Principals and Interests:
Common Agency and Multilateral Development Bank Lending

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Abstract

We extend and apply agency theory to account for divergence between member-country environmental preferences and lending behavior at the multilateral development banks (MDBs). We treat governments in international organizations as members of a collective principal, an understudied concept in political science. A collective principal must overcome collective-action problems before and while delegating. We expect preference heterogeneity and voting fragmentation among member states to increase agency slack, thus accounting for divergence between member states' interests and MDB behavior and for differences among the MDBs themselves. We evaluate these hypotheses statistically with a sample of 1,100 loans from a new dataset of more than 7,200 loans issued by the World Bank, the Inter-American Development Bank and the Asian Development Bank from 1980 to 1999. To measure preferences, we employ two additional new databases of countries' revealed environmental policy preferences and voting shares in MDBs for the same period.

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> *Effective performance by any public agency depends largely upon the incentives and constraints that the agencies' sponsors impose upon it…If there are a number of significant sponsors with varying interests, effective performance becomes increasingly difficult to measure or even define, and the staff's own agenda becomes increasingly predominant within the constraints imposed by the sponsors.*
>
> James Burnham, former US Executive Director at the World Bank, 1994

Introduction

Governments in advanced industrial democracies began embracing environmentalism in the early 1970s. "Green" policy preferences among leading nation-states increased and converged steadily during subsequent decades. Yet only in the late-1980s did the multilateral development banks (MDBs) significantly alter their lending practices in favor of the environment. Moreover, substantial differences persist among the MDBs in their environmental lending. These patterns present puzzles for received international relations (IR) theory and for political science more broadly. In IR, neorealists and neoliberals expect that international organization (IO) behavior follows smoothly from the preferences of the great power(s). Constructivists expect that IOs should actually initiate and spread the normative changes and policy innovations, not follow them. Current theory in international relations thus cannot explain environmental patterns at the MDBs.

We employ agency theory to solve these puzzles. We argue that international organizations can be usefully conceived as agents, like firms in economics and bureaucracies in domestic politics. Member governments make up the principals that create IOs and delegate authority to them in order to solve specific problems and thus improve the principals' welfare. But member governments of an IO typically comprise a *collective principal*, and must overcome a host of familiar collective-action problems before and while they delegate authority to an agent.

However, analysts often assume away collective-action problems when considering delegation, presuming that the principal can be considered a unified actor. We find this assumption problematic in the context of sovereign states and IOs. Instead, coordination problems in a collective principal may magnify the difficulties of hidden action, hidden information and Madison's dilemma common to all delegation settings. Agency slack – where the agent works against the principal's preferences – may thus increase (Kiewiet and McCubbins 1991).

Hence, we simultaneously consider collective-action problems and delegation problems in the same model. We expect that preference heterogeneity and voting fragmentation among members of a collective principal should increase agency slack. Testing these hypotheses requires a method of determining the collective principals' preferences and some measure of agent behavior. Collective principal preferences are a function of the individual preferences of member states aggregated by some political process. We employ a new Environmental Policy Index (EPI) in order to measure

member-state preferences and we check the plausibility of our measure against public opinion data in member countries. In order to model preference aggregation through a majority-voting process we borrow from coalition theory in comparative politics, adapting pivotal-player models to our question of preference aggregation within collective principals at the MDBs. Once we have measured a collective principal's preference for the environment, we can compare this to the actual lending behavior of the MDB in question to compare levels of agency slack.

The development lending activities of MDBs provide a good setting for the evaluation of models focused on complex principals, or what has been termed "common agency." Donor-country preferences over development lending – particularly in the area of environmental protection – shifted markedly from 1980 to 1999. And since these IOs are distributing billions of taxpayer dollars from donor countries every year, we should observe efforts by these donors to alter the behavior of their agents in a direction that is consistent with new policy goals.[1] While analogous conditions occur within domestic political settings, few efforts have been made to study the responsiveness of IO agents to state principals (Vaubel 1994; Pollack 1997; Nielson and Tierney 2003). And little systematic empirical work has been done to test an explicit common agency model in the field of international relations.[2] Thus, MDB loan portfolios provide auseful set of observations with which to test our common-agency model, and the empirical focus of this study helps to judge the generalizability of the principal-agent framework.

Some scholars of international relations are surely skeptical about the utility of institutionalist models developed in the study of American politics. After all, international politics is characterized by anarchy where no leviathan is available to resolve disputes between states. The binding rules that characterize domestic politics are in short supply internationally. Hence, if our common agency model can explain the relative levels of agency slippage within different MDBs, then the prospects for its application elsewhere seem promising.[3] We propose that voting procedures within MDBs act as structures that can induce delegation equilibria. Thus, IO behavioral change that is responsive to shifting preferences within a collective principal should occur only when majority coalitions of member states agree about what they want agents to do.[4] In addition to preference heterogeneity, opportunities for agency slack should grow when voting shares in MDB executive bodies become fragmented.

We evaluate these hypotheses by simultaneously estimating, through the Heckman method, the type and amount of a sample of more than 1,100 from a dataset of 7,200 loans issued by four multilateral development banks over twenty years (1980 to 1999).

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[1] Of course, while Western donors are not the only members of MDBs, they do have disproportionate power on most MDB executive boards because of the weighted voting systems that make the G-7 countries part of almost every winning coalition. When we operationalize our collective principal model we consider the weighted preferences of all member states.

[2] For an exception see Martin 2004.

[3] For similar efforts to integrate explanations of politics from across the sub-disciplines of political science see Milner 1998; Lake and Powell 1999; Pollack 2002; and Lake and McCubbins 2004.

[4] This assumes that decisions are taken by majority vote. If a supermajority or unanimity is required in order to change the status quo, then member states face more significant collective action problems and IO bureaucrats are presumably more free to select their preferred policy.

In addition to compiling an MDB loan database, these tests required that we construct two additional databases: an index of cross-national environmental policy preferences that varies over time and data on voting shares at the MDBs. We turn now to the tasks of model formulation and hypothesis testing.

International Relations Theory and IOs

In recent debates among IR theorists, IOs have become a focal point (Mearsheimer 1994; Mearsheimer 1995; Keohane and Martin 1995; Martin and Simmons 1998; Barnett and Finnemore 2004). However, in discussing the importance of IOs, the debate among neorealists, neoliberals and constructivists has centered on two questions. First, can IOs effectively coordinate or alter states' actions? And second, are IOs merely a reflection of the balance of power and thus ephemeral and epiphenomenal, or are they meaningful institutions resilient to shifts in the balance of power and perhaps even strategic actors in their own right?

Neorealists have long denied that IOs have significance for international relations. States are the only actors that matter, and IOs merely reflect the interests of the most powerful state(s) (Krasner 1985; Mearsheimer 1994; Mearsheimer 1995). The only international institutions that truly matter for neorealists are military alliances. But such alliances are famously brittle and short-lived, responding only to the interests of the states that created them, and then only when immediate interests match prior commitments (Walt 1987). Neorealism's state-centric ontology has reduced its ability to explain the increasing cooperation and multilateral governance that we frequently observe in the world today.

Neoliberals and constructivists have exploited this weakness. Constructivists argue that IOs develop their own norms of appropriateness and thus become important means for spreading related norms to nation states and other international actors. IOs act as "teachers" of norms or as "platforms" through and from which normatively motivated actors can press their causes (Finnemore 1993; Risse-Kappen 1996; Finnemore and Sikkink 1998). IOs often act at the vanguard of normative and ideational movements, becoming important sources of change in international relations (Finnemore 1993, 1996).

Neoliberals adopt a nearly identical ontology to neorealists. Yet, neoliberals have shown both theoretically and empirically that international cooperation is not only possible under anarchy, but common (Keohane 1984; Oye 1986; Martin 1992). More importantly, international institutions facilitate cooperation by reducing transaction costs, lessening information asymmetries and providing quasi-legal frameworks for governments (see Keohane 1984; Krasner 1984; Richardson 1999). However, the adoption of the state-centric ontology hampers neoliberalism's ability to fully explore the mechanisms through which IOs influence outcomes in world politics. Even if IOs can be seen to do things – independent of directives and interests of nation states – there is no place in the state-centric ontology to accommodate such independence.[5]

This oversight is unfortunate and ironic. Keohane (1984) proposed a model of international relations that drew heavily upon the theory of the firm in microeconomics, where transaction costs, information asymmetries and property rights play central

[5] This argument is developed by Nielson and Tierney (2003) and Barnett and Finnemore (2004).

explanatory roles. In developing the theory of the firm, Coase and others first identified these problems and then moved on to mechanisms through which shareholders of firms can control managers. These efforts produced agency theory. But the corresponding next step in neoliberal instituionalism, despite being rooted in theory of the firm, remains underdeveloped.

