Explaining the Allocation of Bilateral and Multilateral Environmental Aid to Developing Countries

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PRELIMINARY DRAFT
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Abstract: In this paper we examine how international development assistance for environmental purposes is allocated to developing countries. In particular, we investigate whether there are patterned differences between environmental aid for international public goods projects versus environmental projects having more localized impacts. We empirically investigate these questions using project project level development assistance data .

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[1] Corresponding author. Senior authorship not assigned. We would like to thank Jess Sloan for most excellent research assistance.

Why do donors provide environmental aid to developing countries? What are the effects of this particular type of development assistance? Since the Rio Earth Summit in 1992, scholars and policy analysts have spilled much ink over the causes and consequences of environmental assistance to developing countries. Yet the study of environmental assistance remains impressionistic and often based on qualitative case studies in small-n samples, thus limiting the prospects for a progressive accumulation of knowledge. One reason our collective knowledge about environmental aid remains limited is the lack of reliable project-level data that is necessary for testing many of the provocative hypotheses in the literature. We seek to rectify these shortcomings by collecting, coding, and analyzing a new database (PLAID) that covers thirty years of environmental aid data from 50 donors (bilateral and multilateral agencies) to more than 190 recipient countries. Specifically, we attempt to make sense of previously irreconcilable debates about bilateral and multilateral environmental aid and test a number of new hypotheses gleaned from the growing literature on delegation to international organizations (IOs).

The issue of environmental aid allocation is an important one because it speaks to a larger debate in the development literature on international public good (IPG) provision and aid effectiveness. Since the fall of the Berlin Wall, we have witnessed a dramatic shift in the rhetoric of bilateral and multilateral aid donors. From world leaders like George W. Bush, Tony Blair, and Kofi Annan, all the way down to paper-shuffling bureaucrats at USAID, DFID, and the World Bank, the aid community now enthusiastically embraces increased IPG provision and aid effectiveness. The International Financial Institution Advisory Commission, established by the US Congress amidst heated debate in 2000 over $18 billion of additional funding to the International Monetary Fund, urged multilateral development banks (MDBs) to redouble their IPG efforts. In particular, its authors argued for a sharper focus on the "treatment of tropical

diseases and AIDS, rational protection of environmental resources, tropical climate agricultural programs, development of management and regulatory practices, and inter-country infrastructure."[2] G-7 Finance Ministers also underscored the need for *ex ante* conditionality in 2000, calling upon "[MDBs to] emphasize a selective, quality-oriented approach rather than a quantity-oriented or profit-oriented one … [and] place [a] high priority on good governance."[3] Again, at the Genoa Summit in 2001, G-7 countries stressed that "[MDBs] main priorities … should be to fight infectious diseases, promote environmental improvement, facilitate trade, and support financial stability." They also endorsed the idea that every MDB should "define more explicitly its role in the provision of [IPGs] on the basis of its comparative advantages."

Casual empiricism suggests that the rise of these two objectives is more than just talk. Western governments have created a Montreal Protocol Fund to protect the ozone layer, a Global Environmental Facility to deal with climate change, bio-diversity loss, the pollution of international waters, ozone depletion, persistent organic pollutants, and desertification, a Global Fund to fight AIDS, Tuberculosis, and Malaria, an Emergency Plan for AIDS relief, a Global Alliance for Vaccines and Immunization, and a Millennium Challenge Account which depoliticizes the aid allocation process by rewarding poor countries based on their adoption of "sound economic policies" and "good governance." Talk may be cheap, but the construction of all these novel aid delivery mechanisms is not. In addition to these institutionalized mechanisms for IPG provision, aid is increasingly channeled to the developing world to prevent drug-trafficking, fight terrorism, resolve financial crises, foster democracy, and promote peace in war-torn regions. These seemingly "functional" interventions beg an important empirical question:

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[2] The International Financial Institution Advisory Commission – more commonly known as the Meltzer Commission – also emphasized that "poverty is often most entrenched and widespread in countries where corrupt and inefficient governments undermine the ability to benefit from aid."

[3] They also encouraged MDBs to "allocate their support increasingly on the basis of borrower performance. Experience has shown that aid is only effective in reducing poverty where governments are committed to sound policies" (G7 Finance Ministers 2000:27).

Are donors *actually,* or *nominally*, concerned with international public good provision and aid effectiveness?

According to many scholars and citizen activists, aid agencies are the villains, rather than the heroes of development.[4] Aid packages are nominally designed for poverty reduction, environmental protection, and international financial stability, but when all is said and done, stated objectives are just that. They provide politically-convenient window dressing to obscure the donor's actual purpose for giving aid. Donors' shroud their real motivations for giving aid in secrecy because funds are primarily used to achieve geo-strategic and commercial aims.[5]

Marshaling evidence in support of this position is hardly difficult. In 2003, Turkey was promised extraordinary amounts of military and economic assistance in the run-up to the US invasion of Iraq. Pakistan and Uzbekistan were also rewarded generously for assisting US military efforts in Afghanistan. International financial institutions, which are in principle designed to provide collective goods like international financial stability, are also routinely "leveraged" by their most powerful shareholders when the geo-strategic stakes are high. For example, in 1998 Pakistan saw IMF loans disappear after testing a nuclear weapon in defiance of US wishes, and then suddenly reappear at the beginning of the war in Iraq. A leading analyst of international organizations also dismisses the World Bank as "a source of funds to be offered to US friends or denied to US enemies."[6] According to this "dysfunctional" aid narrative, donors' commercial goals also place strong constraints on the utility of IPG aid. Haggard and Moravcsik suggest that the West's primary motivation for distributing $30-$40 billion of assistance to former Soviet bloc states was not democracy, economic growth, and environmental protection – the stated objectives – but "privatizable" benefits advantaging special interests in donor

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[4] Rich 1994; Danaher 1994;
[5] Alesina and Dollar 2000; Burnside and Dollar 2000.
[6] Wade 2002.

countries. The same authors argue that "the lack of any coherent justification for the creation of the EBRD … [suggests] … it was *an act of political symbolism rather than functional necessity*."[7] In this view, foreign aid bears little resemblance to its stated objectives, remains uncoordinated and rudderless, and has next to no effect on international public good provision. In the words of strange bedfellows like Jesse Helms and *The Economist*, giving aid is like pouring money "down a rathole."[8]

To be sure, not all evidence for the dysfunctional aid narrative has been anecdotal. In an oft-cited quantitative study of aid, Alesina and Dollar "find considerable evidence that the pattern of aid giving is dictated by political and strategic considerations. An inefficient, economically closed, mismanaged non-democratic former colony politically friendly to its former colonizer, receives more foreign aid than another country with similar level of poverty, a superior policy stance, but without a past as a colony." Subsequent econometric work has yielded similar conclusions.[9]

Yet curiously, foreign aid is also regularly credited with a number of spectacular success stories: the post-war reconstruction in Western Europe, the eradication of river blindness and smallpox, the Green Revolution, the introduction of family planning, and sharp, generalized increases in life expectancy rates.[10] More recently, scholars and policy makers have suggested that *IPG aid can have a profound impact on actual IPG outcomes*.[11] The Montreal Protocol Fund, for example, has helped secure virtually universal participation in an ozone regime that

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[7] Haggard and Moravcsik 1993: 280, emphasis added. Darst writes that "the EBRD's efforts to take a 'hard line' have been regularly undercut by pressure from donor states with politically influential nuclear engineering industries, such as the United States and France" (2003: 20). Marc Levy also "accept[s] the argument made by Stephen Haggard and Andrew Moravcsik that the EBRD is a largely redundant exercise in political symbolism, and suspect[s] that the decision to extend participation in the European Environmental Agency to eastern governments was motivated in large part by a perceived opportunity to garner similar symbolic laurels" (1993: 332).

[8] The Economist 1994.

[9] Alesina and Dollar 2000: 33.

[10] Knack and Rahman 2004; Radelet 2003.

[11] Attaran and Sachs 2001; Speth 1992; Ferroni and Mody 2002; Kaul et al. 1999; 2003.

