Follow the leader! The peer effect in aid supply decisions

Alessandro De Matteis[1]

Abstract

This study assesses the existence of imitative behaviour among donors in terms of their aid supply. The urgency in addressing this subject is motivated by an increasing degree of aid volatility and unpredictability which may be linked to donors' imitative behaviour.

Our results highlight that while any connection among donor peers is a potential channel for the transmission of aid volatility, the extent of such volatility decreases significantly in the presence of established imitative behaviour.

This result leads to the consideration that the promotion of donor imitative behavior would contribute to containing the current growing trend of volatility in aid supply.

Keywords: foreign aid; aid volatility; donor decision-making; donor coordination; peer effect

1. Introduction

One of the various criticisms raised against the international supply of aid is its volatility or randomness. This is supported by a series of key pledges as the Paris Declaration of 2005, the Accra Agenda for Action of 2008 and the Busan Partnership for Effective Development Co-operation of 2011.

The implications of aid volatility and unpredictability are known. It has been highlighted how the poorest and most aid dependent countries are the worst affected, where unexpected aid shortfalls can force governments to disproportionately cut investment, including in human capital, while aid windfalls can disproportionately boost government consumption (Celasun and Walliser, 2008; Bulir and Hamann, 2003, 2008; Hudson and Mosley, 2008a).

This article tackles the issue of aid volatility and predictability from the perspective of donors' decisions on aid supply. Despite the general consideration of donors' heterogeneity in terms of aid supply (Jones, 2015;

[1]University of East Anglia, School of International Development, Norwich, UK. Email: a.de-matteis@uea.ac.uk

Acknowledgements: Comments on an earlier version of this article were gratefully received from an anonymous referee. Usual disclaimer applies.

Hallett, 2009; Bertoli *et al*., 2008), the possibility that one donor's decisions may affect those of others' has led to argue about a peer effect among donors (De Matteis, 2016; Jones, 2015; Frot and Santiso, 2011; Riddell, 2007; Round and Odedokun, 2004; Cassen, 1986). This suggests the presence and relevance of coordination in donors' behaviour. While Frot and Santiso (2011) argue that such herding behaviour may contribute to increasing aid volatility, no evidence of this has been provided so far.

In principle, increasing donor coordination is expected to facilitate the exchange of information among peers and hence expand the knowledge base used to support decision making. But does this necessarily play a stabilizing effect of donors' aid supply? On the contrary, along a generic theoretical approach, it could be argued that greater coordination is expected to increase volatility rather than reduce it. In fact, along the well known identity Var(X+Y) = Var(X) + Var(Y) + 2Cov(X,Y), it could be argued that, given two countries X and Y, the combined volatility of their aid supply – i.e. Var(X+Y) – may increase with greater coordination, even when the volatility of aid supply from both X and Y – i.e. Var(X) and Var(Y) – declines. This follows from the consideration that in our case greater coordination increases the covariance term Cov(X,Y). In this perspective, any connection among donor peers can be seen as a potential channel for the transmission of aid volatility. Having said that, it remains unclear whether the principle just mentioned is actually applicable with reference to aid supply. And, most of all, it is necessary to remark how the approach considered above does not explicitly take into account any contribution played by the imitative behavior among peers that can be induced through donor coordination.

This study contributes to the discussion. It assesses whether the volatility of donors' aid supply has changed over time, whether aid supply patterns reflect an imitative behaviour, and if so, who leads the game and how the game has changed over time. The discussion below is organized as follows: section 2 presents current knowledge; section 3 outlines the methodology and data used for this analysis; section 4 presents and discusses the empirical results; and section 5 summarizes the findings and concludes.

2. Literature Review

The analysis of aid supply has been tackled from various perspectives. Some literature stresses the influence of donors' domestic politics on aid policy (Fleck and Kilby, 2001, 2006, 2010; Irwin, 2000; Lancaster, 2007; Milner and Tingley, 2010; Noël and Thérien, 1995; Thérien and Noël, 2000).

The likelihood that macroeconomic conditions in the donor country affect its aid efforts has also been abundantly highlighted (Beenstock, 1980; Faini, 2006; Boschini and Olofsgård, 2007). In particular, the affordability of aid may be questioned during economic downturns. This is in line with the argument that aid is supplied in a pro-cyclical fashion, although some empirical studies find limited support for the pro-

cyclical behaviour of aid budgets. This topic has received renewed attention since the financial crisis of 2008-9. Dang, Knack and Rogers (2009) estimate that real aid disbursements fall by up to 25% in response to systemic banking crises relative to a 'no-crisis' counter-factual. Frot (2009) finds that aid tends to decline by 13% in response to a financial crisis. However, Jones (2015) argues that systemic banking crises do not exert an independent negative influence on aid supplies, and that aid is becoming less responsive to domestic fluctuations than in the past.

More generally, taxpayers' willingness to pay for foreign assistance, and therefore the size of the aid budget, is likely to increase with their average income. This is in line with Dudley (1979) who assimilates foreign aid to a luxury good demanded only when more basic needs are fulfilled. However, taxpayers' willingness to pay may decrease if the effectiveness of aid in helping to overcome poverty in the recipient country is in doubt. In other words, a feeling of aid fatigue is likely to be among the major determinants of aid budgets (Boschini and Olofsgård, 2007; Mosley, 1985).

The budgetary decision processes in donor countries are complex, and aid budgets are unlikely to change drastically at short notice. As noted by Mosley (1985), aid outflows are dependent on government budget processes which are path-dependent and temporally-lagged. Moreover, aid decisions often involve multi-year commitment, hinting at a certain stability in aid flows. Nevertheless, a certain recent increase in the volatility of aid supply has been noted. Bulir and Hammann (2003, 2008) argue that the volatility of aid is increasing over time, with implications for aid predictability. Celasun and Walliser (2008) and Hudson and Mosley (2008a, 2008b) show that a lack of predictability typically involves managing both aid shortfalls and windfalls: aid shortfalls lead to debt accumulation and cuts in investment spending, whereas aid windfalls help to reduce debt and lead to additional government consumption. Rodrik (1990) argues that the volatility of revenue inflows, a high proportion of which, in the case of the poorest countries, are aid, may result in volatility in expenditure and policy instability. Mosley and Suleiman (2007) show that the ability of the recipient country's public sector to implement coherent investment programmes and fiscal policies is reduced by aid volatility. Lensink and Morrissey (2000) conclude that volatility damages the macro-economic effectiveness of aid.

In an effort to reduce aid volatility, in 2005 the OECD Development Assistance Committee (DAC) developed Progress Indicator 7 to assess whether the target of making aid more predictable is being achieved. The data gathered through the 2011 Aid Effectiveness Survey (OECD, 2012) suggests that the difference between donors' aid commitments and disbursements is generally low (e.g. in 2010, 98% of the aid scheduled for disbursement at the beginning of the year was disbursed). However, detailed analysis provides a diverse view. Hudson (2013) shows that while on average almost all commitments tend to be

met within two years, the situation is different with respect to individual sectors: in some, such as infrastructure, there are very long lags, and in some sectors it seems likely that commitments will never be fully met.

Diarra (2011) argues that both donors and recipients are responsible for such delays. Field experience suggests that it is not uncommon for a recipient not to draw on donor funds or to engage in behaviour that makes it administratively impossible for a donor to release funds for an agreed purpose. However, Eifert and Gelb (2008) report that only 40% of non-disbursements were considered to be due to a failure to meet policy conditionality, with 33% ascribed to problems on the donor's side and a further 25% to recipient governments' delays in meeting administrative conditions.

Celasun and Walliser (2008) argue that there are good and bad reasons for donor unpredictability. Delays in project disbursement may result from recipients not meeting specific procedural requirements. Less justifiable reasons include excessive administration, delays due to aid bureaucracy, cumbersome approval and disbursement processes, and intra-year aid reallocation that prevents the timely disbursement of announced aid (Leurs, 2005; Diarra, 2011). Canavire-Bacarreza *et al.* (2015) argue that the fragmentation of donor-recipient relationships into a large number of minor aid relations increase aid unpredictability.

Jones (2015) considers the possibility that aggregate aid supply decisions may be influenced by changing views on the efficacy of aid, and that such views change in a coordinated fashion at the global or regional levels. Despite the general consideration of donors' heterogeneity in terms of aid supply (Jones, 2015; Hallett, 2009; Bertoli *et al*., 2008) they do not act in isolation from one another. The idea that one donor's decisions may affect others' has led to debate about a 'peer effect', 'herd instinct' or 'bandwagon effect' among donors (Jones, 2015; Frot and Santiso, 2011; Riddle, 2007; Round and Odedokun, 2004; Cassen, 1986). This suggests some coordination in the behaviour of donors and seems to partly contradict evidence of substantial heterogeneity in their aid supply behaviour. According to Frot and Santiso (2011) such herding behaviour does not appear to have observable reasons and may contribute to increasing aid volatility. On the contrary, Hudson and Mosley (2008a) find that more fragmented and uncoordinated aid delivery helps to smooth volatility, and Bertoli *et al*. (2008) find the peer effect insignificant. Mascarenhas and Sandler (2006) and Rowlands and Ketcheson (2002) find only limited evidence of coordination and cooperative behaviour among donors. Along the same lines, Aldasoro *et al*. (2010) and Nunnenkamp *et al*. (2013) and Steinwand (2015) remark that non-coordinated and competitive donor behaviour is on the rise. In particular, export competition between donors is indicated as a major impediment to aid coordination (Fuchs *et al*., 2015).

