

The politics of special purpose trust funds*

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Abstract

Multilateral organizations increasingly receive earmarked voluntary contributions from governments seeking to finance their priorities. This so-called multi-bi aid exhibits characteristics of bilateral aid and of multilateral aid which is pooled by and disbursed at the discretion of the multilateral organization. A question arising from these recent developments of donor practice is: when do governments choose to delegate the distribution of foreign aid to Special Purpose Trust Funds under the auspices of multilateral institutions instead of providing bilateral or multilateral aid?

To make a foray in understanding these decisions by donors we propose a game-theoretical model in which a multilateral organization proposes to his multiple principals (i.e., the donor governments) to limit its discretion

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in fund allocation. Upon approval, the multilateral agent decides to learn about the effectiveness of its projects. Donors with heterogeneous preferences over project outputs give their assessed contributions to the multilateral organization's core account. Conditional on the agent's discretion, each donor chooses his preferred channel of aid provision. In this version, we analyse aid allocation under two decision rules at the multilateral organization, namely unanimity and majority decisions. For unanimity, we find that the agents never receives discretion and that he undertakes no learning. For the majority decision, we find that donors with non-centrist preferences may provide aid bilaterally, through special purpose trust funds financing one project only or as voluntary core contributions to a multilateral institution. Meanwhile, a donor with centrist preferences allocates his aid budget either to the core fund or undertakes bilateral aid activities but she never contributes to a special purpose trust fund. In an important subset of situations, full discretion is accorded to the multilateral agent. However, as domestic benefits rise simultaneously for all donors, the agent will ask for less than full discretion. As domestic payoffs increase further, donors always opt for undertaking their own bilateral aid activities, no matter what the agent proposes.

1 Introduction

Over the last two decades, bilateral donors have increased voluntary contributions to multilateral aid institutions (MAIs), mostly earmarked for specific purposes. Earmarking increases governments' control over the use of their aid but decreases the discretion of the MAI. These contributions with pre-specified use are targeted at specific issues or countries. They are kept in separate accounts, the Special Purpose Trust Funds (SPTFs). In contrast, the contributions to the MAI's core account, consisting of assessed contributions (membership fees) and unearmarked voluntary contributions, is pooled and allocation is determined jointly according to the MAI's decision mechanism. By using these SPTFs instead of giving (un-earmarked) core aid to the MAI, bilateral donors may avoid the sometimes wearisome multilateral¹ processes while increasing the visibility of aid to the national constituency and enhancing their financial flexibility across years. The United Nations (2012, 42) describes the changes in funding patterns as follows:

In general, donor country aid policies are much more carefully targeted today than in the past either by theme or beneficiary or by some combination of the two. Donor aid ministries have also added over the years many new targeted funding lines to their institutional and budgetary structures. Core resources generally come from a budget line used to sustain long-term strategic partnerships with multilateral organizations. Here, the competition for resources has increased dramatically, with the EU and the global funds being but two examples.

Despite the rapid increase in the number and the volume held in SPTFs, evaluations of the reasons for and consequences of these trends are still largely missing. Questions related to accountability, aid (in)efficiency and effectiveness still await answering. In this paper, we wish to understand what leads donors to eschew traditional channels for aid giving i.e., bilateral or traditional multilateral channels. This version analyses how decision rules at MAIs influence aid allocation when SPTFs are available. This is because two institutions, namely the United Nations Development System (UN) and the World Bank Group (World Bank) (Figure 1 below), are most significantly affected by the growth of multi-bi

¹Multilateralism minimally involves the coordination of policies among three or more states, but needs not to involve a formal international institution (Ruggie 1993).

aid, in relative as well as in absolute terms. Their respective decision mechanisms reflect, at least to some extent, the governance rules analysed below: unanimity and majority rule.

Earmarked voluntary contributions to MAIs have been labeled multi-bi aid² because they exhibit characteristics of bilateral³ and multilateral aid. Other labels for multi-bi aid, used as synonyms in this paper, are non-core aid and special purpose trust funds, which, to be precise, is the institutional form earmarked aid takes. For MAIs, multi-bi aid presents challenges and opportunities alike. On the one side, they cherish the increase in resources and new sources of income from the provision of fiduciary, administrative and implementing services to SPTFs. On the other hand, the rise of earmarked aid has been paralleled by stagnating core contributions (United Nations 2011)⁴ to MAIs. Increasingly, multilateral institutions rely on earmarked contributions to maintain their budget. The UN for example receives today the majority of its financial support from (earmarked and unearmarked) voluntary contributions (Graham 2013). Moreover, MAIs have to compete for these funds with other multilateral institutions because multi-bi aid typically is provided on past performance and the quality of project proposals. Therefore, if MAIs wish to keep discretion over allocation (i.e., leave the allocation to the formal governance of the respective organization) about at least a part of the resources they are to implement, they need to effectively manage the trade-offs between multi-bi aid and multilateral aid.