"ensures … no developing country or transition economy can lose by being party to the agreement . . . [and] any country will lose by not signing."[12] Side payments to developing countries also have been a crucial component of many other international efforts to protect the environment.[13] More telling still, Senator Jesse Helms, perhaps the most strident critic of foreign aid in the US Congress, performed an abrupt volte-face in 2002, insisting that Western taxpayers' dollars would be well spent on preventing the transmission of HIV/AIDS worldwide.

These competing narratives – one "functional," the other "dysfunctional" – about IPG aid present us with an empirical puzzle. If the need for IPG provision is more pressing than ever and Western policy preferences are indeed coalescing around such issues, presumably we should observe patterned differences between IPG and non-IPG aid allocation and implementation outcomes. To discriminate between these competing narratives, we seek here to determine whether we can reject the null hypothesis that IPG and non-IPG aid *allocation* are governed by the same set of decision making criteria. To sharpen the analytical bite of our study, we triangulate on what many agree to be the archetypal international public good: environmental protection.

Critics of this approach might argue that the empirical spotlight should be thrown on IPG and non-IPG *implementation* outcomes rather than allocation patterns. Careful studies of implementation are no doubt desirable, but we also mustn't create an illusory divide between donors' intentions at the allocation stage and their follow-up at the implementation stage of the aid giving process.

If we can confirm that (some types of) donors are motivated primarily by the improvement of environmental protection overseas, then it also seems reasonable to assume

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[12] Barrett 1999: 216.
[13] Weiss and Jacobson 1999.

(such) donors will monitor recipient behavior through police-patrol and fire-alarm oversight mechanisms, employ procedural checks and balances, and rescind or re-negotiate contracts in cases of defection, backsliding, or some other failure to follow through on specific policy commitments (Nielson and Tierney 2003). In other words, donors that appear to be genuinely interested in environmental protection at the allocation stage (i.e. those who screen and select for worthy recipients) will presumably take steps to ensure that their aid dollars are also spent wisely at the project implementation stage. Hence, we test whether donors contract primarily with recipient governments that are willing and able to offer an attractive environmental "rate-of-return" on donors' aid investment. If this proposition can be confirmed, we argue we will be much closer to understanding *how concerned* donors are with aid effectiveness and IPG provision.

To be clear, the underlying assumption is that donors are *actually,* as opposed to *nominally*, concerned with both international public good provision and aid effectiveness. Since problems like moral hazard, adverse selection, fungibility, rent-seeking, credibility, and poor economic policies influence the environmental "rate of return" that donors will receive on their aid "investment," we would expect allocation patterns – or the use of scarce taxpayer dollars – to reflect these concerns. If environmental aid flows mainly to countries of geo-strategic and commercial interest to donors, then we can conclude that our first-order assumptions about "eco-functional" donor motivations are inappropriate. However, if donors channel resources to places where they believe it will do the most good – specifically, to countries with reliable environmental information, sound institutions, a good investment climate, a significant level of interest in environmental protection, and meaningful environmental policies – then such an

outcome speaks to the question of why donors are giving money in the first place. As Connolly

puts it, donor allocations "[set] early parameters" on the effectiveness of aid.[14]

The Argument in Brief

In our view, neither the functional nor the dysfunctional aid narrative is necessarily

wrong. One problem with extant econometric work is that it relies on highly-aggregated data

that obscures many of the most important stylized facts about aid allocation and effectiveness –

these aggregated data wash out much of the meaningful variation in aid allocation patterns. By

conflating *types* of aid and lumping together donors with different preferences, incentive

structures, decision-making procedures, and capabilities, analysts have overlooked what may be

the silver lining of the actual aid narrative – that some types of aid and some types of donors are

less beholden to geo-strategic, commercial, and other "dysfunctional" constraints and better

positioned to provide IPGs. In short, the existing literature on foreign aid has over-generalized its

conclusions.

Foreign aid is routinely characterized as an undifferentiated mass of Western money

flowing to corrupt and incompetent developing country governments. The implicit assumption of

most work on aid *allocation* is that different types of donors respond to similar ascriptive and

behavioral recipient characteristics. It is also assumed that different types of aid get allocated by

similar procedures with similar results. The perennial puzzle of aid *effectiveness* – whether, how,

and to what extent the receipt of foreign aid influences development outcomes – is also fraught

with serious theoretical and methodological problems. Careful analysts are no doubt aware that

we should be analyzing *specific* types of aid and their impact on *specific* development outcomes,

but instead what we have witnessed is an outpouring of econometric work on the relationship

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[14] Connolly 1996: 329.

between total aid flows – including support for military expenditures, peacekeeping, landmine clearance, free and fair elections, civil society, bio-diversity, HIV/AIDS, drug trafficking, and refugee movements – and causally-distant outcomes like economic growth and poverty alleviation.[15] These research designs cannot gauge *the effect that specific types of aid have on their stated objectives*. Aid targeting bio-diversity protection surely affects economic growth and infant mortality differently than road construction, electricity grids, and oil derricks, but up until this point scholars have had no way of subjecting such hypotheses to discriminating empirical tests.

Rigorous empirical testing of hypotheses concerning the causes and consequences of IPG aid has proved overwhelmingly difficult because we lack systematic, reliable, and detailed data on the aggregate amount, sources, and destinations of aid. More importantly, we do not know the characteristics of individual aid projects. Interesting and plausible hypotheses pervade the IPG literature, and some of these derive from well-developed theoretical propositions, but knowledge accumulation has been minimal since arguments have not been tested with data gathered at the appropriate level of analysis. Specifically, hypotheses have not been tested at the level of development projects. Instead, scholars aggregate—incorrect and biased[16]—sums of aid and loans at the sectoral or country level.

In this paper, we hope to remedy this shortcoming by relying on a new dataset developed at the College of William and Mary and Brigham Young University. The project-level aid (PLAID) database allows analysts to identify important categories within aid sectors and

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[15] Boone 1996; Burnside and Dollar 2000; Hansen and Tarp 2001; Easterly et al. forthcoming; Collier and Dollar 2002; Easterly 2003a, 2003b; Roodman 2003. All these studies assume that aid is largely fungible. Conversely, Tierney (2003) argues that the fungibility of aid varies dramatically with the type of aid given.

[16] The standard data source on aid is the OECD DAC Report. While OECD staff are cognizant of the coverage problems with their data, few researchers attempt to gather the missing data to supplement DAC statistics or even to mathematically estimate the missing values so that descriptive and inferential errors can be reduced in any empirical analysis of allocation patterns. See Parks et al (2004) for full discussion of these methodological issues.

standardize data across different types of donors. At the sectoral level, different donors often classify sectors differently, making cross-donor comparisons impossible. The independent coding scheme employed in the PLAID dataset standardizes such categories for all donors and recipients so that we can have greater confidence in our classifications of aid type.[17]

Importantly, PLAID codes specific projects based on their actual project descriptions, rather than assuming entire sectors are homogenous. Development agencies' sector coding can be highly misleading because very different projects are often lumped under the same sector heading, thus offering a skewed picture of donor agencies actual spending patterns and priorities. For example, in the OECD database (to which all bilateral donors theoretically report), sustainable forestry and selective logging receive the same sector code as clear-cutting deforestation projects! For scholars interested in the impact of foreign aid on the environment, such distinctions are vital and PLAID data highlights these differences.[18]

PLAID data also permits more accurate comparisons of multilateral and bilateral aid agencies. Currently, analysts cannot determine which types of projects donors tend to delegate to multilaterals and which to their own bilateral agencies.[19] Extant data also cannot distinguish among recipients as to the specific aid they receive from multilateral and bilateral agencies respectively. Such distinctions are critical if we hope to test hypotheses about the motives of donors to provide multilateral, rather than bilateral, aid.[20]

Allocation of Environmental Aid

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[17] For example, PLAID allows for independent coding of environmental projects, technical assistance, social projects, etc…

[18] Clear cutting projects are coded as dirty strictly defined (DSD) while sustainable forestry projects can receive a rating ranging from environmental strictly defined (ESD) to environmental broadly defined (ESD) depending on specific activities that are funded (Schultz 2004).

