioned on aid volatility.

Table 2: **Volatility of flows, 1960-2006**

	Total ODA	Total ODA net of emergency aid and debt relief	Bilateral ODA	Multilateral ODA	FDI	Bond	Equity	Remittances
Mean	0.78	0.76	0.85	0.98	1.26	2.65	3.30	0.74
Standard deviation	0.44	0.37	0.48	0.44	0.39	1.13	1.38	0.41
Minimum	0.26	0.26	0.29	0.37	0.53	0.49	1.32	0.08
Maximum	3.71	2.94	3.99	4.11	2.38	6.08	6.08	1.80
Number of observations	152	152	152	152	126	71	71	124

Source: Authors based World Bank and OECD data.

The second column of Table 2 uses net ODA net of emergency aid and debt relief. These two categories are by nature volatile, because of natural disasters for emergency aid, and because debt relief is usually granted in large amounts. The figures show that aid volatility is actually not created by these.

ODA can be further split up into bilateral aid from DAC countries and multilateral aid. The former is less volatile than the latter, such that DAC donors appear to provide aid on a more stable basis. The combination of bilateral and multilateral aid (total ODA) is less volatile, such

that together the two donor categories manage to reduce aid volatility. As expected, private flows are more volatile than aid with the exception of remittances. Unsurprisingly equity and bond flows are the most volatile. Remittances are not only a major source of funds as shown in Figure 1, they are also a stable source.

Table 2 considers all the countries for which there are non-missing data; this implies that there are more countries in the aid dataset than in the private flows dataset. To avoid this bias in Table 3 volatility is presented only for countries without any missing data for any flow. We omit the column for ODA net of emergency aid and debt relief as results are extremely close to those for Total ODA. The pair-wise comparison implies that many data points are lost and Table 3 uses information on only 54 countries.

Table 3: **Volatility of flows, pair-wise comparison, 1970-2006**

	Total ODA	Bilateral ODA	Multilateral ODA	FDI	Bond	Equity	Remittances
Mean	0.67	0.72	0.94	1.23	2.35	3.06	0.74
Standard deviation	0.25	0.30	0.30	0.39	0.95	1.32	0.38
Minimum	0.27	0.29	0.54	0.69	0.49	1.32	0.08
Maximum	1.41	1.64	1.68	2.38	5.27	6.08	1.80

Source: Authors based World Bank and OECD data.

Volatility for the whole period is partly due to the increasing trend in quantities for all flows. To reduce this effect we present figures by decade in Table 4.

Table 4: **Volatility of flows, by decade, 1960-2006**

	Total ODA	Total ODA net of emergency aid and debt relief	Bilateral ODA	Multilateral ODA	FDI	Bond	Equity	Remittances
1960-1969	0.73	0.73	0.72	1.65	n.a	n.a	n.a	n.a
1970-1979	0.61	0.61	0.65	0.79	0.99	1.79	2.20	0.36
1980-1989	0.37	0.37	0.44	0.50	0.97	1.74	2.19	0.38
1990-1999	0.46	0.48	0.52	0.62	0.90	1.83	1.86	0.50
2000-2006	0.46	0.43	0.53	0.65	0.88	1.72	1.83	0.41

Source: Authors based World Bank and OECD data.

Quite surprisingly, aid has not become more stable over time. Both bilateral and multilateral donors increased the variability of aid compared to the period 1980-1989. On the other hand private flows are now more stable than they used to be. Only remittances are now slightly more volatile but they are still the most stable source of funds. Table 5 restricts the sample to non-missing observations for ODA and remittances to avoid losing too many observations. It confirms that ODA volatility has substantially increased for both types of donors and that remittances and ODA have similar volatilities.

Table 5: **Volatility of flows, by decade, pair-wise comparison**

	Total ODA	Bilateral ODA	Multilateral ODA	Remittances
1970-1979	0.46	0.48	0.61	0.37
1980-1989	0.33	0.39	0.46	0.38
1990-1999	0.40	0.46	0.59	0.50
2000-2006	0.46	0.52	0.62	0.45

Source: Authors based World Bank and OECD data.

It is known that aid flows follow the recipients' business cycles rather than being counter-cyclical. Borensztein *et al*. (2008), among others, document this result by computing the correlation between aid and income shocks, defined by the gap between the variable and its five year moving average (so at least five years of observations are required for the shock variable to be defined). We follow their strategy but using aid and capital flow data. Table 6 shows that the correlation between aid and private capital flow shocks is extremely low. We knew from the literature that aid was not disbursed during a shortfall in GDP, and have now established that it is neither used as a buffer against a shortfall in capital flows. We complement this result by computing the correlation between FDI and other capital flow shocks. The correlations are larger, though still quite small, and all positive. It indicates that the different capital flow shocks tend to happen simultaneously, thus making the counter-cyclicality of aid even more crucial during an unexpected negative shock.

Table 6: **Correlation between aid and capital flow shocks**

Coefficients of correlation	FDI-5-year moving average of FDI	Bond-5-year moving average of Bond	Equity-5-year moving average of Equity	Remittances-5-year moving average of Remittances
ODA-5-year moving average of ODA	0.009	-0.04	-0.03	0.008
FDI-5-year moving average of FDI		0.12	0.09	0.19

Source: Authors based World Bank and OECD data.

Our results on volatility show that compared to private capital flows aid volatility is rather limited, but that aid is not used to act against capital flow shocks. It seems that aid volatility is quite neutral with respect to capital flow variations.

Complementarity between flows

We have established that shocks to capital flows are not compensated by ODA shocks. We now look directly at the complementarity between these same financial resources. We are answering two types of questions: are aid and capital flows complements across countries, and are they complements within countries? The first question investigates whether countries that receive more aid get more (or less) capital flows. The answer does not depend on time variations at the country level but on differences across countries. The second question does the opposite. It

focuses only on time variations within countries and ignores the between country differences. It says whether a country gets more aid when capital flows vary.

To answer these two questions we run two regressions for each ODA-capital flow pair. The first provides the "between estimator" that exactly answers the first question because it ignores within country changes. The second gives the "fixed effects" estimator that answers the second question because it disregards across country changes. No causality should be inferred from these estimators. They are only correlations and show how a higher level of ODA is associated with a higher, or lower, level of capital flows.

Before we estimate the equations, a transformation is applied to the data. The distribution of each capital flow is highly skewed and estimates are heavily influenced by a few outliers (typically China in the last decade). When faced with this issue, the solution is usually to take the logarithm of the variables as it compresses the distribution. It is not directly possible in this case because many net flows are negative. We use a slightly different transformation by using ln(1+x) if x≥0, and –ln(1-x) if x<0, where x is the variable of interest, or equivalently x/|x|.ln(1+|x|). This transformation has the same desired effect than the logarithm and it allows for negative values in a symmetric fashion. We also always control for the log of population and include year fixed effects.

Both estimators are based on the same equation between two flows to recipient i in year t whose transformed values are y_{it} and x_{it}:

$$y_{it} = \beta_{FE} x_{it} + \delta \ln(pop_{it}) + c_i + d_t + u_{it}$$

The between estimator is the OLS estimator applied to the following equation:

$$\bar{y}_i = \beta_{BE} \bar{x}_i + \delta \ln(pop_i) + c_i + \bar{d} + \bar{u}_i$$

where the barred variables are averages across time, i.e. $\bar{y}_i = \frac{1}{T} \sum_{t=1}^{T} y_{it}$, c_i is a country fixed effect, d_t is a year fixed effect, and u_{it} is the error term. The coefficient of interest is β_{BE}. A positive coefficient means that countries with higher levels of x receive more of y.

The fixed effects (within) estimator is the OLS estimator applied to the time-demeaned equation:

$$\ddot{y}_{it} = \beta_{FE} \ddot{x}_{it} + \delta \ln(\ddot{pop}_{it}) + \ddot{d}_t + \ddot{u}_{it}$$

where $\ddot{y}_{it} = y_{it} - \bar{y}_i$. Similarly, we are interested in the parameter β_{FE}. These equations make clear that the between estimator uses only the cross-section information, while the fixed effects estimator uses only the within, or time-series, information. We therefore have access to the cross and within complentarity of flows.

The next table provides the values of β_{BE} and β_{FE} for various flows, while the complete regression tables can be found in the appendix of the paper[2].

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2. β_{BE} and β_{FE} are not elasticities. If η is the elasticity of y with respect to x then $\eta = \frac{x}{y} \frac{1+|y|}{1+|x|} \beta$. However for x and y "large enough" the estimated coefficients are close to the elasticity. A natural point to compute elasticities is the sample mean. For instance the average level of ODA in the whole sample is $ 347.93 million. The average FDI flow is $714.78 million. That implies $\frac{x}{y} \frac{1+|y|}{1+|x|} = 1.001473$ and so the reported coefficients are virtually equal to elasticities.

Table 7: **Complementarity and substitution between flows**

Dependent variable	Estimator	FDI	Bond	Equity	Remittances
ODA	Between	-0.14***	-0.25***	-0.35***	-0.005
	Within	0.01	-0.01	-0.02	0.05
FDI	Between		0.56***	0.95***	0.43***
	Within		0.08**	0.11***	0.12

Source: Authors based World Bank and OECD data. ***significant at the 1 per cent level, **significant at the 5 per cent level, *significant at the 10 per cent level. All regressions include time fixed effects and the logarithm of the country population. For the fixed effects regressions standard errors are clustered at the country level.

The first two rows of Table 7 present the estimates of complementarity between ODA and capital flows. The answer to the first question (are aid and capital flows complements across countries?) is no, they are substitutes. Countries with higher levels of capital flows receive less aid. The results suggest that ODA is less complementary with equity than with any other capital flow, though the different samples on which coefficients are estimated make comparisons difficult[3]. This relationship is absent with remittances. The answer to the second question is neither yes nor no. It confirms the findings of Table 6 that aid is neutral to capital flow variations at the country level. In other words, aid does partially compensate for differences in capital flows across countries, but variations in capital flows within countries do not trigger variations in aid. It has a redistributive quality but no insurance effect. The last two rows of the table report results using FDI as the dependent variable. It shows that there is a quite strong complementarity between different types of capital flows, both across and within countries. As we have already argued, the case for a potential role of aid as a cushion against variations in capital flows is reinforced because of these complementarities. A fall in FDI usually occurs in conjunction with a fall in other types of flows, and no change in aid.

Number of recipients

The last comparison made between official and private flows in this paper deals with the number of countries benefiting from those. We showed that ODA was less volatile than capital flows, but we also expect it to reach a greater number of developing countries. Figure 3 plots the number of developing countries with a positive net flow in a given year. There were 153 countries in the sample in 2006: ODA is available for each of them, but we have FDI, bond and equity data for only 123 of them, and 118 with remittances data[4]. It is therefore quite natural that there are more ODA than FDI recipients. In 2006, of the 123 countries for which we have private flows data, 122 had a positive net ODA flow, 114 for FDI, and 118 for remittances. Therefore it is fair to say that in the sample virtually all countries receive positive quantities of aid, FDI and

3. We ran the estimation on a "minimal" sample where no data for any of the flows considered is missing. It includes 2557 observations, and 118 countries. The between estimator of the regression of ODA on FDI is -0.18, on bonds -0.15, on equity -0.28, and on remittances -0.043.

4. The countries in the DAC sample but not in the WDI sample include many small states, most of them islands (Anguilla, Cook Islands, St Helena, Tuvalu, etc.). There are also some "non-island" countries: Afghanistan, Iraq, North Korea, Libya, Namibia, and Serbia.

remittances. On the other hand very few get a positive quantity of bond and equity portfolio flows. At their peak, in 2005-2006, only around 40 countries in the developing world where receiving equity inflows from global emerging markets funds. Numbers are even lower for bonds.

Figure 3: **Number of recipients with positive net flows**
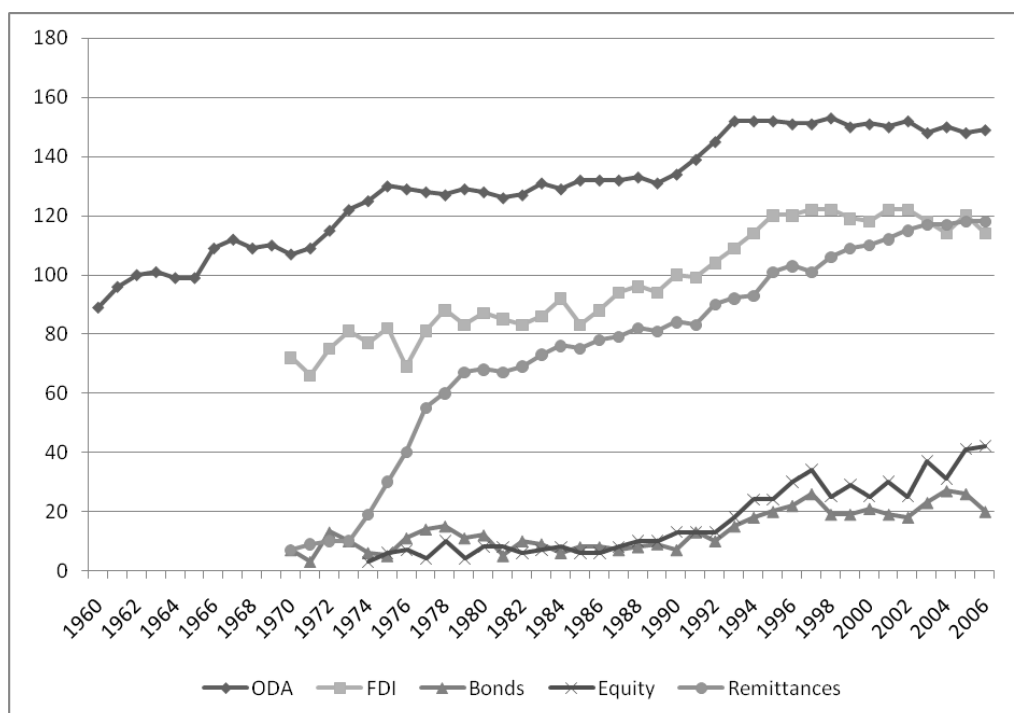
Source: Authors based World Bank and OECD data.