The contradictory findings on donors' coordination show how the imitative effect in donors' decisions about aid supply remains unclear and deserves attention. In particular, no study has yet addressed whether imitative behaviour in donors' decision processes affects the volume of their aid. This study contributes to filling this gap, taking due account of the heterogeneity and complexity of donors' behaviour and focusing on their interactions.

3. Methodology and Data

3.1 Methodology

3.1.1 Predictability of aid supply

To analyze the predictability of donors' aid supply we adopt a simple conceptual framework. The core assumption of the proposed model is that in the long term donors seek to meet a target level of aid. However, taking into account changes in domestic political preferences and socio-economic conditions, the target is allowed to move slowly over time. There is also considerable scope for short-run fluctuations around the target, for instance due to unanticipated macroeconomic events and to unforeseen constraints on the side of the prospective recipient (combined here under the generic expression of "insufficient absorption capacity"). These shocks can lead countries to deviate, at least temporarily, from their aid supply target. Adjustment toward the target is expected to occur after such a deviation, but is likely to be incomplete and is potentially subject to new shocks.

Denoting the natural logarithm of total aid supplied at time *t* by donor country *i* as a_{it} and with a_{it}^{*} (also specified as natural logarithm) denoting the long-run aid supply target of the same country, a basic general model for the logarithm of actual aid supplied at time *t* by donor *i* is:

$$a_{it} = (1-\alpha_i)\, a_{i,t-1} + \alpha_i\, a_{it}^{*} + u_{it} \qquad (1)$$

where it is assumed that $\alpha_i \geq 0$ and u_{it} represents a generic error term. This simple model is focused on two determinants of aid supply: the autoregressive component and the target component. This allows the model to encapsulate two special cases of donor behavior. If $\alpha_i = 0$, aid supplies follow a random walk and the proposition that they are driven by a long-run target does not hold. If $\alpha_i = 1$, aid supplies are always equal to the long-run target plus error. Hence, establishing the value that α_i can take within the

two extremes 0 and 1 is expected to provide indications about donors' approach as well as a summary measure of their performance in terms of the predictability of their aid supply.

3.1.2 The peer effect in aid supply decisions

In order to study the interdependence of time series between volumes of foreign aid supplied by different donors we refer to a linear relationship of the type:

$$a_{it} = \theta_1 + \theta_2 a_{jt} + u_t \tag{2}$$

where a_{it} and a_{jt} represent the volume of foreign aid provided by donors *i* and *j* respectively at time *t*, u_t is the error term, and θ_1 and θ_2 are the coefficients to be estimated.

Once the condition of stationarity of the series and their cointegration are verified, the Error-Correction Mechanism (ECM) is adopted:

$$\Delta a_{it} = \alpha_1 + \alpha_2 \Delta a_{it} + \alpha_3 \left(a_{it} - \theta_1 - \theta_2 a_{jt}\right)_{t-1} + u_t \tag{3}$$

where Δ indicates the change in value between one period and the previous one (*t* and *t-1*).

Within the framework considered above, this model can be interpreted by considering how donors adjust their foreign aid budget from one period to the next in response to changes in own volumes of aid previously granted (in this case indicated by Δa_{it}), as well as in response to the previous disequilibrium between own foreign aid budget and those of other donors. From this perspective, the coefficient α_2 measures the short-run effect in the process of adjustment and the coefficient α_3 measures the speed of adjustment in response to identified discrepancies accrued during the previous period. The error correction term $\left(a_{it} - \theta_1 - \theta_2 a_{jt}\right)_{t-1}$ can be interpreted as the deviation from the long-term equilibrium between the foreign aid budgets of different donors, where the coefficient θ_2 measures the long-run effect in the process of adjustment.

The half-life index *h* helps with a summary measure of the process of adjustment of the aid budget. It measures the number of time units required for the process of adjustment undertaken by one donor to be replicated by another donor, per each pair of donors, before restoring half of the long-run equilibrium between their respective aid budgets. This is measured as:

$$h = \frac{\ln(1/2)}{\ln(\hat{\beta})} \tag{4}$$

where $\hat{\beta}$ is the estimate of β, the coefficient of the lagged difference in:

$$a_{it} - a_{jt} = \alpha + \beta \left(a_{it-1} - a_{jt-1}\right) + u_t \tag{5}$$

Finally, the ratio θ_2/h provides a combined picture of the characteristics of the adjustment process and facilitates comparison.

3.2 The data

This study makes use of data from the Development Assistance Committee (DAC) of the Organization for Economic Cooperation and Development (OECD). There are two sets of data on aid, relating to commitments and disbursements. Commitments are defined as "a firm obligation, expressed in writing and backed by the necessary funds, undertaken by an official donor to provide specified assistance to a recipient country or a multilateral organisation", with the clarification that "bilateral commitments are recorded in the full amount of expected transfer, irrespective of the time required for the completion of disbursements". Disbursements are the "release of funds to, or the purchase of goods or services for a recipient; by extension, the amount thus spent". They record the actual international transfer of financial resources, or of goods or services valued at the cost to the donor.

The completeness of the dataset for DAC members has improved over time, and therefore this study focuses on the period 1995–2014.

This study makes use of data on foreign assistance provided by a sample of donor countries represented by 21 members of the DAC group.[2]

[2]Australia (AUL), Austria (AUS), Belgium (BEL), Canada (CAN), Denmark (DEN), Finland (FIN), France (FRA), Germany (GER), Greece (GRE), Ireland (IRE), Italy (ITA), Japan (JAP), the Netherlands (NET), New Zealand (NZL), Norway (NOR), Portugal (POR), Spain (SPA), Sweden (SWE), Switzerland (SWZ), the United Kingdom(UK) and the United States of America (USA).

For the purposes of this study an investigation of donor commitment to foreign assistance is preferable to one on disbursement, as the former most accurately reflects the donor's original intent.[3] However, for a comprehensive perspective we employ OECD data on both total net official development aid commitment and disbursement, expressed in 2013 constant US dollars.

4. Findings and Discussion

4.1 Volatility and predictability of aid supply

Before considering the predictability of aid supply, we look at the volatility of aid commitment and disbursement for each donor. A commitment is a promise to disburse aid in the future, perhaps over a number of years. For instance, one can envisage a scenario where wide variations in commitments from year to year could nonetheless result in a steady stream of disbursements from year to year if fully implemented. Hence, in Table 1 we compare the volatility of commitment and disbursement, measured by the standard deviation from trend calculated on the difference between values in years *t* and *t-1*. Volatility is generally, though not always, higher in commitment than in disbursement. In fact, the few exceptions are Austria, Belgium, Canada, Italy and Greece. On more general grounds, our donor sample highlights two different ways, more or less equally distributed, in which volatility in commitment and disbursement seem to develop. A first group maintains the standard deviation of disbursement at below 0.1, irrespective of any increase of volatility in commitment, which ranges between 0.1 and 0.4. In the second group, increases in the standard deviation of commitment tend to get reflected in the rise of disbursement, covering approximately the same range, between 0.1 and 0.4. In the former case some of the most volatile evolution of commitment is associated with some of the most stable evolution of disbursement, such as in the Netherlands, Switzerland and Australia. In the latter case Portugal, Italy and Spain combine some of the highest levels of volatility in both commitment and disbursement.

[3]Despite this important distinction, supply-side models of foreign assistance often use data on disbursements. This is understandable when it is necessary to take the recipient absorption capacity into account.

Table 1 Volatility and predictability of commitment and disbursement (1995–2014)

	Volatility (s.d.)		Predictability			ODA/GNI
	commit.	disburs.	1-α	α	R^2	(%)
Australia	0.296	0.079	0.803 ***	0.199 **	1.000	0.471
Austria	0.242	0.258	0.221 *	0.765 ***	1.000	0.297
Belgio	0.138	0.171	0.099	0.890 ***	1.000	0.491
Canada	0.132	0.136	0.318 **	0.676 ***	1.000	0.330
Denmark	0.172	0.053	0.791 ***	0.211 ***	1.000	1.122
Finland	0.256	0.076	0.754 ***	0.248 ***	1.000	0.669
France	0.185	0.110	0.455 ***	0.534 ***	1.000	0.444
Germany	0.117	0.090	0.312 **	0.670 ***	1.000	0.396
Greece	0.170	0.182	-0.056	1.054 *	1.000	0.100
Ireland	0.122	0.120	0.002	0.998 ***	1.000	0.449
Italy	0.314	0.337	0.031	0.954 ***	1.000	0.160
Japan	0.193	0.189	0.506 ***	0.467 ***	1.000	0.209
Netherlands	0.441	0.063	0.950 ***	0.051	1.000	0.686
New Zealand	0.194	0.085	0.642 ***	0.356 ***	1.000	0.311
Norway	0.155	0.079	0.722 ***	0.280 ***	1.000	1.561
Portugal	0.438	0.379	0.285 **	0.716 ***	0.999	0.178
Spain	0.317	0.232	0.694 ***	0.305 **	0.999	0.139
Sweden	0.174	0.081	0.767 ***	0.239 **	1.000	1.331
Switzerland	0.371	0.071	0.825 ***	0.178 ***	1.000	0.657
United Kingdom	0.238	0.152	0.735 ***	0.273 **	1.000	0.669
United States of America	0.147	0.155	0.314 ***	0.678 ***	1.000	0.184

Source: Author's analysis of OECD data
Significance: *** = 0.001, ** = 0.05, * = 0.1.

