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Abstract

The objective of the present paper is to study the factors associated with environmental bilateral aid to recipient countries over the 1990-2013 period, to assess whether it is motivated by non-environmental factors such as donors' self-interest. Environmental ODA is measured using the AidData's Core Research Release, Version 3.1. Three kinds of variables that might influence environmental aid allocation are considered: the environmental and non-environmental needs and merits of recipient countries, and the economic and political interests of donors. Environmental needs and merits variables include vulnerability to extreme climate events and the stringency of climate policy. The Poisson and Fractional regressions find that while vulnerability to climate change seems to be a key determinant of environmental aid, its allocation is poorly linked to recipients' climate mitigation policies. We also find weak evidence of association between donors' interest variables and environmental aid on average, exception made for trade. But a donor-by-donor analysis allows to get deep dive into all the relations above and unveils that some donors are more sensitive to environmental variables, while others rather seem focused on their economic and political interests.

Keywords

Bilateral aid, Environmental aid, Aid allocation, Donors' interests

JEL Codes

F35, F50, Q54, Q56

1 Introduction

Is increasing the global volume of environmental aid enough to achieve effective mitigation and adaptation in the developing world? What would happen if those resources, which are already scarce and which need to be increased, were misallocated and diverted from where they are the most needed? One can easily imagine the impact and the implications for climate, as the question of resource misallocation is not new in economics, whether it concerns total factor productivity analysis or Official Development Assistance (ODA).

The question of the allocation of foreign aid is not new and has been widely documented in the literature, in order to understand the motivations of donors, which go far beyond the needs of recipient countries and poverty reduction objectives. The main determining factors that are highlighted by this literature are the needs and merits of recipients, and the interests of donors. Concerning merits, even after the conclusions of Burnside and Dollar (2000) about the role of recipients' countries good policies on aid effectiveness have been challenged (Roodman, 2007), recipients' countries governance remained one of the key determinant factors in the aid allocation (Berthélemy and Tichit, 2004; Easterly, 2007; Clist, 2011; Acht et al., 2015). However, it has been proven that donors might overlook those merits depending on their self-interest. Beyond recipients' needs and merit, there is indeed large evidence that donors pursue many economic and political interests while providing aid (Alesina and Dollar, 2000; Berthélemy, 2006; Dreher et al., 2008, 2011; Faye and Niehaus, 2012); and new donors, particularly, are not exception to this (Dreher et al., 2011). Such interference of political and economic interests with recipients' needs and merits, in aid allocation processes, may reduce aid's effectiveness (Dreher et al., 2013).

The objective of this paper is to study the factors associated with the allocation of environmental aid, to see if it suffers from the same challenges, which could hamper its effectiveness. Few studies have already attempted to examine the factors affecting the allocation of environmental aid; one of the seminal major contributions is the work of Lewis (2003), based on secondary data from the United Sates Agency for International Development (USAID) and the Global Environment Facility (GEF). She finds that donor interests outweigh recipient needs, environmental aid not being targeted to the recipients that are most in need of abating local pollution. Her findings suggest that donors favor democratic recipients with unexploited natural resources, with whom they have had prior relations (economic and security). These results are opposed to those of Figaj (2010) that finds number of environmental treaties, environmental vulnerability, environmental sustainability, CO_2 emissions, and biodiversity as major determinants of environmental aid, while political variables seem to play no role. More recent studies separately look at mitigation and adaptation aid; while poverty and exposure to climate change risks seem to be positively associated with adaptation aid (Betzold and Weiler, 2017; Weiler et al., 2018), the latter is also linked to donors economic interests (Weiler et al., 2018). For mitigation aid, recipient countries with higher CO_2 emissions, lower GDP per capita and good governance receive more funds (Halimanjaya, 2015, 2016) but again, donors' geopolitical interests play a role in the allocation, especially for bilateral donors such as France or Japan (Halimanjaya, 2016). Also, Clean Development Mechanism (CDM) host countries tend to receive more funds (Halimanjaya, 2016).

Most of the studies consider either aid for mitigation or adaptation separately, which they identify using the Rio-markers, rather than focusing on global environmental aid. While this approach is perfectly understandable, it is somewhat risky to try distinguishing these two types of aid because, beyond the fact that they are not covering a relatively large period, the Rio-markers have been proven to be barely reliable (Michaelowa and Michaelowa, 2011; Weikmans et al., 2017) due to insufficient coding diligence or misinterpretation of the Rio-marker.

Another fact is the risk of misinterpretation, concerning the relation between mitigation finance and recipients' environmental policies, especially for the studies looking at mitigation finance. This, because of how these environmental policies are measured. In the absence of relevant environmental policy variables which are available for many recipient countries, some studies consider environmental degradation as a measure of environmental policy. Some find for instance that recipients with higher CO_2 intensities tend to receive more aid (Halimanjaya, 2015, 2016). This suggests that donors provide more mitigation aid to countries with lax environmental policies, if one considers emissions as a proxy of mitigation policies.[1]. If the goal is to cut emissions, it is reasonable to help countries with high intensities to reduce their emissions; but at the same time, it is important to create good incentives, otherwise they might keep polluting to continue receiving more aid. It is in this regard that the interpretation of the CO_2 variable is ambigous: are donors providing environmental aid to countries with bad climate policies that are facing high pollution, or are they rewarding countries that have high emissions but are making efforts to significantly reduce them?

A third challenge is the use of econometric methods that are not most of the times well suited to analyze these bilateral financial flows, having many zero (0) observations, because not all countries receive environmental aid each-year from each donor.

The objective of this paper is therefore to contribute to this growing non-consensual literature. We use a novel "project-level"[2] aid data set and rely on a comprehensive coding scheme to classify projects according to their environmental impact and obtain the number of projects and the amounts of environmental ODA for 9 donors and 128 recipients over 1990-2013.

The role of different types of factors that might influence the allocation of environmental aid is investigated: the environmental and non-environmental needs and merits of recipient countries, as well as the donors' political and economic interests. Because

[1]Emerging economies such as China and India for instance contribute to CO_2 emissions, but are also some of the largest producers of renewable energy (Kamat et al., 2020). It might therefore be misleading to use CO_2 emissions as a measure of mitigation efforts.

[2]The majority of the activities are traditional aid projects, so we interchangeably use the term "projects" for an easier exposition; the aid-activities also comprise non-project aid.

of the reasons mentioned above, for the recipients' environmental merits we use a new measure of climate mitigation efforts introduced by Combes et al. (2016), rather than relying on observed CO_2 emissions as previous studies. To the best of our knowledge, our study is the first using this indicator to analyze the allocation of environmental aid. We separately analyze the number of environmental projects and the amount of environmental ODA received, using Poisson Pseudo-Maximum Likelihood that are better appropriated than OLS, two-part, and Tobit models in the presence of many zero(0) observations and heteroscedasticity (Silva and Tenreyro, 2006, 2011). Beyond the absolute values, the recipients' shares in donors' total projects and amounts are also analyzed using a fractional logit which is also adapted for proportions as dependent variables (Papke and Wooldridge, 1996, 2008).

Our results show that recipients' climate mitigation efforts are positively associated with the number of projects received, while there seems to be no effect on the amount received. This suggests that donors are just splitting their total funding into more projects for recipients with more stringent policies, but don't increase the total amount they devote to environmental projects in these countries. This finding is also confirmed by the analysis performed on shares. Regarding vulnerability, the results show that more vulnerable recipients tend to receive more environmental aid. But this is made at the expense of aid received by other less vulnerable recipients, given that this result is found only while analyzing shares of donors' total funding. Donors are thus reallocating environmental projects funds from less vulnerable recipients to more vulnerable ones, they do not simply increase environmental aid of these recipients. Governance and GDP per capita also appear to be strong determinants. Concerning donors' interests, only imports from donor seem to play a key role. Finally, donor-by-donor analysis reveals important heterogeneities across donors' allocation behavior, some of them being more sensitive to environmental variables, while others are rather responsive to their self-interests.

The rest of the paper is organized as follows: section 2 presents data and some stylized facts and section 3 explains the econometric methods; the findings and robustness checks are explained in section 4 and section 5 concludes.

2 Data and stylized facts

2.1 Environmental aid

Environmental aid is measured using project-level data from the 3.1 version of the AidData database, constructed by the William and Mary University. It provides a very comprehensive tracking of international development finance. Concerning the amounts, we consider commitment amounts rather than disbursement, due to the high number of missing values for disbursements over our period of study. This could have been an issue if the goal of our study was to assess the impact of environmental aid; then it would make more sense to use disbursed amounts. However, in our context it makes no great difference to look at the determinants of committed amounts or disbursed amounts.

We use the purpose codes provided in the AidData Research release 3.1, to provide environmental impact codes to the projects, following the methodology of Hicks et al. (2008) and the codebook provided by the AidData research team. For the 1990-2013 period, there are 17723 projects (out of 970,749) for which we were not able to assign an environmental impact code, representing (1,83%) of the total projects.[3] The 98.17% remaining (953,026 projects) have been assigned an environmental impact code. Among these projects, 6.93% only are considered as environmental aid. Representing 9.5% of the amount of ODA for which we have environmental impact codes.

We focus on the nine major traditional bilateral donors providing most of the environmental ODA. These are Canada, France, Germany, Japan, Netherlands, Norway,

[3] Before doing so, we also dropped 464 projects with negative commitment amounts.

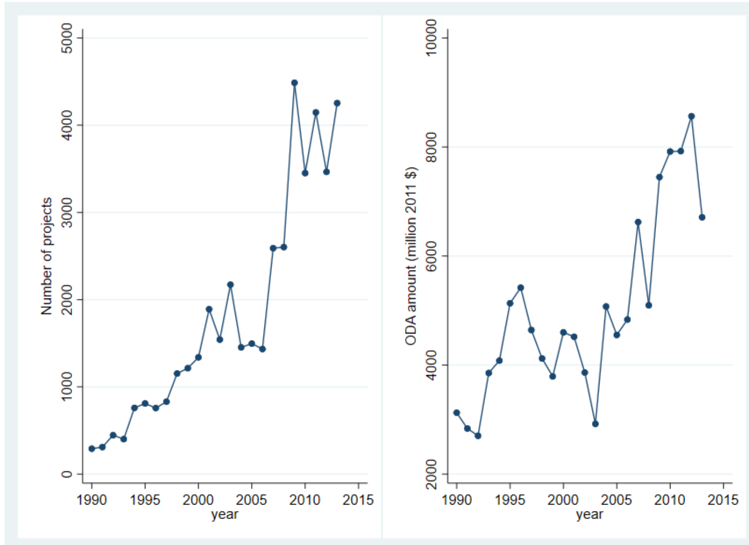

Figure 1: Evolution of ODA projects and amount over 1990-2013

Sweden, United Kingdom and the USA. These countries account for around 61% of all ODA projects over the period, which represents 83% of total amount. When it comes to environmental ODA, these donors represent 65.5% of the number of total projects, constituting 84.3% of the amount of environmental aid over the period.