Private equity and bond funds

We give first a few indications about the sample of countries that are included in the EPFR data. In the first column of Table 8 we read the number of countries in the EPFR equity index with strictly positive weights. The data actually track more countries (slightly less than 60 for the equity funds), but some have a zero weight. Column 2 indicates the number of countries that get strictly positive gross ODA. Very few of them actually do not get anything. In column 3 we report the share of global ODA that equity recipients represent. Columns 4 to 6 contain the same information but restrict the sample to developing countries. Table 9 is the equivalent of Table 8 for bonds.

The two tables confirm that many more countries benefit from ODA than from equity and bonds portfolios[5]. The use of the EPFR dataset also offers new insights. Equity funds invest in

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5.   An important caveat must be made. EPFR data reports portfolio weights, and so must be read as stocks instead of flows (WDI reports flows). On the other hand ODA is a flow of resources, not a stock. However we consider ODA as a portfolio where donors decide from one year to the next whether they increase their holdings in each recipient, as private investors do with funds. When we later use EPFR data to compute a measure of volatility we will use flows, instead of the portfolio weights that reflect stocks.

roughly 20 per cent of all ODA recipient countries. However these countries represent a much larger share of global ODA. Large ODA recipients are over-represented in the EPFR. The correlation between equity and ODA weights turns out to be positive, with a value of 0.10 for developing countries.

The same is true for bonds, though the correlation is smaller. This bias for equity recipients has decreased with time. In 1995, 36 countries were positively weighed in the EPFR and they represented 46 per cent of global gross ODA. In 2004 there were 40 countries that accounted only for 39 per cent of global ODA. This is true also if we look only at developing countries. ODA has actually recently flowed from countries where private funds invest to countries where they do not.

Table 8: **Number of countries in the DAC and EPFR equity datasets**

Year	All countries			Developing Countries		
	EPFR	ODA	ODA share	EPFR	ODA	ODA share
1995	36	186	46.30	27	152	41.78
1996	42	187	51.03	32	152	47.52
1997	38	186	44.18	28	152	41.77
1998	41	186	46.72	29	152	43.10
1999	47	186	48.57	33	152	43.80
2000	48	186	48.37	33	152	43.45
2001	47	185	45.44	33	152	41.79
2002	41	185	38.74	30	152	35.95
2003	40	185	38.43	29	152	35.86
2004	40	184	38.82	29	152	35.93
2005	41			29	152	32.68
2006	43			33	153	36.17
2007	40			29		

Source: Authors based EPFR and OECD data.

Table 9: **Number of countries in the DAC and EPFR bond datasets**

| Year	All countries			Developing Countries		
	EPFR	ODA	ODA share	EPFR	ODA	ODA share
2002	42	185	40.54	32	152	37.81
2003	42	185	31.05	31	152	27.54
2004	48	184	36.93	36	152	33.19
2005	47			36	152	32.66
2006	57			45	153	41.55
2007	57			44		

Source: Authors based EPFR and OECD data.

These changes can be better understood by looking at the regional shares in the EPFR. Regional weights are given in the dataset for four broad regions: Africa and Middle East, Asia, Europe, and Latin America. We define similar regions in the DAC dataset. Since comparisons can

be done for more years using data on developing countries we present graphs using only the data about them.

Figure 4 shows that Africa's ODA share has been increasing while Asia's was falling. At the same time Asia's equity share was increasing. These antagonistic changes explain the falling ODA share of equity recipients. Donors seem to have acknowledged the development of international finance and started to reduce aid to countries with access to it, but as shown later in this section the trend is not strong enough to conclude to substitution between equity and aid.

Figure 4: **ODA, equity, and bond regional shares**
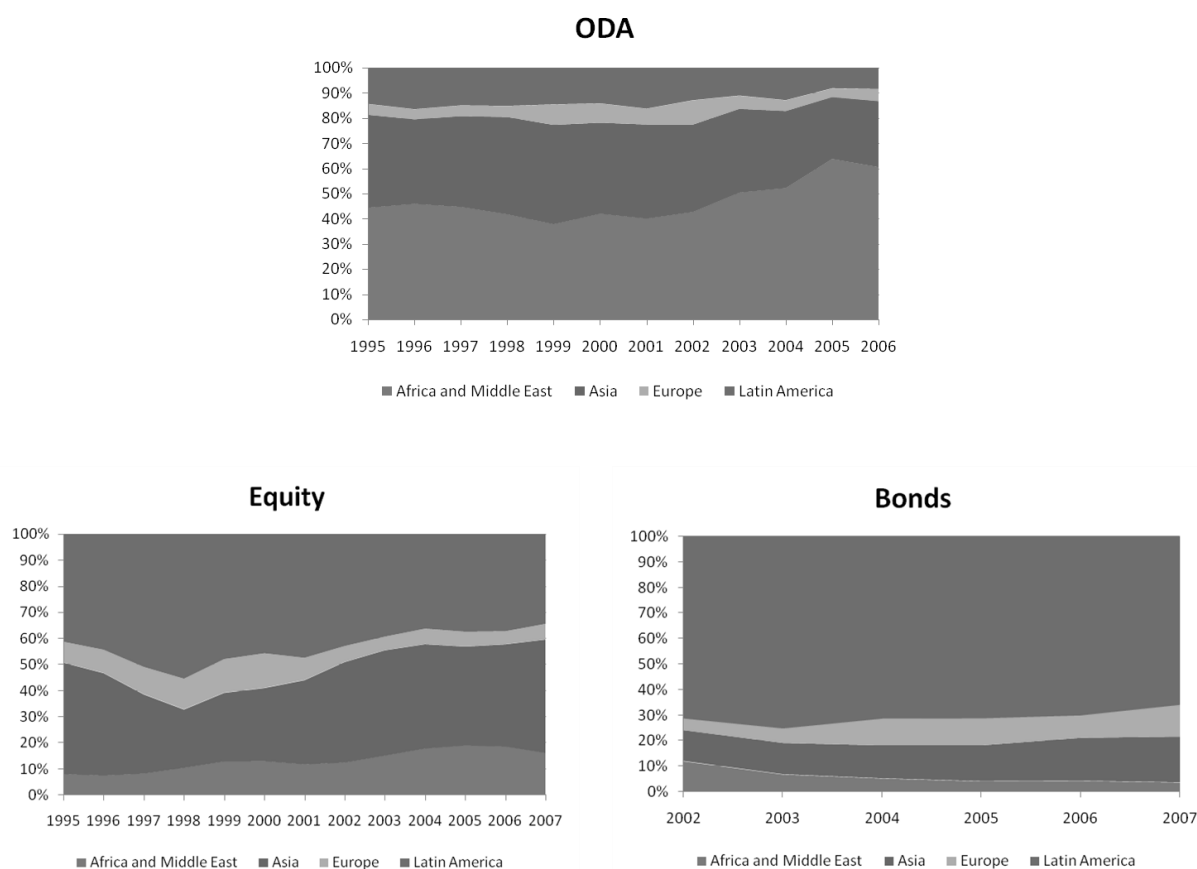
Source: Authors based EPFR and OECD data.

Unfortunately the short time span of the EPFR data makes many useful comparisons between official donors and private portfolio funds difficult to implement. A further hindrance is that data about total assets invested are available only from 2003 for equity and from 2005 for bonds. We are therefore not able to derive flows for earlier dates. However we exploit the data in two other directions. We compute net equity and bond flows per year in order to compare their size with net ODA flows. Second, we measure volatility for the four-year period where we have both DAC and EPFR data.

We compare capital and ODA flows on the EPFR sample. For each country we multiply its weight by the total assets invested. This gives the capital stock in the country. The monthly

flow is given by the difference between two consecutive stocks. We then add up all the flows in a year to get the year flow and convert this figure in 2005 constant dollars using the DAC deflator. We only consider developing countries to use all available years.

Table 10: Net flows of ODA, bond and equity to developing countries, EPFR sample, 2005 constant $ billions

Year	Equity sample		Bond sample	
	ODA	Equity	ODA	Bonds
2003	16.2	16.8		
2004	16.3	6.9		
2005	24.8	10.0	24.4	4.5
2006	30.3	14.1	42.3	4.3

Source: Authors based EPFR and OECD data.

Table 10 shows that ODA is still a larger source of finance than equity and bonds even for EPFR countries that must receive most of these funds.

Table 11: ODA and Equity volatility, developing countries, 2003-2006

	Equity	ODA, EPFR sample	ODA
Mean	1.22	0.38	0.33
Standard deviation	0.44	0.29	0.29
Minimum	0.38	0.024	0.024
Maximum	2	1.24	1.50
Number of observations	34	34	152

Source: Authors based EPFR and OECD data.

The volatility measure is based on a limited number of years but there are two conclusions to Table 11. First, it confirms that portfolio equity is much more volatile than ODA. Quite surprisingly volatility measured using WDI and EPFR data are almost identical, once we adjust for the time span[6]. Second, private portfolio funds invest in countries where ODA volatility is quite representative of its global value. This result can also be read differently: aid donors do not seem to take into account private capital flow variations when they allocate aid. It is suggested by the preceding results on the complentarity between flows. A similar approach with the EPFR data would show no significant estimates across and within countries (all coefficients are negative, but with very low significance levels; the limit of this approach with the EPFR data is the small sample size, with a maximum of 118 observations).

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6. Volatility on the 2000-2006 period using WDI data is normalized for comparison purpose with the other ten year volatility measures. The figure computed from the data is multiplied by the square root of 10/7. The average in Table 4 is 1.83. If we multiply the 1.22 volatility by the square root of 10/4 we obtain a value of 1.93.

III. ODA DONORS

Market shares

This section focuses on ODA donors. It looks at different patterns in donors' allocation policies, mostly about the fragmentation of aid. Bilateral aid is highly concentrated into the hands of a small number of donors. If we consider the 22 bilateral DAC donors, the five largest represent more than 75 per cent of the gross disbursements. Figure 5 shows the average shares of the ten largest donors for the period 1960-2006. Figure 6 depicts the situation in 2006. Note how little the situation has changed. The importance of the 5 largest donors has slightly fallen, but by a very small quantity. Similarly the ten largest donors still represent around 90 per cent of total aid volume, and the ranking is almost identical. Figure 7 presents the cumulative weight of the top 5 donors for the period 1960-2006 and confirms this impression of stability. They represented more than 90 per cent of the gross disbursements in the early sixties but this share has been quite stable around 75 per cent since 1980[7].

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7. The totals calculated here are based on bilateral disbursements, and not the total aid budgets. Those are larger as they include payments to multilateral institutions. We used the bilateral disbursements in order to find the relative importance of donors for developing countries. It is more captured by what they actually spend directly in these countries than their total aid budget. However, had we used the official figures we would have found similar results with the predominance of the five largest donors.

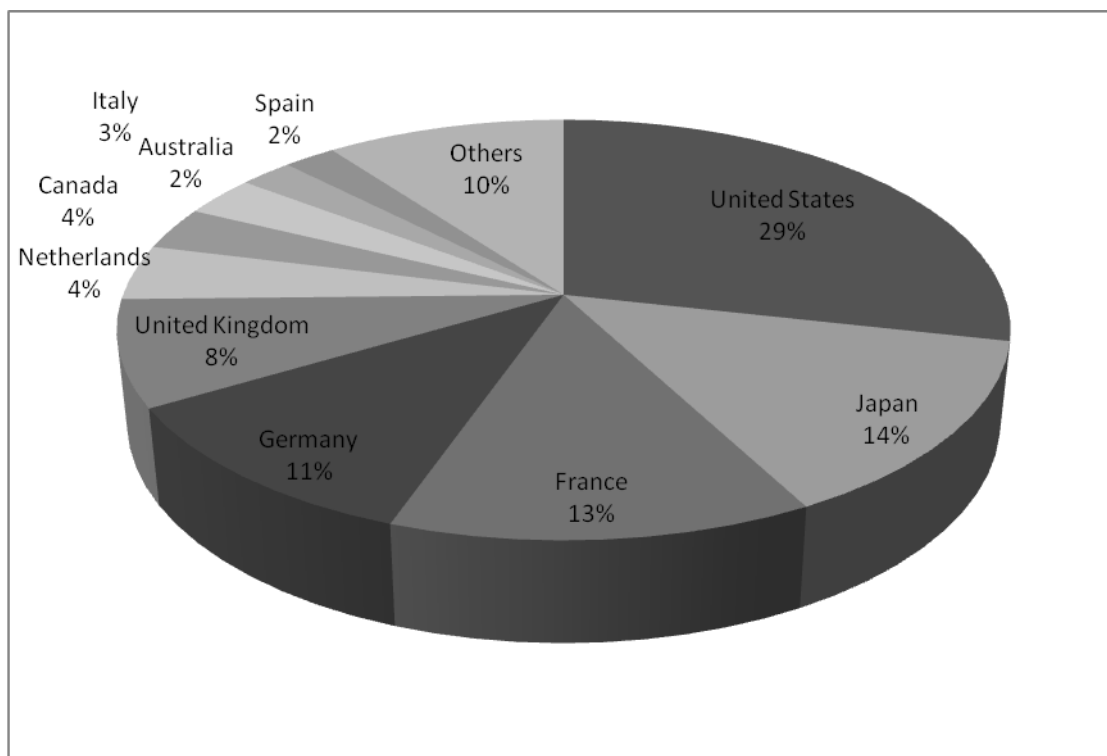Figure 5: **Donor average share, DAC donors, 1960-2006**