International organizations pose significant difficulties for scholars interested in adapting and applying the insights of agency theory (Pollack 2003; Hawkins et. al. 2004). In particular, IOs present the problem of common agency, where IOs typically resemble a collective principal (Bernheim and Whinston 1986; Kiewiet and McCubbins 1991; Dixit, Grossman and Helpman 1997; Lyne 2003). Modeling IOs as agents thus requires the *simultaneous* consideration of delegation problems *and* collective action problems.

Toward a Model of Collective Delegation

Common agency – where more than one principal delegates authority to an agent – is everywhere in politics. Voters delegate to legislators, legislators delegate to party leaders, politicians delegate to bureaucrats, and groups of states delegate to international organizations. Despite the ubiquity of common agency, analysts have only recently begun grappling with the concept in an explicit way (Bernheim and Whinston 1986; Dixit et al 1997, 1999). Moreover, when analysts do address the question of common agency, they often conflate bargaining games involving multiple principals with those entailed by a collective principal. However, these two situations are conceptually distinct (Kiewiet and McCubbins 1991, 26-27).

Multiple principals are independent of one another, and each holds a discrete contract with the same agent. Each principal can unilaterally alter his or her own contract with the agent without the consent of other principals. Alternatively, members of a *collective principal* cannot act independently from one another, but must first solve collective-action problems before affecting agents' incentives. Members collectively hold only a single contract with the agent, and no individual member of this group can alter the contract unilaterally. In order to re-contract with their agent, members within a collective principal must act as one – usually by majority vote or some analogous decision rule. In other words, the members must form a *voting coalition*.

Collective principals are the most common type of principal that we observe in the study of politics. Yet they present under-theorized problems for members of the collective principal. While all members might be better off if they could delegate decision-making authority to a specialized agent, collective settings compound the standard principal-agent problems of hidden action, hidden information and Madison's dilemma. Hence, members will have difficulty coordinating in order to write contracts, screen and select agents, monitor agent actions, sanction deviant behavior, and redesign administrative procedures that will guide agent activities. Any factor that systematically inhibits cooperation within a group should be examined as a potential cause of agency losses (Kiewiet and McCubbins 1991).

Lamentably, the typical analytic strategy employed by researchers to resolve this collective principal problem is to assume it away, expecting that coordination mechanisms have evolved that allow for resolving inherent collective-action problems (Calvert et al. 1989; Hammond and Knott 1996; Brent 1999). That is, analysts often presume that a collective principal – say, an electorate, or a legislative party – can act as

one, and thus can be treated as a single principal. This assumption is problematic, because there is wide variance among collective bodies in their ability to solve coordination dilemmas (Olson 1964). And, as noted, collective-action problems may dramatically compound problems of agency slack. Resolution of collective-action problems in delegation settings should not be assumed, but either derived from deductive models or uncovered inductively through multiple observations of collective principals attempting to delegate authority to an agent.

These issues prompt the question we seek to answer here: Under what conditions will delegation from a collective principal succeed? Alternatively, what factors within the collective principal will increase the size of agency losses? Within a collective principal the incentives to free ride should grow proportionately with the *fragmentation of the group* (Olson 1971; Hardin 1982). As important, the *similarity of preferences* among members of a collective principal influences the ability of that principal to control its agent. As preferences within the principal become more heterogeneous, the size of agency losses should increase (Snidal 1985; Martin 2004).

The central methodological problem with testing any collective delegation model follows from observational equivalence in equilibrium. Without observing a principal that is actively altering an agent's incentives, the analyst cannot know if inaction on the part of the agent stems from the principal's satisfaction or from the inability to coordinate its many members. Thus, evaluating common agency models requires that we examine cases where both the agent's actions and the collective principal's preferences vary. By looking at four different MDBs over time we can observe such variation. Further, the underlying independent variables – fragmentation and preference heterogeneity – also vary over time and across institutions.

Measuring Collective Preferences

Answering the neglected question, "does collective delegation work?" requires two components. First, we must focus on the preferences and preference distribution of members within a collective principal. Second, we should consider the institutions that can provide structure for voting equilibria among the members. For the first component, we derive government environmental preferences for international environmental protection by measuring domestic policy outcomes. We infer that countries most interested in environmental protection at home will be similarly motivated to protect the environment outside their own borders. Hence, the "revealed preferences" we derive are based on an index of policy outcomes. We discuss this at length below.

For the second component, we draw on coalition theory in comparative politics, which suggests ways in which coalitions can be built given majority voting rules. Drawing on theoretical and empirical work in comparative politics, we explore a promising model for predicting voting coalitions within a collective principal: the pivotal-player approach.

Some simplifying assumptions will help in constructing our collective principal model. First, we assume unidimensional policy space, where actor preferences can be arrayed along a single policy dimension. The coalition literature makes it clear that multidimensionality complicates coalition formation considerably (Laver and Schofield 1991; Krehbiel 1988). Our single policy dimension of environmental protection makes

this assumption useful for our initial empirical tests, even if many more policy dimensions are in play at the MDBs.[6]

Second, we assume that our actors form voting coalitions, not governing coalitions. Because voting takes place on discrete policy questions that can be arrayed in unidimensional space, and where the votes do not affect executive tenure (as in confidence votes), little incentive exists for the formation of voting coalitions that are non-contiguous (see Laver and Schofield 1991). That is, we do not expect that actors will vote against a measure if it is closer to their ideal point on the issue continuum than other actors voting favorably. Coalitions will not drop "dummies," or potential members that are not necessary to reach the majority threshold but that nevertheless are aligned in issue space (see Laver and Schofield 1991, 98-101). While voting coalitions are arguably less stable than governing coalitions, they do less violence to the assumptions of preference aggregation models than governing coalitions, where office holding is a key consideration.

Our pivotal-players model injects a concern for veto players into coalition formation. That is, of the many possible connected majority coalitions that might form, some potential members might be "pivotal" in the sense that the combination of their centrist position and their size makes them very attractive coalition partners. It will prove difficult to form connected coalitions without them. Thus, pivotal players can veto a large set of the possible coalitions that might form and can extract policy benefits from their coalition partners that their size alone would not necessarily predict. Large centrist players thus have a strong advantage over similarly large extremist players. In terms of measuring coalition preferences, the privotal-players model counts all possible connected coalitions that might form. Then, it examines how many of the potential coalitions collapse when a party at the far end of the coalition exits. These are the pivotal players. In using this model to determine preferences for a group, the analyst can then weight each player's preferences by the proportion of possible coalitions for which it proves the crucial defector (Garrett and Tsebelis 1996).

We provide a simple example of this technique in Table 1. First, the hypothetical principals are arrayed according to their preferred outcome along a ten-point scale in issue space. Next, all possible contiguous coalitions, where the combined voting shares are greater than .50, are identified. In this example there are five such potential coalitions: (1) ABC, (2) ABCD, (3) ABCDE, (4) BCD, and (5) BCDE. For the first coalition, either actor A or actor C could prove pivotal by defecting. For coalitions 2 and 3 there are no critical defectors (no defections drop the coalition below .50). For coalition 4 either actor B or D could prove pivotal. And only actor B could critically defect for coalition 5. The total number of potential critical defections is 5, with actors A, C and D each proving pivotal in 20 percent of the critical defections, and actor B in 40 percent. Actor E is never pivotal. We then weight each actor's ideal point by the

[6] If trading or logrolling of policies between issue areas occurs extensively in the voting body, the assumption of unidimensionality grows problematic. However, in the case of MDBs, voting in the Executive Board occurs on discrete loans, so omnibus packages do not occur. While trading may indeed take place at the margins, formal institutions mitigate against it. Still, unidimensionality is a useful assumption even where logrolling is extensive, such as the U.S. Congress. Fortunately, the practice in our topic area makes this assumption more both useful and plausible.