In total, these donors financed 43294 environmental ODA projects over the period 1990-2013, representing a total amount of US$2011 120.36 billion. Figure 1 shows the evolution of the number of environmental projects on the left and the amount allocated on the right, over the period. We see that both the annual number of projects and the annual total amount allocated increased over the period. However, the number of projects increased way faster than the total amount which had a very unstable growth made of successive increases and decreases, leading to the decrease in the average amount per project shown in figure 2.

Figure 3 and 4 show the geographical distribution of Environmental aid in recipient countries all around the world over 1990-2013. Figure 3 displays the share of total projects received while figure 4 represents share of the total amount. These figures indicate that most of the environmental ODA has been mostly concentrated in Asia, both in terms of projects and amount. China and India, together concentrate 9.2% of

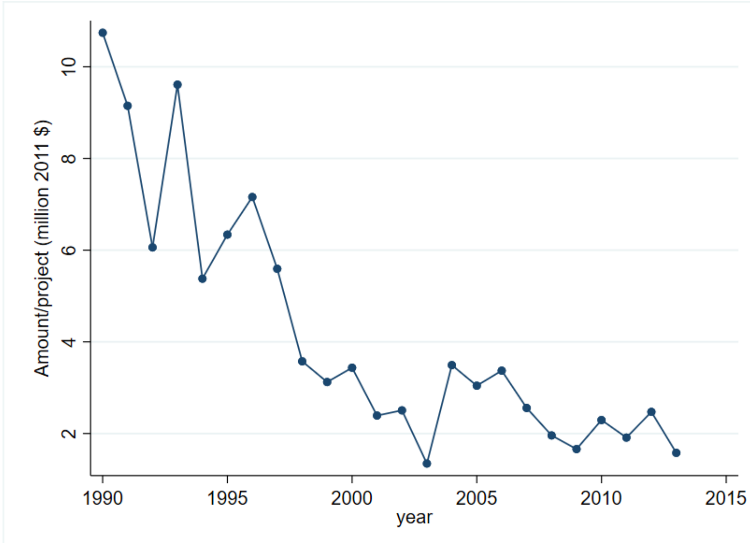

Figure 2: Evolution of the average amount per environmental aid project

Table 1: Top 5 recipients of Environmental ODA over 1990-2013

Projects			**Amount**		
Recipient	**Number**	**Share (%)**	**Recipient**	**Amount (M 2011 $)**	**Share (%)**
China	2086	4.8	India	12978.6	10.8
India	1920	4.4	China	11752.5	9.8
Indonesia	1304	3.0	Indonesia	6579	5.5
Mexico	1186	2.7	Egypt	5765.7	4.8
Vietnam	1135	2.6	Vietnam	4658.6	3.9

the projects and 20.6% of total amount over the period.

Table 1 shows the ranking by number of projects and amount; it indicates that the top five recipients concentrate around 17.5% of the total number of projects, with China being the biggest with 4.8%. In terms of amount received, these recipients represent together up to 34.8% of total amount over the period[4] with India alone, the biggest recipient, concentrating around 10.8% of the total amount.

[4]In our sensitivity analysis, we exclude dyads including the top 5 recipients. In regressions explaining the number of projects, we exclude dyads containing China, India, Indonesia, Mexico, and Vietnam as recipients. For amounts, we have approximately the same list exception made of Egypt which replace Mexico.

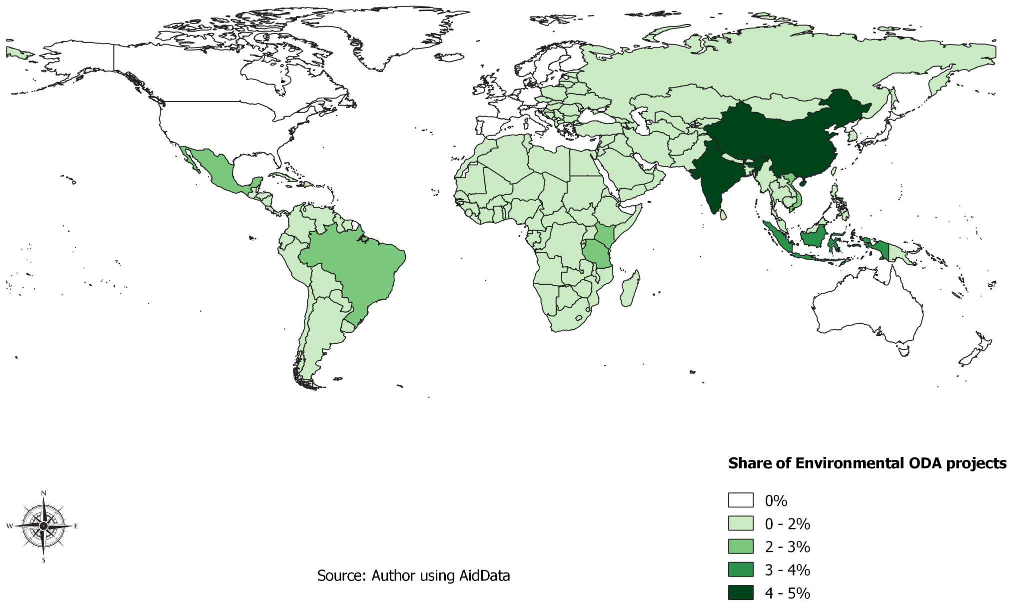

Figure 3: Geographical distribution of Environmental projects

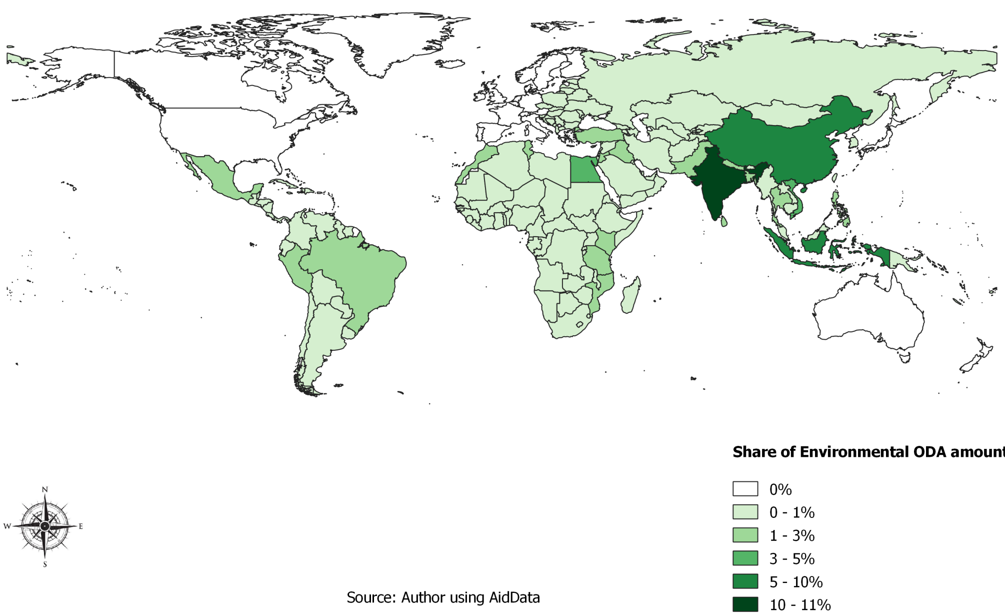

Figure 4: Geographical distribution of Environmental ODA

2.2 Explanatory variables

2.2.1 Environmental need and merit variables: climate change mitigation efforts and vulnerability

Data on public research and development expenditure, investment expenditure for abatement, ratification of multilateral environmental agreements (MEAs) or taxes are scarce, especially for developing countries. Beyond their delayed effects and their enforcement weakness, the impact of such instruments is difficult to assess, given that their implementation may be anticipated (Combes et al., 2016). Finally, since countries are using different sets of instruments, the use of a synthetic index can be challenging.

It then seems better opting for an output-oriented approach to measure climate change mitigation efforts. However, using output-oriented indicators based on emission intensities is challenging because the latter embody both countries' structural features (which are not under governments' control), and climate policies[5].

We adopt the approach proposed by Combes et al. (2016) to measure domestic efforts for climate change mitigation ($DECM$). They suggest that these efforts can be quantified by comparing measured emissions to structural emissions. The intuition behind this approach is that structural emissions are due to structural factors that change slowly over time, and cannot therefore be influenced by environmental policies in the short term.

Domestic efforts are extracted using the Green Solow model of Brock and Taylor (2010):

$$Log(CO_{2i,t}) = \phi Log(CO_{2i,t-1}) + X_{it}\beta + \mu_i + \lambda_t + \epsilon_{it} \tag{1}$$

Where CO_{2it} stands for per capita emissions of country i over period t; ϕ gauges the speed of convergence of emissions toward a steady state which is conditional on

[5]For comprehensive reviews focusing on methodological challenges of measuring environmental policy, see Brunel and Levinson (2013) or Sauter (2014).

other variables; it should be strictly lower than 1 and significant according to the theoretical predictions. X_{it} is a vector of structural determinants of CO_2; these include the logarithm of domestic investment, as well as the logarithm of population growth. As in a Solow growth model, investment drive capital accumulation and is expected to have a positive effect on CO_2 emissions. In the Green Solow model framework, population growth is expected to have a negative impact on CO_2[6] since it reduces the steady state level of per capita emissions. We also include the logarithm of GDP per capita and trade openness, measured as the share of trade to GDP; all variables are retrieved from the World Bank WDI database. μ_i represents country fixed effects which control for structural determinants of CO_2 that are time invariant, and ϵ_{it} is the error term.

Given the dynamic specification linked to the emissions convergence assumption, we rely on the GMM-System estimator of Blundell and Bond (1998) to estimate equation 1. Beyond dealing with the potential endogeneity of regressors in the absence of true internal instruments, it provides consistent estimates when the lagged dependent variable is among the regressors and when there is unobserved heterogeneity. Moreover, it is recommended for panel datasets with a larger individual dimension (Roodman, 2009). The results are presented in Table A.2.

From equation 1, we predict $DECM_{it} = \hat{\epsilon_{it}}$ which is for each country-period the growth in CO_2 emissions that is not due to structural factors, i.e the growth rate in emissions that is due to domestic climate change mitigation efforts. A positive $DECM$ corresponds to lax climates policies while negative values of $DECM$ denote stringent policies. For ease of interpretation, We normalize it on a scale ranging from [-5, 5] interval[7] using the following transformation :

$$DECM = 10 * \frac{max(\epsilon) - \epsilon}{max(\epsilon) - min(\epsilon)} - 5.$$

After such a transformation, countries-periods with lax climate policies will now get

[6] In opposition to previous studies (Ehrlich and Holdren, 1971; Holdren, 1991; Shi, 2003)

[7] The choice of the bounds is arbitrary; one could range the values in any interval [a,b], using : $DECM = (b - a) * \frac{max(\epsilon) - \epsilon}{max(\epsilon) - min(\epsilon)} + a$

a score ranging between -5 and 0, while stringent climate policies will correspond to a value of the indicator ranging from 0 to 5.