Earmarking has taken distinct institutional forms both across and within MAIs (see Eichenauer & Reinsberg (2013))⁵. Typically, multi-bi aid takes the

²According to the OECD (2012, 28), multi-bi aid is “bilateral ODA earmarked for a specific purpose, sector, region or country and channeled through multilateral agencies”. For an almost identical definition by the World Bank Group (“aid targeted for specific purpose, sector, region, or country, and channeled through multilateral agencies as TFs”) and managed by MAIs. see World Bank (2012, 3).

³Bilateral policies are not coordinated with other countries and engage with one other country alone.

⁴Core contributions consist of assessed and unearmarked voluntary contributions, “Multilateral Official Development Assistance (ODA) (also referred to as “core” multilateral ODA to distinguish it from “non-core” multilateral ODA) comprises assessed contributions required as a condition of membership and unearmarked voluntary, or discretionary, contributions, or any combination thereof.” (OECD 2012, 23).

⁵Earmarking is a question of degree with very rigid forms (e.g., project-specific technical assistance), the so-called hard-earmarking, and more flexible ones (e.g., for a given thematic issue or a certain region of the world), soft earmarking. We think that the logic and the implications of earmarking as modeled by Special Purpose Trust Funds speak to different types

form of trust funds supported by one or several donors and aimed to support specific objectives. The variety of Trust Funds is the result from negotiations between the MAI and the donor(s) over responsibilities and procedures.⁶ These negotiations are cumbersome for the MAI and donor(s) alike and, moreover, require an additional monitoring effort by the donor(s). Thus, the question arises: Why would donors (increasingly) channel their foreign aid through these Trust Funds? For answering these questions, it is helpful to consider the answers provided by the literature to two closely related questions: why is foreign aid provided in the first place? And why is it provided multilaterally?

In the next section we first describe the relevance and evolution of multi-bi aid. We then relate this to the more general literature on earmarking in a domestic context which often adopts a principal-agent framework, before discussing work related work, namely how earmarking affects agents. We then emphasize, based on empirical data, that one thing we wish to explain is the considerable differences among donors with respect to their use of multi-bi aid. In section three we present, based on our discussion, a game-theoretical model that we analyze for its equilibrium characteristics. Section four presents several propositions based on the equilibria we derive, while section five we discuss our insights. Section six concludes and discusses possible extensions of our model that we envision in future versions of this paper.

2 The rise of Trust Funds and donor heterogeneity

For multilateral institutions, multi-bi aid has become an important source of funding over the last two decades. In 2010, almost one third of all Official Development Aid channeled through the multilateral system may be considered multi-bi aid.⁷ While we make an effort for being as parsimonious as possible with

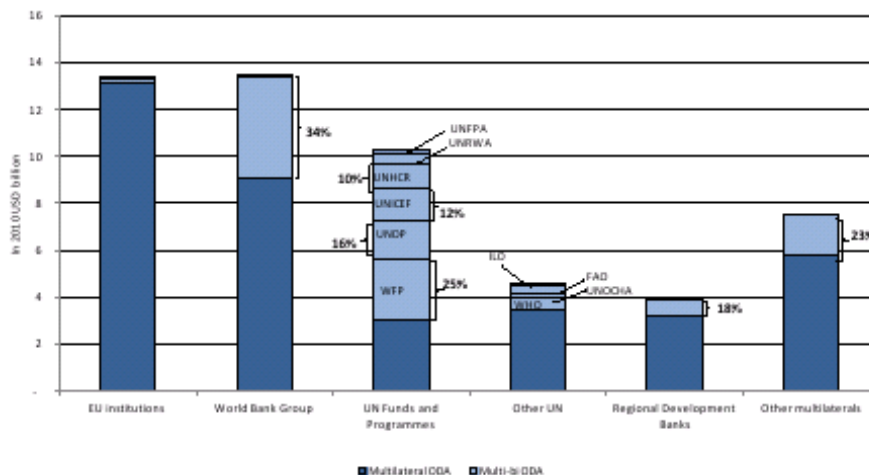
of earmarking.