"pivotalness" share. For example, Actor A's ideal point of 2 is multiplied by its pivotalness share of .20, producing a product of .40. Finally, we sum each of these products to produce an overall preference for the collective principal. In the hypothetical example in Table 1, the pivotal-weighted collective preference is 5.2.

Table 1: Hypothetical Pivotal Players

Actor	Vote Share	Ideal	Pivotal	Ideal * Pivotal
A	0.2	2	0.2	0.4
B	0.3	5	0.4	2.0
C	0.1	6	0.2	1.2
D	0.3	8	0.2	1.6
E	0.1	9	0.0	0.0
			Sum	**5.2**

Actors' Ideal Points:

	A			B	C		D	E	
1	2	3	4	5	6	7	8	9	10

As the *voting preferences converge* within the collective principal along an issue dimension, we expect that agent behavior will adjust to reflect the preference agreement among members of the principal. Preference agreement may also allow the principal to convey clear and credible signals to the agent regarding desired behavior. Coalition preference agreement narrows the range in which agents can set policy. Close proximity of the members of the collective principal within a given issue space should limit agent action to that space and should reduce the probability of agency slippage.

However, interest agreement among numerous actors within a collective principal is not analogous to a single principal. Coordination is not costless and collective-action problems cannot be assumed away. In fact, a fragmented[7] principal, where members are in complete agreement about what the agent should do, cannot reduce agency slack with the same efficiency as a single principal. The former case provides many more opportunities for agency slippage than the latter. When principals must coordinate before they screen and select, monitor, draft procedural checks or re-contract, resources that could have gone toward mitigating agency slack must be expended in coordination. Thus, fragmentation within a collective principal enables greater shirking – and manipulation of the principal – by the agent (Lyne 2003; Lyne and Tierney 2002).

Thus, we argue that as the *voting fragmentation grows* within the collective principal, agency slippage should be expected to increase. As the concentration of voting power among the leading shareholder states declines, the probability declines that any one state or group of states will be able to form a privileged group (Olson 1965; Snidal 1985).

[7] Fragmentation refers to the number of actors required to form a winning coalition. Hence, as the number of powerful states holding larger vote shares within a collective principal decreases, we have greater fragmentation. At the extreme, a single hegemonic state might have enough votes to unilaterally authorize an agent to act. As membership of IOs expand and as the most powerful states decrease their voting, fragmentation increases.

Hence, altering agent behavior toward a collective preference point is a collective good and its provision is subject to the familiar pitfalls. In the absence of a hegemon or a privileged group collective action is harder to organize.

We add a final caveat here. Preference agreement matters if and only if there are established mechanisms for aggregating the collective principal's preferences. Collective-action problems can be overcome in very large groups, such as domestic polities, but usually only if voting rules (or some institutional or normative substitute) channel voting preferences in predictable and efficacious ways. The same is true of international organizations. Preference agreement matters in IOs, but only because a pre-existing set of institutions aggregate members' desires. In the absence of such institutional mechanisms, we are skeptical about the importance of changing interests. Absent prior institutions, latent preference agreement will likely remain latent. In sum, fragmentation and/or preference heterogeneity among members of the collective principal will enable agency slack. In order to apply these insights, however, we will need to make assumptions about the preferences and incentives motivating actors in our empirical domain: the multilateral development banks.

Actors and Preferences

Whole forests have been killed attempting to specify the preferences of citizens, interest groups, parties, bureaucracies, bureaucrats, politicians, and nation-states. In future iterations of this project we will provide a more lengthy derivation of actor preferences. For now, few will be surprised by the assumptions we make here.

Generally, all the actors in our model make purposive choices in pursuit of their own interests – but intentions do not necessarily equal outcomes. The ability of any actor to achieve its goals is constrained by its relative power, institutional rules, and the expected and actual choices of other actors pursuing their own ends. In this sense, all the actors in our model are making strategic choices – their ability to achieve their own ends is conditioned by the actions that others take (Lake and Powell 1999). This assumption applies to representatives of national governments, but also extends to leaders and staff members at the MDBs. IO agents are strategic actors in their own right (Hawkins et al 2004) and their strategic choices are likely to shape outcomes in IR – in our case the type and size of development loans.[8] Our substantive assumptions flesh out this general strategic choice perspective and suggest how hierarchical delegation contracts can structure the strategic choices of the actors in our model.

Legislators, presidents, prime ministers, party leaders within national political systems, and chief executives within MDBs all seek at a minimum to maintain their positions of authority by serving those groups or individuals who are empowered to remove them (Mayhew 1974; Roeder 1993; Bueno de Mequita et al 2003). If leaders stray too far from the preferences of the "selectorate," they are at risk of being replaced. Staying in the leadership position is a necessary condition for achieving personal or

[8] Senator Patrick Leahy recognizes the ability of IO agents to shape outcomes while discussing the efforts of World Bank President, James Wolfensohn, to change the practices of the Bank. "Frankly, I am concerned that despite his best intentions, the Bank bureaucracy continues to put up fierce resistance and may in the end succeed in thwarting many of his reforms" (Leahy 1997).

policy aims that might also be driving behavior. Hence, in equilibrium we assume that leaders will attempt to stay in office.

Staff members of MDBs seek to maximize their budgets and minimize the uncertainty about the substance and security of their jobs (Niskanen 1971; Miller and Moe 1983; Allison and Zelikow 1999). Many – but not all – of these motives can be reduced to the size of their organization's budget. MDB bureaucrats will be interested in increasing the size of their own organization's budget (and may be even more interested in avoiding reductions) for several reasons. First, the bureaucrat's own compensation and future career prospects may be tied to the size of his/her organization's budget. Second, if individuals are motivated by non-material ends such as power or prestige, then leading a larger and more powerful organization may provide precisely that type of ego gratification. Third, most bureaucrats actually care about the mission of their own organization, since it pursues goals that may have initially attracted them to public service, such as reducing poverty. Staff members who work in MDBs tend to be interested in questions of development, and they understand that the stakes are high in their field. It is not hard to understand why task managers and even Presidents at MDBs believe that increased funding for their organizations will be money well spent.

Relatedly, we assume that the key MDB staffers in our story – task managers, with roles similar to loan officers at commercial banks – seek to pursue their careers within the banks in two ways. First, task managers pursue the types of loans to which they are accustomed, usually in the traditional infrastructure sectors of industry, mining, urban development, irrigation, and transportation. Second, task managers take up larger projects over smaller loans. Larger projects are much more visible within the banks, more readily serve institutional interests of moving large amounts of money to recipients, and function to establish managers as competent administrators of complicated responsibilities. Larger loans build resumes. While assumptions do not have to be "true" to be useful, this one is well grounded in the qualitative literature on the development banks and corroborated by scores of interviews we have performed at the MDBs over the last decade (See Ascher 1992; Rich 1994; Fox and Brown 1998; Nielson and Tierney 2003).

Multilateral Development Banks and the Environment

Given these assumptions, we evaluate the applicability of our collective delegation model by examining behavioral change at the Multilateral Development Banks from 1980 to 1999**.** The MDBs offer a particularly useful place to examine the value of our argument. First, international relations settings likely possess the thinnest institutionalized structures that we should expect to induce decisionmaking equilibria. Members of collective principals in international organizations thus likely face substantial collective-action problems compared to their domestic counterparts in legislatures (Maltzman 1998) or on corporate boards (Gourevitch 2003).

Moreover, MDBs are among the largest and allegedly most autonomous of all international organizations (see Ascher 1992; Barnett and Finnemore 1999). The World Bank alone employs more than 10,000 full-time staff members and issued an average of $20 billion per year in development lending from 1980 to 1999. The Inter-American Development Bank and the Asian Development Bank are each roughly half the size of the World Bank. Moreover, approximately 80 percent of MDB lending capital is raised

on world debt markets by leveraging AAA bond ratings, making the MDBs financially independent of member states to a significant degree. Further, the MDBs as a class are known for the highly technical nature of their enterprise, where specialized expertise makes monitoring by principals difficult. MDBs therefore constitute unlikely places to encounter evidence for our model, which expects agents to be responsive to principals under the conditions we specify.

The empirical focus of this study – the changing patterns of lending behavior at the MDBs – offers a natural experiment of sorts in the area of environmental protection. Member states pressured MDBs to champion environmental projects in their lending only after the mid-1980s. This clear break allows us to track both shifts in member-state interests along with their effects, if any, on subsequent MDB behavior. Specifically, in the wake of World Bank-sponsored environmental fiascoes the Bank drew strong criticism from environmentalists (see Rich 1994; Wade 1997; Fox and Brown 1998). Moreover, as societal interests in the developed world shifted toward environmentalism, environmental groups placed increasing pressure on donor-country governments to compel the Bank to adopt more environmentally sound practices.