From a temporal perspective, the evolution of aid supply volatility has been rather diverse within the donor group considered here. In fact the comparison of decadal averages in Table A.1 highlights how while changes in the variability of aid supply from the group as a whole are not significant,[4] this is not reflected in individual donor performance. In some cases, changes in commitment volatility have been accompanied by consistent changes in terms of disbursement, as with Portugal and Denmark, among others, which have experienced the largest decreases. In other cases, for instance the Netherlands and France, an increase in commitment volatility has been accompanied by a decrease in volatility in terms of disbursement. Conversely, for other donors such as Norway and Spain a decrease in commitment volatility has been accompanied by an increase in disbursement volatility.

[4] Pr(|T|>|t|) = 0.809 and 0.448 for commitment and disbursement, respectively.

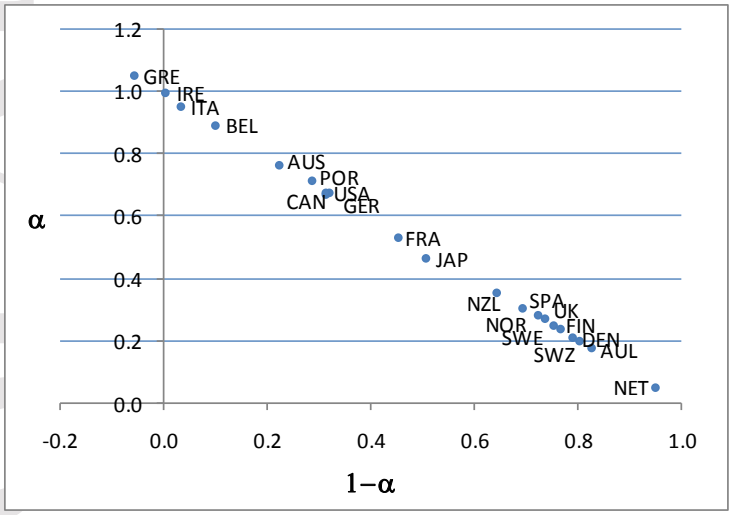
Volatility in aid commitment and disbursement is only one component of overall aid variability. The gap between commitment and disbursement adds another major layer of variability and further contributes to reduce aid predictability. The divergence between commitment and disbursement highlights a certain contrast between donor availability or intention to provide aid and the constraints imposed by contingent factors such as own economic performance, changes in domestic policy environment, or simply a certain skepticism about recipient absorption capacity. In other words, the discrepancy between commitment and disbursement can be thought of as the result of a sort of reality check on donor initial plans or desires. A quick look at Figure A.1, showing the scatter plot of aggregate commitment and disbursement from our donor sample, seems to support the opinion expressed by OECD (2012) and Hudson (2013) that a large share of disbursement occurs within a couple of years after commitment is officially announced. Having said that, it is recognized that there are wide variations underpinning these averages, since the ability to predict future aid volumes varies strongly from one donor to another (OECD, 2012).

The volatility of commitment and disbursement, considered above, and the gap between them, are supposed to affect the predictability of aid volume and flows. Concurrently, a low degree of predictability is expected to contribute to increasing volatility. A measure of aid predictability is shown in the second part of Table 1. Along with what was presented earlier in (1), the estimation of α and of corresponding 1 - α allows us to synthetically describe donor attitude to aid provision. In particular, neglecting any constant value in (1) allows us to force a linear donor distribution, as in Figure 1, with immediate advantages in terms of visualization and comparison of donor performances. Values of α close to zero identify donors whose aid supply follows a random walk – i.e. it is less inspired by past values or trends and is instead based mainly on immediate contingencies. This is the case of the donors in the right lower corner in Figure 1, such as the Nordic countries, Australia, Switzerland, and the UK. These donors are traditionally recognized as being among those most committed to international aid, and regularly score the highest ratios between official development assistance and gross national income (ODA/GNI) which is also reported in Table 1. On the opposite end, α values close to one identify donors whose aid supply is more conservative and stable. This seems to be the case for Greece, Ireland, Italy and Belgium. This group includes some of the poorest performers within our donor sample in terms of their oda/gni ratio. Interestingly, we have found a remarkable correlation (i.e. –0.57) between the values of α and of the ODA/GNI ratio. This entails that, overall, the most committed donors are also the most unpredictable. While this consideration may sound counterintuitive, it can at least partly be explained by considering how this group of donors' initial plans about desired aid supply may need to be scaled down at a later stage due to constraints that are mostly beyond the donor's intention and capacity (e.g. reduced recipient absorption capacity). Likewise, it can be argued that the high predictability of aid supply typical of donors recording high α values may actually

reflect an emphasis on the stability of aid supply and not necessarily the same attention to some of the preconditions for aid effectiveness, and might eventually lead to a suboptimal aid allocation and utilization.[5]

As seen above regarding volatility, even the predictability of aid supply has evolved in a rather diverse manner during the two decades covered by this study. In some cases the average gap between commitment and disbursement, as captured by α, has increased overtime, while in others has reduced.[6] However, once again this is not shown when the donor sample is considered as a whole.

Figure 1 Predictability of aid supply



Source: Table 1

4.2 Peer effect in aid supply decisions

As a first step in this part of the analysis, the focus is on checking for the presence of the peer effect; that is, whether a certain donor's decisions about aid supply are influenced by those of its peers. We do this by testing the cointegration of the evolution of aid supply, both as commitment and disbursement, among the donors in our sample, along the lines presented in section 3.1.2.[7] Suffice it to say for the time being, 315 of the 1722 possible combinations between donor pairs have been found to be cointegrated.[8] This confirms the existence of donors' imitative behavior, although on a rather contained scale.

[5]This consideration is supported by a large share of the literature on aid allocation and aid effectiveness. For a summary review on this topic, see Clist (2011) and De Matteis (2016).

[6] $Pr(|T|>|t|) = 0.908$ and 0.890 for α and $1 - \alpha$ respectively.

[7]When setting their aid policy, donors may be linked together by strategic interests (commercial, military, diplomatic, …). The analysis of the rationale of such imitative behavior goes beyond the aim of the present study and no attempt is made here to assess whether donors imitate each other in a strategic manner or through more myopic herding behavior.

[8] Each donor in our sample has been considered separately both as a leader and as a follower in each possible pair with the other donors.

The next step is to check the relevance of the peer effect on aid supply. The structure of the dataset suggests the adoption of a nested approach. Along such approach, each cointegrated link identified so far has been classified according to the leader involved and to the two categories of commitment and disbursement. The values in Table 1 have been used to check for the existence of any significant difference between the degree of volatility and the predictability of aid supply in the presence of an established peer effect.

The results reported in Table 2 highlight how the condition of cointegration contributes to reducing the volatility of peers' aid supply, but does not affect aid predictability. The disbursement dummy shows how peers' supply volatility is higher in the case of commitment than disbursement.

Table 2 Influence of cointegration on volatility and predictability of aid supply

	Follower volatility	Follower predictability
Cointegration dummy[†]	-0.023 ***	-0.023
	(0.006)	(0.018)
Disbursement dummy[‡]	-0.080 ***	0.000
	(0.004)	(0.014)
Constant	0.233 ***	0.497 ***
	(0.003)	(0.011)
N. obs.	1722	1722
Log likelihood	1654.779	-346.804
Wald χ^2	334.390	1.620
Prob. > χ^2	0.000	0.445

Notes: [†] Cointegration dummy: 1 = cointegrated, 0 = not cointegrated. [‡] Disbursement dummy: 1 = disbursement, 0 = commitment
Source: Author's analysis of OECD data
Significance: *** = 0.001, ** = 0.05, * = 0.1. Standard errors in brackets

Our results contradict the opinions expressed by Bertoli *et al.* (2008) and by Frot and Sontiso (2011). The peer effect seems to play a statistically significant role, albeit rather weak, in the reduction of the volatility of the aid supply. Table 3 provides further details of this by testing any significant difference between the degree of volatility and the predictability of aid supply in the presence of an established peer effect. In other words we assess the relevance of cointegration over the volatility and predictability of aid supply. In order to take account of the evolution of commitment and disbursement for both cointegrated and not

cointegrated links, we have carried out four separate tests: disbursement vs disbursement (column a); commitment vs disbursement (column b); commitment vs commitment (column c); and disbursement vs commitment (column d). For all combinations Table 3 presents the average degree of volatility and predictability and the t-test of the null hypothesis of no difference between the average degrees in cointegrated pairs and not cointegrated pairs. Columns (a) and (b) refer to the relevance of donors' commitment and disbursement on peers' decisions during the disbursement phase, while columns (c) and (d) refer to the commitment phase. First of all, the results highlight a higher degree of volatility in decisions about aid commitment – columns (c) and (d) – than disbursement – columns (a) and (b). Having said that, no significant difference is found in columns (c) and (d) when comparing cointegrated versus non-cointegrated links. On the contrary, the results in columns (a) and (b) highlight how cointegration is associated with significantly lower degrees of volatility of aid supply with regard to disbursement. In other words, the results allow the argument that the peer effect is associated with a lower degree of aid supply volatility during the disbursement phase, supporting what considered above.