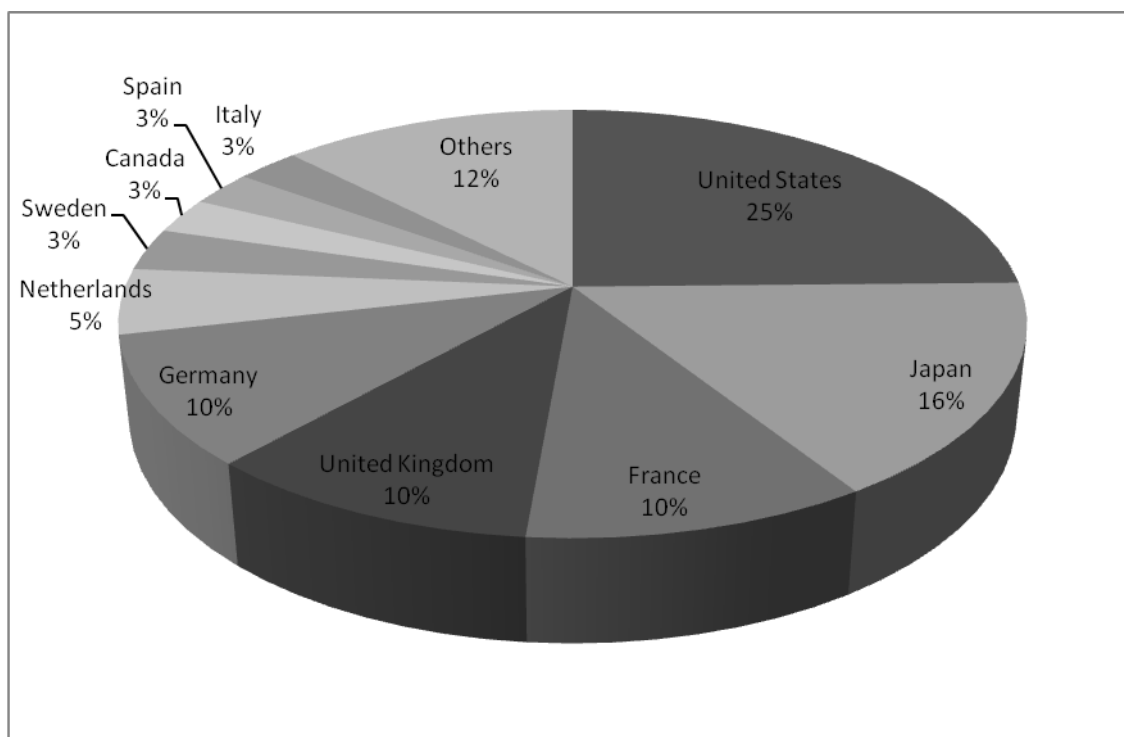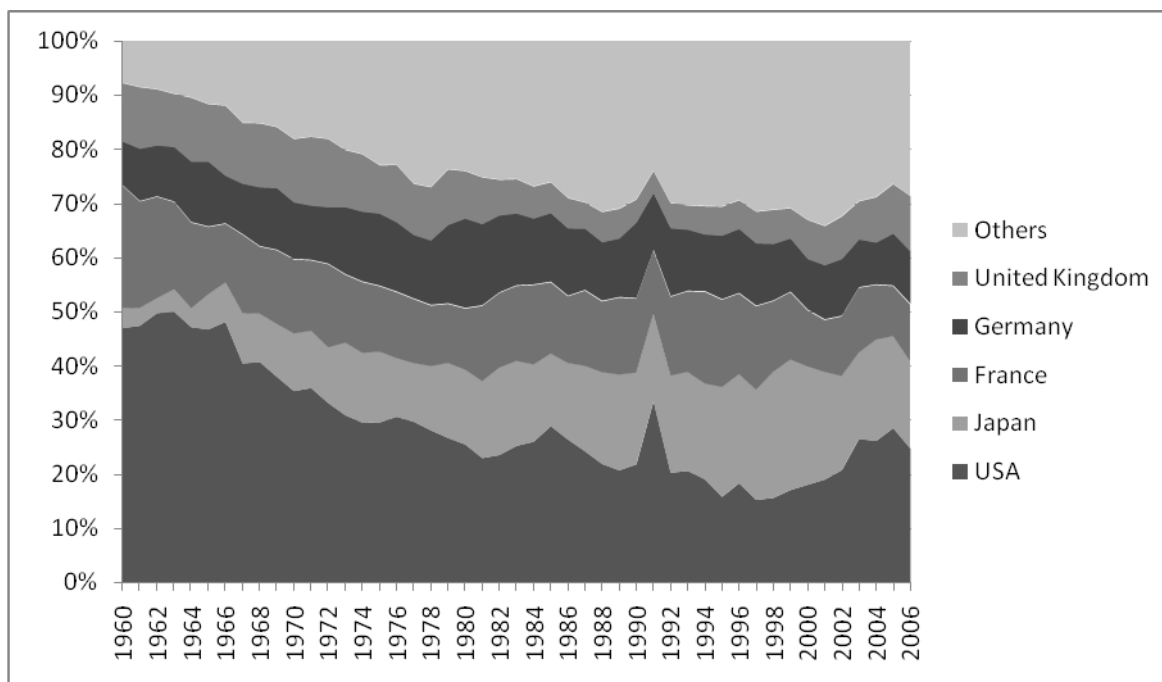Figure 6: **Donor average share, DAC donors, 2006**

Figure 7: **Cumulative donor shares, DAC donors**

Source: Authors based on OECD DAC data.

The high concentration of bilateral aid is not uniform across regions. In order to measure the intensity of concentration we compute the Hirschman-Herfindahl index of market concentration. It is equal to the sum of squared donor shares. A high index means that few donors represent a large share of aid disbursed in the region. We present the results in Table 12.

Table 12: **Market concentration, all donors, by region and decade**

	1960-1969	1970-1979	1980-1989	1990-1999	2000-2006	2006
World	0.26	0.16	0.13	0.13	0.13	0.13
Europe	0.32	0.30	0.28	0.18	0.12	0.11
Latin America and Caribbean	0.42	0.23	0.20	0.16	0.16	0.17
Middle East and North Africa	0.29	0.30	0.37	0.26	0.24	0.24
Other Asia and Oceania	0.43	0.21	0.23	0.27	0.30	0.27
South and Central Asia	0.38	0.17	0.14	0.18	0.18	0.20
Sub-Saharan Africa	0.25	0.16	0.12	0.12	0.11	0.12

Source: Authors based on OECD DAC data.

The first row of the table confirms that world concentration has remained the same for the past 30 years. However it differs significantly across regions. If we leave aside the decade 1960-1969, when few donors were active, concentration has usually decreased but only slightly. Other Asia and Oceania is an exception, mainly because of the increasing importance of Japan in the region. Sub-Saharan Africa receives a large amount of aid from most donors and as a result its concentration index is low. On the other hand Middle East and North Africa, and Other Asia and Oceania get a lot of funds from one donor, respectively the US and Japan/Australia.

Portfolio size and concentration

In this section we study different characteristics of donors' portfolios of recipients. There is growing concern that donors give aid to too many recipients, in other words that aid allocation is too fragmented.

Fragmentation creates costs on both sides of the relationship. The recipient has to deal with many donors which have different administrative procedures. The bureaucratic burden can be heavy for developing countries, whose administration has already limited resources. On the other hand the donor must keep active relationships with many recipients. Development agencies must keep track of hundreds of projects in many countries with different organisations. Donors started to acknowledge the inefficiency of aid dispersion and calls have been made for greater co-ordination. SIDA, the Swedish aid agency, for example, has decided in 2007 to halve its number of aid recipients. It made it clear that the aid budget would remain constant but that having too many recipients was too costly, and harmful for developing countries.

We measure aid dispersion by looking first at donors, and then at recipients. A first crude measure of dispersion is the average number of recipients a donor gives aid to. We split the sample into two donor categories: DAC donors, and multilateral donors. Figure 8 shows this index for each year in the sample, alongside with the number of recipients in the dataset that gives the maximum portfolio size. A recipient is considered to be in a donor portfolio in a given year if it receives a strictly positive amount of gross ODA from the donor. We later use gross ODA net of emergency aid and debt relief. This measure gets as close as possible with our data to the concept of country programmable aid (CPA) used by the DAC to assess fragmentation. Any flow that is unpredictable by nature is not included in CPA. Around 60 per cent of unpredictable aid is made up by emergency aid and debt relief, but other items that do not imply transfers in the recipient countries (research, administrative costs) are also taken into account. We are not able to use the direct measure of CPA as it is available only for 2005 and cannot be recovered on a disbursement basis for other years. We must add that debt relief grants started to be reported as a separate category in 1988, and emergency aid in 1995 (either because they were inexistent before that date or because of reporting directives). We estimate that our measure that excludes emergency aid and debt relief is a good variable to measure fragmentation at the recipient level.

The average number of recipients in a donor portfolio increased tremendously. It was less than twenty in 1960, and is now above 100, reaching the record value of 109 recipients in 2006. Even small donors tend to disburse funds to many countries. Luxembourg had 82 recipients in 2006, Greece had 115.

Multilateral donors seem to be more focused but this actually hides large differences among them. There are some small donors, with ten or twenty recipients (Caribbean Development Bank, EBRD, Nordic Development Fund), and some very large (the European Commission gave aid to 149 developing countries in 2006, more than any bilateral donor, UNDP, UNICEF, UNTA all have more than 100 countries in their portfolios).

Figure 8: **Donor portfolio size**
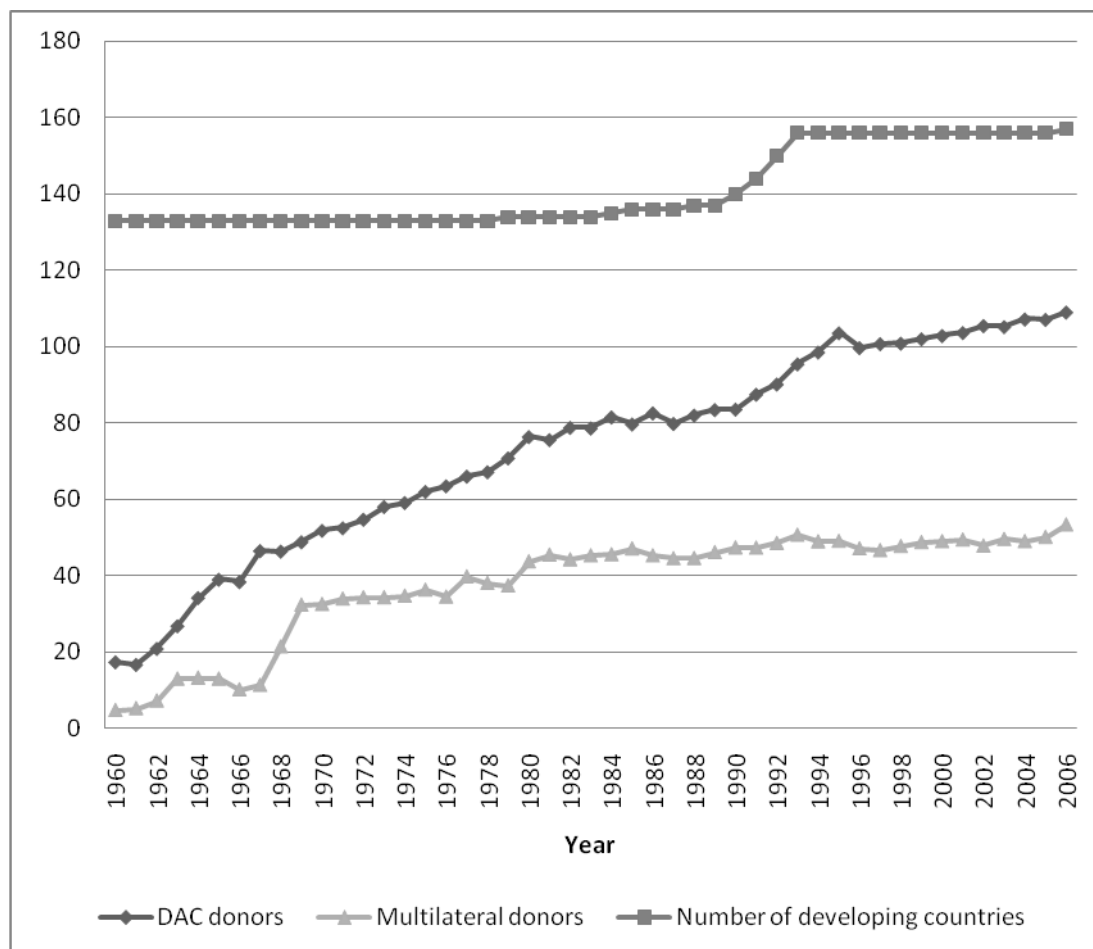
To complement Figure 8 we present the number of countries in each portfolio in 2006. For this year the maximum number of recipients is 153. Some donors are not far from this value. The portfolios with the largest number of recipients include both bilateral and multilateral donors. Even a donor that does not allocate large aid quantities can spread them over a large number of countries. Greece for instance represents less than 0.2 per cent of total gross disbursements in 2006 but still reaches 115 countries.