However, agency theory suggests that these pressures should manifest only to the degree that environmentalists gain influence in domestic political contexts. Thus, we do not focus on demands from interest groups, but instead on the policy interests of governments – who are the proximate principals of the multilateral development banks (see Nielson and Tierney 2003). Hence, increasing and converging environmental interests by member states forming voting coalitions on MDB executive boards should improve the probability of environmental loans being issued, giving way to the following hypothesis:

H1: INTEREST AGREEMENT AND ENVIRONMENTAL LOANS. As the policy interests of majority coalitions shift toward and converge upon environmental concerns, the frequency of environmental loans at MDBs will increase.

Next, as voting fragmentation on an executive board increases, board members should find it more difficult to solve collective action problems that could thwart their interests, making it harder to monitor and sanction the agent. With fragmentation of voting shares, agency slippage should manifest itself in larger environmental loans on average. This is due to the employment incentives of MDB staff members, noted earlier. The more money that task managers and country directors push out the door, the higher the probability of promotion within the organization.[9] Larger loans allow MDB officers to move greater amounts of money more quickly and thus move up the organizational ladder (see Ascher 1992; Rich 1994; Upton 2000; Weaver 2003). This pattern should occur despite pressure from member governments for a shift in lending priorities toward smaller, more targeted loans that allegedly have more positive environmental impacts.

[9] While the World Bank and other MDBs have made numerous efforts to change the disbursement culture at MDBs by altering personnel rules and diluting traditional authority patterns within these organizations, our interviews with Bank personnel suggest that such efforts never completely succeed and sometimes do fail completely. As Our interview data is consistent with the conventional wisdom about the World Bank on this issue (Upton 2000; Weaver 2003). As Winters (1997) explains, "The more money staffers move, the more status they have within the Real Bank."

Thus, by examining fragmentation in voting shares on the executive board we have very basic conceptual tools to address one important problem faced by collective principals. The second hypothesis follows.

H2: FRAGMENTATION AND AGENCY SLACK. As fragmentation of voting shares increases on executive boards, MDB environmental loans should become larger on average.

We next apply these hypotheses to a dataset of MDB loans.

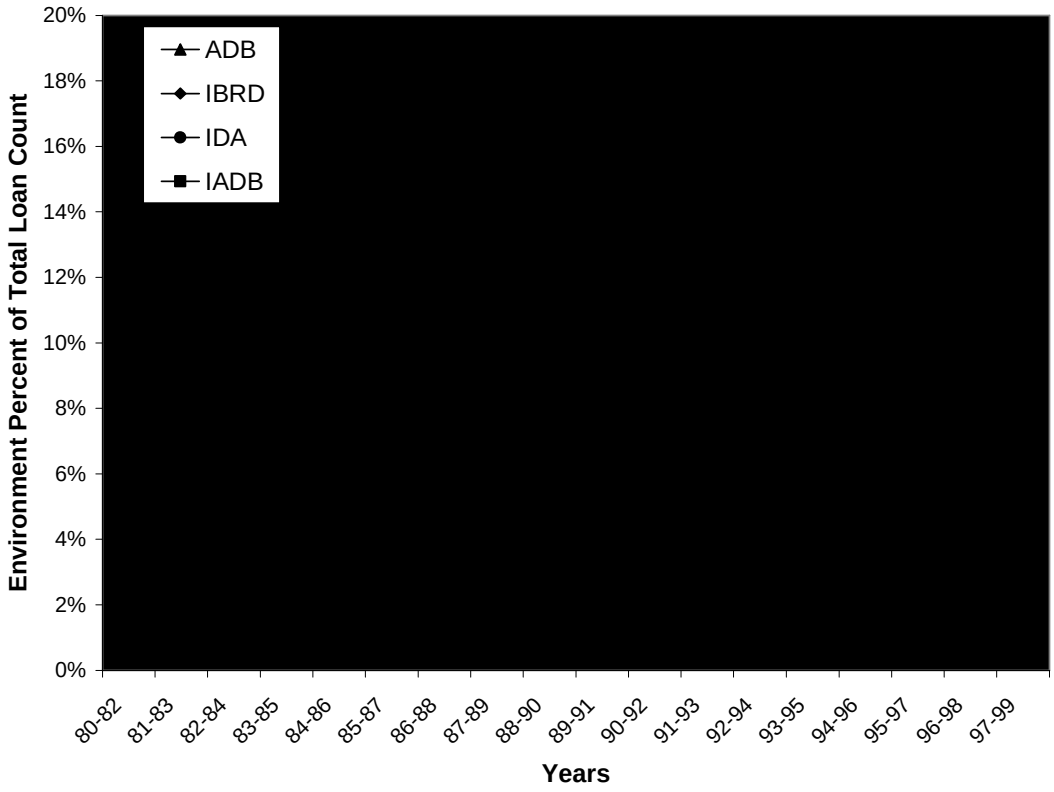
Data and Methods

We evaluate these hypotheses with an 1,100-loan sample from a new dataset of more than 7,200 loans issued by the World Bank, the Inter-American Development Bank and the Asian Development Bank from 1980 to 1999, focusing specifically on environmental lending by the banks. We also employ two additional new databases: the first measures the environmental policy preferences of member states year-by-year since 1980, the second tracks member states' voting shares in the MDBs over time. We employ two-part estimation and a Heckman-selection model to the data.

Dependent Variables

We have defined environmental loans as MDB projects whose primary intent is to address the following issues: air and water pollution, loss of forests and natural habitats, degradation of natural ecosystems, and insufficient legal and institutional capacity to implement environmental regulations. In general, these "stand-alone" environmental projects are sufficiently described in the banks' annual reports, which are the sources we used to gather all loan data. Only a handful of coding questions arose among the 566 loans coded as environmental, and those were almost all in the period before 1987 – when environmental lending was not as high an MDB priority. In those early cases, we coded questionable loans as environmental, since our argument about increasing and converging environmental interests predicts fewer loans in that earlier period. Thus, if there are problems with the validity of our measurements, these validity problems will make it *more difficult* to support our hypotheses. Figure 1 displays the portion of loans committed to these stand-alone environmental projects over time at the four MDBs.

Figure 1:
Environmental Percent of MDB Loan Counts, 1980-1999
(Three-Year Rolling Average)



The descriptive statistics in Figure 1 reveal a generally upward trend in the percent of loans committed to environmental projects until the mid-1990s, when all four trends either level off or decrease. Of course, unlike a regression equation, Figure 1 does not indicate the shape of the disbursement curve in the presence of control variables. We discuss this below.

Several factors are not visible in the graph and may, in part, account for the decrease in environmental lending that occurred in the mid-1990s. First, MDB environmental lending has become "marbled" throughout traditional sectors such as energy, transportation, and agriculture. The World Bank calls this integration of environmental spending into traditional sector loans "mainstreaming." Statistical evidence provided by the MDBs suggests that such marbled environmental spending is becoming a major component of total environmental spending (Ancharya 2001; World Bank 1995; World Bank 1997; Nielson and Tierney 2003). However, due to the Bank's unwillingness to release the specific line-items of loans prior to 1993, we were unable to construct a satisfactory database to capture the mainstreamed spending from 1980-1993. Though we strongly suspect that almost all marbled spending occurred after 1993, we chose not to include this environmental spending in order to avoid the criticism that our data was not comparable between the two time periods.

That said, there is little question among observers that the amount of money devoted to environmental assessment, protection and cleanup in these traditional loans has

increased since 1987 and increased since 1993. The fact that our statistics do not capture the marbled portion of environmental lending certainly understates the strength of the hypothesized relationships measured here. Our results and conclusions are therefore likely conservative.[10]

Third, in the early 1990s member governments created an alternative funding mechanism to address environmental issues. Between 1991 and 1998, the Global Environment Facility (GEF) issued 563 additional environmental grants (not loans) totaling more than $2.16 billion, with the two thirds of these grants approved after 1994. The World Bank administers roughly 60 percent of GEF project moneys. These disbursements may also substitute for Bank environmental projects and thus compensate for the downturn in environmental lending at the World Bank and IDB that we observe after 1994 in Figure 1. The creation of the GEF as a specialized facility to transfer resources and technology for the environment from developed to less-developed countries may reflect an institutional division of labor (Aggarwal 1998). Once the GEF began to perform some of the functions previously performed by other MDBs, we should not be surprised by an absolute decline in the amount of money being disbursed by the traditional MDBs. It is not likely a coincidence that the dramatic increase in GEF grants in 1994 corresponds perfectly with the downturn at the World Bank and the IDB.