Table 3 **Significance of peer effect on volatility and predictability of aid supply through commitment and disbursement**

	disb. → disb. (a)	com. → disb. (b)	com. → com. (c)	disb. → com. (d)
	Average degree of volatility			
Cointegrated links	0.121 (0.008)	0.121 (0.009)	0.219 (0.010)	0.220 (0.010)
Not cointegrated links	0.154 (0.005)	0.161 (0.005)	0.231 (0.005)	0.231 (0.005)
Pr (T > t)	0.000	0.000	0.138	0.172
	Average degree of predictability			
Cointegrated links	0.439 (0.030)	0.419 (0.030)	0.536 (0.035)	0.504 (0.032)
Not cointegrated links	0.504 (0.016)	0.506 (0.015)	0.484 (0.016)	0.490 (0.016)
Pr (T > t)	0.029	0.006	0.091	0.655

Source: Author's analysis of OECD data
Standard errors in brackets

In terms of predictability, the lower half of Table 3 highlights how cointegrated links are characterized by a larger gap between commitment and disbursement than non-cointegrated links during the disbursement phase, while there is partial evidence of an opposite relationship during the commitment phase. In other

words, the peer effect seems to contribute to reducing predictability during the disbursement phase and to be irrelevant or to increase predictability to a certain extent during the commitment phase.

Although the above has been able to establish the existence of a significant relationship between the peer effect and volatility and predictability in aid supply, more can be done with the results of the cointegration analysis. In fact, it is easy to assume that much of the effectiveness of the peer effect is determined by the size of the net of influential connections among peers, and in particular by the strength and effectiveness of such connections, measured by θ_2/h and α_3 in (3). The former measures how much a certain donor's decisions tend to be affected by those of another donor, and the latter measures how long it takes for this influence to officially materialize. The values of θ_2/h and α_3 are reported in Tables A.2–A.5 together with the indication of the direction of causality. In order to ensure the significance of the analysis and to facilitate the interpretation of results, only coefficients with a significance of more than 0.1 and in the presence of a clear direction of Granger causality have been retained. Their average value and the average size of integrated networks are presented in Table 4.

Table 4 Average features of the peer effect

	disb. → disb. (a)	com. → disb. (b)	com. → com. (c)	disb. → com. (d)
average n. of long-term relationships	4.000 (2.387)	3.905 (2.364)	3.476 (2.315)	4.143 (1.740)
average θ_2/h	3.826 (5.857)	3.767 (5.540)	4.463 (5.053)	3.969 (4.570)
average α_3	0.363 (0.329)	0.841 (0.754)	0.612 (1.096)	0.604 (1.024)

Source: Author's analysis of OECD data
Notes: All estimates are based on data with significance ≥ 0.1. Standard deviation in brackets

As shown in Table 4, each donor averages approximately eight significant long-term links in terms of commitment volume – columns (c) and (d) – and approximately the same in terms of disbursement – column (a) and (b) – although a certain variability among donors is highlighted by the values of standard deviation. The above supports the position that a donor coordination system is effectively in place. It also highlights how some donors are more connected than others. What these data cannot reveal is that one

donor's aid-supply decision process may be more connected to peers in one phase – i.e. commitment or disbursement – than in another.

The relationship of cointegration between two donors can be presented as a flow of influence, according to the source and the destination of the flow. As shown in Figure 2, in each row, the donor we are currently focusing on – say in this case New Zealand – is placed in between influential links eventually identified with another donor, which is considered both as the possible source and destination of the influence flow, which in this case is figured as flowing rightwards. For instance, the expression "$BEL_d \rightarrow NZL_d \rightarrow BEL_d$" shows the flow of influence between New Zealand and Belgium. The "d" in both "BEL_d" and "NZL_d", clarifies that in both cases we are referring to disbursement. The expression summarizes the result of the analysis of Granger causality which reveals the existence of bilateral causality: aid disbursement from New Zealand is influenced, and at the same time influences, aid disbursement from Belgium.

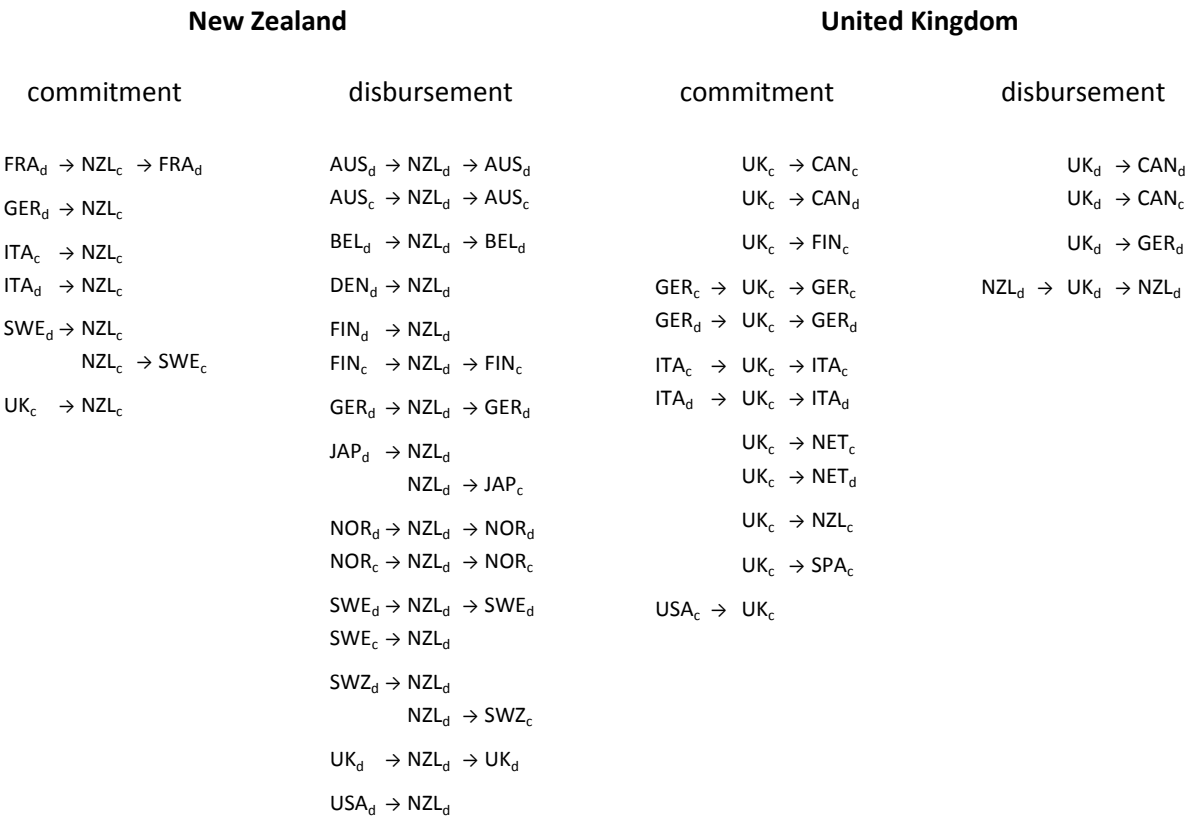
In general terms, the clarification whether the influence refers to commitment or disbursement reflects the possibility of different influential capacity exercised by different donors through different phases of the aid-supply decision process. For instance, in the case of New Zealand, the net of influential links with peers is much greater in the case of disbursements than of commitments. Conversely, for some donors the number of influential links may be greater in terms of commitments than of disbursements, as in the case of the UK, also shown in Figure 2.[9]

The analytical process described above allows to depict the donor system of influential links as a highly ramified and interconnected network, with each donor being the leader of its own sub-network.[10] As expected, some sub-networks are more densely ramified than others: the largest sub-networks are led by Australia, New Zealand, Germany, Belgium and the USA, while the smallest networks are led, in reverse order, by Ireland, Italy, Greece, Portugal and France. If we focus on the largest donors, we find a certain degree of cointegration among the USA, the UK and Germany, as well as among their respective sub-networks of influence. The same does not occur with regard to France and its sub-network.

[9] The reasons for such different influential capacity exercised by different donors through different phases of the aid-supply decision process are assumed to be related to the specific features of donors' bureaucratic processes. Although their comparative analysis may contribute to improving coordination in donor aid-related administration, it goes beyond the purposes of the present study and is ignored here.

[10] Overall, the main contribution of Figure 2 is to help the reader visualize how the network of influence referred to each donor can be structured. The consideration that each donor is at the same time in a plurality of other donors' network of influence, gives the idea of the multidimensional complexity of the combined representation of all donors' networks.