Figure 9: **Portfolio size in 2006, by donor**
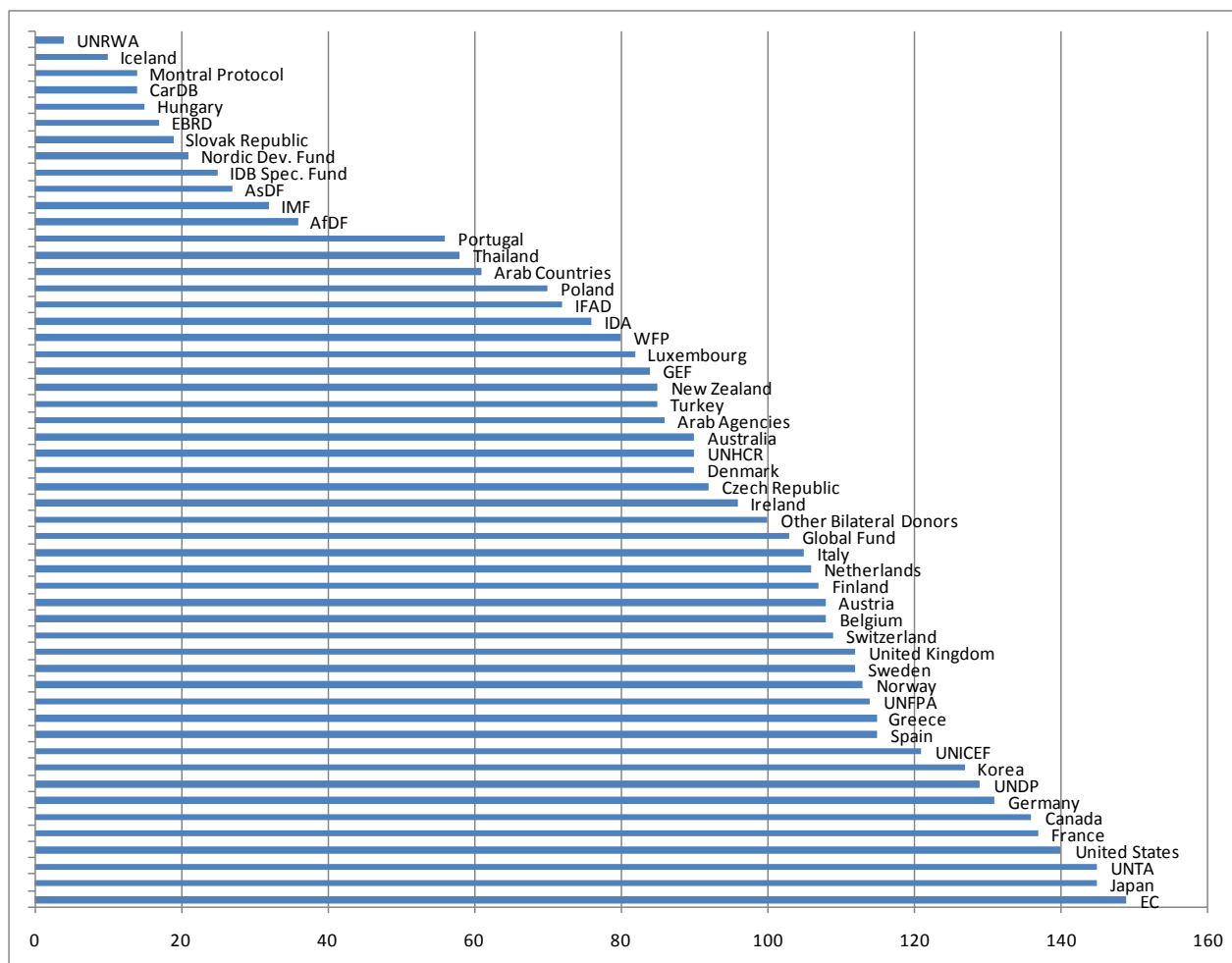
Source: Authors based on OECD DAC data.

Dispersion is measured more precisely by using the Hirschman-Herfindahl index on portfolios. If N is the number of developing countries, the index ranges from 1/N to 1, with a higher value indicating more concentration, i.e. most aid is given to a limited number of countries. The issue with this index is that the only way it takes into account the number of potential recipients is through its lower bound. An additional issue is that it is debatable whether a high or a low value of the index is to be preferred. A high value may mean that the donor spends most of its funds on few countries and very little on many. If there is a fixed cost of establishing a relationship then this may be inefficient. It seems preferable that, with the same budget, the donor gives an equal share to all its recipients, and so has a low index. On the other hand by doing so the donor might spend very little on each country, making its presence worthless everywhere. The right balance is therefore difficult to find. For this reason we believe that portfolio size and concentration must be considered simultaneously and separately. Past studies on aid fragmentation have not exploited this possibility. We first use the simple Hirschman-Herfindahl index but we then complement the analysis to take into account the number of countries in the portfolio. Fragmentation is calculated using gross aid minus emergency aid and debt relief grants.

Table 13: **Fragmentation of aid, by donor and decade**

DAC donors	1960-1969	1970-1979	1980-1989	1990-1999	2000-2006	2006
Australia	0.57	0.51	0.27	0.17	0.13	0.16
Austria	0.35	0.23	0.20	0.09	0.05	0.06
Belgium	0.59	0.25	0.16	0.04	0.04	0.05
Canada	0.27	0.10	0.04	0.03	0.03	0.04
Denmark	0.40	0.08	0.09	0.05	0.05	0.05
Finland		0.25	0.09	0.05	0.05	0.05
France	0.37	0.05	0.03	0.04	0.04	0.04
Germany	0.14	0.05	0.04	0.04	0.03	0.03
Greece				0.23	0.25	0.14
Ireland		0.29	0.22	0.10	0.09	0.07
Italy	0.19	0.12	0.06	0.06	0.05	0.11
Japan	0.20	0.13	0.07	0.07	0.06	0.06
Luxembourg				0.05	0.05	0.06
Netherlands	0.46	0.14	0.05	0.03	0.03	0.04
New Zealand		0.10	0.12	0.07	0.05	0.06
Norway	0.47	0.11	0.08	0.05	0.03	0.03
Portugal	0.49		0.27	0.31	0.28	0.16
Spain			0.18	0.07	0.04	0.04
Sweden	0.22	0.13	0.08	0.05	0.04	0.03
Switzerland	0.24	0.09	0.04	0.03	0.03	0.03
United Kingdom	0.09	0.11	0.06	0.04	0.06	0.08
United States	0.10	0.09	0.09	0.09	0.09	0.14
Average	0.31	0.15	0.10	0.08	0.07	0.07

| Multilateral donors	1960-1969	1970-1979	1980-1989	1990-1999	2000-2006	2006
AfDF (African Dev.Fund)		0.14	0.05	0.05	0.06	0.06
Arab Agencies		0.31	0.06	0.07	0.03	0.03
AsDF (Asian Dev.Fund)	1.00	0.23	0.19	0.16	0.13	0.12
CarDB (Carribean Dev. Bank)		0.24	0.15	0.14	0.16	0.22
Council of Europe		1.00	1.00	1.00		
EBRD				0.11	0.12	0.13
EC	0.13	0.05	0.03	0.02	0.02	0.02
GEF				0.13	0.06	0.04
Global Fund (GFATM)					0.23	0.03
IBRD		0.22	0.31			
IDA	0.48	0.18	0.13	0.06	0.05	0.05
IDB	0.34					
IDB Spec. Fund	0.15	0.08	0.08	0.11	0.17	0.16
IFAD		0.35	0.06	0.03	0.03	0.03
IMF Trust Fund		0.07	0.50			
Montreal Protocol				0.24	0.45	0.36
Nordic Dev. Fund				0.08	0.09	0.07
SAF+ESAF+PRGF(IMF)			0.14	0.11	0.10	0.09
UNDP	0.03	0.02	0.02	0.02	0.02	0.02
UNFPA		0.05	0.05	0.03	0.02	0.02
UNHCR	0.13	0.20	0.11	0.08	0.03	0.03
UNICEF	0.05	0.06	0.05	0.03	0.03	0.03
UNRWA	0.54	0.54		0.36	0.42	0.49
UNTA	0.02	0.02	0.01	0.01	0.01	0.01
WFP	0.08	0.05	0.04	0.05	0.05	0.07
Average	0.29	0.18	0.15	0.09	0.10	0.10

Source: Authors based on OECD DAC data.

We first make the distinction between DAC bilateral and multilateral donors (data on some non DAC bilateral donors is also available but we do not report it in the table for the sake of space). For both types of donors fragmentation has increased on average. Bilateral donors tend to be more dispersed in their asset allocation than multilateral donors, but it must be underlined that multilateral donors are a heterogeneous group, with some small, specialised organisations and some large aid agencies (EC, IDA) whose portfolios are highly fragmented.

The section of the table for bilateral donors shows that even small donors can have very fragmented portfolios. Luxembourg (but also Norway or Sweden) allocates small aid quantities compared to large donors but has a concentration index lower than the two largest donors. On the other hand it means that some small donors have more equal aid allocations across countries. Luxembourg has around 75 countries in its portfolio, but a low fragmentation index. The US give aid to 135 countries but have a less fragmented portfolio. We will come back to this point later but we should keep in mind at this point that a lower concentration index only means that the recipients' portfolio weights are more equal.

Portfolios have become more fragmented over time. This is true for most donors, but some stand out. The US have kept the same level of fragmentation for 45 years. Finally, donors such as Australia and Japan, that are quite specialised geographically, have less fragmented portfolios. Turning to multilateral donors, we observe that some of them have highly fragmented portfolios. The European Commission and UN agencies give aid to most countries and so have extremely low fragmentation indexes. Figure 10 uses data for 2006 and shows the level of fragmentation for each donor in 2006. Remember that a low value indicates high fragmentation. The most fragmented portfolios are held by multilateral institutions, especially UN agencies and the European Commission.

Figure 10: **Portfolio fragmentation in 2006, by donor**
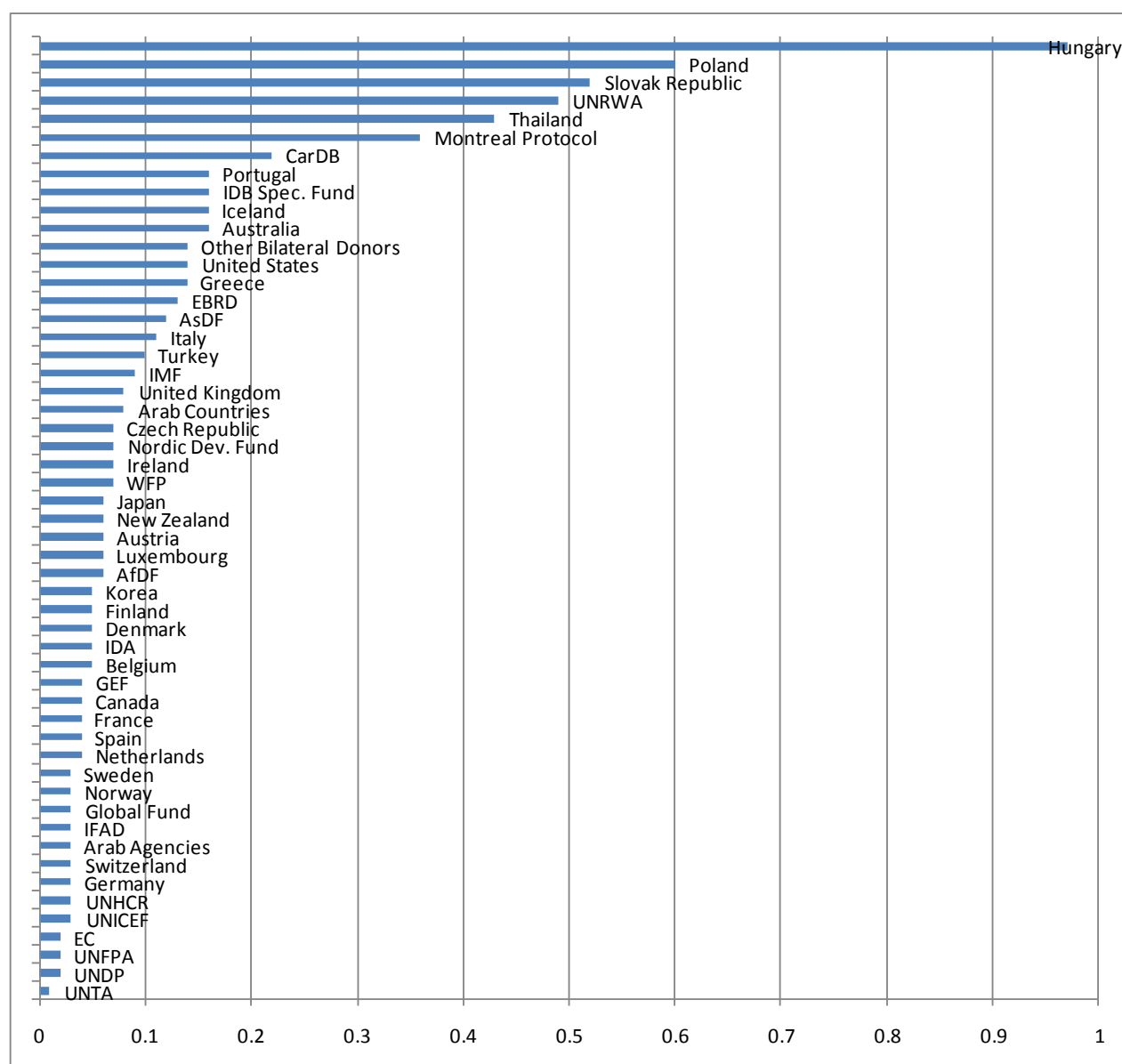
Source: Authors based on OECD DAC data.