[19] OECD data on multilateral donors is not complete for any year since many multilaterals simply do not provide their data to the DAC. This problem was even more severe for the first 15 years of our time series.

[20] Milner 2003; Rodrik 1996; Boulding 2004.

After World War II, the overwhelming body of IR scholarship viewed foreign assistance as a quid pro quo—that is, an intergovernmental bribe.[21] The dominant principle governing aid allocation seemed to be "we know they are bastards, but at least they are our bastards, not theirs."[22] Substantively, this meant that international financial transfers were often made for reasons of political loyalty, domestic politics, and national security, not their stated objectives (i.e. economic development, poverty reduction, public health, and education). Thus, until the end of the Cold War, most money flowed to strategic military locations, areas rich in natural resources, newly-independent colonies, and certain key trading partners. But soon after the fall of the Berlin Wall, analysts found that political motivation alone failed to explain new types of aid that closely resembled *voluntary* interstate cooperation. As international financial transfers for collective good provision—particularly, debt relief, environmental protection, infectious disease control, and structural adjustment—grew more prominent within bilateral and multilateral portfolios, new empirical patterns began to beg new questions concerning donor (and recipient) motivations. Most obviously, why had benefactors and beneficiaries moved toward pursuing broader shared interests that required and enhanced long-term policy coordination, unlike the earlier focus on more straightforward "aid-for-loyalty"—or "private good"—transactions?

More recent work explains this shift by characterizing foreign assistance as an act of international cooperation that represented mutual policy adjustment on the part of recipients and donors.[23] Aid, they argued, could be understood as a "contract in which funders trade concessional loans or grants for policy reforms in a recipient [country]."[24] Crucial too for

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[21] Morgenthau 1962; Baldwin 1985.
[22] Neumayer 2003: 1.
[23] Keohane and Levy 1996; Kaul et al. 1999; Kaul et al. 2003; Barrett 1994.
[24] Ross 1996: 186.

institutionalists was the presence of underlying rules, principles, norms and decision-making procedures to govern such resources-for-reform swaps.[25] They emphasized that states could reduce transaction costs and uncertainty, discourage reneging, and advance the shared interests and absolute gains of all parties by establishing mutually acceptable "rules of the game" that would stabilize expectations.

Environmental aid transfers occurs as inter-governmental contracts that promote collective good provision. Donors who distribute environmental assistance are assumed to be genuinely interested in environmental protection. To test this assumption, before turning to any analytical statistics, it is worth looking at patterns in the descriptive data. If donors are indeed motivated by a desire to advance the cause of environmental protection, we would expect to observe a) an increase in environmental aid as a percentage of total aid spending and b) a decrease in aid that harms the environment – or "dirty" aid –as a percentage of total aid spending. Figures 1 and 2 confirm both of these expectations. Since "green" environmental issues like climate change, bio-diversity loss, deforestation and ozone depletion more closely resemble collective goods than "brown" issues like sanitation, soil erosion, and sewerage, which are more easily carved up into projects that can reward a targeted group of political supporters or construction contractors, we would also expect donors to distribute relatively more green aid than brown aid. Figures 3 and 4, again, lend support to this proposition. To explain what *actually* motivates the behavior of environmental aid donors, we must analyze how scarce aid resources are allocated among recipient countries.

Observable Implications

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[25] Keohane and Levy 1996:5.

We argue that five recipient-level (behavioral and ascriptive) characteristics promote successful international financial transfers for environmental protection:

- First, for an "efficient" environmental aid contract to be written, we argue donors and recipients must establish a shared interest. Their interests needn't be naturally harmonious, but both parties must stand to gain from cooperation.[26] Donor and recipient preferences are less likely to coalesce around issues of local environmental concern since they often lack the characteristics of a collective good. Issues like climate change and bio-diversity, which yield significant benefits to both donors and recipients, require collective action and thus increase the probability of a stable cooperative equilibrium. We would therefore expect more environmental aid dollars and contracts to flow to countries of global environmental significance. For example, Brazil, Tanzania and the Philippines should matter more to eco-functional donors than Chad or Mongolia, even when holding all other factors that might explain aid flows constant.

- Donors will target recipient countries where environmental quality is poor, ceteris paribus. There are no doubt a whole host of variables that condition the effectiveness of environmental aid – and thus a donor's willingness to give aid – but if donors are genuinely interested in improving environmental protection, they will target those countries where they expect their aid investment to yield the highest "environmental rate-of-return." Furthermore, recipients experiencing high levels of environmental stress will have a greater interest in securing environmental aid contracts than recipients with relatively undamaged environmental resources.

- Another plausible determinant of environmental aid allocation is recipient credibility. Donors will be less likely to enter into aid contracts with recipients that cannot

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[26] In the absence of a shared interest, donors are vulnerable to malfeasant recipient behavior. See Darst 2001, 2003,.

convincingly demonstrate their willingness and ability to implement meaningful

environmental reforms. As Connolly suggests, "recipient countries' political commitment

to environmental reforms stands out as a major explanatory factor for the success or

failure of financial transfers."[27] Thus, we predict that donors will reward countries based

on the strength of their revealed environmental policy preferences.[28]

- Also critical to a recipient's credibility is its willingness and ability to provide donors

  with reliable information about its own behavior.[29] Transparency is an important

  determinant of inter-state cooperation because it allows demandeurs[30] to assess the

  intentions, capabilities, and past behavior of potential cooperators and thus evaluate their

  trustworthiness. Trust lubricates cooperative efforts by reducing uncertainty and

  transaction costs, enhancing the credibility of state commitments, making defection more

  costly, and promoting stable expectations. Though free-riders can certainly report false

  information, those who report less environmental information, should be viewed with

  greater suspicion and thus receive fewer environmental aid dollars and contracts. Bad

  information is better than no information because self-reporting opportunistic actors run a

  higher risk of being detected and punished by donors, particularly in an era of high

  resolution satellite, spacecraft, and aircraft imagery, which provides "objective, unbiased,

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[27] Connolly 1996: 330.

[28] Kotov and Nikitina (1998) argue that the USSR was unable to secure external financing for environmental protection during the Cold War largely because of credibility problems: "Unlike most other countries, the USSR had no agency devoted entirely to the environment with authority to issue and enforce regulations. Environmental quality was simply too low a priority for the government, which lacked the resources to invest in cleaner technology and could not provide incentives for plants to behave differently. Underlying these failings, of courses, was the inability of a command economy to operate efficiently or to make significant technological progress. Limited information about the environment, low levels of public concern, and even lower responsiveness by the central government to these public concerns also contributed to this situation."

[29] Mitchell 1998; Florini 2000; Stein 1999; Tierney 2003.

[30] Abbott and Snidal (1998: 431) define demandeurs as states … that have worked to obtain commitments from others … in the face of strong resistance."

and transparent data sources in a near real time basis."[31] The incentive to misrepresent one's intentions, capabilities, or level of need is also weaker in transparent countries since government officials are aware that donors are better able to assess the credibility.[32]

- Finally, one additional factor that might be expected to impact the a donor's calculation of the "environmental rate of return" would be the economic policy and institutional environment of the recipient countries within which donors identify, prepare, execute, and maintain projects. In countries where the government regularly intervenes in markets and distorts pricing structures, there is a strong possibility that the selection and appraisal of public investment projects will also be distorted. For example, in countries where excess demand has been artificially generated, donors may select inappropriate investments and overestimate the "optimum attainable output capacity" of their projects.[33] Where trade, investment, and exchange rate restrictions are high, crucial project inputs may be prohibitively expensive or entirely unavailable.[34] Local firms seeking to provide complementary environmental goods and services will also do so more efficiently in the absence of state controls on capital goods and other imported inputs. As Raustiala and Victor note, "When domestic regulatory and market institutions are poorly developed, it is especially difficult for recipients to assure donors that financial

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[31] Sherbinin and Giri 2001: 3.

[32] Raustiala and Victor (1998: 675) offer anecdotal support for this hypothesis. In the Baltic Sea region, they report, "donors have focused on countries where transaction costs are lower and domestic assurances are higher. Consequently, in the Baltic Sea regime donors have favored Poland over Russia; the fraction of resources sent to Russia has risen only slowly. In both the regime to limit dumping of radioactive waste and the regime to protect the Baltic Sea, programmatic commitments and activities, such as to report and analyze data, have improved knowledge about national situations and made it easier to target aid."