Figure 2 Network of peer influential links



Source: Author's analysis of OECD data
Notes: 'c' and 'd' in country acronym stand for commitment and disbursement. The arrows identify the direction of causality, or in other words, the flow of influence. This allows identification of a leader and a follower in each pairs, although in the case of bidirectional causality both donors in a pair happen to play both roles concurrently.

At this stage we have the tools to assess the relevance of cointegration to the volatility and predictability of aid supply. Average values of θ_2/h shown in Table 4 highlight how a donor's changes in aid supply tend to expand when replicated by other donors, wherever the aid supply from the two donors are found to be cointegrated. According to average data, changes in leaders' aid supply tend to increase approximately fourfold when replicated by followers. However, after remarking the large average value of θ_2/h, it is also necessary to consider the high diversity in followers' reactions, as shown in the high values of standard deviation. In this regard it is important to clarify that in this case the influence exercised or received by a donor – and consequently its net influencing power – is independent of the direction of influence. In other words, such influence is the result of each donor's combined capacity to influence others towards both an increase and a decrease in aid volume. Therefore, the comparison of the influential power involved in each donor pair connection is made on the basis of the absolute value of θ_2/h.

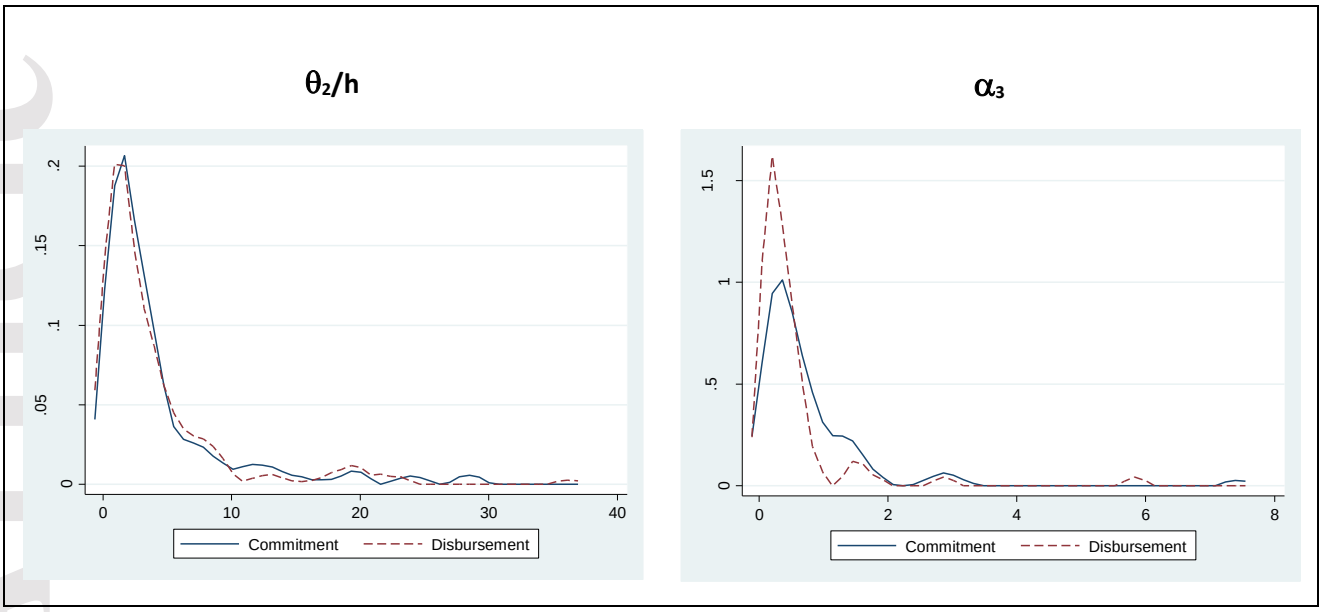
No significant difference is found among the values of θ_2/h when comparing the four typologies of connections involving commitment and disbursement considered in Table 4 (χ^2_3 = 5.863). Concurrently, the four typologies of connections between commitment and disbursement are characterized by significant differences in terms of speed of adjustment (χ^2_3 = 52.611), with the adjustment of aid volume occurring at a faster pace when the peer effect refers to the commitment-disbursement case and at a slower pace when it refers to the disbursement-disbursement case. In the former, the adjustment occurs within just over a year (i.e. $1/\alpha_3$ = 14 months), while in the latter it takes 33 months on average.

Interestingly, an inverse relationship between θ_2/h and α_3 is found (Pearson correlation = -0.31), highlighting how a stronger peer effect on aid volume decisions requires a longer period. While this is somehow expected, it supports the argument that donors' influential capacity through the different phases of the aid supply decision process is affected by the specific features of the bureaucratic processes involved.

At this stage, following the nested approach above, the three main features of the peer effect as well as the degree of volatility and the predictability of the leading donor in each cointegrated link are considered as possible determinants of the degree of volatility and predictability of each respective peer.

A certain concern is given by the wide variability identified above with reference to the data in Table 4. Visual analysis of the kernel distribution of θ_2/h and α_3 in Figure 3 supports this and advices the truncation of such distributions above ad hoc maximum values, in this case arbitrarily fixed at θ_2/h=10 and α_3=2. The number of significant long-term cointegrated links is kept unaltered.

Figure 3 **Kernels of strength (θ_2/h) and speed (α_3) of influential power**



Source: Author

The results of most relevant nested models are presented in Table 5, where columns (a) – (b) and columns (c) – (d) refer respectively to follower volatility and predictability, both being arranged according to the use of original and truncated data.

First of all, analysis of both datasets reveals very low values for the coefficients of strength and speed and of the number of cointegrated connections. Besides that, the strength of influential power is found to be insignificant and the size of the influence network seems to play a significant role only with regard to the predictability of peers' aid supply. In this case the increase in the size of the influence network tends to be associated with a wider commitment-disbursement gap.[11] While justification of this result remains rather counterintuitive, it is useful to consider how the leaders of the largest influence networks also happen to be among the most unpredictable donors. As remarked earlier on, this donor profile, identified by a low value of α in Figure 1, is characterized by strong commitment to international aid, and its aid supply is typically inspired by contingencies rather than by past trends.[12] Therefore, while on one side the large size of the influence network reflects a recognized status among peers, on the other side the lower-than-average predictability of the aid supply is explained by a certain proactivity in donors' responses to contingencies, which for various reasons may find it difficult to substantiate commitments through disbursement.

[11]In Table 5, predictability is measured through the values of α reported in Table 1 and in Figure 1. The use of values of 1-α generates similar results *ceteris paribus* which are not reported here.
[12]See what said in 4.1.

The absence of models that include a significant coefficient of the strength of influential power and of the size of the influential network as determinants of aid volatility seems to highlight how what matters in influencing the volatility of peers' aid supply is ultimately the condition of being part of a connecting network, rather than the strength of the influence exercised by the leader of such a network. This supports what considered above. Following the same line of thought, it seems possible to argue that being part of either a large or a small network has little effect on a donor's influence over the volatility of aid supplied by its connected peers. In other words, our results hint once again at the consideration that it is the condition of being connected that in the end contributes to reducing volatility, rather than the extent to which peers are connected or how many are connected.

Contrary to the above, the results show that the speed of influential power is significant. Despite the low value of the coefficient, its sign confirms that the peer effect actually contributes to reducing aid volatility. This leads to the consideration that any effort towards an increased – particularly in terms of higher frequency – coordination among donors which are interconnected through a network of influence would contribute to containing the current trend of increasing volatility in aid supply.

Conversely, there is some evidence that the speed of donor connection may contribute to making aid more unpredictable. While on one side this may recall the consideration above about the inverse link between predictability and volatility, any evidence dissolves when repeating the analysis with the truncated dataset.

Overall, the results so far show that the peer effect works as a way of containing the transfer of volatility and plays a contradictory role in the predictability of aid supply. In this light, caution is required in interpreting the coefficients of the leader's volatility and predictability over those of its connected peers. The positive sign for the coefficient of the leader's volatility may lead to the interpretation that a connection among peers may be a channel for the transmission of volatility. Actually there is nothing wrong with such an interpretation; however, it needs to be considered within the wider perspective above when a significant reduction in the degree of volatility in aid supply in the presence of an established peer effect has been detected. Our results ultimately show that a certain amount of the volatility of the leader's aid supply is transmitted to peers that happen to fall within its network of influence anyway, but they also highlight that the amount of volatility that is passed along actually decreases when a peer effect relationship is in place.

In terms of predictability, the results of our analysis do not admit any transmission of predictability from one donor to another.

Table 5 Transfer of variability and predictability through peer effect

	Follower volatility		Follower predictability	
		truncated		truncated
	(a)	(b)	(c)	(d)
θ_2/h	0.001	0.005	-0.005	0.021
	(0.001)	(0.004)	(0.005)	(0.013)
α_3	-0.014 *	-0.039 *	-0.067 **	0.000
	(0.008)	(0.021)	(0.028)	(0.071)
Size of leader influence network	0.001	0.000	-0.010 *	-0.012 **
	(0.002)	(0.002)	(0.006)	(0.006)
Leader volatility	0.157 **	0.168 **		
	(0.075)	(0.079)		
Leader predictability			-0.011	-0.092
			(0.102)	(0.108)
Constant	0.122 ***	0.136 ***	0.636 ***	0.589 ***
	(0.029)	(0.033)	(0.086)	(0.110)
N. obs.	153	134	153	134
Log likelihood	165.103	150.813	-22.310	-19.327
Wald χ^2	8.050	15.890	7.840	8.160
Prob. > χ^2	0.090	0.003	0.098	0.086

Source: Author's analysis of OECD data
Significance: *** = 0.001, ** = 0.05, * = 0.1. Standard errors in brackets

5. CONCLUSIONS

This study has assessed the existence and relevance of an eventual imitative behaviour among donors in terms of their aid supply. The urgency of the subject is motivated by an increasing degree of aid volatility and unpredictability and by the suspected link between aid volatility and the presence of imitative behaviour in the donor's decision processes about aid volume.