As mentioned by Combes et al. (2016), the $DECM$ measure presents several advantages; it first allows comparison across countries and periods, given that it is a relative measure obtained from an error term for which the average value is zero. Second, progress in abatement technologies is already captured by period fixed effects λ_t and determinants of abatement technology (which depends on investment and economic growth) are already accounted for in X_{it}; thus, one can reasonably assume that $DECM$ only captures abatement costs induced by climate policies. Third, it is a macro-economically based measure contrary to other micro-economically focused indicators used by other studies (Brunel and Levinson, 2013; Sauter, 2014). It then takes economic policies with proximate influences on CO_2 emissions into account. Lastly, it avoids criticism faced by synthetic indicators regarding subjectivity in the choice and weighting when combining climate policy instruments[8].

The allocation decisions might not solely depend on the recipients' efforts, but also on the donors' own mitigation efforts, therefore justifying to consider these latter as well. Given that the DECM variable is obtained from a regression on a sample of world countries, we are also able to compute the DECM for donors. We can then define the gap between the donor and recipient mitigation efforts[9] as:

$$DECMgap_{drt} \equiv DECM_{dt} - DECM_{rt}.$$

Since higher and positive values of DECM correspond to stringent climate policies, the higher the value of this new variable for a dyad, the lower the recipient's effort compared to the donor. A positive effect of this variable would imply that the donors are providing more environmental ODA to countries with very lax climate policies relatively to their own; while a negative effect implies the opposite, meaning that environmental

[8] For a detailed discussion on the building and the advantages of $DECM$, see Combes et al. (2016).

[9] Estimates using the recipient countries DECMs rather than the DECMs gap are also performed. The results are similar, with the sign on DECM_{rt} being the opposite of the one on DECMgap_{drt}

ODA rewards recipients with higher mitigation efforts.

Vulnerability to climate change is proxied through natural disaster variables. We use the number of droughts and floods from the Emergency Events Database (EM-DAT) provided by the Centre for Research on the Epidemiology of Disasters (CRED) of the Catholic University of Louvain. Given that these two types of disasters are not likely to occur for the same region at the same time, it is better not considering separately these variables. We rather add them up to build a "number of natural disasters" variable. Countries more frequently affected by such extreme climate events are likely to receive more adaptation aid; we expect a positive correlation between this variable and environmental ODA if the allocation of this latter takes vulnerability to climate change as criterion.

2.2.2 Non-environmental need and merit variables

The non-environmental needs are captured by GDP per capita and the ratio of the total debt service to Gross National Income (GNI), both taken from the World Development indicators (WDI). Also, to measure the non-environmental merits, we use the Kraay et al. (2010) control of corruption index which has been proven to be a strong determinant of aid especially for DAC donor countries (Dreher et al., 2011). It is ranging from -2.5 to 2.5 with higher values corresponding to better governance. We thus expect this variable to show a positive correlation with environmental ODA.

2.2.3 Donors' economic and political interest

Donors' political interests are captured by the United Nations General Assembly (UNGA) voting alignment of recipient countries with donors (Strezhnev and Voeten, 2013). According to previous studies (Alesina and Dollar, 2000; Neumayer, 2003; Faye and Niehaus, 2012), UNGA voting seems to be a key determinant in the aid allocation decisions of donors. We expect a positive correlation between voting alignment and environmental ODA if donor countries use it as part of their diplomatic policy with recipients.

The donors' economic interests are measured by recipients' oil rents [10], as a share of GDP as well as total imports from the donor, as a share of recipient's GDP. The oil rents are retrieved from the WDI and the bilateral imports come from the UN Comtrade database. If donors allocate their environmental aid according to these economic interests, to support domestic markets opening or access to natural resources, we should observe a positive correlation between the imports from donors, the oil rents and Environmental ODA. However, it is important to mention that we cannot strictly consider oil rents as a proxy of economic interests as it could be the case for trade, since we are analyzing environmental aid.[11]

2.2.4 Other explanatory variables

As other control variables, we also use the recipient countries' population in millions, in order to control for their size. This variable is obtained from the WDI. To study the substituability or complementarity between environmental ODA and ODA in other sectors, we include the number and amount of non-environmental ODA projects respectively in the regressions explaining the number of projects and the amount of environmental ODA. Table A.12 in appendix provides details on the definitions and sources of all the variables.

[10] We also run regressions using total natural resources rents as a share of GDP, in robustness. The results for this variable are the same as those of Oil rents.

[11] Donors might provide aid to resource rich countries to help them protect the environment and reduce resource plundering.

3 Methods

Let d index donors, r index recipients and t index the time period considered. Environmental ODA from donor d to recipient r at period t is given by:

$$Env\_ODA_{drt} = X_{1drt}\beta_1 + X_{2rt}\beta_2 + \mu_{dr} + \delta_t + \epsilon_{drt} \quad (2)$$

where Env_ODA_{drt} denotes environmental aid. For the regressions studying the absolute values, it represents either the number of projects, or the amount. For the regression analyses of shares, it represents the recipient r's share in donor d's total number of projects or total amount. X_{1drt} is a vector of time-varying donor-recipient variables; those include DECM gap, UNGA voting alignment, bilateral exports from donors to recipients and non-environmental ODA projects or amounts, depending on the regression. X_{2rt} is a vector of time-varying recipient-specific variables such as the number of natural disasters, GDP per capita, population, oil rents, Debt, and control of corruption index. μ_{dr} represents a vector of dyads fixed effects, δ_t the time dummies and ϵ_{drt} the error term.

Data are compiled in 4-year averages to smooth short-run fluctuations, except for ODA projects, amounts and the number of natural disasters for which we take the total for each period. This also help reducing the number of dyads with zero(0) values for aid, compared to taking the data yearly.

Many recipient countries in our sample did not benefit from environmental ODA projects each period, therefore leading to the presence of many zero(0) observations. In that case, simple regression techniques like OLS are not well suited to estimate factors associated with the allocation of environmental ODA: the effects of the independent variables will be underestimated, as OLS estimates will be biased toward 0.

To deal with this issue, some alternative models could be used. First, one could rely on a Two-Part model in which the factors associated with being a recipient country (i.e receiving a positive value of ODA) and those associated with the amount would be estimated independently. There is however the risk of introducing a selection bias in the second-step if the amount of ODA received by a donor is not independent of the selection as recipient by this donor.

The Heckman selection model can help dealing with this selection bias, by adding an exclusion restriction on at least one independent variable which must explain the selection process but not the amount of ODA received. In our study, this restriction is difficult to meet because independent variables affecting the selection as recipient will very likely also affect the amount received, and the task is much more complicated by the fact that we have more than one donor.[12]

Another solution would be to estimate in one step the factors associated with the volume of environmental ODA while correcting for the downward bias due to the many 0 observations, thanks to a Tobit model. The independent variables are thus assumed to have the same impact on both the selection as recipient and the volume. One major constraint with the Tobit model is however the homoscedasticity condition that it imposes on residuals; it provides biased estimates in the presence of heteroscedasticity.

In the presence of heteroscedasticity and many zero observations, the Poisson pseudo-maximum likelihood (PPML) regression model have been proven by Silva and Tenreyro (2006, 2011) to outperform the Tobit model. Last but not least, compared to other count data models such as zero-inflated Poisson (ZIP) and negative binomial, the PPML estimator also remains consistent when there is over-dispersion due to the high number of zero(0), with the advantage of being invariant to the scale of the dependent variable[13]. We therefore rely on the PPML to study the factors associated with environmental ODA. Given that the DECM measure is generated from a first-stage regression, we rely

[12]While studying the factors linked to Chinese aid allocation in particular, Guillon and Mathonnat (2020) for instance were able to use the recognition of Taiwan as an exclusion variable.

[13]One drawback of ZIP and negative binomial is that they are not invariant to the scale of the dependent variable. In our case, measuring ODA in millions of dollars or thousands dollars for instance would lead to different estimates with these estimators.

on bootstrap for all the regressions to correct the standard errors.

We also run regressions using the share of environmental projects and the share of environmental ODA as dependent variables, using fractional logit method (Papke and Wooldridge, 1996, 2008).

4 Findings

4.1 Number of projects and amounts

Table 2 shows the results of regression analyses for the number of projects and amount of environmental ODA. To quantify the effects of the explanatory variables, coefficients are reported as incidence rate ratios (IRRs). Columns 1-3 show regression analyses explaining the number of projects. Compared to other variables, control of corruption index and Debt have a relatively higher share of missing values. Therefore, to avoid losing many observations, they are not systematically included in all columns.

Environmental needs and merits

We observe a non-significant correlation between the number of natural disasters and the number of environmental ODA projects. There is a small correlation with the amount in column 4, one additional natural disaster in the recipient country being associated with 2.2% increase in the received amount. However, this correlation disappears, in columns 5 and 6, when control of corruption and Debt are included. Therefore, there seems to be no association between climate vulnerability and the absolute values of projects and amounts, which is contrasting with previous findings (Figaj, 2010; Betzold and Weiler, 2017; Weiler et al., 2018).

Concerning DECM gap, regression analyses show a negative correlation with the number of environmental aid projects, meaning that the recipient countries with the most lax policies relative to the donor, tend to benefit from a lower number of projects.

From column 3, a 1 unit increase in the DECM gap is associated with a 23.4% decrease[14] in the number of projects. It is however, not correlated with the amount received. This suggests that stringent climate policies lead donors to increase the number of projects in these countries, but not the total amount, which means a smaller average amount per project as illustrated previously in Figure 2. As robustness check, we replace the donor-recipient DECM gap by the DECM of recipients (results are shown in Table A.3). The results go in the same direction: we find a positive correlation between recipients' DECM and the number of project, suggesting that recipients' with lax environmental policies benefit from a lower number of projects. Again, we find no significant correlation with the amount of environmental ODA received. The results for the number of natural disasters also remain the same. These findings contrast with previous studies that use environmental degradation as proxy of environmental policies (Figaj, 2010; Halimanjaya, 2015, 2016): we find that donors increase the number of environmental projects in recipient countries with stringent climate policies, but not the amount.

Donors' economic and political interest

For the donors' economic interests, we find a positive correlation between recipients' oil rents and the number of projects, a 1% increase in oil rents being associated with 3.2% more projects. However, it shows no significant correlation with the amount received. It is however important to recall again, that we cannot strictly consider oil rents as a proxy of economic interests in the case of environmental aid, as it could be the case for aid in other sectors. In robustness, we replaced oil rents by natural resources rents as a share of GDP, the results, presented in Table A.5 in appendix, remain similar for both the number of projects and amounts.