While we are interested in these GEF grants, they are very different creatures from MDB environment loans in terms of size and scope, particularly because they are grants and not loans, the time period does not match the period studied here, and *all* of the GEF grants are environmental – leaving no categories for comparison. Hence, we have excluded the GEF data.

As an additional caveat, we note here that controversy surrounding the aims of MDB-funded forestry-sector projects, even following substantial reforms in 1987, leads us to exclude them from the environmental category (see Korten 1992; Rich 1994, 160-66). Given the limited information provided by the MDBs regarding forestry loans, particularly prior to 1993, it is often difficult to assess which loans are intended primarily for preservation of forests, and which are intended for timber extraction. We feel that the safest practice is to sidestep the controversy and focus on the areas of the MDB loan portfolios that are more easily placed in one category or another. We thus excluded forestry loans from the sample.

We seek to explain two different aspects of environmental lending at MDBs**:** *loan type* and *loan amount*. We want to predict the odds that a given loan, out of the larger sample, will fall into the environmental category. And, once that choice has been made, we seek to predict how large in dollar amount the loan will be. These are two related questions that nevertheless possess an important degree of independence. Hence, they require different econometric modeling techniques, explained below. "Loan type" we have coded as a dummy variable, where 1 corresponds to an environmental loan (coded as discussed above), and 0 indicates a loan that is not primarily environmental.

"Loan amount" is the banks' total dollar commitment (in millions) for a given environmental project. If more than one bank co-financed a project, we coded each bank's lending commitment as an individual loan. Since each bank's portion had to be

[10] We believe that the World Bank's conscious decision to move away from stand-alone environmental loans and toward mainstreaming may actually account for a large amount of the apparent downturn in environmental lending that is shown in Figure 1.

approved through its own institutional mechanisms, thus, in the sense most important to our argument, the commitments are effectively independent. While we treat each loan as an independent observation, we do not expect that a given loan to any given country is necessarily independent from other loans to the same country, but we do assume that the loans are independent across countries. Below we explain how these potential problems are addressed.

Independent Variables

We evaluate our hypotheses empirically by coding the following variables.

Environmental Vote. This variable represents our effort to quantify the environmental interests of the member countries that are represented on the executive boards of the four MDBs under study.[11] "Environmental vote" represents a proxy of countries' environmental policy interest scaled according to voting share and weighted by the degree to which the country might prove pivotal to potential voting coalitions. This produces a single environmental preference for each MDB for each year.

Calculating voting share is relatively straightforward. Countries receive a share of voting power on MDB executive boards that is weighted according to their financial contribution. Each bank publishes this information in their annual reports. However, we are not as interested in all countries' vote shares as we are in any given country's ability to build a voting coalition on issues before the Board. The problem is one of collective action.

Countries' influence over bank decisions should diminish in a curvilinear – not linear – way as their vote shares decrease. Compare, for example, a ten percent share to a two percent share. The ten percent share will give the country considerably more than five times the sway over an MDB decision than a simple ratio measure would imply. This argument follows unless we adopt the unreasonable assumption that organizing a political coalition is costless. It is more reasonable to assume that transaction costs are non-negligible and that smaller states have an incentive to free ride on the contributions of others. As described above, to operationalize Environmental Vote we ranked all countries' vote shares by their environmental preferences and weighted those preferences by the countries' "pivotalness" in potential coalitions.

Determining countries' environmental preferences poses potentially greater challenges. One might be tempted to find measures of public opinion for given countries that chart the populations' preferences on environmental issues.[12] However, this method

[11] Since voting shares differ for the two major branches of the World Bank – the IBRD and the IDA – we computed each separately.

[12] Surveys that measure elite opinion or public opinion might offer the most direct measure of societal norms and principled beliefs regarding the environment; hence, these would arguably be the preferred method for measuring the key independent variable within the constructivist model. Unfortunately, no studies within the constructivist literature have attempted such quantitative empirical work. In fact, very little comparative work on attitudes toward the environment has been done over the past 20 years outside OECD countries. The only study that comes close to providing such a measure is the World Values Survey. (Inglehardt 1998) However, even then the WVS contains only 3 observations for a relatively small subset of countries over the past 20 years. (The first wave of surveys was done between 81-84. The second wave from 90-93, and the third wave was conducted between 95-97.)

assumes that environmental public opinion translates directly into government policy preferences. Such an approach requires a chain of logic with several potentially weak links. A more promising and conventional method for determining government preferences toward the environment would measure actual environmental policy outcomes. This is the revealed- preferences approach (See Samuelson 1938, 1948; Varian 1982; Sippel 1997; Snidal 1985).

From environmental policy outcomes we induced comparative environmental policy preferences.[13] This approach has the advantage of not presuming that public opinion is translated directly into government preferences.[14] Instead, a country's environmental interest is derived from observed outcomes after all relevant interest organizations and political institutions have filtered environmental demands.

For these reasons we constructed an environmental policy index, modeled closely on the Environmental Sustainability Index project (Esty 2001).[15] In constructing the index we gathered 1996 data for 122 countries on 22 distinct measures of environmental policy outcomes, ranging from atmospheric sulfur dioxide concentration to dissolved oxygen levels in freshwater to number of reporting commitments kept as part of the Convention on International Trade in Endangered Species. Data on these variables were gathered from World Development Indicators (2000) and World Resources, various years.

We standardized the measures, aggregated them into 17 indicators (air pollution, water pollution, biodiversity, etc), and then averaged them to generate the environmental policy index. We used this 1996 index as a baseline from which we calculated a pooled time series for all countries with voting shares in MDBs from 1980-1999 (the largest set was 179 countries in the IBRD for 1999), allowing index scores to vary over time. Our environmental policy index is a comparative measure of environmental sustainability, not an absolute measure. The higher a country's score on our index, the more sustainable are its environmental outcomes compared to the 179 countries in the index in 1996. Hence, this offers us a relative measure of environmentalism, which varies over time.[16] These index scores were weighted according to countries' voting shares, and then summed for each year for each MDB, creating an overall environmental voting score for each bank year. Figure 2 displays the time trend for each of the four institutions. For details on the construction of the index, see the Appendix.

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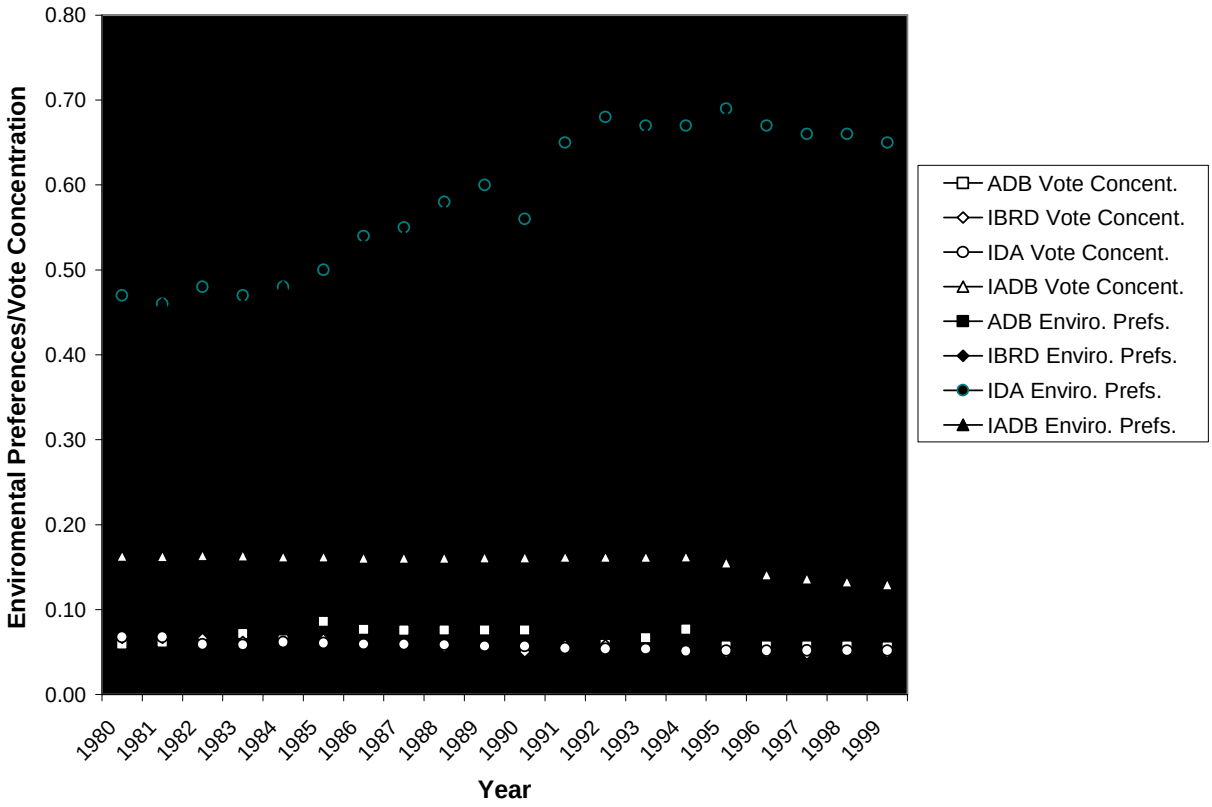
[13] We thank Robert Keohane for this suggestion.