This analysis has found evidence of certain imitative behaviour among donors in terms of aid supply, although on a limited scale compared to the potential.

Our findings contradict the opinion that such herding behaviour may contribute to increasing aid volatility. On the contrary, we find that the peer effect contributes to reducing the volatility of donors' aid supply. While any connection among donor peers is a potential channel for the transmission of aid volatility, the amount of such volatility decreases significantly in the presence of established imitative behaviour.

Our results have shown also how the peer effect is more relevant with regard to commitment than to disbursement. This is understood in view of the political and administrative rigidities faced during the

disbursement phase both domestically and particularly abroad, mainly with regard to the eventual revision of donor priorities with consequent reallocation of budget, as well as to a possible review of commitments due to the limited absorption capacity of perspective aid beneficiaries.

The evolution of aid commitment and disbursement has allowed the listing of the donors in our sample according to their degree of aid predictability, or, in other words, according to their capacity to substantiate their aid commitment as disbursement. This has allowed to deduce that the most committed donors are also the most unpredictable.

Our results highlight that it is the condition of being connected with peers which in the end contributes to reducing volatility, rather than the strength of such connection among peers or the number of peers that are connected. Conversely, the results show that the speed of the peer effect plays a significant role: the faster the imitative process, the more it contributes to reducing aid volatility.

Overall, the result of our analysis leads to the conclusion and policy recommendation that any effort to fuel and speed up the peer effect among donors, would contribute to containing the current increasing trend of volatility in aid supply.

Finally, while this study has focused on assessing the existence of donors' imitative behaviour and its relevance in terms of aid supply, the rationale of such imitative behaviour remains unclear and is recommended for further research.

References

Aldasoro, I., Nunnenkamp, P. and Thiele, R. (2010). "Less aid proliferation and more donor coordination? The wide gap between words and deeds", *Journal of International Development*, Vol. 22 (7), 920-940.

Bertoli, S., Cornia, G.A. and Manaresi, F. (2008) "Aid Effort and Its Determinants: A Comparison of the Italian Performance With Other OECD Donors", Working Paper No. 2008-11. Firenze: Università degli Studi di Firenze Dipartimento di Scienze Economiche.

Boschini, A. and Olofsgård, A. (2007) "Foreign Aid: An Instrument for Fighting Communism?", *Journal of Development Studies*, Vol. 43 (4), 622-648.

Bulir, A. and Hamann, A.J. (2008). "Volatility of Development Aid: From the Frying Pan into the Fire?", *World Development*, Vol. 36 (10), 2048-2066.

Bulir, A. and Hamann, A.J. (2003). "Aid Volatility: An Empirical Assessment", IMF Staff Papers, Vol. 50, No. 1, 64-89.

Canavire-Bacarreza, G.J., Neumayer, E. and Nunnenkamp, P. (2015). "Why Aid is Unpredictable: an Empirical Analysis of the Gap Between Actual and Planned Aid Flows", *Journal of International Development*, Vol. 27 (4), 440-463.

Cassen, R. (2008). "Does Aid Work?", Oxford: Clarendon Press.

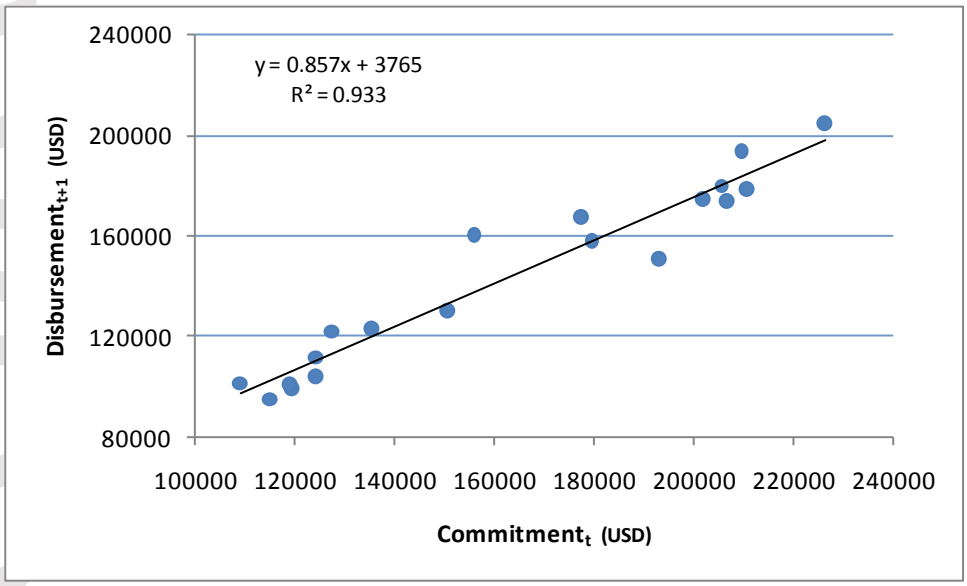
Celasun, O. and Walliser, J. (2008). "Predictability of Aid: Do Fickle Donors Undermine Aid Effectiveness?", *Economic Policy*, Vol. 23 (55), 546-594.

Clist, P. (2011). "25 Years of Aid Allocation Practice: Whither Selectivity?", *World Development*, Vol. 39 (10), 1724-1734.
De Matteis, A. (2016). "Whose Poverty Really Matters When Deciding Aid Volume?", *International Journal of Public Policy*, Vol. 12 (1/2), 28-53.
Diarra, G. (2011). "Aid Unpredictability and Absorptive Capacity: Analyzing Disbursement Delays in Africa", *Economics Bulletin*, Vol. 31 (1), 1004-1017.
Dudley, L. (1979). "Foreign Aid and the Theory of Alliances", The Review of Economics and Statistics, Vol. 61 (4), 564-571.
Eifert, B. and Gelb, A. (2008). "Reforming Aid: Toward More Predictable, Performance-Based Financing for Development", *World Development*, Vol. 36 (10), 2067-2081.
Faini, R. (2006). "Foreign Aid and Fiscal Policy", Discussion Paper No. 5721, London: CEPR.
Fleck, R. and Kilby, C. (2010). "Changing Aid Regimes? U.S. Foreign Aid from the Cold War to the War on Terror", *Journal of Development Economics*, Vol. 91 (2), 185–197.
Fleck, R. and Kilby, C. (2006). "How do Political Changes Influence US Bilateral Aid Allocations? Evidence from Panel Data." *Review of Development Economics*, Vol. 10 (2), 210–223.
Fleck, R. and Kilby, C. (2001). "Foreign Aid and Domestic Politics: Voting in Congress and the Allocation of USAID Contracts across Congressional Districts." *Southern Economic Journal*, Vol. 67 (3), 598–617.
Frot, E. (2009) "Aid and the Financial Crisis: Shall We Expect Development Aid to Fall?", Technical Report. Stocholm: Stocholm School of Economics.
Frot, E. and Santiso, J. (2011) "Herding in Aid Allocation", Kyklos, Vol. 64 (1), 54-74.
Fuchs, A., Nunnenkamp, P. and Öhler, H. (2015). "Why Donors of Foreign Aid Do Not Coordinate: The Role of Competition for Export Markets and Political Support", *World Economy*, Vol. 38 (2), 255-285.
Hallett, M. (2009). "Economic Cycles and Development Aid: What is the Evidence from the Past?", ECFIN Economic Brief No. 5, European Commission Directorate General for Economic and Financial Affairs.
Hudson, J. (2013). "Promises Kept, Promises Broken? The Relationship Between Aid Commitments and Disbursements", *Review of Development Finance*, Vol. 3 (3), 109-120.
Hudson, J. and Mosley, P. (2008). "Aid Volatility, Policy and Development", *World Development*, Vol. 36 (10), 2082-2102.
Hudson, J. and Mosley, P. (2008). "The Macroeconomic Impact of Aid Volatility", *Economic Letters*, Vol. 99 (3), 486-489.
Irwin, L.G. (2000). "Dancing the Foreign Aid Appropriations Dance: Recurring Themes in the Modern Congresses." *Public Budgeting and Finance Summer*, 30–48.
Jones, S. (2015). "Aid Supplies Over Time: Addressing Heterogeneity, Trends and Dynamics", *World Development*, Vol. 69, 31–43.
Lancaster, C. (2007). "Foreign Aid: Diplomacy, Development, Domestic Politics." Chicago: University of Chicago Press.
Lensink, L. and Morrissey, O. (2000). "Aid Instability as a Measure of Uncertainty and the Positive Impact of Aid on Growth", *Journal of Development Studies*, Vol. 36 (3), 31-49.
Leurs, R. (2005). "Aid Disbursement Delays: Measures, Causes, Solutions", *Public Administration and Development*, Vol. 25 (5), 379-387.
Mascarenhas, R. and Sandler, T. (2006). "Do Donors Cooperatively Fund Foreign Aid?", *Review of International Organizations*, Vol. 1 (4), 337-357.
Milner, H. and Tingley, D. (2010). "The Domestic Politics of Foreign Aid: American Legislators and the Politics of Donor Countries." *Economics and Politics*, Vol.22 (2), 200-232.
Mosley, P. (1985). "The Political Economy of Foreign Aid: A Model of the Market for a Public Good", *Economic Development and Cultural Change*, Vol. 33, 373-393.
Mosley, P. And Suleiman, A. (2007). "Aid, Agriculture and Poverty in Developing Countries", *Review of Development Economics*, Vol. 11 (1), 139-158.
Noel, A. and Therien, J.P. (1995). "From Domestic to International Justice: The Welfare State and Foreign Aid." *International Organization*, Vol. 49 (3), 523–553.