We have already mentioned that the Hirschman-Herfindahl index misses the portfolio size dimension. Two donors can have the same concentration index with very different portfolio sizes. We now attempt to combine the two approaches using portfolio size and concentration together. The first measure disregards any distributional issue, while the second is loosely linked to the number of recipients. We propose to use a graphical approach. A donor is characterised by its position in a two dimensional space where its coordinates are given by its portfolio size and its concentration index. Of course we are losing the time dimension in these graphs. We present data in two different years: 1980 and 2006. It is arbitrary and graphs could be made for each year. However we want here to propose this approach rather than providing a detailed analysis. We

chose these two dates because 1980 is still an early year, and we know the aid market expanded a lot since then. 2006 is simply the last year in the data and so the graph presents the current level of fragmentation[8].

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8. We could follow Acharya *et al*. (2006) and use the Theil index that takes into account the number of zeros in a portfolio. Other inequality measures would equally do. We could alternatively keep the Hirschman-Herfindhal index and multiply it by the maximum number of recipients. We do not present these results here but they would be highly similar to those in Table 13. However these indexes mix the two dimensions of concentration and size, to the point that comparisons can be difficult to make.

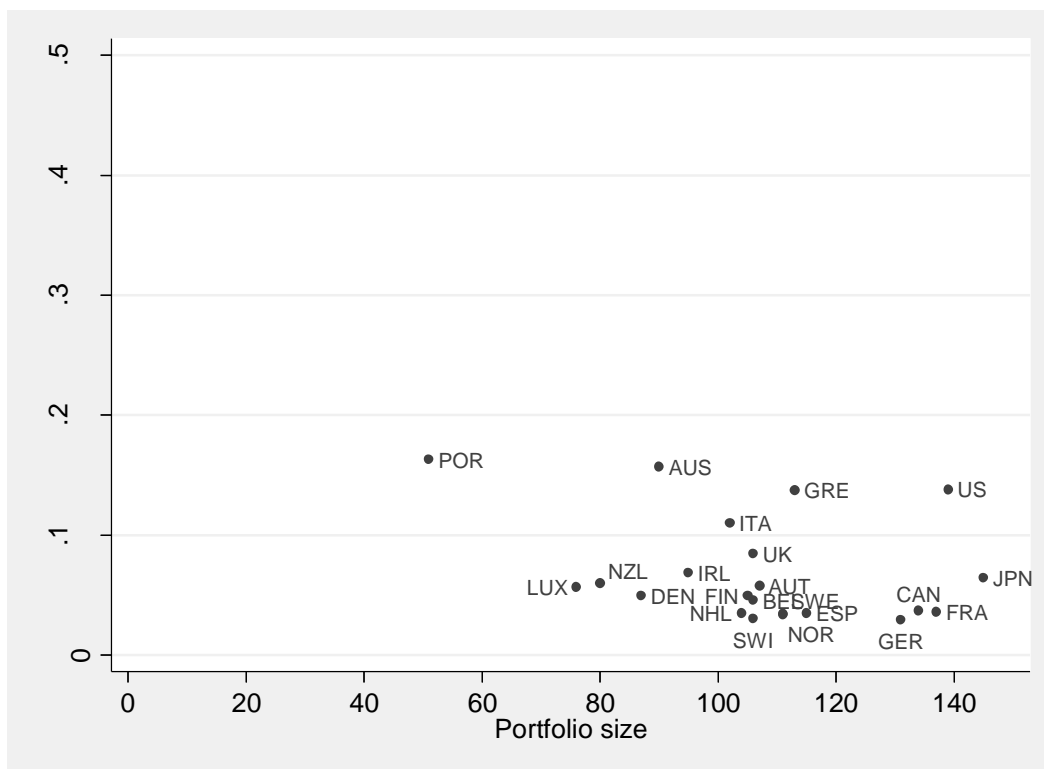Figure 11: **Portfolio concentration and size, 1980**
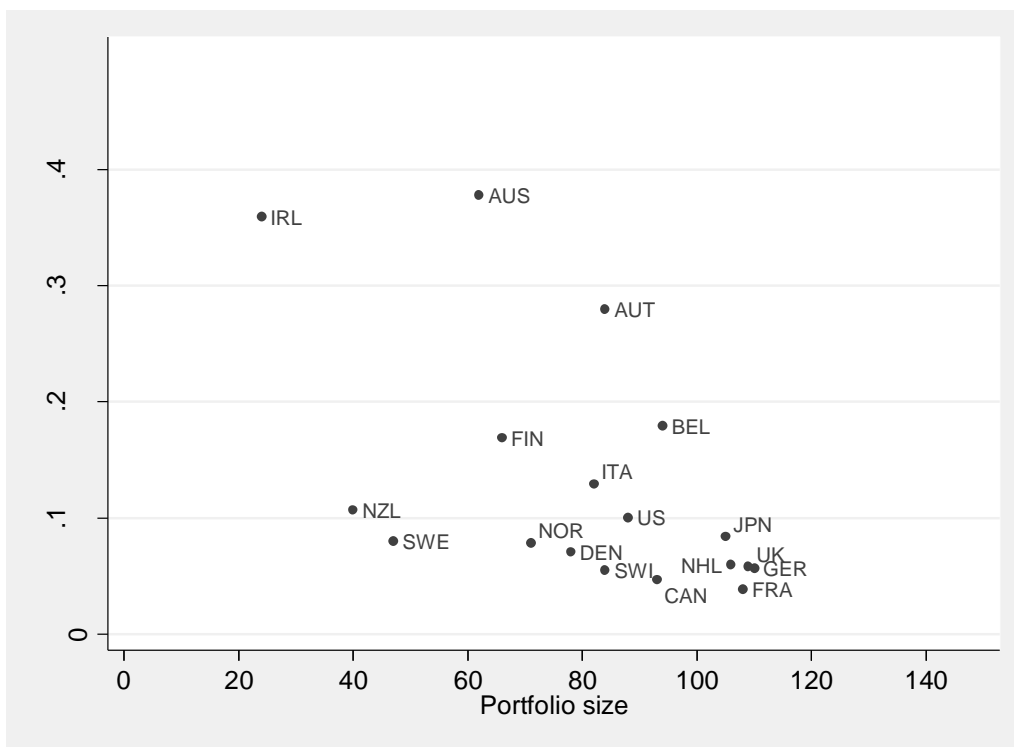
Figure 12: **Portfolio concentration and size, 2006**

Source: Authors based on OECD DAC data.

We read for each donor its two portfolio characteristics. The movement towards the lower right hand side between the two years reflects the increase in portfolio size, and at the same time the smaller portfolio concentration. Consider Figure 11. A simple look at portfolio concentration would indicate that the US and New Zealand have similar portfolios. Combining this index with portfolio size shows that these two countries are actually quite different. New Zealand has a much smaller portfolio. Comparisons across time are insightful. For instance the Australian portfolio size increased, while its concentration fell a lot. It implies that Australia has increased its number of recipients and that it now allocates aid on a more balanced basis. These considerations would have been lost had we used a single index. The same could be said of Ireland. On the other hand Denmark, France, Sweden, Japan, the United Kingdom, etc. moved almost exclusively along the size dimension. They kept an overall level of concentration, that is the relative importance between countries has remained quite stable, but they expanded their portfolios. This really is fragmentation at work: the addition of recipients to a portfolio without affecting much the other aid shares, or in other words new recipients with very little aid.

Comparisons between donors are easier if we hold one dimension constant. The United States in Figure 12 are a good example. Holding portfolio size constant, we find that the United Kingdom and France rank similarly. However for an identical size, their portfolio concentrations are lower. In other words, when compared to France, the US allocates smaller shares of its aid to many recipients. It may not be efficient as these small shares imply costs that may not be worth incurring. The donor could focus its aid on a smaller number of countries and avoid being a rather small partner to some countries. Holding portfolio concentration, we find that the Greek portfolio is equally concentrated. The US could keep a similar level of concentration with a much reduced portfolio. Quite obviously, Greece would be able to do the same as Portugal has a similar concentration for a much smaller portfolio.

The case of donors with a large portfolio size and a very low concentration is quite problematic. They give a small aid share to many countries, and so contribute to the overall level of fragmentation along both dimensions. The reshuffling toward less fragmentation is more difficult to achieve as all recipients receive rather similar shares.

OECD (2008) considers that opportunities exist to reduce fragmentation when a donor spreads its aid over a large number of recipients. In the size-concentration diagrams, that is equivalent to the lower right hand corner: many, but few large, partners. The overall movement over time has been in this direction. The diagrams show that there might be other opportunities when a large portfolio size is combined to a relatively high concentration: the donor could easily drop minor partnerships. The majority of donors have moved towards lower concentration and larger portfolio size, with direct consequences for recipients. They have to deal with many donors, many of them representing only small stakes. We come back to this point in Section IV.

Finally, these two graphs also illustrate the convergence of donors, especially along the concentration dimension. In 1980 there was (unsurprisingly) a rather clear negative relationship between portfolio size and concentration. A larger portfolio was associated with smaller aid shares and so with lower concentration. This is not true anymore. All donors, quite regardless of their portfolio size, tend to have similar concentration levels. Small donors, despite their portfolio sizes, have equally fragmented portfolios than large donors do. If they were to expand further

they would reach much smaller concentration levels than the current large donors. It means that donors have multiplied the number of partnerships, to the point of having only relatively small ones. In order to reduce fragmentation, these donors should coordinate and act towards a better division of labour.

Comparison with private equity and bond funds

The EPFR data provides manager averages. For each country it gives the average weight a country is given in a manager portfolio. It represents how, on average, fund managers decide to weigh each country. We build similar weights for ODA. The advantage compared to a "capitalisation" weight simply defined as the country ODA divided by global ODA, is that it avoids the extreme bias due to very large differences in donor sizes. For instance if the US weighs heavily a particular country its share of global ODA increases substantially. To take into account the allocation decision of each donor, one has to use the donor weights that give equal importance to each donor, regardless of its size.

We build two portfolios. The first includes all the ODA recipients, the second only those in the EPFR dataset. We then compare the properties of these with the average fund manager portfolio. We already know that aid is delivered to many more countries than equity and bonds. Table 14 shows the Hirschmann-Herfindahl index of concentration for the average portfolio.

Table 14: **ODA donors and private funds portfolio concentration**

				Developing Countries	
Year	Equity	Bond	ODA	ODA, equity portfolio	ODA, bond portfolio
1995	0.087		0.014	0.039	
1996	0.092		0.014	0.038	
1997	0.1		0.014	0.038	
1998	0.12		0.015	0.038	
1999	0.11		0.015	0.039	
2000	0.13		0.016	0.039	
2001	0.13		0.015	0.041	
2002	0.12	0.12	0.016	0.039	0.049
2003	0.12	0.13	0.017	0.039	0.051
2004	0.12	0.12	0.015	0.039	0.05
2005	0.13	0.11	0.02	0.04	0.048
2006	0.13	0.094	0.018	0.042	0.042
2007	0.14	0.091			

Source: Authors based on EPFR and OECD DAC data.

Compared to the full ODA portfolio that includes more than 150 countries, the average fund portfolio is of course much more concentrated. However the concentration of ODA is rather stable (2005 and 2006 concentrations are inflated because of Iraq and large debt reliefs in Nigeria), whereas it increased for equity. Fund managers tend to invest in a more inegalitarian

way in developing countries than they used to. The expansion of the market, in capitalisation terms, has impacted countries differentially. The opposite is true for bonds.

Instead of looking at the whole universe of developing countries, we build an ODA portfolio only with countries that are in the EPFR. It allows us to find the ODA portfolio concentration had donors only allocated aid to the EPFR countries. Concentration is of course higher on this smaller portfolio but very stable and still much lower than the EPFR portfolio concentration. Funds invest much more disproportionately in some countries than aid donors do. It suggests that donors are more "egalitarian" than investors.

IV. ODA RECIPIENTS

Portfolio size

We considered in Section III that donors held a portfolio of recipients, and that they chose its size and its concentration. In this section we develop the mirror analysis with recipients. They receive aid from various donors that constitute a portfolio. Each asset (donor) pays a return that the recipient enjoys. Kharas (2008) develops a similar interpretation. The developing country decides how much money it requires and then decides how to finance it. Because negotiating with each lender entails transaction costs (administrative resources, meetings, human capital), the country decides its sources of finance, taking these costs into account, the return of the assets, and their risks. The recipient portfolio is also characterised by it size and its concentration. From an investment point of view, portfolio expansion and de-concentration corresponds to a commitment to diversification. Finance investors diversify their portfolios in order to lower the overall risk they bear. Recipients might well follow a similar strategy. If an asset returns can dry out (a donor may choose unilaterally to stop a partnership), or at least decrease, the recipient is well advised to diversify its sources of income. However this ignores the upfront costs that have to be paid in order to have access to these returns. We have already mentioned along with others (see Acharya *et al*. 2006, Knack and Rahman 2007) that the administrative burden for the recipient is large. Diversification comes at a cost but it does not seem that this cost has played any role in limiting it. It must be mentioned that some recipients started to take measures against fragmentation. India decided in 2003 to progressively phase out aid from all but six large donors, arguing that the benefits were too small compared to the bureaucratic costs associated with small sums of money (Financial Times 2008). In order to reduce the administrative burden of aid Tanzania also announced in 2003 that the period April-August each year would be a "quiet time" and that it would meet only the most urgent donor missions during these months (Roodman 2006).

Figure 13 plots the average recipient portfolio size in each year.