[14] It has the concomitant disadvantage of assuming that countries with poor environmental records are relatively disinterested in producing sound environmental policy. Countries with environmentally disadvantageous geographies are thus punished in the index. We understand this limitation. However, the wide variety of variables and indicators used to construct the index should mitigate most of the problems stemming from difficulties in one, or a few, environmental areas. The empirical alternative seems less justifiable in our minds. Measures of environmental public opinion face the strong disadvantage that we do not know if opinion is politically meaningful unless it translates into outcomes.

[15] This project is a joint effort by researchers at the Yale Center for Environmental Law and Policy (YCELP) and Columbia University's Center for International Earth Science Information Network (CIESIN) in collaboration with the Environment Task Force of the World Economic Forum, Davos, Switzerland.

[16] We are collecting data on 22 distinct variables for all the countries with voting shares in each of the four MDBs for every year from 1980-1999.

Figure 2:
Environmental Voting Preferences
and Voting Fragmentation at the MDBs, 1980-1990



Voting Concentration. This variable is a relatively simple measure of concentration/fragmentation. Again using voting shares for all MDB member countries, we computed a Hirfindahl-Hirschman concentration index score, which is the sum of each squared value. As given shares grow more dominant, the index increases toward one; as shares become smaller and more equal, the index score diminishes toward zero. This is a familiar concept in political science, as the inverse of this index is the measure known as the effective number of parties. A voting concentration score was thus computed for each of the institutions (IBRD, IDA, ADB, IDB) for each year from 1980-1999. Figure 2 shows concentration levels for the four institutions over time.

Lender. We generated dummy variables for each institution in the sample, with the IBRD and the IDA being coded separately. This is particularly helpful because no set of dummy variables must ever include all of the possible categories or intractable collinearity will result. We thus report estimates for IBRD, ADB and IDB, leaving the effects of IDA to be captured in the intercept. One can think of these dummy variables as capturing the residual effects of differences in institutions and organization that are not encompassed by environmental voting and vote concentration.

Controls Variables. In addition to these independent variables that stem from our argument, we also included a relatively large set of control variables. **Log of GDP** and **GDP Per Capita** are standard comparative measures and control for the size of a given

country's economy and its relative wealth, respectively. Following the conventional wisdom, environmental loans should grow more frequent and larger as each of the measures increases.[17]

We also include a set of controls that probe the need that given borrower countries might have for environmental loans. We include **Sulfur Dioxide Emissions** per capita as a proxy for air pollution, and **Organic Water Pollution** to control for water pollution.[18] **Forestation**, or net change in hectares in the extent of forest lands, provides a control for the destruction of natural ecosystems. **Threatened Mammals** controls for biodiversity under habitat and/or overhunting stress.[19] **Sanitation** controls for the demand for sewerage and water projects. **Infant Mortality** controls for environmental health problems that commonly increase the death rate for children. **Fertility Rate** provides a measure of the stress that increased population may place on the environment. **Agricultural Value Added** may help control for the pressures that farming places on the environment. Finally, **CITES Commitments** provides a proxy for the degree of sensitivity countries may show toward international pressure from environmental interests.[20]

Methods and Results

Independent of the method employed here, we have reason to believe that not all of our observations are independent from all others. In particular, we suspect that given loans for any specific country are not independent from other loans for that same country. It is unlikely that we would be able to control for all the common factors that lead to MDB lending for a given country even if our list of control variables were longer. This problem will likely violate ordinary least squares and maximum likelihood estimation assumptions. In an attempt to correct for this potential problem, we employ cluster estimation in both models by grouping observations within countries. This technique re-estimates the standard errors and re-computes the variance-covariance matrix (though not the coefficients) while relaxing the assumption that observations are independent within groups.[21] The results reported thus include robust standard errors.

In the econometric analysis, we employed multiple methods. Since, as noted above, we are interested in two different aspects of environmental loans – the probability of an

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[17] These numbers came from *World Development Indicators 2000* (WDI).

[18] These data came from WDI.

[19] For both deforestation and threatened biodiversity, bank officers might be interested in large-scale losses even if they do not represent a significant share of total forests or biodiversity, as in the cases of Brazil or Indonesia. Or, they might be interested in preserving natural resources in places where the number of hectares or species threatened is small compared to other countries, but is large relative to totals in that country, as in the case of Costa Rica or Rwanda. Thus, we include both measures. Data for these last four variables were gathered from *World Resources* (various years).

[20] Data for these last controls also came from WDI.

[21] Although it still assumes that observations are independent between groups – an assumption that we believe is reasonable given this data. We also assume that observations are independent from year to year. The controls for total number of loans per year, total lending per year and year should capture most residual temporal autocorrelation that escapes the cluster technique.

environmental loan and its size – we have two different econometric problems. First, we seek to assess the odds that a given loan will be in the environmental category. Second, we want to explain the dollar value that a given environmental loan will take. The first problem employs a discrete dependent variable and is conducive to logistic regression analysis. The second involves a continuous dependent variable and conforms better to assumptions of ordinary least squares regression analysis. In the econometrics literature, employing these two techniques in stages is known as a two-part model for estimating discrete and continuous dependent variables (see Manning et al. 1987).

We initially ran regressions using the full 7,200-loan dataset. However, the resulting estimations, while producing some evidence consistent with our hypotheses, were not robust across specifications. We strongly suspected that the sensitivity of the results stemmed from the fact that, among the 7,200 loans, only 566 were for environmental projects. Environmental loans are rare events and likely require adjustments to estimation techniques to reduce biases (See King and Zeng 2001). Thus, we included in our sample all environmental loans and randomly sampled an additional 589 loans from the universe of non-environment projects. This correction dramatically increased the robustness of our estimations, removing the prior sensitivity to minor changes in parameters. All results reported below used the 1,155-loan sample.

Employing the logit stage first, the results are displayed in Table 2. Here we find support for our key hypothesis regarding preference formation in a collective principal. *Environmental Vote* was positively and significantly related to environmental loan type in the basic estimation shown in Model 1, which includes *Environmental Vote,* the bank dummies and logged GDP. The efficiency of the estimators decreases in Model 2 when a large set of controls for environmental need are included. Still, in both models as the share of MDB executive board votes grew more environmentally oriented, the odds that any given loan would be in the environmental category also increased significantly (at the .001 and .01 levels, respectively).

The logistic results can also be used to predict probabilities for environmental loans. For this sample, where nearly half of the loans are environmental, these results suggest that a shift from the bottom of the *Environmental Vote* range of .39 (the ADB in 1980) to the top of .72 (the IADB in 1999) would lead to an increase in the probability of an environmental loan from .38 to .62. Put another way, the results suggest that an upswing of one standard deviation for *Environmental Vote* (.09) would increase the probability of an environmental loan by .07. These results suggest substantive as well as statistical significance.