[33] Isham and Kaufmann 1999: 155.

[34] Kaufmann and Wang 1995; Burnside and Dollar 2000.

transfers will be spent as intended."[35] Hence, we expect that donors will reward recipient governments with "sound" economic policies, ceteris paribus.[36]

The Empirical Aid Allocation Model

The allocation of foreign aid has been studied empirically with respect how donor preferences and recipient characteristics affect foreign aid allocation (Burnside and Dollar; Neumeyer). The goal of the empirical puzzle is to examine how donor countries allocate their environmental aid and to examine if their allocation rule depends in part on environmental, economic, or political factors in the recipient country.

The patterns of environmental aid for the years reveals that a significant proportion of countries receive no environmental aid for a given period while others receive large amounts of aid. This pattern of aid allocation lends itself empirically to thinking about aid allocation as a two step process. In the so-called gatekeeping stage, a donor country decides whether to give a recipient country some positive amount of aid. Once a recipient country has passed the gatekeeping stage, the donor country then allocates a portion of their overall aid budget to the recipient country in what is called the allocation stage. Consequently, when one asks how do donor preferences and recipient characteristics affect aid allocation, one needs to think about how both of these factors affect the gatekeeping and allocation stage of the donor process.

The two stage process described above is more an artifact for how we treat zeros in the empirical model. Since a significant portion of recipient countries receive no aid, then the

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[35] Raustiala and Victor 1998: 675. Roginko (1998: 604), somewhat tangentially, argues that more environmental aid flows to goes to Russia than other Baltic states because of the "greater political and economic stability in the Baltic countries compared with the situation in Russia. Furthermore, enterprise and municipal facilities in Estonia, Latvia and Lithuania are better positioned to purchase foreign technology because their domestic currencies are convertible."

[36] Of course, this logic holds for many types of aid, not just environmental aid. Hence, if our expectations are confirmed here we would explore the generalizability of this tendency.

probability distribution of aid exists only in the non-negative range, with a probability mass at zero. We estimate this two-stage process using a Cragg Model- in an aid context, a country will only give aid to a donor if some "hurdle" is overcome. Once the hurdle is overcome, a positive amount of aid is determined. To motivate the model, let the probability of observing no aid being given (y=0) be written as

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(1) \quad
\begin{aligned}
&P(y = 0 \mid \mathbf{z}, \mathbf{x}) = 1 - \Phi(\mathbf{x}\gamma + \mathbf{z}\alpha) \\
&E(y \mid \mathbf{x}, \mathbf{v}) \sim \text{Log Normal}(\mathbf{x}\gamma + \mathbf{v}\delta)
\end{aligned}
$$

where $\Phi(\cdot)$ is the standard normal CDF.

It is important to note that unlike the Tobit Model, the Cragg Model does not restrict explanatory variables to necessarily be the same, nor does it require that the marginal effects to be the same across the gatekeeping and quantity portions of the model. A drawback of the Cragg Model is that there is no formal linkage between the gatekeeping and allocation stages of the models. In an aid allocation context, this model is preferred to the Heckman, since it is widely argued (and professed by donors) that the same factors influence the gatekeeping and the amount stages of allocation. If there is no readily available set of exclusionary variables then it is likely that the inverse Mills ration that enters the allocation equation will be highly collinear with the other explanatory variables. If this happens, then identification may not be possible or even if we can identify the parameter, there will be little chance of estimating parameters with much precision. Wooldridge further points out that even if we do estimate the parameters with some precision it is difficult to discern whether it is because of sample selection or misspecification of the functional form of the model.

Further Complications

In the data we have collected on foreign environmental aid, we have a three-way panel of observation. We have information on donor pairs (donor-recipient) and we have multiple time periods from which to observe donor pair patterns of aid allocation. The implication of this data structure is that a donor (such as the United States) will appear in many donor pairs. Some systematic factor associated with the donor pair may influence the total amount of aid that all recipients receive from the United States. Hence treating our panel dataset as independently and identically drawn observations is likely throwing away important information. In this paper, there are only 9 observations per donor-recipient pair for the gatekeeping equation and likely far fewer in the observations in the amount equation (since it is unlikely that every donor-recipient-year combination will receive positive amounts of aid). Consequently, in all of our estimations, we did not employ a full-blown panel estimator, but rather allowed the error structure to be correlated amongst recipient country observations and use robust (with respect to heteroskedasticity) standard errors.

In what follows we operationalize the various factors that may influence allocation of aid into five categories: 1) recipient need, 2) recipient environmental need, 3) recipient environmental policy, 4) recipient government institutions, 5) recipient economic policy. In the gatekeeping model, define $gate_{ijy}$=1 if a positive amount of aid was given by donor i to recipient j in year y. Otherwise, $gate_{ijy}$=0. We model the gatekeeping stage using a probit model as follows:

$$gate_{ijy} = \alpha_{ij} + \alpha_1 * gdp/population_{jy-1} + \alpha_2 * organicwateremmissions_{jy-1} + \alpha_3 * naturalcapitalindex_j +$$
$$\alpha_4 * citesreporting_{jy-1} + \alpha_5 * governmenteffectiveness_{jy-1} + \alpha_6 * fdi_{jy-1} + \varepsilon_{ijy}$$

where the gdp/population is gross domestic product (measured in PPP) divided by population [capturing recipient need], organic water emissions is the amount of organic water pollutants emitted per worker [capturing environmental need], natural capital index is a measure of the level of natural capital existing in a country [capturing environmental need], cites reporting is the percentage of cites reporting requirements met by the country [capturing environmental policy], government effectiveness [government institutions] , and the level of foreign direct investment (fdi) [economic policy].[37]

The amount equation uses the same variables. The share of total environmental aid that a donor country i gives to recipient j in year y (SH_ENV_{ijy}) is modeled as

$$\ln\left(SH\_ENV_{ijy}\right) = \alpha_{ij} + \alpha_1 * gdp/population_{jy-1} + \alpha_2 * organicwateremmissions_{jy-1} + \alpha_3 * naturalcapitalindex_j +$$
$$\alpha_4 * citesreporting_{jy-1} + \alpha_5 * governmenteffectiveness_{jy-1} + \alpha_6 * fdi_{jy-1} + \varepsilon_{ijy}$$

where the dependent variable, *ln(SH_ENV)*, represents the share of the total environmental aid budget given by donor j captured by a recipient j in year y. We perform the same procedure for the dependent variables for other aid sectors- "non-environmental," and "green,"

These data are taken from the project-level aid (PLAID) database, which codes more than 400,000 individual aid projects between the period 1970 and 2002 – approximately 90 percent of the entire development assistance universe – on a 5-point scale, ranging from strictly-defined environmental projects (ESD) to strictly-defined dirty projects (DSD).[38] Projects are also classified as broadly-defined environmental (EBD), broadly-defined dirty (DBD), or

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[37] For each category, we have tried running the models with the substitute variables listed in Table 1. Our results are remarkably robust across these measures. We expect that as this paper matures more of these comparisons will be included. We will also add a sixth category- geo-strategic variables such as human rights violations, two-way trade, and former colony dummies.

[38] All these data are from the e-PLAID I database. Schultz et al. 2004.

environmentally neutral (N).[39] From cleanest to dirtiest, then, the ordinal scale runs: ESD, EBD, N, DBD, DSD. In the models reported below, we measure environmental aid as the sum of ESD and EBD. Likewise, we take dirty aid to equal the sum of DSD and DBD. Any project that received an ESD or EBD designation was also coded as either green or brown.[40] This second coding scheme seems to capture the "collective good" vs. "private good" distinction discussed earlier. General coding criteria are provided in Tables 10 and 11.