Regarding imports from donor, we find no significant correlation with the number

[14] A 1 unit increase in DECM gap is associated with an IRR of 0.766; multiplying the number of projects by a factor of 0.766 corresponds to a 23.4% decrease.

of projects, while it shows a positive and significant correlation with the total amount received. A 1% increase in imports from donor is associated with a 13% increase in the amount of environmental ODA received.

For political interests, we find no correlation between UNGA voting alignment and the amount of environmental ODA; for the number of projects, we even find a negative correlation between voting alignment and the number of projects, a 1% increase in voting alignment being associated with a 1.4% decrease in the number of projects benefited. These findings are in line with those of Figaj (2010), but they might be the result of important heterogeneities regarding donors' behavior.

Non-environmental needs and merits

We find a negative correlation between GDP per capita and the number of projects; a thousand dollar increase in GDP per capita is associated with a 16% decrease in received projects. However, the correlation between this variable and the amount is not statistically significant.

Institutional quality seems to play an important role for donors, with least corrupt countries receiving more projects and higher amounts. Indeed, control of corruption is positively correlated with both the number of projects and the amount. A 1 unit increase in the value of the control of corruption index is associated with 34% more projects and 61.7% more funds.

We find a negative link between population and the number of projects. A million more people leading to 0.2% less projects. Concerning the amount, we however find a non-significant correlation. The coefficient on Debt is also non-significant for both the number of projects and the amount. Finally, we also find evidence of complementarity between environmental ODA and ODA in other sectors, for both the number of projects and the amounts.

Table 2: Determinants of number of projects and amount of environmental ODA

Method	PPML					
Dependent variable	Total Number of projects			Total Env. ODA Amount		
	(1)	(2)	(3)	(4)	(5)	(6)
DECM gap	0.718***	0.730***	0.766**	0.929	1.240	1.245
	(0.0654)	(0.0729)	(0.0833)	(0.180)	(0.292)	(0.280)
Natural disasters	1.008	1.006	1.007	1.022*	1.021	1.020
	(0.00685)	(0.00781)	(0.00693)	(0.0130)	(0.0154)	(0.0141)
GDP per capita (1000 $)	0.859***	0.825***	0.840***	0.970	1.026	1.065
	(0.0267)	(0.0263)	(0.0445)	(0.0715)	(0.0792)	(0.103)
Population (million)	0.995***	0.996***	0.996**	0.998	0.998	0.998
	(0.00118)	(0.00165)	(0.00165)	(0.00181)	(0.00267)	(0.00223)
UNGA Voting alignment	0.985***	0.984***	0.986***	1.002	1.011	1.011
	(0.00384)	(0.00439)	(0.00441)	(0.00934)	(0.00989)	(0.0102)
Imports from donor(% recipient GDP)	0.986	0.967	0.985	1.094**	1.136*	1.130*
	(0.0179)	(0.0216)	(0.0253)	(0.0476)	(0.0747)	(0.0773)
Oil rents (% GDP)	1.032**	1.029**	1.032**	1.023	1.050	1.057
	(0.0132)	(0.0134)	(0.0143)	(0.0316)	(0.0395)	(0.0376)
Non-env. ODA projects	1.002***	1.002***	1.002***			
	(0.000231)	(0.000214)	(0.000242)			
Non-env. ODA amount (million $)				1.000***	1.000**	1.000**
				(0.0000704)	(0.0000835)	(0.0000813)
Control of Corruption		1.323**	1.340**		1.698*	1.617*
		(0.149)	(0.158)		(0.486)	(0.472)
Debt (% GNI)			1.001			0.973
			(0.00780)			(0.0216)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5259	4414	3605	5259	4414	3605
Number of dyads	894	890	732	894	890	732
Log pseudolikelihood	-12148.4	-10611.9	-9249.6	-45110.5	-34492.4	-32080.1

Exponentiated coefficients (IRRs); Bootstrapped standard errors in parentheses. Replications based on clustering on Dyads
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.2 Results using recipients' shares in donors' allocations

After the regressions on the absolute values, in a second step, we also perform regressions on the shares[15] to see if the factors associated with the allocation of level variables also play a role in the trade-off by donors, concerning the allocation among several recipients. The results are presented in Table 3 below.

Regarding the environmental merits, results are very similar to those obtained using the absolute values: DECM-gap is negatively correlated with the share of environmental projects. It also shows a negative correlation with the share of total amount but which tends to vanish once Control for corruption index is included. Donors allocate more environmental aid projects to recipients that tend to have more stringent climate mitigation policies. This result is still observed in Table A.4 in appendix where DECM gap is replaced by recipient's DECM, and also in Table A.7 where top five recipients are removed. The number of natural disasters now shows a positive correlation with both the share of projects and total amount, suggesting that donors tend to allocate more projects and funds to most vulnerable recipients. These conclusions still hold in Table A.4. However, when top five recipients are removed from the analysis (see Table A.7), the correlation vanishes.

When it comes to donors' interests, UNGA voting alignment and Oil rents show a non-significant correlation with both the share of projects and amount. These results remain the same, after removing the top five recipients in Table A.7. This suggests that donors are not allocating more projects or funds to countries that are more politically aligned with them or with high oil rents. Commercial ties seem to matter more: the imports from donor show a positive and significant correlation with the share of environmental ODA amount. The correlation with the share of projects is however non-significant, in line with the previous results in Table 2. This result strongly holds

[15]The share of environmental ODA projects (or amount) for a dyad in a given period is computed as the number (or amount) of environmental ODA projects of this dyad this period, divided by the total number (or amount) of projects of the corresponding donor.

in the robustness checks made in Tables A.4, A.6 and A.7.

We also find a positive correlation between control of corruption and the share of environmental aid projects; for the amount share, we again get a positive correlation which becomes insignificant, once debt is controlled for. GDP per capita and population show strong negative correlations with the share of projects and amount, and there is still evidence of complementarity between ODA in other sectors and environmental ODA. These results are also found in tables A.4 and A.6. However, once we remove the top recipients in Table A.7, only the coefficients of GDP per capita and ODA in other sectors remain statistically significant.

Table 3: Determinants of the Share of projects and amount

Method	Fractional logit					
Dependent variable	Share of env. ODA projects			Share of env. ODA amount		
	(1)	(2)	(3)	(4)	(5)	(6)
DECM gap	-0.367***	-0.400***	-0.330***	-0.411**	-0.228	-0.182
	(0.0881)	(0.0982)	(0.101)	(0.180)	(0.209)	(0.205)
Natural disasters	0.00871*	0.00461	0.00627	0.0237**	0.0183*	0.0177*
	(0.00493)	(0.00496)	(0.00490)	(0.00949)	(0.00978)	(0.0100)
GDP per capita (1000 $)	-0.100***	-0.146***	-0.122***	-0.210***	-0.215***	-0.162*
	(0.0263)	(0.0282)	(0.0402)	(0.0636)	(0.0655)	(0.0826)
Population (million)	-0.00180*	-0.00181*	-0.00170*	-0.00394***	-0.00376***	-0.00371***
	(0.00101)	(0.000987)	(0.000992)	(0.00109)	(0.00138)	(0.00140)
UNGA Voting alignment	-0.000542	0.00225	0.00337	0.000900	0.0103	0.0124
	(0.00325)	(0.00349)	(0.00358)	(0.00707)	(0.00795)	(0.00842)
Imports from donor(% recipient GDP)	0.0203	0.00515	0.0162	0.0754**	0.111***	0.112**
	(0.0155)	(0.0239)	(0.0239)	(0.0343)	(0.0373)	(0.0447)
Oil rents (% GDP)	0.0139	0.0178	0.0184	0.0288	0.0474	0.0480
	(0.0142)	(0.0174)	(0.0182)	(0.0280)	(0.0324)	(0.0328)
Share of non-environmental ODA projects (%)	0.405***	0.431***	0.408***			
	(0.0377)	(0.0420)	(0.0417)			
Share of non-envionmental ODA amount (%)				0.0952***	0.0860***	0.0850***
				(0.0159)	(0.0227)	(0.0229)
Control of Corruption		0.261**	0.254**		0.401*	0.373
		(0.122)	(0.128)		(0.236)	(0.243)
Debt (% GNI)			0.0147			-0.00170
			(0.00960)			(0.0218)
Constant	-6.131***	-5.561***	-5.945***	-6.195***	-6.757***	-7.278***
	(0.414)	(0.444)	(0.480)	(0.987)	(1.087)	(1.174)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5259	4414	3605	5259	4414	3605
Number of dyads	894	890	732	894	890	732
Log pseudolikelihood	-189.7	-158.9	-145.0	-167.6	-139.1	-132.9

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3 Donor-by-donor results

The results presented above hide an important heterogeneity. Indeed, donors might differ on many aspects particularly on their interests; some might value certain particular criteria, while others do not, all these opposite effects potentially offsetting in some of the coefficients above. This might be the reason behind some of the non-significant correlations above. We thus rely on donor-by-donor analysis to get an in-depth overview of the effects. We plot donor-by-donor coefficient estimates of some of the key variables, using the specifications explaining the shares, in tables A.10 and A.11 presented in appendix[16].

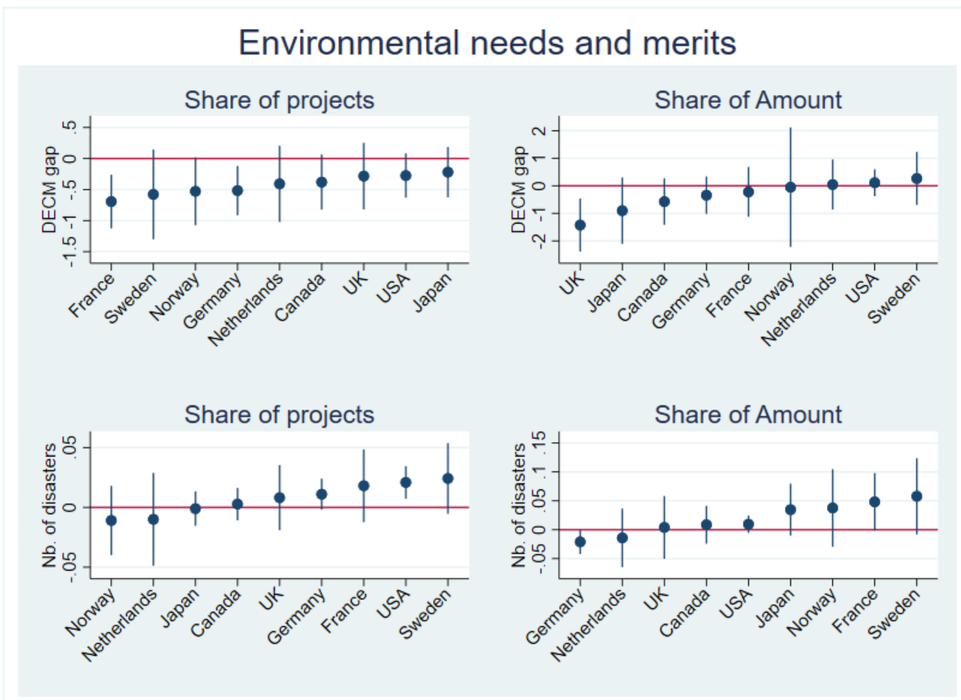

Figure 5: Environmental needs and merits

Figure 5 presents the coefficient estimates for the DECM gap and number of natural disasters. Regarding DECM gap, the largest negative and significant correlations with the share of projects are observed for France, Norway, Germany and Canada, while

[16]We also performed regressions on the absolute values, which are presented in Tables A.8 and A.9 in appendix.

the variable is not significant for other donors. But concerning the amount, we find a negative and significant correlation only for United Kingdom.