Results for the control variables are mixed to weak. The IBRD and the ADB were significantly more likely to issue environmental loans than the IDA. Log of GDP was significantly related to the odds of an environmental loan in Model 1, but was not so in Model 2. None of the other control variables were significantly related to the probability of an environmental loan.

Table 2:
Logistic Regressions for First Stage –
Environmental Loan Dummy as Dependent Variable

Variables	Model 1 Coeff. St. Err.		Model 2 Coeff. St. Err.	
Environmental Vote	3.492	***	2.944	**
	0.815		0.934	
IBRD Dummy	0.186		-0.004	
	0.134		0.165	
ADB Dummy	0.680	**	0.558	*
	0.228		0.245	
IADB Dummy	0.672	***	0.478	*
	0.192		0.215	
Log of GDP (Constant Billions US$)	0.096	***	0.066	
	0.027		0.043	
Infant Mortality			-0.005	
			0.004	
Fertility Rate			-0.011	
			0.087	
Agricultural Value Added			-0.003	
			0.008	
GDP Per Capita (Constant US$)			0.000	
			0.000	
Sulfur Dioxide Emissions			0.000	
			0.000	
Threatened Mammals			-0.427	
			0.739	
Organic Water Pollutants			0.000	
			0.000	
Forestation			0.692	
			0.588	
Sanitation			-0.002	
			0.005	
CITES Commitments			-0.003	
			0.002	
Constant	-2.591	**	-1.531	
	0.503		1.043	
Number of Observations	1155		1155	
Wald Chi-Squared	38	**	60	**
Log Likelihood	-774		-767	

* $p < .01$; ** $p < .001$

Table 3:
Ordinary Least Squares Regressions for Second Stage – Environmental Loan Amount as Dependent Variable

Variables	Model 1 Coeff. St. Err.		Model 2 Coeff. St. Err.	
Vote Concentration	-71.621		-41.160	
	195.585		170.722	
IBRD Dummy	19.075	**	23.289	**
	6.798		7.023	
ADB Dummy	1.761		5.791	
	10.209		10.209	
IADB Dummy	21.413		20.712	
	19.591		18.681	
Log of GDP (Constant Billions US$)	14.433	***	10.966	***
	1.277		1.347	
Infant Mortality			0.128	
			0.180	
Fertility Rate			-4.494	
			3.758	
Agricultural Value Added			-0.776	
			0.433	
GDP Per Capita (Constant US$)			-0.001	
			0.001	
Sulfur Dioxide Emissions			0.005	*
			0.002	
Threatened Mammals			-36.939	
			23.215	
Organic Water Pollutants			-0.001	*
			0.000	
Forestation			-8.153	
			25.787	
Sanitation			-0.247	*
			0.123	
CITES Commitments			-0.141	
			0.145	
Constant	4.752		57.527	**
	13.031		18.133	
Number of Observations	589			
F Statistic	57.9	***		
R-squared	0.250			

* $p < .05$; ** $p < .01$; *** $p < .001$

The results for the OLS regression in Table 3 for the dollar amount of environmental loans suggests that the log of GDP was significantly, though not surprisingly, related to the size of environmental loans. Larger countries received significantly larger loans. The results also suggest – again, unsurprisingly – that environmental loans at the IBRD were $23 million larger than loans at the IDA on average. Given that the IBRD lends at below-market rates mostly to middle-income countries, and the IDA provides no-interest loans to the poorest of the poor countries, this result is understandable. Among the control variables, only *Sulfur Dioxide Emissions* was significantly related to the odds of an environmental loan as expected. *Organic Water Pollutants* and *Sanitation* were significantly related to environmental loans, but in a *negative* direction.

Notably, Model 1 presents no evidence that fragmentation of the executive board vote significantly influenced the size of environmental loans as predicted, although the sign is in the expected direction. In particular, it is highly likely that the amount of a given environmental loan is itself dependent on the loan's selection into the environmental category. To make this more concrete, it is likely that MDB staffers consider the *size* of the loan they will pursue when they are considering the *type* of loan. If environmental loans are being systematically excluded from loan officers' consideration because they are not large enough to help in career building, then we have perhaps chosen the wrong model with the two-part approach. Instead, this problem may call for the simultaneous estimation of type and size together.

A leading econometric technique for such a problem is the Heckman selection model (see Heckman 1976; Heckman 1979). The Heckman method concurrently estimates parameters for a continuous numerical value (loan amount) and for whether or not the observation is included in a given category (environmental or not). This is a simultaneous equation method that, in essence, jointly estimates continuous and dummy dependent variables. This is a particularly useful method for our purposes in that we are interested in the category in which the loan is included, the amount of the loan, and any effects on loan amount of the loans' selection into the environmental category.

The challenge with any two-step estimator is identifying the equation. Here, our main independent variables help. While *Environmental Vote* should matter for selection of environmental loans, we cannot identify a strong theoretical reason for why it should also affect the size of the environmental loans themselves. Indeed, the qualitative literature suggests strongly that pressure from member countries came to bear on the banks to issue *a greater number of* stand-alone environmental loans, but executive board members said little concerning the appropriate size for environmental loans (see Rich 1994; Wade 1997; Fox and Brown 1998). We thus omit *Environmental Vote* from the loan amount equation. This has the beneficial effect of helping to identify the equation.

Vote Concentration works similarly for loan size. While the fragmentation of the members of the collective principal ought to make it more difficult to monitor and reduce agency slack for the principal, we do not believe that this variable should affect the probability of environmental loans in the first place. There is no preference content to voting fragmentation, and thus it should not affect the decision to issue environmental loans at the first stage. The omission of *Vote Concentration* from the selection step also helps to identify the overall equation.

Regression results for the Heckman model are displayed in Table 4. Again, the control variables performed weakly on the whole. Only log of GDP and *Sulfur Dioxide Emissions* are significantly related to the odds and size of environmental loans.

Environmental Vote is strongly and significantly related to the selection of an environmental loans. Bank years with higher scores on *Environmental Vote* were significantly more likely to issue environmental loans. This result corroborates the findings in logistic estimation. With the Heckman model, only the IADB is more likely to issue environmental loans than the IDA to a significant and consistent degree across the models. Here, log of GDP is again significant, but this time it is consistently so in both Models 1 and 2.

Turning to the estimates for the continuous dependent variable of loan amount, the major difference between the two-part estimation and the Heckman estimation becomes clear. In both Model 1 and Model 2 using Heckman estimation, *Vote Concentration* is significantly related to the size of environmental loans. A Wald test, reported at the bottom of Table 4, strongly suggests that the *amounts of* environmental loans are significantly related to their *selection as* environmental loans. Indeed, when the selection effect is considered, *Vote Concentration* is significantly related to the size of environmental loans in the expected direction. As voting becomes more concentrated on the executive boards of the MDBs, the results suggest that environmental loans decrease in size as predicted. This result is consistent with our argument that task managers at the MDBs may pursue larger loans on average when the member countries' votes at the banks are more fragmented and opportunities for hidden action are greater. However, the relatively small coefficients here suggest that the substantive import of *Vote Concentration* may be limited.

While these results are suggestive, however, work remains ahead to make conclusions more definitive. While the Heckman model is a conventional method of estimating the effects of selection, other models should also be explored using these data. Tobit models can also be employed when a large share of observations are zeros, and Tobits have the advantage of not requiring instrumental variables to identify the equation. Likewise, Cragg or Lognormal hurdle models may prove useful in evaluating the robustness of the results reported here. We will explore all of these models in future iterations of this project.