On the right-hand side of the equation, we introduce GDP per capita, as a control variable. Extant econometric work on aid allocation suggests that both of these variables routinely emerge as significant across multiple specifications of donor allocation models. This variable, which we use as a proxy for "recipient need," should drive allocation decisions. We hypothesize that donors will allocate a larger share of a given aid budget to more needy countries. There is wide agreement among aid analysts that donors are sensitive to human development needs, regardless of the specific type of aid they seek to distribute. We expect these relationships to hold across both the environmental and green models we resent below.

The amount of "natural capital" that a country possesses is intended to capture the global environmental significance of a recipient. We expect that countries with more natural capital will be more likely to establish a shared interest with donors and thus secure more environmental aid contracts and dollars. This relationship, we predict, will be positive and significant in the environmental aid share estimation, and stronger for green aid. The Natural Capital Index (NCI)

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[39] Any foreign aid project which, according to its project description, could be characterized as beneficial toward the natural environment, by both intent and consequence, is classified as *environmental*. This included both *green* projects, dealing with issues such as global warming and biodiversity, and *brown* projects, dealing with issues such as water supply and sewerage. Any foreign aid project that is likely to have a detrimental impact on the natural environment is classified as *dirty*. Projects that appeared unlikely to affect the environment in a significant way were coded as *neutral*.

[40] Green projects deal with global environmental problems, such as climate change, deforestation, and biodiversity, while Brown projects deal mostly with local environmental problems, like sanitation, soil erosion, and sewerage. The criteria were extremely specific, so that coders did not have to make judgment calls about different projects.

comes from Rodenburg et al.[41] Nations scoring high have larger land areas, more valuable

natural species diversity, and resources. The formula used to calculate the NCI multiplies

remaining natural areas (including water territory) by a biodiversity indicator. Remaining

natural areas are obtained by subtracting commercial lands from total national territory, and the

biodiversity indicator divides the total number of species in a country by the average number of

species for a country with a given territory. We also employ organic water pollutant emissions

per worker as a measure of environmental need, which should factor into the "shared interest"

calculation for both donors and recipients as well.

As a proxy for the credibility of a recipient's environmental policy commitments, we use

the percentage of CITES reporting requirements met by the recipient country. This measure is

intended to capture the extent of environmental policy (and attention devoted to environmental

issues) in a recipient county. We would expect that donors more concerned with effectiveness of

their environmental aid will be more concerned with the environmental policy in a country.

Further, we expect a stronger effect in the green model. The final variables we introduce are

intended to capture the economic policy and political institutions of the recipient country. We

expect that all other things equal, a country with better economic policy or government

institutions will tend to increase the share of aid they receive from a donor country. Our

measures are also analytically similar to those employed by Burnside and Dollar, who conclude

that "poor countries with sound economic policies benefit directly from [such] policies…

[because] aid is [not] dissipated in unproductive government expenditure."[42]

Any empirical work in the international development is plagued by missing data

problems. In estimating our models, we have chosen independent variables that balance

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[41] Rodenburg et al. 1995.
[42] Burnside and Dollar 2000: 847. The World Bank (1998: 13) also takes the position that "there is no value in providing large amounts of money to a country with poor policies."

tradeoffs associated with maximum coverage versus capturing the effect we believe is important in describing the allocation of environmental aid. For all of the models presented here, and for additional models not presented, we have estimated using listwise deletion (deleting observations that have missing data for any of the independent variables and using Markov Chain Monte Carlo simulation methods to impute missing data (for details, see Schafer). We believe that the imputation method we use provides more complete data coverage and provides a better picture of aid allocation. Table 1 provides a comprehensive list of variables by category that we are actively pursuing.

Results

The results presented in this section are preliminary and subject to change. The reader should note that we are actively working on these models. Table 2 presents the results for both environmental and green aid for the aggregate bilateral and multilateral donor groups. [43] Note that for all models, whether green or environmental, donors respond to recipient need, irrespective of a countries environmental need even when allocating environmental aid. However, we see a consistent pattern- donors respond to need in the gatekeeping stage. Higher pollution levels and a higher level of natural capital increases the probability that a recipient country receives a positive share of a donors aid. Better environmental policy (as evidenced by the CITES reporting parameter) also increases the probability of a positive share. As for the amount equation, multilaterals tend to respond to higher natural capital scores, and given that a country has reached a minimum level of need, tends to target those countries having less pollution problems. Multilaterals also respond to government institutions and economic policy in ways that we hypothesized. A notable result following from arguments earlier in the paper is

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[43] We have also estimated donor-specific models that will be reported in later versions of this paper.

that bilateral donors become increasingly responsive to environmental and political institutions when allocating IPG (Green) projects.

Table 3, presents the results when examining allocation patterns across two groups of multilaterals, those whose primary mission deals with public goods (termed MGA for multilateral granting agencies consisting of the Global Environmental Facility, the European Development Fund, the EU Fund for Central European Countries, the Montreal Protocol Fund, and development aid from UN Agencies) and those that provide a wide mix of projects (termed MDB for multilateral development banks consisting of the remainder of multilateral lending institutions). In the selection stage, all provide dollars to countries with higher natural capital scores, while MDB's target countries with less pollution per worker and MGA's tend to target countries with more pollution per worker. For both sets of 'green' results in the amount equation, we see that government effectiveness plays an important role in the allocation of aid money.

From both sets of results some generalizations can be drawn. First, when moving from environmental projects to the smaller subset of environmental projects having global or regional significance (GREEN), government effectiveness and economic policy- those factors likely influencing the effectiveness of the project- become increasingly important. Additionally, multilaterals are more responsive to environmental need than bilateral donors. Not surprisingly, this trend seems to be being driven largely from the MGA institutions.

Conclusions

We still have some work left to finalize the models. Beyond the addition of several more independent variables, we plan on testing for homogeneity of donor preferences and will be moving more toward donor-specific models of allocation. Further, we intend to test for

differences across types of aid, to see if environmental or green aid allocation is fundamentally different (with respect to the revealed preference of past donor aid patterns) than other types of aid.

Despite the apparent limitations of what we have so far, we already can see several interesting policy implications. First, for a citizen in a donor country that is really interested in providing money for effective environmental projects, whether they have global significance or not, it is better for their country to channel aid through the specialized multilateral granting agencies (like the Global Environmental Facility). Not only do this institutions target need but they target need selectively.

For recipients, regardless of whether money is coming from bilateral or multilateral institutions, having sound environmental, economic, and government institutions pays off with respect to getting larger shares of the foreign aid budget. Having a demonstrated, albeit not dire, environmental need leads to a larger share of donors' aid budgets.

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Figure 1.

Environmental Aid as a Percentage of Total Aid

Figure 2.

Dirty Aid as a Percentage of Total Aid

Figure 3.

Composition of Bilateral Environmental Aid (3-year Rolling Averages)

Figure 4

Composition of Multilateral Environmental Aid (3-year Rolling Averages)

Figure 5.

Composition of Multilateral Aid

—◯— Percent of Dirty Aid —▢— Percent of Environmental Aid —✳— Percent of Neutral

Figure 6.