Concerning recipients' vulnerability, we find that more vulnerable recipients benefit from more projects from Germany and the US. However, these donors do no allocate more funds to vulnerable recipients; the correlation is even negative for Germany. Rather, only France and Sweden seem to relatively allocate more funds to vulnerable recipients.

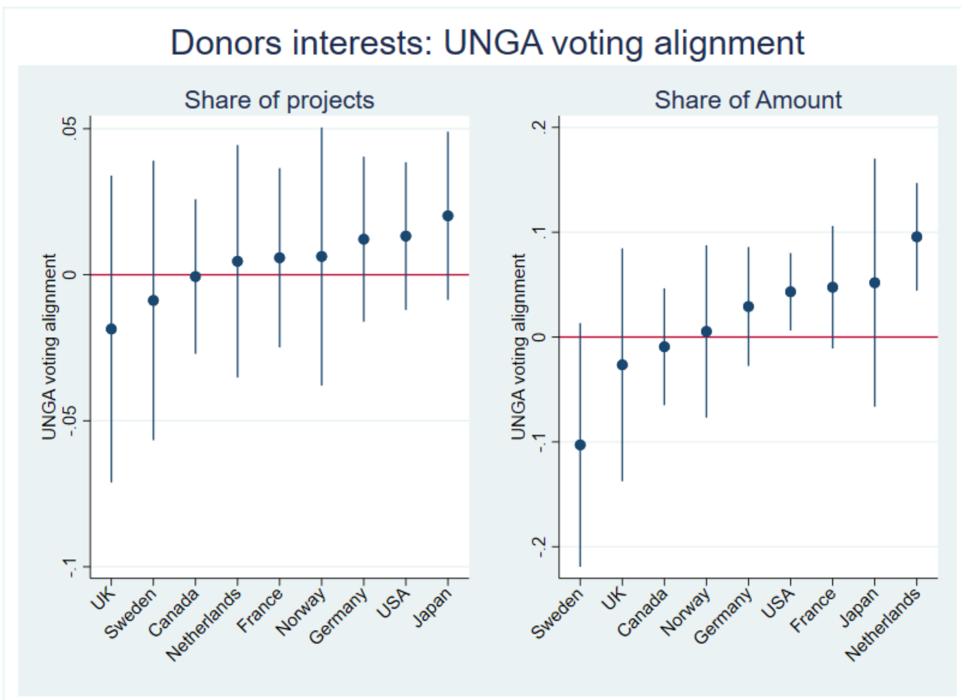

Figure 6: Donors interests: UNGA voting alignment

For the share of projects, the UNGA voting alignment variable remains insignificant for all donors; however, even if they don't receive more projects, recipients' that are more aligned with Netherlands and USA tend to receive a higher share of these donors' environmental aid (Figure 6).

Imports also play a role, for donors like Canada and Germany given that both of them increase the share of funding for recipients having strong commercial ties with them. For Germany, we find a significant effect or both the projects and amount (Figure

7). We also find evidence that Norway and USA allocate more funds to recipients having higher oil rents. Japan also consider oils rents, but these seem to play a role only on the number of projects (Figure 8).

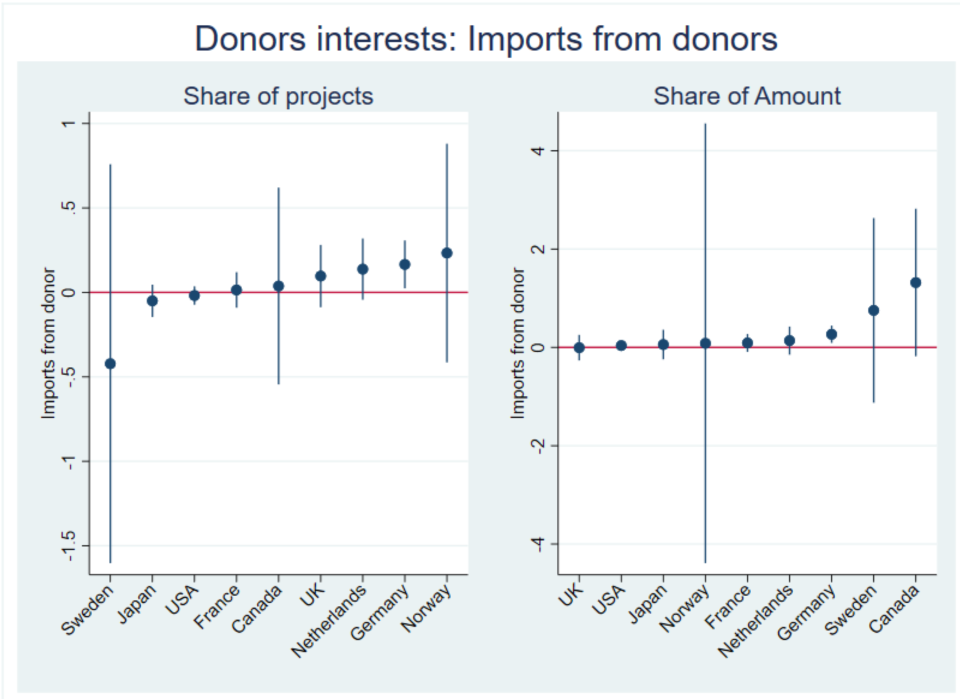

Figure 7: Donors interests: Imports from donors

Control of corruption turns out to be a key determinant in the allocation of funds for France, Japan, Sweden and USA. Sweden and USA increase both the number of projects and amount for recipients with a better governance (Figure 9).

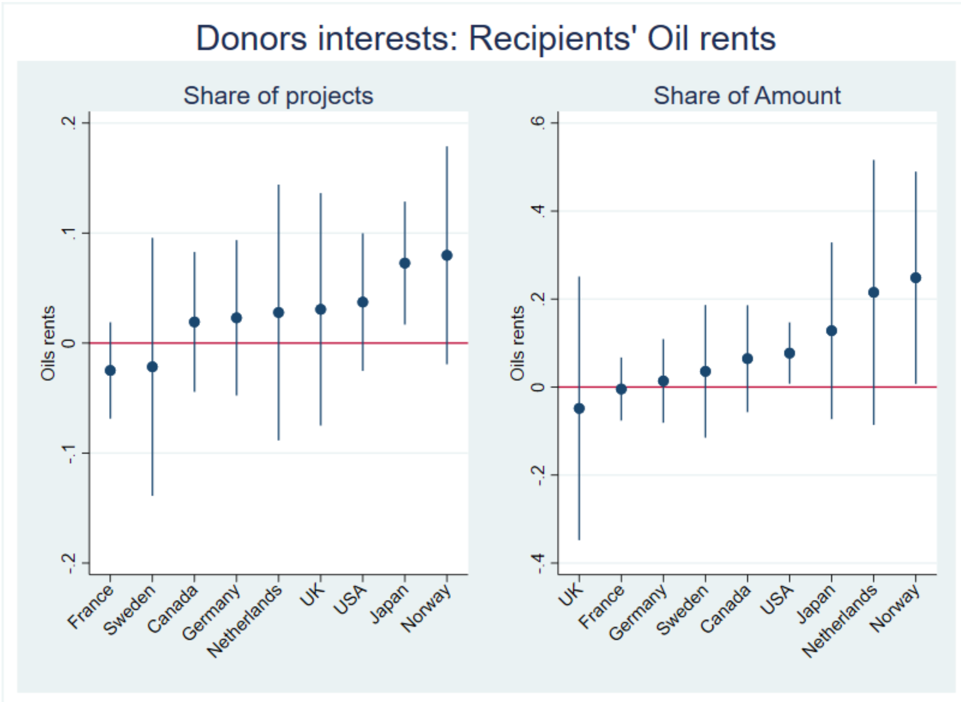

Figure 8: Donors interests: Recipients' Oil rents

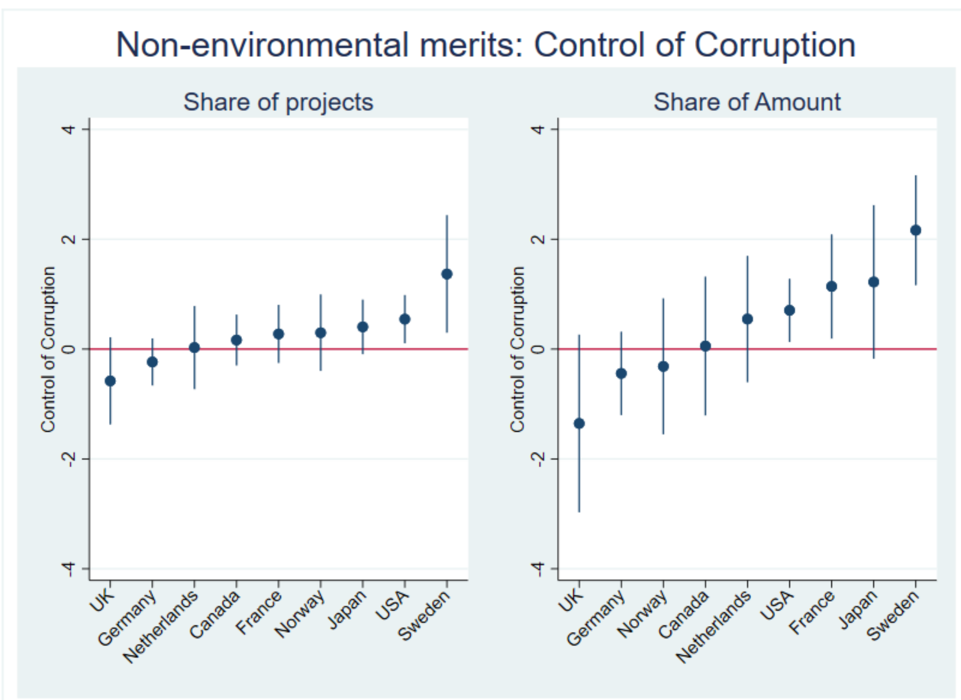

Figure 9: Non-environmental merits: Control of Corruption

5 Conclusion and discussion

This paper analyzes the factors associated with the allocation of environmental aid over the period 1990-2013, using project-level data for the 9 major donors that provided 84.3% of the total environmental aid over the period, and 128 recipient countries. The fact of systematically analyzing both the number of projects and the amounts has proved particularly useful in this analysis, as it has made it possible to highlight two types of strategic behavior from donors. Indeed, some of the criteria lead donors to increase (reduce) the amount with or without an increase in projects; while other criteria only make them increase the number of projects, but not the amount. For instance, concerning recipients' climate policies, donors such as France tend to increase the number of projects in countries with stringent policies, but without significantly increasing their funding to these countries. At the opposite, recipients' that are more aligned with USA do no systematically benefit from more projects, but receive a significantly higher amount from the USA.