Figure 13: **Average recipient portfolio size**
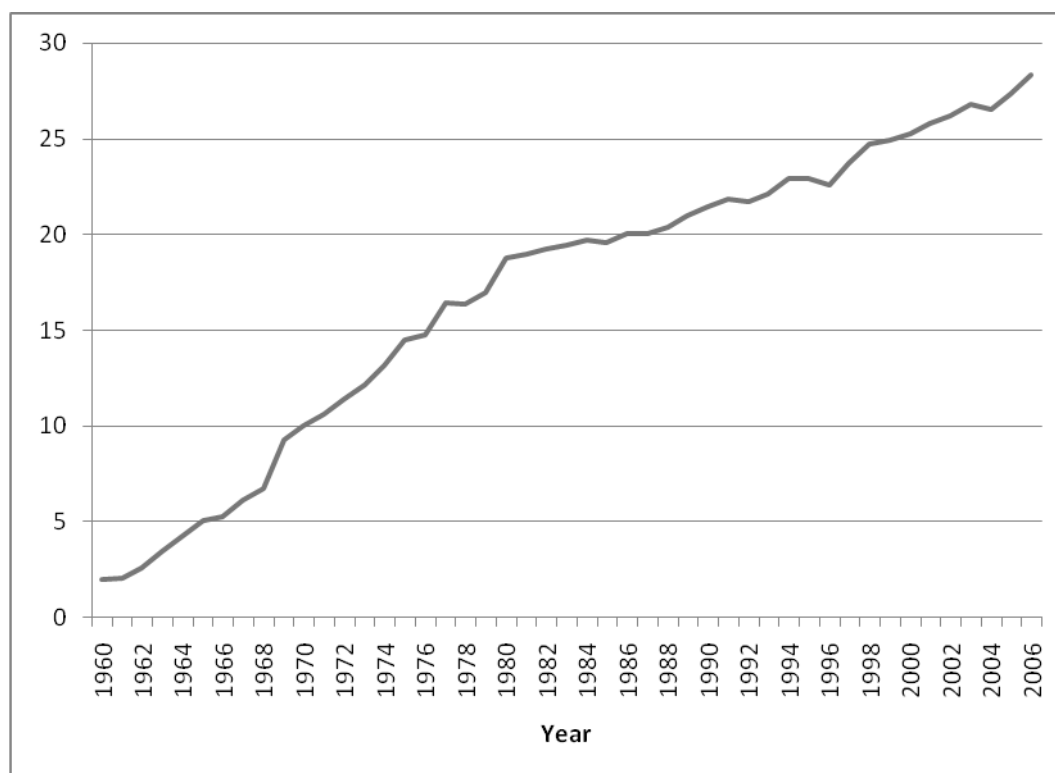
Source: Authors based on OECD DAC data.

A developing country received aid on average from less than 2 donors in 1960. This number was more than 28 in 2006, and can be further divided into 15 DAC donors, 9 multilateral donors, and 4 bilateral non-DAC donors. The median has an even higher value 33. The increase has been gradual and continuous. Recipients deal with an increasing number of donors. The time trend is steady and does not show any sign of abatement.

This evolution has not been confined to a particular region. Table 15 shows that recipients in all regions experienced a large increase in the number of donors. However there are some disparities between regions, with Other Asia and Oceania being consistently less affected than other regions.

Table 15: **Average number of donors per recipient, by region and decade**

	1960-1969	1970-1979	1980-1989	1990-1999	2000-2006	2006
Europe	9.20	16.60	17.59	20.90	33.72	34.40
Latin America and Caribbean	4.23	12.04	17.82	22.18	23.96	25.06
Middle East and North Africa	5.81	15.46	18.99	23.17	28.14	29.86
Other Asia and Oceania	3.21	9.69	14.71	17.69	20.45	21.33
South and Central Asia	6.36	18.98	25.93	26.05	34.18	36.94
Sub-Saharan Africa	5.04	15.59	23.95	27.73	30.64	32.62

Source: Authors based on OECD DAC data.

The next table identifies the ten recipients with the highest average portfolio size in each decade, and in 2006. Note how India and Tanzania which both acted against fragmentation have always been present in this list.

### Table 16: Ten largest recipient portfolio sizes, average by decade

1960-1969		1970-1979		1980-1989		1990-1999		2000-2006		2006	
India	13.1	India	25.7	Bangladesh	31.6	Mozambique	36	Ethiopia	42.1	Sri Lanka	44
Pakistan	11.5	Pakistan	25.2	Pakistan	31.3	Uganda	35.2	Mozambique	40.3	Afghanistan	43
Turkey	11.4	Tanzania	25.1	India	31.2	India	35	China	40.1	Indonesia	43
Chile	11.3	Kenya	24.2	Tanzania	31	Ethiopia	34.8	Pakistan	40.1	Zambia	43
Tanzania	10.8	Egypt	24	Kenya	30.5	Philippines	34.6	Ghana	40.1	Malawi	43
Nigeria	10.4	Ethiopia	23.8	Philippines	30.5	Ghana	34.4	Tanzania	40	Vietnam	43
Indonesia	10.4	Sri Lanka	23.8	Uganda	29.8	Nepal	34.3	Uganda	40	Bangladesh	43
Kenya	10.3	Sudan	23.5	Sudan	29.8	Bangladesh	34.2	India	39.9	Tanzania	43
Tunisia	10.2	Indonesia	22.8	Ghana	29.7	Kenya	34.1	Senegal	39.9	Uganda	43
Brazil	9.8	Turkey	22.7	Ethiopia	29.6	Tanzania	34	Kenya	39.6	Nepal	42

Source: Authors based on OECD DAC data.

Portfolio concentration

We expect portfolio expansion to have implied a greater fragmentation of recipients' portfolios. For each recipient we compute its Hirschman-Herfindahl index H. A large value means that a large share of the aid it receives comes from a small number of donors. A low index can be interpreted as a high dispersion of its aid among many donors. Figure 14 plots the average value for all recipients. If we consider all donors, aid allocation was highly concentrated before 1970, but quickly became much more fragmented. This process has slowed down but is still ongoing. Aid from multilateral donors has actually become less fragmented for 15 years and is usually less fragmented than aid from DAC. Figure 14 must be compared to Figure 13. On the one hand, portfolio size has greatly increased. On the other hand, portfolio concentration has been quite stable for 15 years. The only way to reconcile these two results is that new additions to the recipients' portfolios represent only very small aid shares, leaving H almost unchanged. By using data on portfolio size and concentration we are able to uncover the process of fragmentation: an ever-increasing portfolio size that brings in only small aid quantities.

Figure 14: **Recipient concentration index H**
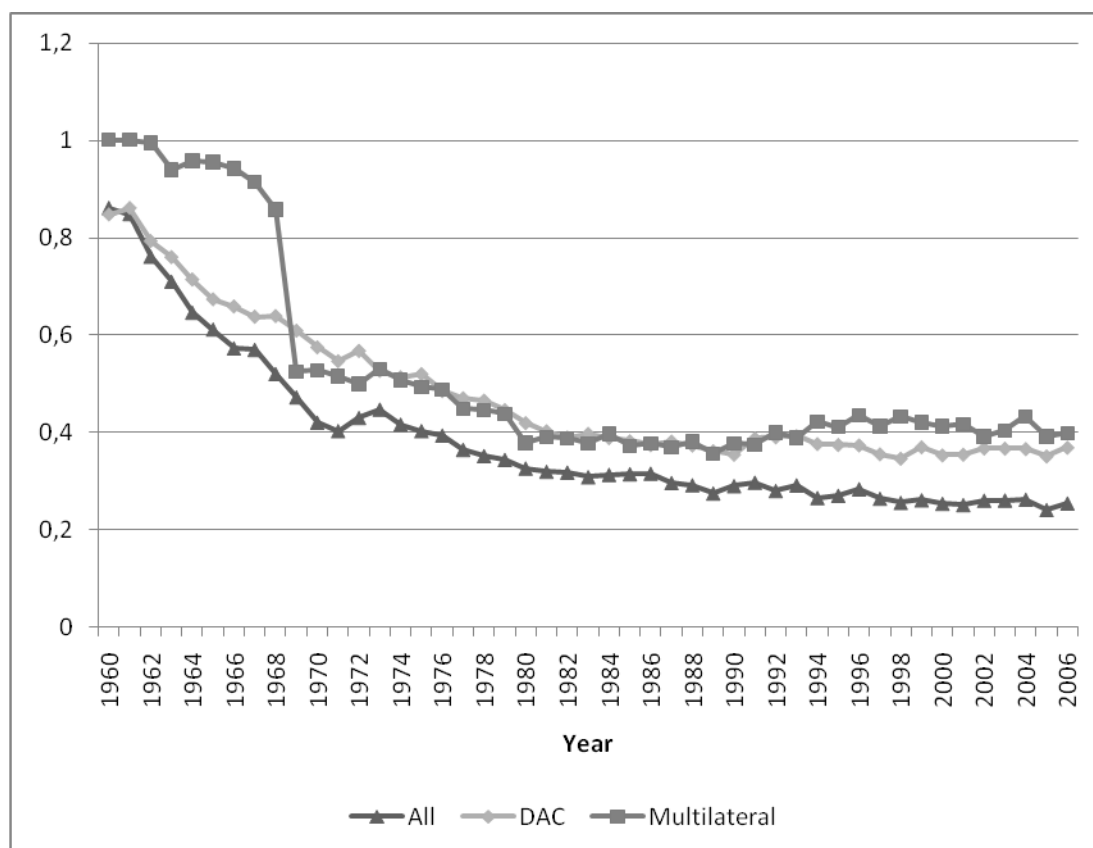
Finally Table 17 gives the list of countries with the most fragmented aid allocation, measured as the average of their concentration index. Some recipients have suffered from fragmentation for a long time. Tanzania topped the list during three decades. It implemented its new policy in 2003 and actually ranked lower in the following years. Mozambique, Lesotho, Gambia, Kenya are also often in the list. At the other end of the ranking we find small countries, mainly islands (St Helena, Tokelau, Mayotte, Niue) which get most aid from a single donor.

Table 17: **10 Most fragmented recipient, all donors, aid net of emergency aid and debt relief grants, by decade**

| 1960-1969		1970-1979		1980-1989		1990-1999		2000-2006		2006	
Sri Lanka	0.29	Tanzania	0.10	Tanzania	0.076	Mozambique	0.069	Mozambique	0.072	Mozambique	0.073
Argentina	0.33	Sri Lanka	0.11	Kenya	0.081	Tanzania	0.076	Nicaragua	0.091	Nicaragua	0.079
India	0.34	Bangladesh	0.13	Zambia	0.087	Zimbabwe	0.081	Nepal	0.093	Zambia	0.083
Indus Basin	0.34	Ethiopia	0.13	Mozambique	0.087	Cape Verde	0.083	Burkina Faso	0.095	Rwanda	0.085
Indonesia	0.34	India	0.14	Lesotho	0.092	Gambia	0.087	Kenya	0.096	Bosnia-H	0.086
Sudan	0.35	Pakistan	0.15	Rwanda	0.094	Ethiopia	0.089	Cambodia	0.096	Malawi	0.088
Togo	0.35	Tunisia	0.15	Cape Verde	0.095	Sudan	0.090	Tanzania	0.098	Mali	0.089
Ghana	0.35	Peru	0.16	Bangladesh	0.097	Lesotho	0.092	Cuba	0.10	Benin	0.089
Somalia	0.38	Nepal	0.16	Gambia	0.099	Kenya	0.092	Mali	0.10	Somalia	0.091
Ethiopia	0.38	Nigeria	0.16	Sri Lanka	0.099	Angola	0.095	Bolivia	0.10	Cambodia	0.092

We provide a visual overview of fragmentation at the recipient-level in different decades using the following maps.