Composition of Bilateral Aid

—◯—Environmental Aid —■—Dirty Aid —△—Neutral
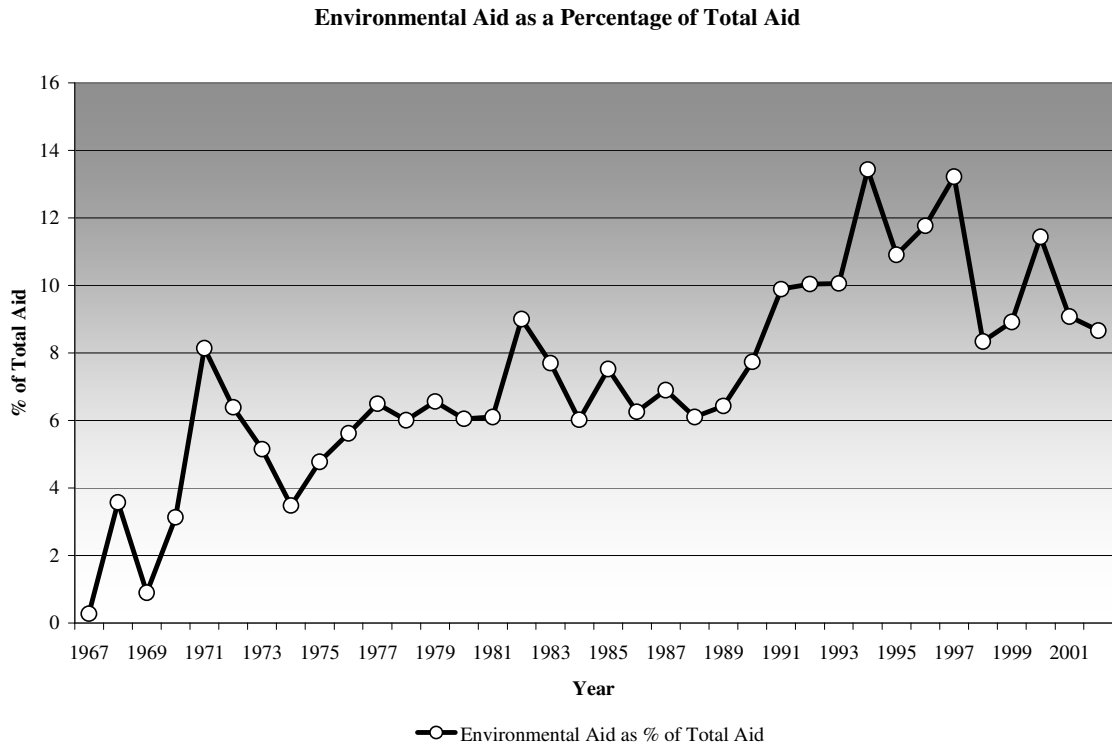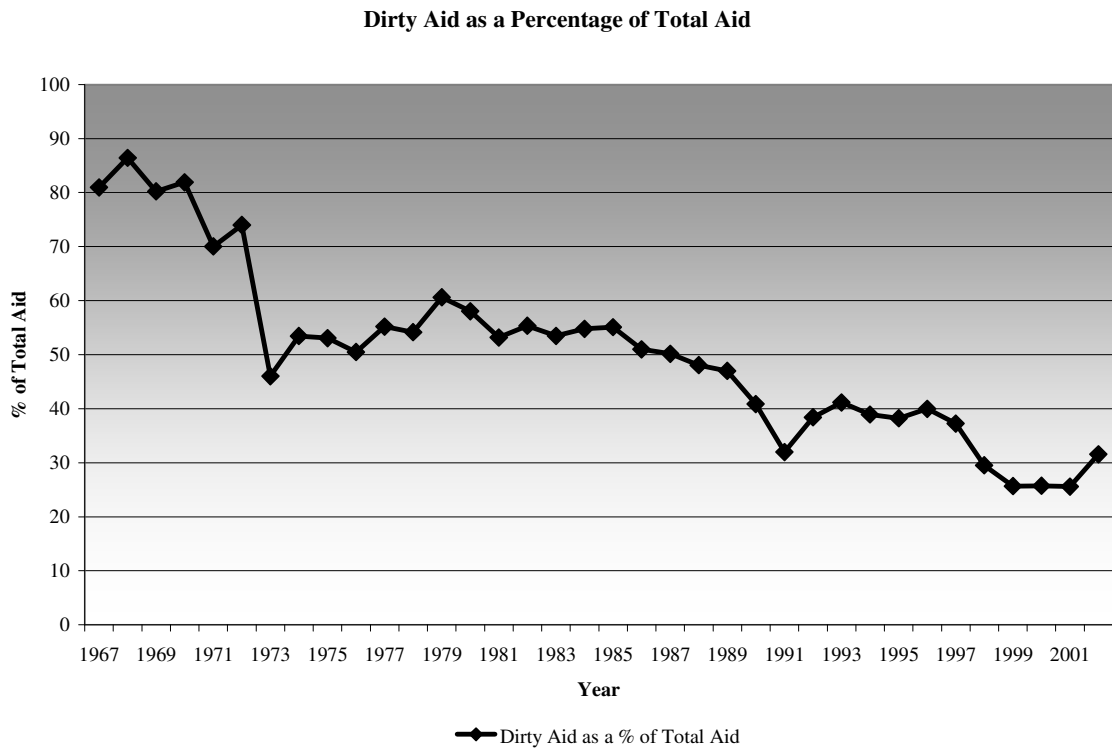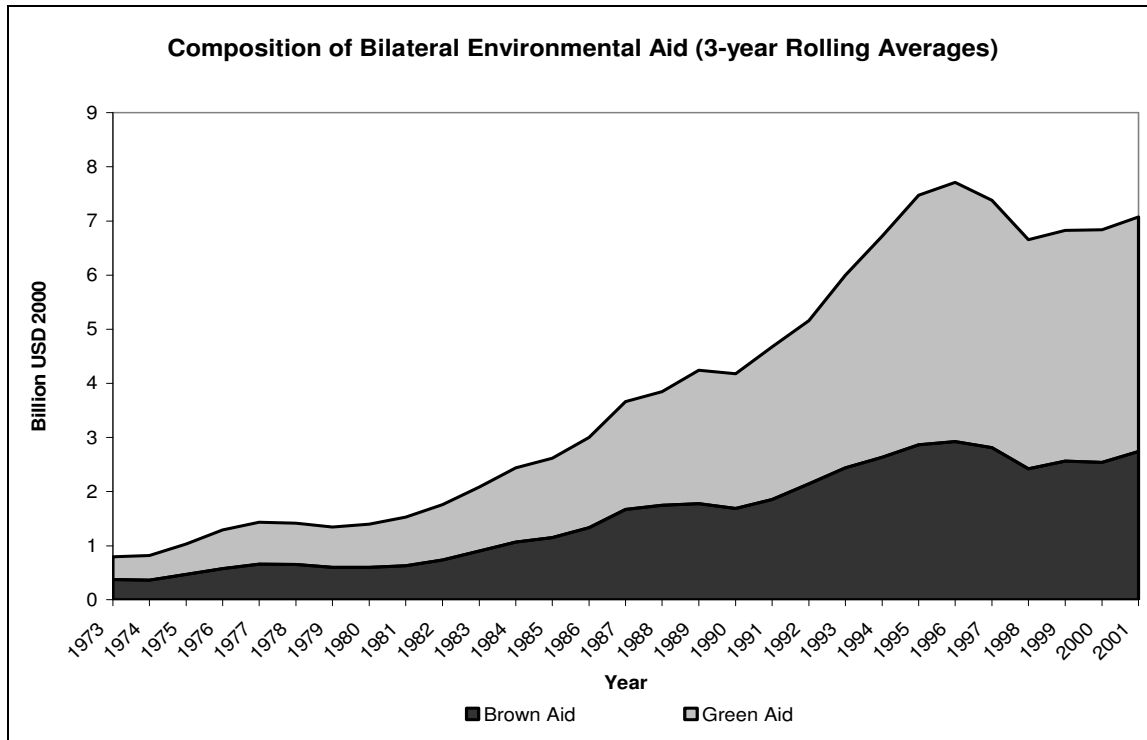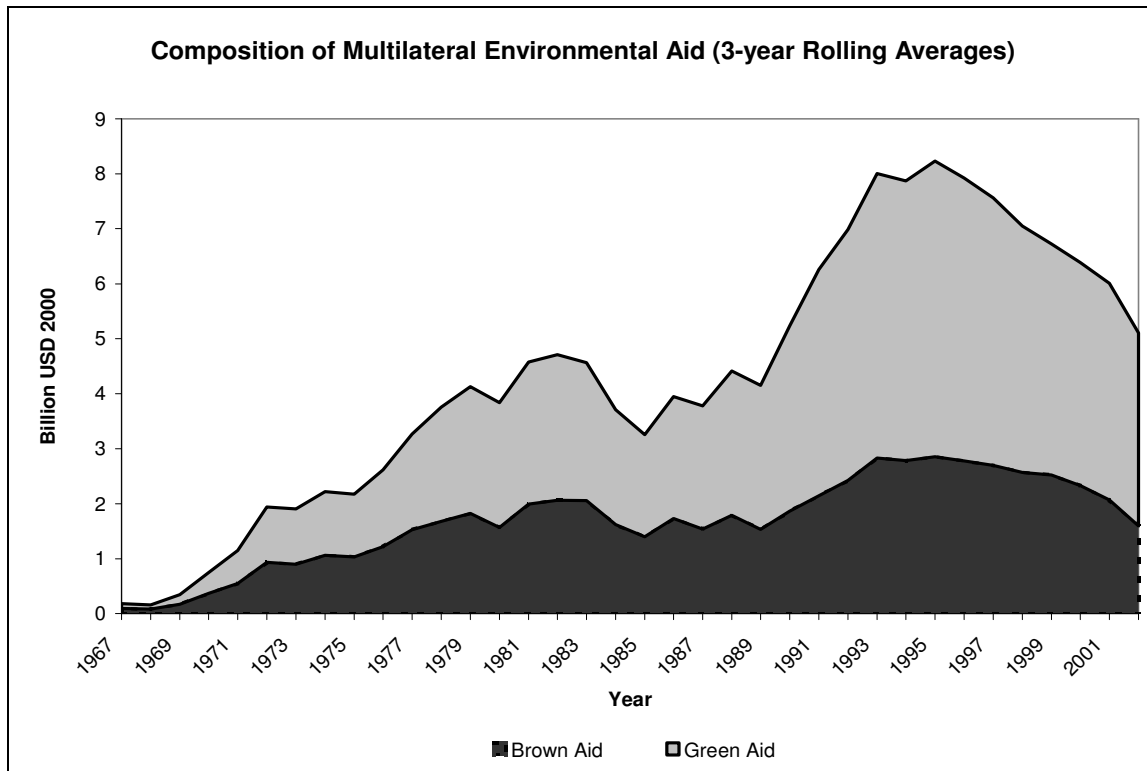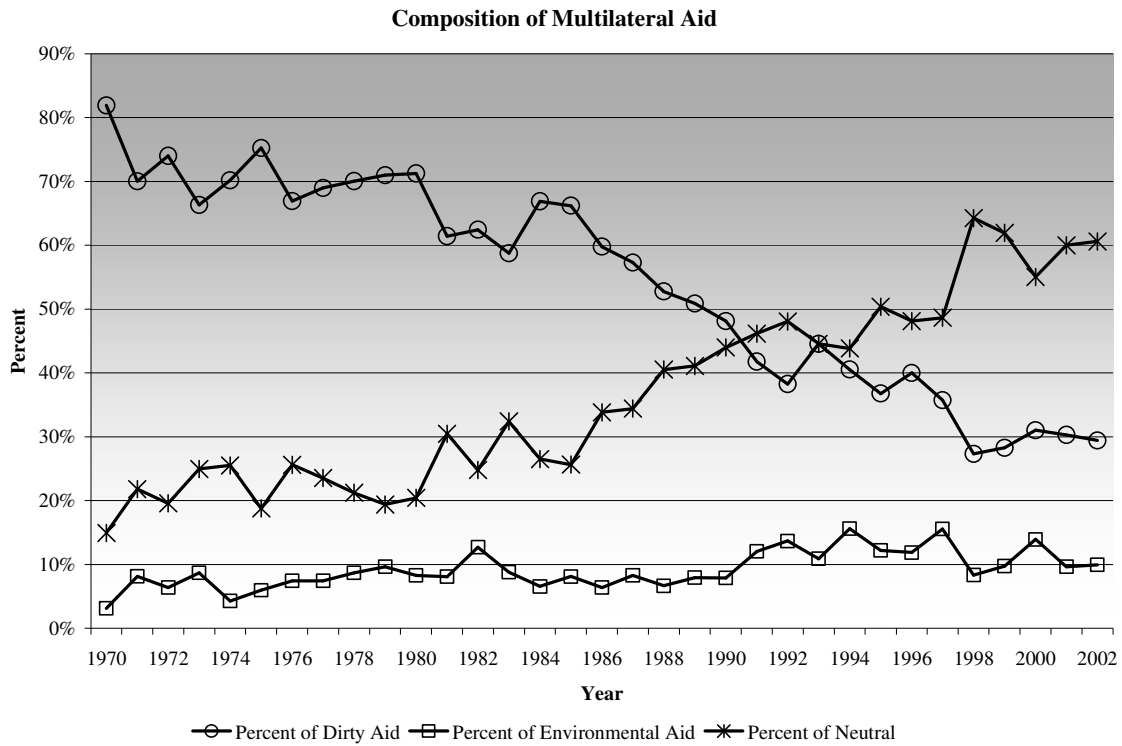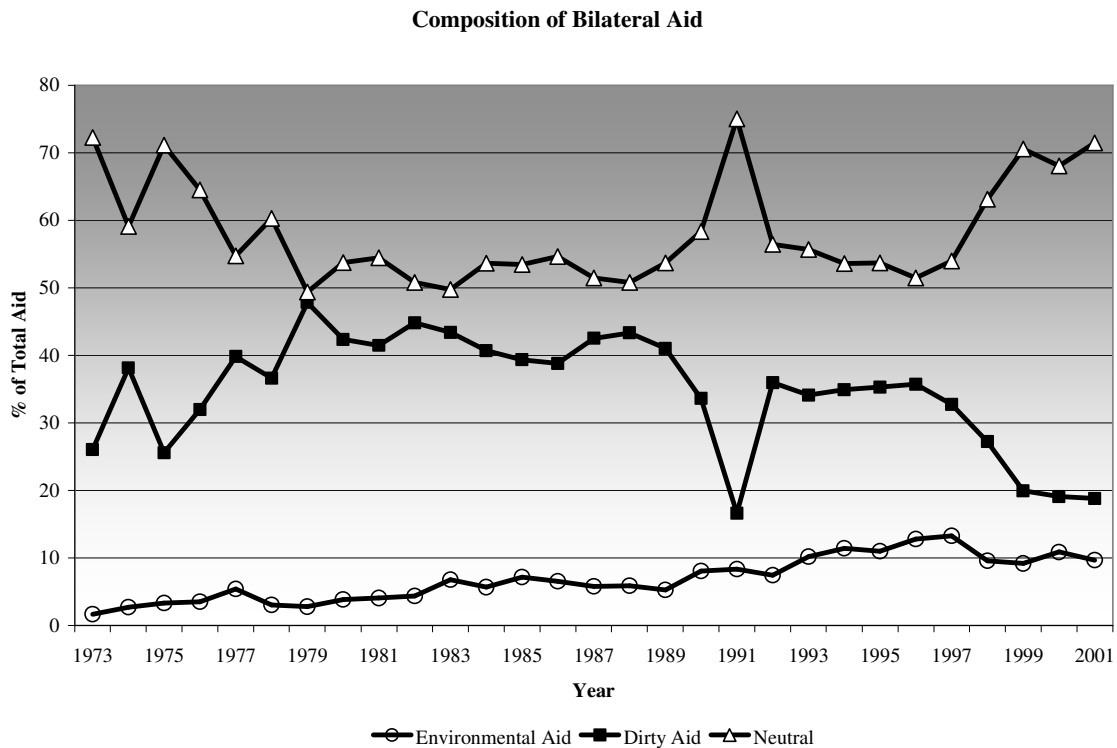
TABLE 1—DESCRIPTION OF DATA AND SOURCES