A very likely explanation to such different behaviors is the fact that donors behave differently depending on how much they value a criterion. Therefore, a donor that does not give much importance to recipients' climate policy compared to their political cooperation, will will be more reluctant to increase funding for recipients with stringent climate policy. Thus, increasing the number of projects, but not the amount, might be a good option to "reward" those recipients, without increasing the donor's total costs. However, this donor will be more inclined to increase the amount for politically aligned recipients.

The key takeaways of the present paper are the following:

Concerning environmental variables, recipients' vulnerability is a strong determinant in donors' allocation, since they provide more environmental ODA to vulnerable countries that have a higher frequency of extreme weather events. However, recipients' climate mitigation efforts seem not to be important for the donors, given that it globally doesn't affect the amount they provide.

Donors' political and economic interests seem to play a more important role in the allocation of environmental ODA, as suggested by previous studies (Lewis, 2003). We can say that globally, even if these variables show weak correlations with the amount received, the donor-by-donor analysis put the spot on some particular donors that are giving much more importance to them.

Environmental ODA is also complementary to ODA received in sectors and for other purposes, and is responsive to traditional determinants of development aid such as governance and recipients' level of development. Basically, allocation of environmental ODA suffers from the same drawbacks as poverty aid.

One major limit of the links exposed here is that, though very strong, they remain correlations, because it would have been challenging to try isolating a causal impact for each of these determinants. Next studies could take a deep dive into each of the correlations exposed in this study and isolate a proper causal impact. But most importantly, given the emergency of climate change, beyond simply highlighting the weaknesses in the allocation of environmental ODA, it is important to start thinking about ways to improve its allocation process and make it more efficient. In that vein, possibilities offered by new technologies such as blockchain (through smart contracts) should not be neglected (Reinsberg, 2019).

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6 Appendices

Table A.1: Evolution of environmental ODA

Year	Projects	Amount (2011 M$)	Amount/project (2011 M$)
1990	291	3126.39	10.74
1991	310	2836.53	9.15
1992	446	2702.71	6.06
1993	401	3854.23	9.61
1994	759	4081.51	5.38
1995	810	5134.29	6.34
1996	757	5419.75	7.16
1997	830	4642.82	5.59
1998	1153	4121.58	3.57
1999	1214	3791.41	3.12
2000	1339	4599.63	3.44
2001	1890	4519.24	2.39
2002	1542	3863.33	2.51
2003	2172	2921.21	1.34
2004	1453	5074.11	3.49
2005	1496	4552.09	3.04
2006	1434	4834.57	3.37
2007	2590	6623.29	2.56
2008	2603	5096.43	1.96
2009	4487	7449.00	1.66
2010	3451	7917.22	2.29
2011	4147	7924.45	1.91
2012	3465	8565.36	2.47
2013	4254	6710.83	1.58

Table A.2: Regression to compute DECM

Method	GMM-system
Dependent variable	log CO_2 per capita
Lagged D.V	0.831***
	(0.124)
Investment (log)	0.467***
	(0.169)
Population growth (log)	-0.0917
	(0.553)
GDP per capita (log)	0.876**
	(0.371)
Openness (log)	0.207
	(0.243)
Constant	-6.946
	(4.839)
Year dummies	Yes
Observations	3328
Countries	151
Instruments	32
AR1 pvalue	0.001
AR2 pvalue	0.978
Hansen pvalue	0.731

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.3: Regression analysis for number of projects and amount, replacing DECM gap by recipient DECM

Method	PPML					
Dependent variable	Total Number of projects			Total Env. ODA Amount		
	(1)	(2)	(3)	(4)	(5)	(6)
Recipient's DECM	1.388***	1.355***	1.313***	1.339	1.057	1.090
	(0.135)	(0.139)	(0.129)	(0.269)	(0.240)	(0.285)
Natural disasters	1.008	1.006	1.007	1.022*	1.021	1.019
	(0.00664)	(0.00714)	(0.00746)	(0.0121)	(0.0142)	(0.0137)
GDP per capita (1000 $)	0.859***	0.826***	0.840***	0.933	0.978	1.006
	(0.0299)	(0.0279)	(0.0452)	(0.0677)	(0.0828)	(0.105)
Population (million)	0.995***	0.996***	0.996**	0.997	0.997	0.997
	(0.00119)	(0.00152)	(0.00157)	(0.00194)	(0.00225)	(0.00255)
UNGA Voting alignment	0.986***	0.986***	0.987***	1.002	1.009	1.009
	(0.00401)	(0.00444)	(0.00445)	(0.00976)	(0.0110)	(0.0107)
Imports from donor(% recipient GDP)	0.985	0.968	0.985	1.083*	1.119*	1.111*
	(0.0196)	(0.0245)	(0.0268)	(0.0478)	(0.0653)	(0.0680)
Oil rents (% GDP)	1.032**	1.029**	1.033**	1.019	1.047	1.055
	(0.0130)	(0.0140)	(0.0154)	(0.0312)	(0.0395)	(0.0377)
Non-environmental ODA projects	1.002***	1.002***	1.002***			
	(0.000236)	(0.000240)	(0.000254)			
Non-environmental ODA amount (million $)				1.000***	1.000**	1.000**
				(0.0000621)	(0.0000871)	(0.0000859)
Control of Corruption		1.326**	1.337**		1.704*	1.622
		(0.154)	(0.154)		(0.471)	(0.488)
Debt (% GNI)			1.000			0.970
			(0.00745)			(0.0245)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5259	4414	3605	5259	4414	3605
Number of dyads	894	890	732	894	890	732
Log pseudolikelihood	-12154.3	-10617.9	-9250.3	-44983.6	-34549.5	-32132.6

Exponentiated coefficients (IRRs); Bootstrapped standard errors in parentheses. Replications based on clustering on Dyads

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Regression analysis for Shares, replacing DECM gap by recipient DECM

Method	Fractional logit					
Dependent variable	Share of env. ODA projects			Share of env. ODA amount		
	(1)	(2)	(3)	(4)	(5)	(6)
Recipient's DECM	0.411***	0.474***	0.420***	0.451**	0.241	0.219
	(0.0921)	(0.100)	(0.104)	(0.190)	(0.221)	(0.212)
Natural disasters	0.00880*	0.00465	0.00623	0.0237**	0.0182*	0.0176*
	(0.00494)	(0.00487)	(0.00482)	(0.00965)	(0.00978)	(0.0100)
GDP per capita (1000 $)	-0.110***	-0.161***	-0.140***	-0.214***	-0.217***	-0.168**
	(0.0278)	(0.0302)	(0.0418)	(0.0671)	(0.0685)	(0.0840)
Population (million)	-0.00197*	-0.00212**	-0.00207**	-0.00398***	-0.00375***	-0.00380***
	(0.00101)	(0.000975)	(0.000986)	(0.00115)	(0.00134)	(0.00136)
UNGA	0.00125	0.00398	0.00488	0.00302	0.0114	0.0133
	(0.00327)	(0.00348)	(0.00357)	(0.00690)	(0.00767)	(0.00810)
Imports from donor(% recipient GDP)	0.0195	0.00236	0.0140	0.0746**	0.110***	0.111**
	(0.0158)	(0.0244)	(0.0240)	(0.0345)	(0.0373)	(0.0444)
Oil rents (% GDP)	0.0137	0.0177	0.0182	0.0283	0.0475	0.0479
	(0.0144)	(0.0179)	(0.0187)	(0.0284)	(0.0327)	(0.0332)
Share of non-environmental ODA projects (%)	0.405***	0.432***	0.409***			
	(0.0373)	(0.0408)	(0.0406)			
Share of non-environmental ODA amount (%)				0.0958***	0.0859***	0.0851***
				(0.0161)	(0.0230)	(0.0232)
Control of Corruption		0.242**	0.229*		0.394*	0.361
		(0.121)	(0.126)		(0.235)	(0.242)
Debt (% GNI)			0.0133			-0.00271
			(0.00952)			(0.0217)
Constant	-7.482***	-6.994***	-7.130***	-7.722***	-7.593***	-7.944***
	(0.292)	(0.339)	(0.367)	(0.625)	(0.701)	(0.766)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5259	4414	3605	5259	4414	3605
Number of dyads	894	890	732	894	890	732
Log pseudolikelihood	-189.7	-158.9	-144.9	-167.6	-139.1	-132.9

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.5: Regression analysis replacing recipient's Oil rents by natural resources rents

Method	PPML					
Dependent variable	Total Number of projects			Total Env. ODA Amount		
	(1)	(2)	(3)	(4)	(5)	(6)
DECM gap	0.726***	0.747***	0.779**	0.922	1.233	1.236
	(0.0644)	(0.0781)	(0.0818)	(0.168)	(0.316)	(0.331)
Natural disasters	1.007	1.005	1.006	1.022*	1.020	1.018
	(0.00708)	(0.00851)	(0.00738)	(0.0116)	(0.0144)	(0.0134)
GDP per capita (1000 $)	0.856***	0.823***	0.838***	0.968	1.019	1.057
	(0.0229)	(0.0264)	(0.0378)	(0.0692)	(0.0831)	(0.104)
Population (million)	0.995***	0.996**	0.996**	0.998	0.998	0.998
	(0.00129)	(0.00166)	(0.00151)	(0.00189)	(0.00256)	(0.00263)
UNGA	0.986***	0.985***	0.986***	1.002	1.011	1.010
	(0.00398)	(0.00437)	(0.00462)	(0.00934)	(0.0105)	(0.0112)
Imports from donor(% recipient GDP)	0.985	0.968	0.986	1.093**	1.132**	1.129*
	(0.0194)	(0.0241)	(0.0269)	(0.0483)	(0.0713)	(0.0724)
Natural resources (% of GDP)	1.024***	1.025***	1.020***	1.008	1.021	1.021
	(0.00642)	(0.00709)	(0.00689)	(0.0146)	(0.0171)	(0.0162)
Non-environmental ODA projects	1.002***	1.002***	1.002***			
	(0.000227)	(0.000222)	(0.000228)			
Non-environmental ODA amount (million $)				1.000***	1.000**	1.000**
				(0.0000638)	(0.0000936)	(0.0000908)
Control of Corruption		1.398***	1.396***		1.748*	1.665*
		(0.168)	(0.161)		(0.548)	(0.479)
Debt (% GNI)			0.999			0.973
			(0.00795)			(0.0214)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5259	4414	3605	5259	4414	3605
Number of dyads	894	890	732	894	890	732
Log pseudolikelihood	-12125.1	-10583.2	-9242.7	-45132.9	-34539.1	-32160.7