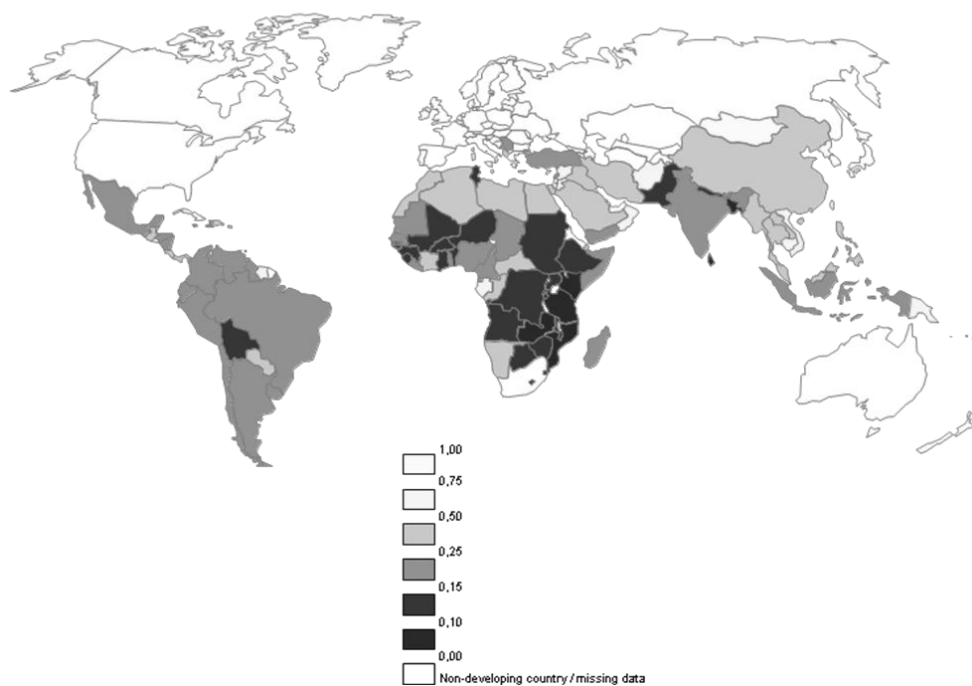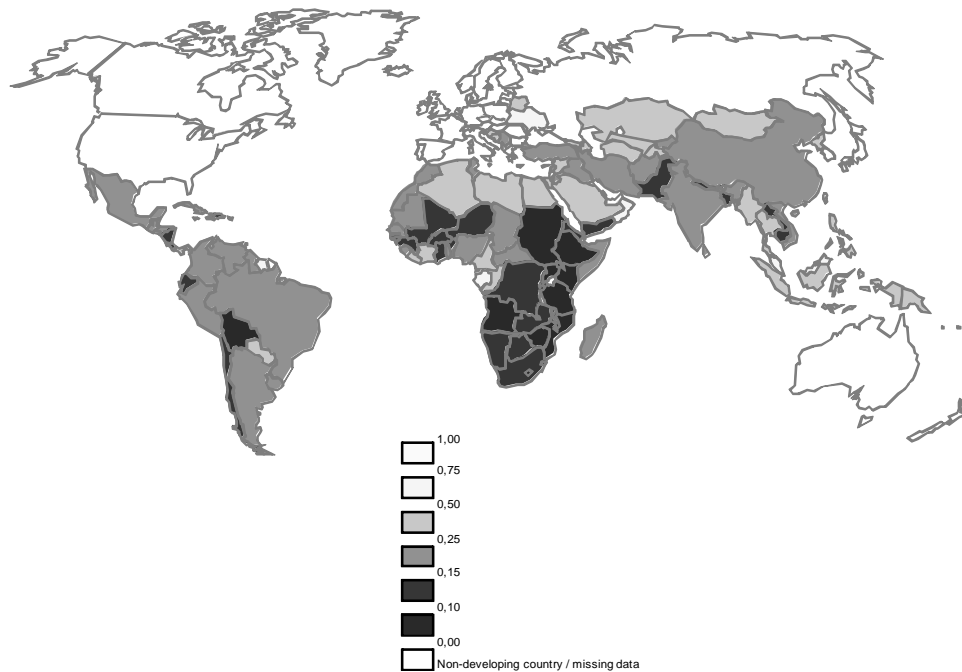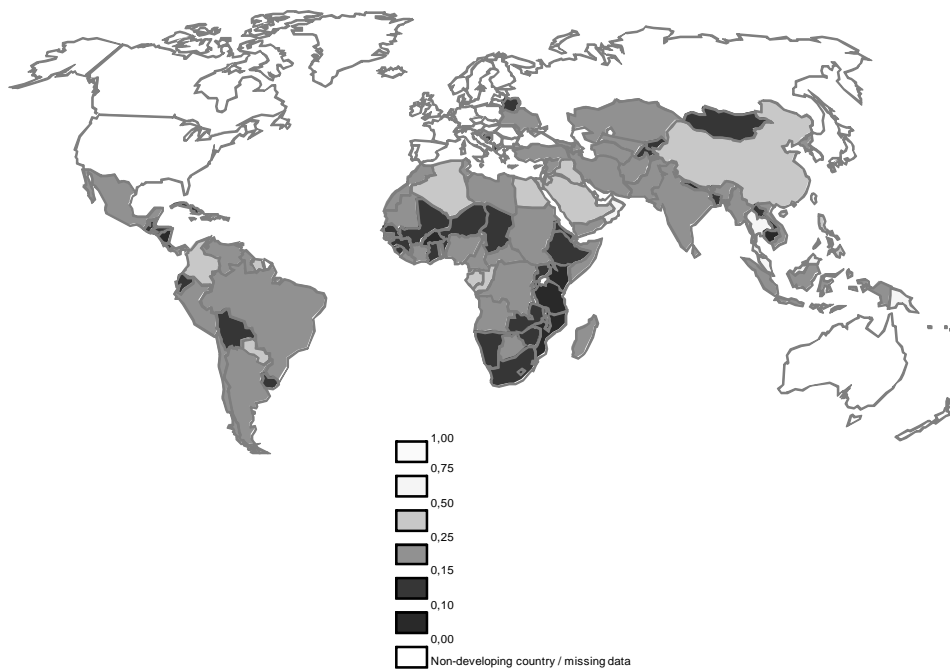Figure 15: **Aid fragmentation, by decade**

1960-1969
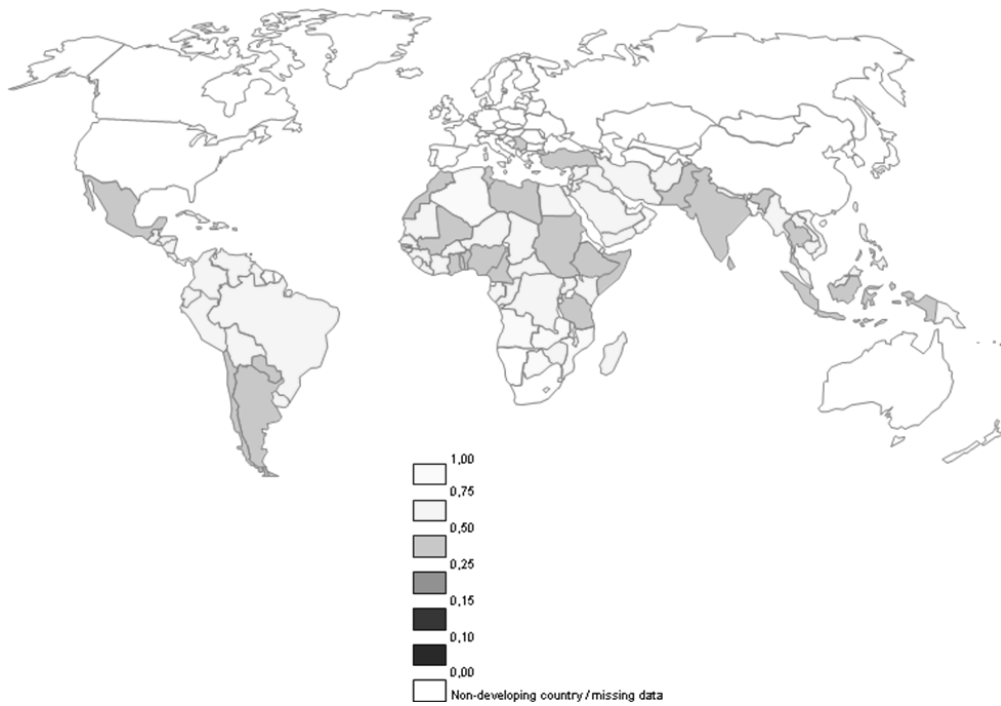
1970-1979
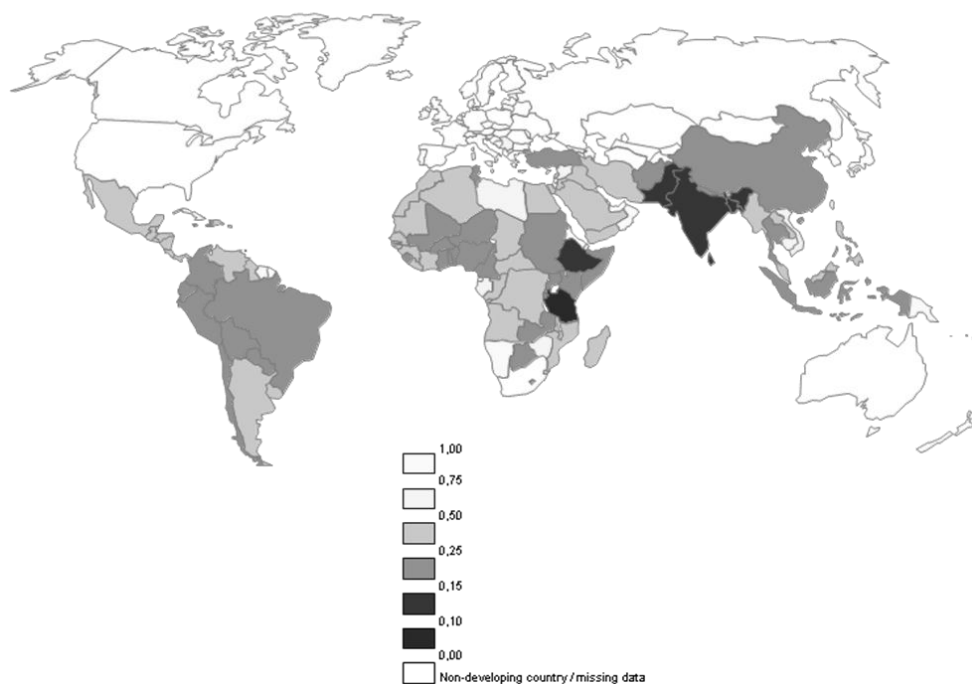
1980-1989

1990-1999

2000-2006

Fait avec Philcarto * 2008-03-26 14:55:39 * http://philgeo.club.fr

Source: Authors based on OECD DAC data.

It is striking to see how fragmentation has become more severe with time. We can also visually check that it has slightly recently improved.

V. ALTERNATIVE DEFINITIONS

In a recent report, OECD (2008) investigated the fragmentation of aid using CPA data for 2005-2006. Their definition of fragmentation is different. They consider that aid is fragmented when a large number of donors represent 10 per cent of the aid allocated to a recipient. This definition considers that fragmentation is severe when a recipient deals with many recipients for small aid quantities. It does not necessarily match the Hirschman-Herfindhal index H.

Consider a recipient with 20 small donors that each provides 0.5 per cent of its total aid allocation, and one large donor that represents the remaining 90 per cent. The Hirschman-Herfindahl index for this hypothetical recipient has a value of 0.8105. It would therefore classify as a very un-fragmented country. However 20 donors represent only 10 per cent of aid and so aid is quite fragmented using the DAC definition. The two measures do not necessarily disagree however. We repeat the analysis using this measure, as we consider it is a useful complement. One disadvantage of this measure is that it completely disregards fragmentation in the remaining 90 per cent of the allocation. It is equivalent that one or ten donors represent the last 90 per cent. The H measure takes the whole distribution into account.

First we replicate Figure 13 but we add the new fragmentation index, labelled DAC10. For each recipient it gives the average number of donors that represent 10 per cent of the total gross aid net of emergency aid and debt relief grants disbursed to each recipient. We compare it to the average recipient portfolio size.

Figure 16: **Average recipient portfolio size and average DAC10**
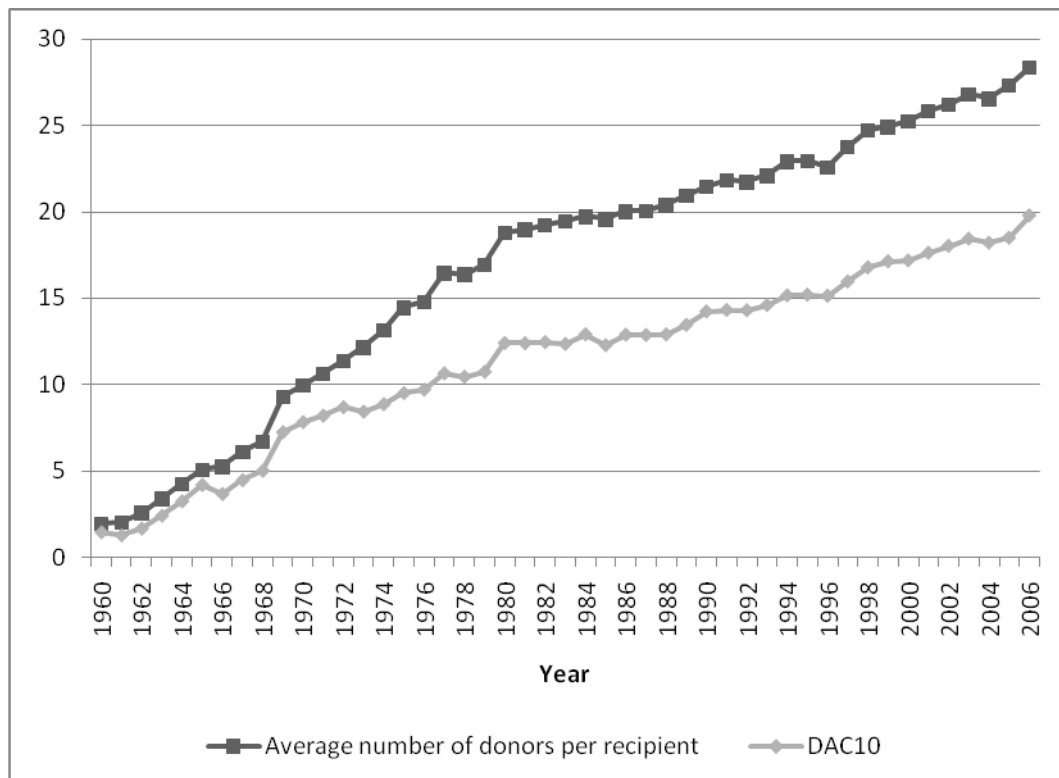
Before 1970, fragmentation in terms of donors per recipient was low and there was usually one very large donor for each recipient. The two curves are very close and we know that the Hirschman-Herfindahl index is high. Between 1970 and 1980 the addition of donors into each recipient was not accompanied by a parallel increase of donors representing small aid quantities: the gap between the two curves was expanding. After 1980 it is much less the case. Almost each addition of donor was then into the group of small donors. After 1990 the two curves are virtually parallel. In 2006 each donor received on average aid from 28 donors, with 20 accounting for less than 10 per cent of its total aid allocation.