Variable	Description	Source
Country Need:		
GDPPPP	GDP measured in PPP	Global Development Network (GDN) database
GNI PERCAP	GNI per capita	World Bank World Development Indicators
IMR	Infant mortality rate per 1000 live births	Global Development Network (GDN) database
POPULATION	Total population	Global Development Network (GDN) database
Environmental Policy:		
EPI	Environmental Policy Index (EPI) score, measuring environmental policy of a country : 1 (greatest environmental policy), 0 (least environmental policy)	Nielson and Tierney (year)
CFC PRODUCTION	CFC production (in ODP tons, i.e. Metric Tons x Ozone Depletion Potential)	World Resources Institute (WRI)
CITES REPORTING	Percent of CITES reporting requirements met	World Resources Institute (WRI)
Econ Policy:		
TRADE OPEN	Trade Openness index score: imports + exports/GDP	Global Development Network (GDN) database
PROP RIGHTS	Property Rights index score: 1 (high property rights), 5 (low property rights)	Heritage Foundation
FDI	Foreign Investment index score: 1 (most foreign investment, 5 (least	Heritage Foundation
TRADE GDP	Total trade: (imports+exports) (% of GDP)	Global Development Network (GDN) database
Environmental Need:		
SCORE	Natural Capital Score: 1225 (most natural capital), 0 (least natural capital)	World Bank
EWI	Ecosystem Wellbeing Index (EWI) score: 100 (maximum), 0 (minimum)	Ecosystem Wellbeing Index (EWI)
NAT BIODEV INDEX	National Biodiversity Index score. Based on estimates of country richness and endemism in four terrestrial vertebrate classes and vascular plants; vertebrates and plants are ranked equally; index values range between 1.000 (maximum) and 0.000 (minimum). The NBI includes some adjustment allowing for country size. Countries with land area less than 5,000 sq km are excluded	UNEP-WMC
ORG WATER EMIT	Organic water pollution intensity indicator, measured as kilograms of organic water pollutant (determined by bacterial biochemical oxygen demand) emissions per day per worker	Wordl Bank World Development Indicators
FERTILIZER USE	Fertilizer use intensity (Fertilizer kilograms per hectare)	World Resources Institute (WRI)
LAND USE	Percent of land affected by agriculture	World Resources Institute (WRI)
TOTAL FOREST AREA	Total forest area in hectares	World Resources Institute (WRI)
Institutions:		
PRESS INDEX	Press freedom data are collected by Freedom House. The final index is a scale rating from 100 (free press) to 0 (highly controlled press)	Freedom House
CONTROL CORRUPT	Corruption in government score: 60 (low corruption), 0 (high corruption)	The IRIS Dataset
DEMOC	Institutionalized Democracy: 10 (democracy), 0 (nondemocracy)	POLITY IV
POLCONV 2002	Political Constraint Index (POLCON), plus two additional veto points (the judiciary and sub_federal entities): 1 (low constraint), 0 (high constraint)	The Political Constraint Index
CIVIL LIBERTIES	Freedom House Index of Civil Liberties: 7 (low civil liberties), 0 (high civil liberties)	Freedom House
GOVT EFFECTIV	Government Effectiveness Estimate: 2.5 (highly effective), -2.5 (highly ineffective)	Governance Matters Database
REGULATORY QUAL	Regulatory Quality Estimate:-2.5 (extremely poor record), 2.5	Governance Matters Database