Exponentiated coefficients; Bootstrapped standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6: Regression analysis replacing recipient's Oil rents by natural resources rents

Method	Fractional logit					
Dependent variable	Share of env. ODA projects			Share of env. ODA amount		
	(1)	(2)	(3)	(4)	(5)	(6)
DECM gap	-0.368***	-0.391***	-0.331***	-0.406**	-0.231	-0.208
	(0.0883)	(0.0979)	(0.100)	(0.179)	(0.201)	(0.191)
Natural disasters	0.00837*	0.00405	0.00561	0.0227**	0.0166*	0.0158
	(0.00491)	(0.00493)	(0.00487)	(0.00913)	(0.00952)	(0.00968)
GDP per capita (1000 $)	-0.103***	-0.151***	-0.130***	-0.221***	-0.242***	-0.195**
	(0.0263)	(0.0281)	(0.0406)	(0.0634)	(0.0633)	(0.0798)
Population (million)	-0.00183*	-0.00179*	-0.00172*	-0.00401***	-0.00393***	-0.00392***
	(0.00101)	(0.000987)	(0.000992)	(0.00109)	(0.00136)	(0.00137)
UNGA Voting alignment	-0.000300	0.00283	0.00372	0.00269	0.0129*	0.0148*
	(0.00323)	(0.00345)	(0.00355)	(0.00672)	(0.00756)	(0.00807)
Imports from donor(% recipient GDP)	0.0189	0.00498	0.0170	0.0695**	0.107***	0.113**
	(0.0156)	(0.0243)	(0.0239)	(0.0347)	(0.0378)	(0.0461)
Natural resources (% of GDP)	0.0133**	0.0201***	0.0168**	0.0440**	0.0607***	0.0586***
	(0.00662)	(0.00702)	(0.00739)	(0.0173)	(0.0191)	(0.0212)
Control of Corruption		0.297**	0.281**		0.468**	0.430*
		(0.120)	(0.126)		(0.232)	(0.240)
Debt (% GNI)			0.0130			-0.00869
			(0.00951)			(0.0232)
Share of non-environmental ODA projects (%)	0.404***	0.430***	0.408***			
	(0.0378)	(0.0417)	(0.0415)			
Share of non-envionmental ODA amount (%)				0.0950***	0.0902***	0.0888***
				(0.0160)	(0.0226)	(0.0226)
Constant	-6.154***	-5.621***	-5.942***	-6.429***	-6.930***	-7.336***
	(0.414)	(0.442)	(0.482)	(0.970)	(1.060)	(1.127)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5259	4414	3605	5259	4414	3605
Number of dyads	894	890	732	894	890	732
Log pseudolikelihood	-189.7	-158.9	-144.9	-167.4	-138.8	-132.7

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.7: Regression analysis excluding top 5 recipients

Method	PPML				Fractional logit			
Dependent variable	Total Number of projects		Total Env. ODA Amount		Share of env. ODA projects		Share of env. ODA amount	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
DECM gap	-0.296***	-0.246**	-0.0743	0.0701	-0.291***	-0.356***	-0.257	-0.187
	(0.0947)	(0.103)	(0.191)	(0.215)	(0.0885)	(0.0973)	(0.218)	(0.234)
Natural disasters	-0.00466	-0.00564	-0.00720	-0.0185	-0.00230	-0.00587	0.00490	0.000339
	(0.00945)	(0.00859)	(0.0179)	(0.0192)	(0.00707)	(0.00723)	(0.0180)	(0.0166)
GDP per capita (1000 $)	-0.154***	-0.198***	0.0175	0.0757	-0.0924***	-0.103**	-0.196***	-0.149
	(0.0346)	(0.0471)	(0.0719)	(0.108)	(0.0262)	(0.0417)	(0.0679)	(0.0957)
Population (million)	-0.00914**	-0.00664	-0.00198	0.00220	-0.00351	-0.00345	-0.00651	0.00204
	(0.00401)	(0.00460)	(0.00853)	(0.0124)	(0.00428)	(0.00536)	(0.00763)	(0.00868)
UNGA	-0.0142***	-0.0137***	0.00484	0.00612	-0.00199	0.00128	-0.00411	0.00606
	(0.00358)	(0.00398)	(0.0103)	(0.0102)	(0.00345)	(0.00367)	(0.00768)	(0.00941)
Imports from donor(% recipient GDP)	-0.0113	0.000510	0.0922***	0.0966**	0.0196	0.0212	0.0619*	0.0967**
	(0.0185)	(0.0251)	(0.0337)	(0.0491)	(0.0172)	(0.0267)	(0.0327)	(0.0433)
Oil rents (% GDP)	0.0305**	0.0323**	0.0536	0.0696*	0.0120	0.0147	0.0346	0.0518
	(0.0119)	(0.0132)	(0.0350)	(0.0413)	(0.0136)	(0.0180)	(0.0297)	(0.0367)
Non-environmental ODA projects	0.00235***	0.00217***						
	(0.000265)	(0.000237)						
Non-environmental ODA amount (million $)			0.000425***	0.000300**				
			(0.000164)	(0.000152)				
Share of non-environmental ODA projects (%)					0.430***	0.450***		
					(0.0446)	(0.0444)		
Share of non-envionmental ODA amount (%)							0.118***	0.0427
							(0.0294)	(0.0339)
Control of Corruption		0.258**		0.271		0.127		0.283
		(0.131)		(0.266)		(0.124)		(0.263)
Debt (% GNI)		0.00241		-0.0117		0.0178*		0.00810
		(0.00812)		(0.0222)		(0.0101)		(0.0241)
Constant					-6.254***	-5.854***	-6.252***	-6.816***
					(0.429)	(0.500)	(1.132)	(1.243)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5001	3390	4989	3380	5001	3390	4989	3380
Number of dyads	851	689	849	687	851	689	849	687
Log pseudolikelihood	-10438.9	-7818.7	-35172.6	-24419.6	-159.9	-120.0	-130.2	-102.3

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.8: Regression analysis by donor (Numbers of projects)

Method	PPML								
Dependent variable	Number of projects								
Donor	Canada	France	Germany	Japan	Netherlands	Norway	Sweden	UK	USA
DECM gap	-0.362	-0.526**	-0.344*	-0.217	-0.260	-0.586***	-0.496	-0.185	-0.322*
	(0.223)	(0.256)	(0.179)	(0.151)	(0.237)	(0.205)	(0.369)	(0.398)	(0.192)
Natural disasters	-0.00119	0.00867	-0.000243	-0.0108	0.00278	0.00220	0.0216	0.0178	0.0181**
	(0.0212)	(0.0171)	(0.00682)	(0.0170)	(0.0169)	(0.0127)	(0.0222)	(0.0214)	(0.00854)
GDP per capita (1000 $)	-0.347***	-0.293	-0.108	-0.0369	-0.454***	-0.163	-0.0737	0.0780	-0.351**
	(0.129)	(0.180)	(0.0917)	(0.132)	(0.175)	(0.140)	(0.171)	(0.208)	(0.151)
Population (million)	-0.00616*	-0.00489	-0.00500*	-0.00172	-0.00479	-0.00520	0.000286	-0.00208	0.0000889
	(0.00329)	(0.00361)	(0.00259)	(0.00256)	(0.00335)	(0.00416)	(0.00281)	(0.00422)	(0.00618)
UNGA	0.00965	-0.0167	0.0122	-0.0153	0.00456	0.0229	-0.0136	-0.00580	0.0145
	(0.0133)	(0.0168)	(0.0101)	(0.0165)	(0.0258)	(0.0345)	(0.0289)	(0.0352)	(0.0226)
Imports from donor(% recipient GDP)	0.152	0.0814	0.117	0.0406	0.189	0.242	-0.374	0.116	-0.0137
	(0.381)	(0.0926)	(0.0791)	(0.0634)	(0.146)	(2.136)	(0.766)	(0.196)	(0.0412)
Oil rents (% GDP)	0.0314	-0.0348*	0.0102	0.0358	0.0150	0.108*	-0.0221	0.0273	0.0490*
	(0.0291)	(0.0203)	(0.0311)	(0.0319)	(0.0591)	(0.0589)	(0.110)	(0.0531)	(0.0274)
Non-environmental ODA projects	0.00436***	0.00257***	0.00160***	-0.0000507	0.00883***	0.00312**	0.00625	0.00327*	0.000524*
	(0.000887)	(0.000789)	(0.000429)	(0.000525)	(0.00321)	(0.00131)	(0.00419)	(0.00170)	(0.000278)
Control of Corruption	0.235	0.411	-0.0522	0.634**	0.188	0.305	1.502***	-0.349	0.320
	(0.381)	(0.312)	(0.232)	(0.255)	(0.445)	(0.557)	(0.427)	(0.488)	(0.279)
Debt (% GNI)	0.00802	-0.0453***	0.0363**	0.00643	0.0422	0.00974	0.0656**	-0.0245	-0.00959
	(0.0207)	(0.0105)	(0.0177)	(0.0181)	(0.0314)	(0.0166)	(0.0299)	(0.0219)	(0.0129)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	419	438	439	443	358	364	312	384	448
Number of dyads	85	89	89	90	73	74	63	78	91
Log pseudolikelihood	-658.0	-892.9	-902.3	-712.6	-683.8	-627.3	-425.1	-672.8	-1423.6

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.9: Regression analysis by donor (Amount)