Nunnenkamp, P., Öhler H. and Thiele, R. (2013). "Donor Coordination and Specialization: Did the Paris Declaration Make a Difference?" *Review of World Economics*, Vol. 149 (3), 537-563.
OECD. (2016) Official Development Assistance Figures. Accessed January 2016 via http://www.oecd-ilibrary.org/development/data/oecd-international-development-statistics_dev-data-en
OECD. (2012) *Aid Effectiveness 2011: Progress in Implementing the Paris Declaration*, Paris: OECD.
Riddle, R. (2007). "Does Foreign Aid Really Work?", Oxford: Oxford University Press.
Rodrik, D. (1990). "How Should Structural Adjustment Programmes Be Designed?", *World Development*, Vol. 18 (7), 933-947.
Round, M. and Odedokun, J. (2004). "Aid Effort and its Determinants." *International Review of Economics and Finance*, Vol. 13 (3), 293-309.
Rowlands, D. and Ketcheson, I. (2002). "Multilateral Aid Coordination by the International Financial Institutions: An Examination of Canadian Development Assistance to SubSaharan Africa". In B. Mak Arvin, ed. *New Perspectives on Foreign Aid and Economic Development*. Westport: Praeger.
Steinwand, M.C.(2015). "Compete or Coordinate? Aid Fragmentation and Lead Donorship", *International Organization*, Vol. 69 (2), 443-472.
Therien, J.P. and Noel, A. (2000). "Political Parties and Foreign Aid." *American Political Science Review*, Vol. 94 (1), 151–162.

Appendices

Figure A.1 Aggregate commitment at year t and disbursement at year t+1



Source: Author's analysis of OECD data

Table A.1 Decadal estimates of aid volatility

	commitment		disbursement	
	1995-2004	2005-2014	1995-2004	2005-2014
Australia	0.234	0.351	0.076	0.078
Austria	0.145	0.165	0.202	0.155
Belgio	0.120	0.157	0.207	0.122
Canada	0.152	0.121	0.150	0.100
Denmark	0.226	0.115	0.075	0.028
Finland	0.101	0.356	0.040	0.072
France	0.162	0.216	0.115	0.104
Germany	0.085	0.110	0.057	0.078
Greece	0.177	0.152	0.177	0.179
Ireland	0.084	0.139	0.079	0.139
Italy	0.321	0.266	0.347	0.267
Japan	0.190	0.199	0.147	0.186
Netherlands	0.416	0.504	0.049	0.047
New Zealand	0.104	0.243	0.101	0.060
Norway	0.193	0.121	0.070	0.092
Portugal	0.493	0.164	0.373	0.172
Spain	0.358	0.242	0.147	0.297
Sweden	0.171	0.167	0.079	0.070
Switzerland	0.491	0.259	0.069	0.075
United Kingdom	0.179	0.287	0.120	0.176
United States of America	0.180	0.101	0.171	0.107

Source: Author's analysis of OECD data

Table A.2 Peer effect between the jth donor disbursement and the ith donor disbursement

j-disbursement \ i-disbursement	AUL	AUS	BEL	CAN	DEN	FIN	FRA	GER	GRE	IRE	ITA	JAP	NET	NZL	NOR	POR	SPA	SWE	SWZ	UK	USA
AUL						-4.170 *** ← 0.211 **							-0.019 *** ← 0.214 **	0.805 ** ↕ 0.152 **			1.365 *** ←				-6.000 *** ← 0.097 **
AUS					0.699 *** ↑		-2.563 *** ↑	-8.608 *** ↑			-0.906 *** ↑	0.549 *** ↑	12.81 *** ↕ -0.075 ***								
BEL				0.403 * ←	-1.738 *** ← 1.494 ***		22.53 *** ← -0.064 ***					0.326 *** ↑		-0.572 *** ↕							
CAN			-1.787 *** ← 0.358 ***																	-3.671 *** ← 0.199 ***	-6.112 *** ← 0.275 ***
DEN													13.96 *** ↑ -0.036 ***	36.27 *** ↑ -0.008 **							
FIN	-3.293 *** ↑		1.208 *** ← 0.266 **											-0.626 *** ↑	-0.507 *** ↑			3.942 *** ↕			
FRA			-4.182 *** ↕ 0.226 ***										1.464 *** ↕								
GER											-4.059 *** ↑			-3.688 *** ↕				-3.025 *** ← 0.506 **	20.52 *** ←	-2.110 *** ← 0.291 ***	-20.37 *** ←
GRE							-0.410 *** ↕									-0.308 ** ↑					
IRE											-0.531 *** ↑										
ITA																					
JAP							-7.918 *** ↑ 0.058 ***						7.150 *** ← -0.220 ***	-2.791 ** ↑ 0.164 ***				4.625 *** ← -0.302 ***			
NET	0.163 *** ↑			5.741 ** ↑			-7.811 *** ↑ 0.058 ***		-5.317 *** ↕												
NZL	-5.772 *** ← 0.214 **		-1.603 *** ↕ 0.264 ***	-0.859 *** ↑	-0.340 *** ← -0.693 *	-1.473 *** ← 0.586 ***	-8.974 *** ← 0.079 *	-1.490 *** ↕ 0.490 ***							-0.784 *** ↕ 0.544 **			-1.240 *** ↕ 0.347 **	-1.064 *** ← 0.629 ***	-1.398 *** ↕ 0.192 *	-1.630 *** ← 0.541 ***
NOR								-1.332 *** ↕ 0.276 **						-18.01 *** ↕				1.168 ** ←	-2.868 *** ↕ 0.150 *		
POR			-2.944 *** ← 0.486 ***				-2.809 *** ↑ 0.549 ***		-3.102 *** ← 0.360 ***			1.398 *** ← -1.555 ***									
SPA					-0.826 *** ←	0.809 * ←															
SWE	-1.597 *** ↑			0.363 *** ↑ -0.472 **									2.700 *** ↑	-0.129 ** ↕	-0.346 *** ↑						
SWZ								-1.153 *** ↑						-0.840 *** ↑	-2.270 *** ↕						
UK								-0.689 *** ↑	-0.554 *** ↑					-0.390 *** ↕ 0.734 **							
USA	-4.030 *** ↕ 0.452 *** ↕	2.885 *** ↑											1.442 *** ↕	-1.543 *** ↑			1.720 *** ↑		-3.091 *** ↑		

Notes: Where available, for each ij combination the values of θ_2/h and α_3 are reported in dark and light colour respectively.
Significance: *** = 0.01, ** = 0.05, * = 0.1
Direction of Granger causality: ↑ = unidirectional from j to i, ← = unidirectional from i to j, ↕ = bidirectional.
Source: Author

Table A.3 Peer effect between the j[th] donor commitment and the i[th] donor disbursement