Table 2: A Comparison of Bilateral and Multilateral Environmental and Green Aid

	ENV		GREEN	
	Selection Equation			
Variable Name	Bilat	Multilat	BILAT	MULTILAT
GDP/Population	-.00038**	-.00015**	-.00039**	-.00013**
	(-4.87)	(-3.58)	(-5.79)	(-3.22)
Water Pollution	2.3865**	1.0176**	1.7089**	.92577*
	(3.48)	(1.98)	(2.70)	(1.80)
Natural Capital	.05046**	.03799**	.04549**	.03733**
	(2.50)	(3.31)	(3.04)	(4.02)
Cites Reporting	.00413**	.00247**	.00412**	.00231**
	(3.24)	(2.94)	(3.47)	(2.96)
Govt. Effectiveness	.05922	.04353	.11062**	.04652
	(1.13)	(1.02)	(2.12)	(1.13)
FDI	9.2E-12	4.9E-11**	7.4E-12	5.0E-11**
	(.33)	(2.14)	(.27)	(2.34)
Constant	-1.4767**	-1.5431**	-1.8827**	-1.7309**
	(-8.21)	(-11.51)	(-11.09)	(-12.67)
N	25557	14391	25557	14391
	Amount Equation			
GDP/Population	-.00053**	-.00069**	-.00061**	-.00073**
	(-3.70)	(-4.75)	(-3.60)	(-4.60)
Water Pollution	.39605	-7.5454**	-.70814	-8.2382**
	(0.27)	(-4.62)	(-.48)	(-4.85)
Natural Capital	.12634	.1862**	.09205*	.20613**
	(1.64)	(3.21)	(1.93)	(3.18)
Cites Reporting	.00178	.00151	.00274	.00359
	(.52)	(0.54)	(.73)	(1.04)
Govt. Effectiveness	-.11287	.43561**	.0744	.35586**
	(-0.72)	(2.59)	(.49)	(2.03)
FDI	-1.3E-10	2.0E-10**	-1.2E-10	2.2E-10**
	(-1.149)	(2.40)	(-1.37)	(2.33)
Constant	-5.196**	-3.2021**	-4.2984**	-3.7108**
	(-12.43)	(-8.12)	(-9.41)	(-9.89)
N	4418	1545	1705	1066

* significant at 10% level
** significant at 5% level
t statistics in parenthesis

Table 3: A Comparison of Multilateral Development Banks and Grant Agencies

Selection Equation

Variable Name	ENV MDB	ENV MGA	GREEN MDB	GREEN MGA
GDP/Population	-.00024**	-.00012**	-.00025**	-.00015**
	(-3.81)	(-2.08)	(-2.76)	(-2.67)
Water Pollution	-1.1317*	2.7496**	-2.737**	2.0687**
	(-1.70)	(3.84)	(-2.54)	(2.94)
Natural Capital	.04536**	.03695**	.0542**	.0431**
	(3.10)	(2.66)	(3.40)	(3.12)
Cites Reporting	.00282**	.00268**	-.00296*	.00283**
	(2.40)	(2.51)	(1.86)	(2.71)
Govt. Effectiveness	.10006*	.00931	.0534	.06114
	(1.73)	(.16)	(.76)	(1.33)
FDI	5.7E-11*	4.9E-11	7.2E-11	5.7E-11*
	(1.81)	(1.55)	(1.64)	(1.90)
Constant	-1.506**	-1.3981**	-1.8617**	-1.3257**
	(-9.21)	(-7.78)	(-8.01)	(-7.19)
N	9963	4428	9963	4428

Amount Equation

Variable Name	ENV MDB	ENV MGA	GREEN MDB	GREEN MGA
GDP/Population	-.00051**	-.00053**	-.00073**	-.00062**
	(-2.75)	(-4.07)	(-2.30)	(-4.19)
Water Pollution	-4.4618**	-4.158**	-7.3598**	-4.8862**
	(-2.35)	(-2.42)	(-2.76)	(-2.81)
Natural Capital	.10652**	.21531**	.04324	.21561**
	(2.49)	(3.12)	(0.83)	(3.38)
Cites Reporting	.00292	-.0022	.00839*	.00996
	(1.19)	(-.08)	(1.95)	(0.61)
Govt. Effectiveness	.37169**	.23828	.37926**	.28919*
	(2.58)	(1.46)	(2.18)	(1.88)
FDI	9.4E-11	2.E3-10**	-7.6E-11	2.1E-10**
	(0.92)	(2.45)	(-.51)	(2.50)
Constant	-2.1763**	-4.7581**	-.86235	-4.7497**
	(-5.41)	(-11.70)	(-1.44)	(-11.55)
N	484	1061	122	944

* significant at 10% level
** significant at 5% level
t statistics in parenthesis

TABLE 4: AIDTYPE VALUES AND GENERAL CRITERIA	
Values	**General Criteria**
Environmental Strictly Defined (ESD)	—Considered environmental aid in preponderance of literature —Description suggests that aid is intended as "green" aid
Environmental Broadly Defined (EBD)	—Considered environmental aid in some of the literature —Significant environmental benefits despite not being intended as "green" aid
Dirty Strictly Defined (DSD)	—Project description contains explicitly dirty elements
Dirty Broadly Defined (DBD)	—Project not explicitly dirty, but supports an empirically dirty sector —Project harms environment, but not enough to classify as DSD
Neutral (N)	—Project has no apparent or direct environmental effects

TABLE 5: ENVAIDTYPE VALUES AND GENERAL CRITERIA	
Values	Broad Criteria
Green	—Environmental benefits of the project are regional or global
Brown	—Benefits accrue primarily to recipient