Method	PPML								
Dependent variable	Amount								
Donor	Canada	France	Germany	Japan	Netherlands	Norway	Sweden	UK	USA
DECM gap	-0.553	0.0656	-0.236	-0.989	-0.0425	0.222	0.272	-1.334**	-0.0188
	(0.532)	(0.556)	(0.150)	(0.827)	(0.473)	(1.157)	(0.416)	(0.526)	(0.502)
Natural disasters	0.00524	0.0364	-0.0187	0.0237	-0.0176	0.0316	0.0568*	-0.00274	0.0190**
	(0.0212)	(0.0571)	(0.0187)	(0.0314)	(0.0398)	(0.0259)	(0.0323)	(0.0539)	(0.00935)
GDP per capita (1000 $)	-0.127	0.198	0.134	-0.230	-0.994***	0.158	-0.436*	-0.713***	-0.0630
	(0.219)	(0.169)	(0.105)	(0.307)	(0.222)	(0.367)	(0.242)	(0.268)	(0.129)
Population (million)	-0.00142	0.00171	0.000682	-0.00439	-0.00670	-0.00557	0.00165	-0.0108	0.000128
	(0.00782)	(0.0144)	(0.00621)	(0.00759)	(0.0117)	(0.00632)	(0.00787)	(0.00908)	(0.00348)
UNGA	-0.00635	0.0105	0.0313	0.0608	0.0858**	0.0169	-0.0990**	-0.0468	0.0405*
	(0.0446)	(0.0716)	(0.0254)	(0.0637)	(0.0417)	(0.0523)	(0.0441)	(0.0438)	(0.0220)
Imports from donor(% recipient GDP)	1.262*	0.113	0.274**	0.0179	0.129	-0.244	0.907	-0.0457	0.0885
	(0.705)	(0.139)	(0.110)	(0.166)	(0.177)	(3.145)	(1.687)	(0.249)	(0.0689)
Oil rents (% GDP)	0.0762	-0.0203	0.0105	0.137	0.175	0.312	0.0644	-0.0106	0.0966
	(0.0832)	(0.0834)	(0.0281)	(0.181)	(0.128)	(0.259)	(0.394)	(0.202)	(0.0606)
Non-environmental ODA amount (million $)	0.00539***	-0.000646	0.0000212	0.000217**	0.00143	-0.00142	-0.00154	0.000130	0.000503***
	(0.000858)	(0.000729)	(0.000336)	(0.0000880)	(0.00186)	(0.00329)	(0.00287)	(0.000525)	(0.000130)
Control of Corruption	0.0402	0.312	-0.343	1.208*	0.535	-0.229	2.239**	-1.568	0.448
	(0.913)	(0.830)	(0.339)	(0.687)	(0.401)	(0.689)	(0.871)	(1.333)	(0.279)
Debt (% GNI)	-0.0142	-0.0321	0.00466	-0.154**	-0.105	-0.122	0.190***	0.0202	0.0167
	(0.0415)	(0.0387)	(0.0349)	(0.0609)	(0.0788)	(0.110)	(0.0525)	(0.0511)	(0.0412)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	419	438	439	443	358	364	312	384	448
Number of dyads	85	89	89	90	73	74	63	78	91
Log pseudolikelihood	-679.2	-4728.5	-3406.1	-9775.6	-1540.6	-942.5	-774.5	-1330.0	-2011.7

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.10: Regression analysis by donor (Share of projects)

Method	Fractional logit								
Dependent variable	Share of projects								
Donor	Canada	France	Germany	Japan	Netherlands	Norway	Sweden	UK	USA
DECM gap	-0.380*	-0.693***	-0.516**	-0.219	-0.408	-0.528*	-0.578	-0.283	-0.275
	(0.227)	(0.220)	(0.202)	(0.207)	(0.314)	(0.279)	(0.369)	(0.274)	(0.182)
Natural disasters	0.00276	0.0181	0.0110*	-0.00103	-0.00998	-0.0109	0.0242	0.00810	0.0209***
	(0.00690)	(0.0155)	(0.00665)	(0.00735)	(0.0198)	(0.0148)	(0.0151)	(0.0139)	(0.00695)
GDP per capita (1000 $)	-0.305***	-0.173*	-0.120	-0.00651	-0.478***	-0.191**	-0.111	0.0614	-0.154*
	(0.0890)	(0.102)	(0.101)	(0.109)	(0.146)	(0.0909)	(0.143)	(0.0941)	(0.0855)
Population (million)	-0.00334***	-0.00869***	-0.00339***	-0.000508	-0.00284	-0.00369	0.000501	0.000567	0.000267
	(0.00121)	(0.00282)	(0.00121)	(0.00128)	(0.00309)	(0.00251)	(0.00184)	(0.00159)	(0.00134)
UNGA	-0.000611	0.00582	0.0122	0.0202	0.00461	0.00627	-0.00879	-0.0186	0.0132
	(0.0135)	(0.0157)	(0.0144)	(0.0147)	(0.0203)	(0.0225)	(0.0244)	(0.0268)	(0.0129)
Imports from donor(% recipient GDP)	0.0376	0.0144	0.166**	-0.0502	0.138	0.233	-0.422	0.0968	-0.0186
	(0.297)	(0.0537)	(0.0723)	(0.0489)	(0.0925)	(0.330)	(0.602)	(0.0941)	(0.0278)
Oil rents (% GDP)	0.0192	-0.0249	0.0229	0.0727**	0.0278	0.0798	-0.0216	0.0307	0.0373
	(0.0324)	(0.0224)	(0.0360)	(0.0285)	(0.0593)	(0.0505)	(0.0598)	(0.0539)	(0.0319)
Share of non-environmental ODA projects (%)	0.488***	0.685***	0.540***	0.435***	0.655***	0.466***	0.316***	0.287***	0.434***
	(0.0663)	(0.135)	(0.128)	(0.102)	(0.116)	(0.118)	(0.0962)	(0.0722)	(0.0853)
Control of Corruption	0.164	0.276	-0.234	0.404	0.0278	0.298	1.367**	-0.579	0.545**
	(0.236)	(0.270)	(0.219)	(0.254)	(0.387)	(0.355)	(0.546)	(0.405)	(0.225)
Debt (% GNI)	0.00808	-0.0391***	0.0288*	0.0187	0.0315	0.0260	0.0750**	-0.000694	0.00667
	(0.0185)	(0.0125)	(0.0158)	(0.0151)	(0.0307)	(0.0256)	(0.0327)	(0.0210)	(0.00975)
Constant	-4.971***	-1.972	-5.128***	-5.173***	-3.122	-2.173	-0.321	-2.985	-3.852***
	(1.255)	(1.667)	(1.325)	(1.478)	(1.948)	(2.039)	(2.190)	(2.211)	(0.942)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	419	438	439	443	358	364	312	384	448
Numberofdyads	85	89	89	90	73	74	63	78	91
Log pseudolikelihood	-16.54	-16.79	-17.25	-16.50	-15.76	-14.26	-14.11	-15.55	-17.47

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.11: Regression analysis by donor (Shares of amount)

Method	Fractional logit								
Dependent variable	Share of Amount								
Donor	Canada	France	Germany	Japan	Netherlands	Norway	Sweden	UK	USA
DECM gap	-0.575	-0.220	-0.341	-0.903	0.0457	-0.0523	0.267	-1.426***	0.110
	(0.430)	(0.461)	(0.347)	(0.616)	(0.463)	(1.106)	(0.491)	(0.492)	(0.249)
Natural disasters	0.00855	0.0481*	-0.0210*	0.0347	-0.0142	0.0376	0.0578*	0.00395	0.00955
	(0.0167)	(0.0254)	(0.0108)	(0.0229)	(0.0259)	(0.0342)	(0.0336)	(0.0277)	(0.00765)
GDP per capita (1000 $)	-0.125	0.165	0.122	-0.218	-1.009***	0.157	-0.420	-0.786***	-0.0844
	(0.166)	(0.139)	(0.136)	(0.294)	(0.232)	(0.274)	(0.284)	(0.235)	(0.118)
Population (million)	-0.00265	-0.00298	0.000194	-0.00361	-0.00638	-0.00835	0.00132	-0.0105***	-0.000100
	(0.00228)	(0.00359)	(0.00179)	(0.00304)	(0.00395)	(0.00691)	(0.00321)	(0.00307)	(0.00147)
UNGA	-0.00926	0.0475	0.0291	0.0519	0.0956***	0.00532	-0.103*	-0.0265	0.0432**
	(0.0284)	(0.0298)	(0.0290)	(0.0604)	(0.0262)	(0.0420)	(0.0593)	(0.0567)	(0.0188)
Imports from donor(% recipient GDP)	1.319*	0.0904	0.267***	0.0577	0.137	0.0822	0.753	-0.00597	0.0370
	(0.766)	(0.0931)	(0.0899)	(0.153)	(0.145)	(2.281)	(0.958)	(0.133)	(0.0365)
Oil rents (% GDP)	0.0646	-0.00442	0.0140	0.128	0.215	0.248**	0.0358	-0.0484	0.0772**
	(0.0620)	(0.0365)	(0.0485)	(0.102)	(0.154)	(0.123)	(0.0770)	(0.153)	(0.0356)
Share of non-envionmental ODA amount (%)	0.404***	-0.0931	0.0251	0.119***	0.138*	-0.0258	-0.0648	0.0244	0.151***
	(0.0670)	(0.0707)	(0.0574)	(0.0277)	(0.0713)	(0.0983)	(0.0927)	(0.0443)	(0.0160)
Control of Corruption	0.0561	1.141**	-0.442	1.222*	0.547	-0.314	2.164***	-1.354	0.706**
	(0.645)	(0.484)	(0.388)	(0.713)	(0.588)	(0.632)	(0.511)	(0.825)	(0.294)
Debt (% GNI)	-0.00258	-0.00650	0.00220	-0.167***	-0.123**	-0.109***	0.190***	0.0479	0.00989
	(0.0479)	(0.0266)	(0.0272)	(0.0582)	(0.0484)	(0.0396)	(0.0517)	(0.0711)	(0.0265)
Constant	-4.980*	-8.224***	-8.680***	-4.777	-9.841***	-4.364	3.507	4.467	-6.585***
	(2.986)	(3.169)	(2.563)	(4.714)	(2.672)	(7.659)	(4.781)	(4.765)	(1.219)
Period FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dyad FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	419	438	439	443	358	364	312	384	448
Number of dyads	85	89	89	90	73	74	63	78	91
Log pseudolikelihood	-15.18	-16.91	-15.92	-13.69	-14.51	-12.53	-14.27	-13.41	-14.08

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.12: Definition and description of variables

Variables	**Definition and description**	**Source**
Carbon dioxide emissions	Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring	WDI(World Development Indicators)
GDP per capita	GDP per capita in thousand (2011 US)	WDI(World Development Indicators)
Debt to GNI ratio	Total debt service (sum of principal repayments and interest actually paid in currency, goods, or services on long-term debt, interest paid on short-term debt, and repayments to the IMF) in % of GNI	WDI(World Development Indicators)
Control of corruption index	Index representing the control of corruption ranging from -2.5 to 2.5 with higher values corresponding to better governance	WGI (World Governance Indicators)
Imports from donor	Recipient's Total imports from donor	UN Comtrade Datbase
Natural resources rent	The total natural resources rent, is the sum of oil, natural gas, coal (hard and soft), mineral and forest rents, expressed in % of GDP	WDI(World Development Indicators)
UNGA voting alignment	Voting alignment in the United Nations General Assembly	Strezhnev and Voeten (2013).
Drought	Number of droughts	The International Disaster Database
Flood	Number of floods	The International Disaster Database
Population	Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship. The values shown are midyear estimates.	WDI(World Development Indicators)

Openness rate	Trade is the sum of exports and imports of goods and services measured as a share of gross domestic product.	WDI(World Development Indicators)
Investment	Net investment in government nonfinancial assets includes fixed assets, inventories, valuables, and non-produced assets. Nonfinancial assets are stores of value and provide benefits either through their use in the production of goods and services or in the form of property income and holding gains. Net investment in nonfinancial assets also includes consumption of fixed capital	WDI(World Development Indicators)
Population growth	Annual population growth rate. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship.	WDI(World Development Indicators)