Table 4:
Heckman Selection Model Regressions – Environmental Loan and Environmental Loan Amount as Dependent Variables

Environmental or Not – Discrete Variables	**Model 1 Coeff. St. Err.**		**Model 2 Coeff. St. Err.**	
Environmental Vote	2.379	***	7.045	**
	0.003		0.063	
IBRD Dummy	16.079	**	10.552	
	6.187		7.191	
ADB Dummy	7.782		7.519	
	8.466		8.368	
IADB Dummy	29.187	**	21.433	*
	9.193		7.680	
Log of GDP (Constant Billions US$)	13.757	***	9.708	**
	1.781		1.599	
Infant Mortality			-0.110	
			0.213	
Fertility Rate			-6.189	
			4.137	
Agricultural Value Added			-0.549	
			0.393	
GDP Per Capita (Constant US$)			0.000	
			0.003	
Sulfur Dioxide Emissions			0.008	*
			0.002	
Threatened Mammals			-54.185	
			28.102	
Organic Water Pollutants			0.000	
			0.001	
Forestation			10.726	
			25.449	
Sanitation			-0.154	
			0.186	
CITES Commitments			-0.226	
			0.129	
Constant	-63.969	***	6.980	
	12.341		24.554	

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 4 continued

Environmental Loan Amount - Continuous Variables	**Coeff.** **St. Err.**		**Coeff.** **St. Err.**	
Vote Concentration	-0.865 0.109	***	-0.798 0.000	***
IBRD Dummy	0.144 0.065	*	0.070 0.084	
ADB Dummy	0.056 0.097		0.066 0.098	
IADB Dummy	0.396 0.082	***	0.315 0.090	**
Log of GDP (Constant Billions US$)	0.150 0.014	***	0.102 0.019	***
Infant Mortality			-0.001 0.003	
Fertility Rate			-0.088 0.048	
Agricultural Value Added			-0.008 0.005	
GDP Per Capita (Constant Thousands US$)			0.000 0.000	
Sulfur Dioxide Emissions			0.000 0.000	**
Threatened Mammals			-0.606 0.329	
Organic Water Pollutants			0.000 0.000	
Forestation			0.175 0.298	
Sanitation			-0.002 0.002	
CITES Commitments			-0.003 0.002	
Constant	-0.641 0.077	***	0.367 0.288	
Number of Observations	1155		1155	
Censored Observations	566		566	
Uncensored Observations	589		589	
Wald test Chi squared of independence of equations	6057	***	12054	***

* $p < .05$; ** $p < .01$; *** $p < .001$

Conclusion

We are encouraged by the evidence we have encountered in support of hypotheses related to this common agency application. In the suggestive case of environmental reform at the multilateral development banks, the frequency of environmental loans was positively associated both with the environmental policy interests of predicted coalitions of member states on executive boards. Moreover, as voting fragmentation increased, environmental loans grew larger on average, suggesting that agency slack may be manifest.

This article takes merely an early step in developing and applying a model of collective delegation. More advanced theoretical work must take place in fleshing out the strategic dynamics of principal-agent relations given the compounded problem of common agency associated with IOs. Theorists need to consider that principal-agent relations are two-way and reciprocal. Simple models implying that principals fully dominate agents, which we hope we have not replicated here, are inadequate to address the complex relationship between member states and international organizations.

Moreover, additional empirical work ought to be accomplished. Multilateral development banks, while important, form only one category of IOs potentially subject to a principal-agent logic. Intriguing possibilities present themselves for addressing multilateral trade organizations, security alliances, human rights institutions, environmental accords and the European Union. In all, however, we see this early step as relatively successful at advancing a promising analytic tool into a new arena in political science.

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Appendix:
Constructing a Pooled Time-Series Index of Environmental Policy

The most sophisticated and successful attempt to look at environmental outcomes cross-nationally is the Environmental Sustainability Index (ESI), an initiative of the Environment Task Force of the Davos, Switzerland-based World Economic Forum (Esty 2001). A set of researchers at the Yale Center for Environmental Law and Policy (YCELP) and Columbia University's Center for International Earth Science Information Network (CIESIN) have collaborated in collecting environmental data on 122 countries for 2001. The broad index that results encompasses 67 different variables grouped into 22 overall indicators. It is by far the most significant effort to date to develop a comparative measure of environmental outcomes cross-nationally. A detailed description of the process used to construct the ESI is found in the *2001 Environmental Sustainability Index*. However, the ESI exists only for a single year and its intent does not precisely match ours.

The ESI is probing a broader question than the one that interests us. We are concerned with revealed policy preferences, not overall environmental sustainability – some part of which is not affected by government policy. Thus, we were compelled to remove from consideration the variables where we felt a credible argument could not be made that they were the product, at least to a significant degree, of government policies. This eliminated several possible indicators, such as water quantity (a function of geography) and private-sector responsiveness (largely market driven). We also eliminated the indicator for international environmental financing, feeling that this indicator would create endogeneity problems for our model.

After dropping from consideration these three indicators, we gathered data. Time series data on 26 of the underlying variables, involving 16 of the 22 indicators, exist for the key MDB donor countries.[22] Using these variables and indicators, a partial ESI can thus be reconstructed over time for the countries in question.[23] A list of the indicators and their constituent variables appears in Table 5.

There do not exist absolute standards of environmental sustainability from which we can judge a given country's position in a given year. The ESI and our index are entirely

[22] Each ESI indicator encompasses multiple variables. For example, the variables of dissolved oxygen levels, phosphorus concentration, electrical conductivity and suspended solids were aggregated into the indicator of water pollution. We preserved this approach where possible. However, given the lack of time series data availability for many of the ESI variables, seven of our indicators are composed of a single variable alone, and are not composites.

[23] Our partial index is reasonably consistent with the full ESI for 2001, with an overall correlation coefficient of 0.56. All of the indicators in our partial index are highly and significantly related to their ESI counterparts. More important than having the two measures be perfectly consistent, however, is the fact that our index varies over time, allowing us to track the response in lending patterns to changing environmental interests of MDB donor countries.

relative and comparative measures. Thus, we needed a baseline year. The year 1996 was the last year for which the largest amount of necessary data was available. (While many of the variables were available through 1999, some were last collected in 1996.) This became our baseline year. Following the steps suggested by the ESI team, we collected data for all 122 ESI countries for 1996. Where data were missing, again following the ESI procedures, we imputed them from values on variables that were significantly related, in the statistical sense, to the variables with the missing values. We transformed highly skewed variables (skewness values in excess of 5) using the base-10 log. Next, we truncated distributions to the 95-percent range, setting all values above the 97.5 percentile and below the 2.5 percentile to those threshold values. We then standardized the variables by computing a z-score (value minus mean divided by standard deviation). These became our baseline indicators, which we then employed in calculating index scores in the time series.

We collected the time series data from two primary sources: the World Bank's *World Development Indicators 2000* and *World Resources* (various years), which is published by the World Resources Institute. For the time series, we imputed missing values by two methods. First, if the time series data showed a discernable time trend, we imputed missing values by fitting a polynomial to the existing values. If a time trend was absent, we imputed missing values using the impute command in the statistical program, Stata 7.0, based on the values for other variables that were found to be significantly related to the variable with the missing values. For each variable in the time series, we followed the same procedure listed above: transforming skewed variables, truncating them to the 95 percent range, and standardizing them with z-scores. The difference with the time series was that we used the 97.5 threshold, the 2.5 percentile value, the mean and the standard deviation from the 1996 baseline in computing the z scores for each variable.

Again following the ESI procedure, for all country years we then averaged the variables' z scores constituting each indicator. Next, we averaged all of the indicators for each country year. Finally, we computed the overall percentile rank for each country year. But we computed the country year's percentile rank as if it had appeared in 1996, according to the baseline. This allows the index scores to vary over time.

Table 5: EPI Indicators and Variables

Indicator	Variable
Air Quality	Urban sulfur dioxide concentration
	Urban total suspended particulates concentration
Water Quality	Dissolved oxygen concentration
	Phosphorus concentration
Biodiversity	Percentage of mammals threatened
	Percentage of breeding birds threatened
Terrestrial Systems	Land area affected by agriculture as a percentage of total
Reducing Air Pollution	Coal consumption per populated land area
	Vehicles per populated land area
Reducing Water Stress	Fertilizer consumption per hectare of arable land
	Industrial organic pollutants per available fresh water
Reducing Ecosystem Stress	Percentage change in forest cover
Reducing Waste	Percent of population with access to sanitation services
Reducing Population Pressure	Total fertility rate
Basic Human Sustenance	Daily per capita calorie supply as a percent of total requirements
	Percent of population with access to improved drinking-water supply
Environmental Health	Under-5 mortality rate
Science/Technology	Research and development scientists and engineers per million population
	Expenditure for R & D as a percentage of GNP
	Scientific and technical articles per million population
Regulation and Management	Percentage of land area under protected status
Eco-Efficiency	Energy efficiency (total energy consumption per unit GDP)
	Hydroelectric energy production as a percent of total energy consumption
International Commitment	Number of memberships in environmental intergovernmental organizations
	Percentage of CITES reporting requirements met
Protecting International Commons	Clorofluorocarbon consumption (total times per capita)