j-commitment \ i-disbursement	AUL	AUS	BEL	CAN	DEN	FIN	FRA	GER	GRE	IRE	ITA	JAP	NET	NZL	NOR	POR	SPA	SWE	SWZ	UK	USA
AUL	-1.072 *** ← 1.381 ***					1.076 *** ← -1.088 ***							-0.934 *** ← 1.331 ***	-1.716 *** ↕ 0.994 ***			-4.792 *** ← 0.212 ***				3.313 *** ← -0.309 *
AUS					-1.004 *** ↑		2.949 *** ↑	7.254 *** ↑			0.719 *** ↑	-0.526 ***	-11.07 ***								
BEL	-1.483 *** ↑			-0.959 *** ↕	1.436 *** ← 0.807 **		-23.41 *** ↕														
CAN	1.081 ***	-5.985 *** ← 0.126 **		-1.209 *** ↑			-0.819 *** ↑ 0.486 *													2.774 *** ←	3.479 *** ←
DEN								-12.48 ***			-5.908 *** ↑ 0.229 ***		16.84 ***		-6.844 *** ↕						
FIN	0.756 ***		-2.114 *** ← 1.614 ***	-6.453 *** ↑ 0.375 ***		-0.860 *** ← 1.475 ***		4.641 ***						-0.649 *** ↕ 1.255 ***				-4.080 *** ← 0.518 ***			
FRA													-1.104 *** ↕								
GER											2.964 *** ↕ -0.378 ***			2.676 ***	-0.850 *** ← 1.402 ***				-24.51 *** ← 0.046 ***		28.58 ***
GRE							-0.399 *** ↕									-0.307 *** ↑					
IRE																					
ITA																					
JAP	-2.871 *** 0.379 ***						-7.945 *** ← 0.066 ***	19.66 ** ← -0.019 ***					1.711 * ↑	-5.195 *** ← 0.213 ***				-1.744 *			
NET							1.884 ***						-0.434 *** ← 2.872 ***								
NZL	2.081 *** ↑				0.405 *** ← -2.695 *		3.765 ***														-0.499 * ← 1.373 ***
NOR						-1.589 *** ← 0.781 ***							-0.905 *** ← 0.767 ***	12.22 *** ↕ -0.068 ***				-2.262 *** ← 0.570 ***	1.634 *** ↕ -0.294 ***		
POR							1.036 ***					-0.664 ***									
SPA			4.211 *** ← -0.230 ***			7.474 ***										-0.531 ** ↑					
SWE								-0.820 *** ↑ 0.881 *					3.017 *** ↑ -0.272 ***	-0.633 ***	-0.209 ** ←						
SWZ								-0.768 *** ↕ 1.223 ***						-0.637 *** ← 1.680 ***	1.484 *** ↑ -0.871 ***				-0.735 *** ← 3.069 ***		
UK		-1.867 *** ↑ 0.396 ***							-0.616 *** ↑	-1.410 *** ↕ 0.612 ***	-0.953 *** ↑ 0.825 **										
USA	2.772 ***	-3.782 *** ↑								-2.461 *** ↕			-1.976 ***	1.044 ***			-2.732 *** ↑		1.993 ***		

Notes: Where available, for each ij combination the values of θ_2/h and α_3 are reported in dark and light colour respectively.
Significance: *** = 0.01, ** = 0.05, * = 0.1
Direction of Granger causality: ↑ = unidirectional from j to i, ← = unidirectional from i to j, ↕ = bidirectional.
Source: Author

Table A.4 Peer effect between the j[th] donor disbursement and the i[th] donor commitment

j-disbursement \ i-commitment	AUL	AUS	BEL	CAN	DEN	FIN	FRA	GER	GRE	IRE	ITA	JAP	NET	NZL	NOR	POR	SPA	SWE	SWZ	UK	USA
AUL	-1.071 *** ↑		-5.006 *** ← 0.102 **		-0.595 *** ↕	-3.143 *** ← 0.197 ***	-3.978 *** ↕	-0.916 *** ↑			-1.424 *** ↑						19.01 *** ← 0.029 **	0.825 *** ← 0.136 ***			4.580 *** ← 0.038 *
AUS					-0.195 *** ↑ 5.840 ***		-1.758 *** ↕			-2.572 *** ←											
BEL		5.772 *** ↑ -0.146 **	-1.137 *** ← 0.882 ***				2.938 *** ← -0.370 ***			3.346 *** ←						-8.746 *** ↕ 0.109 ***	19.16 *** ↕				1.116 ***
CAN			-4.044 *** ← 0.570 ***		-0.413 *** ↑ 1.787 ***		-1.919 *** ← 0.612 ***													-4.953 ** ← 0.218 ***	
DEN		2.629 ** ↑																			
FIN			1.525 *** ← 0.228 **							2.848 *** ← 0.534 ***					1.153 *** ↑						
FRA			8.467 ** ↕ 0.097 **	-1.407 *** ← 0.675 ***							3.862 *** ←			-2.103 *** ↕ 0.435 ***							
GER		-4.178 *** ↑									-2.049 *** ↑		-5.021 *** ↑	-3.450 *** ↑			-22.69 *** ←	-3.236 *** ↕	-1.199 *** ↕ 0.165 **	-9.365 *** ↕ 0.274 **	-6.688 *** ←
GRE																	-6.734 *** ↑				
IRE																					
ITA		-2.991 *** ↕												-4.001 *** ↑						-3.517 *** ↕ 0.407 ***	
JAP			7.985 *** ← -0.201 ***	2.161 *** ← -0.451 ***		12.15 *** ↑ -0.122 ***		0.482 *** ←										4.144 *** ↕ -0.256 ***			
NET							-5.218 *** ↑		-4.63 *** ↕				-2.211 *** ↑			-8.698 *** ↕				-3.622 *** ← 0.546 ***	
NZL	-3.307 *** ↑					-1.692 *** ↕ 0.178 **		-2.055 *** ↕		5.569 *** ←					-1.166 *** ↕ 0.343 *			-0.663 *** ←	-1.168 *** ↑		1.794 *** ←
NOR					-0.831 ** ↕ 0.434 **			-6.464 *** ↑													
POR									-3.093 *** ← 0.360 ***												
SPA								0.026 ** ←			2.074 *** ↕				-0.242 ** ←	0.776 *** ↑					
SWE	-0.533 ** ↕					-0.719 *** ←	1.638 *** ↑	-16.81 *** ↑						-0.328 *** ↑				-0.907 *** ↑			
SWZ					1.924 *** ←	-6.889 *** ↑		-19.21 *** ↑											-1.214 *** ↑		
UK								-1.620 *** ↑	-0.935 *** ↑								1.653 *** ↑		-0.728 *** ↕		
USA																	7.304 *** ↕		-2.020 *** ↑		-0.890 *** ← 0.869 **

Notes: Where available, for each ij combination the values of θ_2/h and α_3 are reported in dark and light colour respectively.
Significance: *** = 0.01, ** = 0.05, * = 0.1
Direction of Granger causality: ↑ = unidirectional from j to i, ← = unidirectional from i to j, ↕ = bidirectional.
Source: Author

Table A.5 Peer effect between the jth donor commitment and the ith donor commitment

j-commitment \ i-commitment	AUL	AUS	BEL	CAN	DEN	FIN	FRA	GER	GRE	IRE	ITA	JAP	NET	NZL	NOR	POR	SPA	SWE	SWZ	UK	USA
AUL			3.836 *** ←		0.641 *** ↑ -1.124 **	1.611 *** ←					1.362 *** ↑ -0.417 **						-14.23 *** ← 0.196 ***	-1.878 *** ← 0.780 ***			-6.567 *** ↕ 0.320 ***
AUS					0.169 *** ↑ 7.429 ***		1.872 *** ↕														
BEL		-5.426 *** ↑					-3.359 *** ↑			-4.422 *** ↕							-14.64 *** ↕				-2.307 *** ← 0.370 *
CAN			2.500 *** ←		0.394 *** ↑ 1.772 **		1.150 *** ←				4.158 *** ←										
DEN	-19.88 *** ↑ 0.065 ***						-10.20 *** ↑ 0.105 ***														
FIN			-2.512 *** ↕ 1.253 ***							-4.117 *** ←	-8.539 *** ← 0.345 ***									-11.76 *** ← 0.131 ***	
FRA			-3.403 * ←								-3.922 *** ←										
GER		2.884 *** ↑ -0.194 ***									1.505 *** ↑		3.836 *** ↑ -0.130 *				19.15 *** ↑		-1.127 *** ↑	8.106 *** ↕	4.873 *** ↕ 0.299 **
GRE																	-8.772 *** ↑				
IRE															-0.668 *** ↑ -0.440 **						
ITA		2.121 *** ←												3.283 *** ↑						-3.332 *** ↕ 0.362 ***	
JAP								-1.511 *** ← 0.377 ***							-3.661 *** ← 0.269 ***						
NET							1.892 *** ↑ -0.632 ***									3.157 *** ↑ -0.354 ***				-2.603 *** ← 0.546 ***	
NZL							-1.467 *** ↑ 0.459 *			-3.726 *** ← 0.372 **								-0.535 *** ←		-2.792 *** ← 0.734 ***	-2.478 *** ← 0.722 ***
NOR					0.439 ** ↑					-3.397 *** ← 0.358 ***							-28.40 *** ← 0.076 ***				
POR																					
SPA	6.775 *** ↕ -0.157 ***							3.830 *** ↕ -0.300 **		13.00 *** ↑ -0.077 ***	-8.191 *** ↑ 0.226 ***				4.168 *** ↕ -0.188 **	-1.136 *** ↑				-5.535 *** ← 0.093 ***	
SWE						-0.693 *** ↕ 0.518 ***	-2.358 *** ↑ 0.734 ***							-0.754 *** ← 0.842 ***							
SWZ						3.515 *** ↑ -0.401 ***														2.547 *** ← -0.599 ***
UK								-5.842 *** ↑ 0.268 **	-0.549 *** ↑	-1.304 *** ↕ 0.597 ***				-0.832 *** ↑ 0.660 *			-2.030 *** ↑				-1.436 *** ← 0.625 ***
USA										-2.373 *** ↕							-10.05 *** ↕			-2.794 *** ↑	

Notes: Where available, for each ij combination the values of θ_2/h and α_3 are reported in dark and light colour respectively.
Significance: *** = 0.01, ** = 0.05, * = 0.1
Direction of Granger causality: ↑ = unidirectional from j to i, ← = unidirectional from i to j, ↕ = bidirectional.
Source: Author