Figure 16 provides a useful illustration of the pervasive fragmentation due to the multiplication of small actors on the market. It confirms our conclusions drawn from the analysis of portfolio size and concentration. Portfolio expansion corresponds to an almost equivalent increase of the number of small donors (the DAC10 curve). If we simply regress the DAC10 measure on the recipient portfolio size, we obtain a very highly significant coefficient of 0.67. In other words, three more donors in a portfolio means on average two more donors in the group accounting for less than 10 per cent of total aid. If donors were all providing the same aid quantity to a given recipient, the relationship would imply that ten more donors would be needed to have one more donor in the group accounting for less than 10 per cent of total aid (so a coefficient of 0.1 in the regression). The gap between the actual and purely mechanical relationship indicates how severe fragmentation is.

We now normalise the H measure such that both measures have identical ranges and comparisons are easier to make[9]. Figure 17 plots the evolution of fragmentation with time. For both measures a higher value means more fragmented allocation. As we can see they both indicate very similar trends in fragmentation. The correlation at the recipient level between the normalised H and DAC has also a high value of 0.84. As already indicated above, the two measures diverge when one donor dominates the market and many small donors are present. A recent example is Iraq. In 2005 there were 34 donors present in Iraq but the US dominated them all. The H index is therefore very high, 0.88, and the normalised index is 5.9. On the other hand 33 donors out of 34 represent less than 10 per cent of aid, and so the DAC measure is extremely high.

Figure 17: **Evolution of aid fragmentation since 1960.**
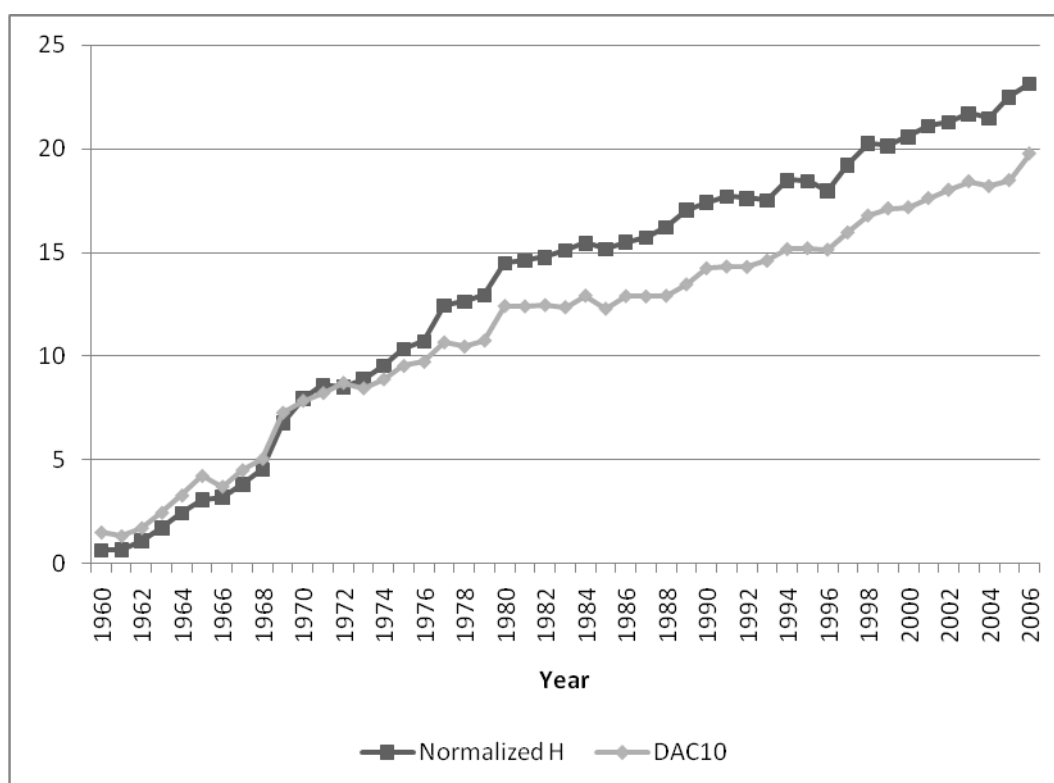
Source: Authors based on OECD DAC data.

These three fragmentation measures all show a dramatic change in the aid market during the last decades. More donors are present and their portfolios are more diversified. At the recipient level it implies that recipients get aid from many donors but most of the new donors have small market shares and enter the group of small donors which contributes less than 10 per cent of total aid.

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9. The DAC10 measure ranges from 0 to D-1, where D is the number of donors allocating aid to the recipient. The H measure ranges from 1/D to 1. We define a normalised H equals to D*(1-H) that also takes values between 0 and D-1.

VI. CONCLUSION

This paper presented first a series of stylised facts about official aid and capital flows to developing countries. We showed that ODA has stopped being the most important source of funds for these countries but that large disparities subsist between them. Sub-Saharan Africa stands out as the region that missed the development of private finance and does not receive large quantities of remittances.

We then compared the volatility of these flows. ODA and remittances have similar volatilities and smaller than other private flows, in particular bond and equity flows. Quite importantly aid volatility has not significantly decreased in the last decades. This brings two new elements to the debate about aid volatility: first, aid is volatile but less than most private flows and as such still constitutes a rather stable source of income; second, given the concerns about the damaging consequences of excessive aid volatility, it is however worrying that this stability has not improved. The volatile nature of private capital flows and their increasing importance for developing countries suggest that aid should play a new role and act against this new source of volatility. No evidence is found that it actually does. We have showed that capital flow shocks do not trigger aid flows, and that aid donors seem particularly neutral with respect to capital flow variations. If they are the result of bad domestic policies then this neutrality may not come as a surprise. On the other hand, large exogenous variations affect the capital account and are also costly to developing countries. Future research should try to disentangle these two sources of volatility and assess the responsiveness of aid to each of them.

The paper also innovates by using detailed data about private portfolio investors. These do not particularly target countries with low levels of ODA, but the reallocation of ODA in the recent years toward Sub-Saharan Africa has modified this property. It suggests that donors may have acknowledged that they had to modify their asset allocation policies to take into account this new source of development finance, but it is too early to give a firm conclusion. These new comparisons are useful in the current context of renovation of the aid system and cast a new light on the role of private funds in development finance.

The second part of the paper investigates aid fragmentation. Both sides of the donor-recipient relationship are studied. Donors have continuously increased the number of recipients in their portfolios. We are now in a situation where most donors have large portfolios, with lots of small partnerships. Many new donors have entered the market but the main effect for recipients has been an increase in the number of small disbursements. We showed how donors have expanded their portfolios while keeping relatively stable portfolio concentration levels. It has greatly worsens fragmentation and donors should act cooperatively in order to reverse this still ongoing trend.

We also make use of the private funds data to study fragmentation. Portfolio investors usually weigh heavily few countries in their investment funds, such that they are quite concentrated, unlike aid donors. We might think that aid donors compensate for the bias of private fund managers, but the low aid concentration implies that countries are treated quite equally, and so aid is unlikely to compensate for private capital flows volatility.

We used in this paper the maximum amount of available data. However we still believe that our results underestimate fragmentation. DAC collects data for some non-DAC donors but there is virtually no reliable figure, and even less any bilateral data, for some important donors. China and Venezuela, for example, have their own aid policies, respectively very active in Africa and in Latin America, that remain largely unreported (see on China lending policy in Africa, Reisen and Ndoye, 2008). We cannot assess the additional fragmentation that these new donors create. On top of these official donors, a myriad of non-governmental organisations should be added. If we wish even to complicate further the issue we could add to the list the sovereign wealth funds, public owned institutions, that tend to internalise their portfolios also towards other emerging and developing countries.

Apart from this issue, fragmentation is also largely underestimated because of data aggregation. Aggregate aid flows at the recipient level do not give any idea of the number of projects actually run in the country. Acharya *et al*. (2006) reports that in 2002 in Vietnam there were 25 official bilateral donors, 19 multilateral donors, and about 350 international NGOs. They collectively accounted for more than 8000 projects. Van de Walle and Johnston (1996) tell of 40 donors and 2000 projects in Tanzania in the mid-1990s. Roodman (2006) uses CRS data to measure the number of projects in each recipient country and finds figures of up to 1900 projects in a single country. Fragmentation based on project numbers is expected to be much higher. More systematic research could be useful in this regards.

This article opens up new research avenues on aid fragmentation. First, it can be extended to sector aid. OECD (2008) has initiated the analysis for the health and economic infrastructure sectors, but only for 2005-2006. Second, the causes of fragmentation are still not well understood. The costs it creates, for donors and recipients, should limit its expansion. There is however limited visible effort in this direction, and so there must also be some strong incentives to fragment portfolios. Though more research needs to be done on this topic, we can already suggest some possible answers. As Knack and Rahman (2007) put it, "… aid agencies additionally have the objective of maximizing aid budgets, which requires satisfying key domestic constituencies in parliament and among aid contractors and advocacy groups. This latter objective often requires making the results of aid programs visible, quantifiable, and directly attributable to the donor's activities –even when doing so reduces the developmental impact of aid". Agencies are subjected to incentives that are not fully aligned with those of developing countries (see Seabright 2002 for a theoretical approach). In order to maximize their number of successes, they choose to diversify their portfolios but without taking into account the costs imposed on the recipients. Donors treat the recipient scarce resources (budget, maintenance, skilled personnel) as a common pool and fail to internalise the social cost of establishing new partnerships, focusing instead on their private benefits. Another explanation may be more politically oriented. Donors may well understand the costs of fragmentation but

each is reluctant to break a partnership if their mere presence brings some political or trade-related benefits. A simple game theoretical approach would prove the point. Assume there are two donors and two developing countries, and that the optimal allocation of resources implies having only one donor in each country. Donors may still end up in a socially non optimal equilibrium where both are present in each country, simply because none of them is willing to sever any partnership for fear of leaving all the benefits to the other donor.

On a more policy based dimension, this research advocates for the need to reduce aid fragmentation. Too many donors are giving too little to too many recipient countries, increasing the transaction costs in both directions, for donors and recipients. We also underlined that private portfolio equity is neither a substitute nor a complement of official development aid (ODA).We also do not find any negative and significant correlation between aid volatility and capital flow volatility. We argue that these results reinforce the calls for a new stabilising role of ODA: if appropriately targeted and allocated not only aid could be concentrated in less countries, particularly on the ones receiving less private inflows and being poorer, but aid could be more counter cyclical when in poor countries the already small amounts of private inflows dry up. In line with this idea, Cohen *et al*. (2008), for example, developed recently the idea of countercyclical loans in order to smooth shocks.

A systematic monitoring, on a yearly basis, both at donor and recipient levels, could also be also imagined and developed based on the indexes here deployed. It could help both donors and recipients to benchmark and monitor their respective performances and add an incentive to reduce aid fragmentation.

APPENDIX

We present in the appendix the regressions used in Section II.4. Tables A1 and A2 investigate the complementarity between ODA and capital flows. Each column presents the estimates for a different capital flow, ODA being the dependent variable. Tables A3 and A4 do the same with FDI being the dependent variable.

Table A1: Complementarity of ODA and capital flows, between estimator

	(1) FDI	(2) Bonds	(3) Equity	(4) Remittances
Capital flow	-0.14**	-0.25***	-0.34***	-0.0054
	(0.058)	(0.071)	(0.095)	(0.058)
Population	0.49***	0.54***	0.57***	0.56***
	(0.057)	(0.041)	(0.040)	(0.055)
Constant	-6.85***	-0.20	-3.54	26.2
	(1.92)	(7.19)	(2.42)	(15.8)
Observations	3974	3927	4140	2810
Countries	126	122	122	127
Adjusted R^2	0.598	0.637	0.643	0.612

Standard errors in parentheses. All regressions include time fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A2: Complementarity of ODA and capital flows, within estimator

	(1) FDI	(2) Bonds	(3) Equity	(4) Remittances
Capital Flow	0.0100	-0.011	-0.019	0.054
	(0.011)	(0.013)	(0.024)	(0.046)
Population	0.81*	0.25	-0.20	0.81
	(0.45)	(0.44)	(0.38)	(0.64)
Constant	-7.63	1.26	8.51	-6.54
	(7.16)	(7.02)	(6.08)	(9.68)
Observations	3974	3927	4140	2810
Countries	126	122	122	127
Adjusted R^2	0.047	0.055	0.080	0.042

Standard errors clustered at the country level in parentheses. All regressions include time fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A3: **Complementarity of FDI and other capital flows, between estimator**

	(1) Bonds	(2) Equity	(3) Remittances
Capital Flows	0.56***	0.95***	0.43***
	(0.13)	(0.18)	(0.11)
Population	0.44***	0.30***	0.32***
	(0.083)	(0.089)	(0.11)
Constant	-43.6	-2.23	-15.7
	(57.3)	(8.28)	(29.1)
Observations	3730	3887	2683
Countries	122	122	121
Adjusted R^2	0.494	0.514	0.405

Standard errors in parentheses. All regressions include time fixed effects.   * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A4: **Complementarity of FDI and other capital flows, within estimator**

	(1) Bonds	(2) Equity	(3) Remittances
Capital Flows	0.079**	0.11***	0.11
	(0.035)	(0.025)	(0.070)
Population	-1.47*	-1.14	-0.74
	(0.85)	(0.88)	(1.13)
Constant	28.5**	23.2	15.6
	(13.6)	(14.0)	(17.0)
Observations	3730	3887	2683
Countries	122	122	121
Adjusted R^2	0.142	0.142	0.136

Standard errors clustered at the country level in parentheses. All regressions include time fixed effects. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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