⁶Most multilateral SPTFs are formed through a series of procedures that allow the donors, trustee, and other key stakeholders to shape the specific contours of the fund. There is no commonly agreed-upon categorization of trust funds. Therefore, each institution uses its own concepts and definitions arising from administrative categorization (Eichenauer & Reinsberg 2013).

⁷In 2010 USD 37.6 billion was provided in core funding to multilateral agencies. In addition, USD 16.7 billion were earmarked and channeled through and implemented by MAIs (12% of total ODA in 2010). Together, core and non-core use of the multilateral system accounted for

descriptive statistics, we seek to illustrate convincingly the increased relevance of multi-bi aid and the speed of change. Two institutions are most significantly affected by the growth of multi-bi aid, in relative as well as in absolute terms. These are the United Nations Development System (UN) and the World Bank Group (World Bank) (Figure 1).

Figure 1: Total use of the multilateral system, gross ODA disbursements (2010) (excluding debt relief and contributions from EU Institutions, in constant 2010 prices)



Source: OECD (2012, 10)

The World Bank is both a significant manager and recipient of multi-bi aid. In the fiscal year 2009-10, the Bank received about USD 57.5 billion in Trust Fund contributions while it managed USD 29.1 billion in 1075 Trust Funds for 205 donors (IEG 2011, 8). To put some flesh on the bones of these numbers: since 2003, World Bank-administered Trust Funds receive more contributions than the International Development Association (IDA)⁸.

The proliferation of Trust Funds challenges MAIs' ways of operating as shown by the World Bank's constant efforts for consolidation of the number of Trust

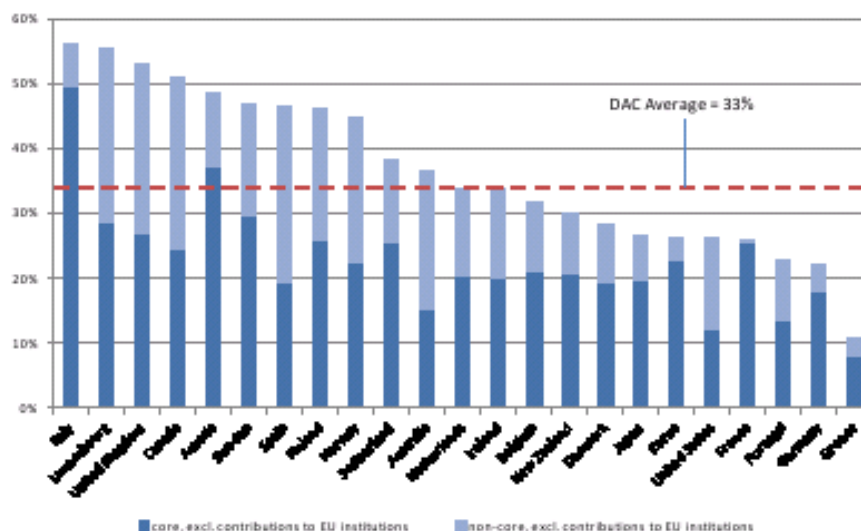
40% of gross ODA (OECD 2012, 4).

⁸One explanation suggested for the rise of SPTFs is the legal constraint at the World Bank for non-states to participate in decision-making (Eichenauer & Reinsberg 2013). Though Trust Fund contributions are still provided largely by traditional donors, "new donors" and "foundations" are increasing their support (IEG 2011). Due to the increasing importance of these donors, new challenges in fragile countries, a commitment to global public goods, and higher accountability demands domestically multi-bi aid is still on the rise (Eichenauer & Reinsberg 2013)

Funds under management. According to the Bank, the stagnating core budget of the Bank renders the quest for a new business model even more pressing. For the UN system, the situation is similar (United Nations 2011). In 2010, some 74% of funding was non-core “characterized by varying degrees of restrictions with regard to their application and use” (United Nations 2012, 1). The growth of these resources is impressive. Between 1994 and 2009, non-core resources grew by 208 percent (United Nations 2011) whereas in this same period core (i.e., voluntary unearmarked and mandatory contributions) resources to the UN stagnated.

Use of the multilateral system varies across donors (as investigated by Milner (2006)) and so does the extent and the institutional type of multi-bi aid donors chose to provide. This heterogeneity in the extent of multi-bi aid is somewhat surprising given the great variety in institutional forms and purposes. One is tempted to think that each and every donor finds her darling fund. As depicted in figure 2 France, Korea and Germany provide less than five percent of their aid budget as multi-bi aid whereas Spain, Australia and Canada provide more than 20% of their aid budget as earmarked aid to MAIs in 2010.

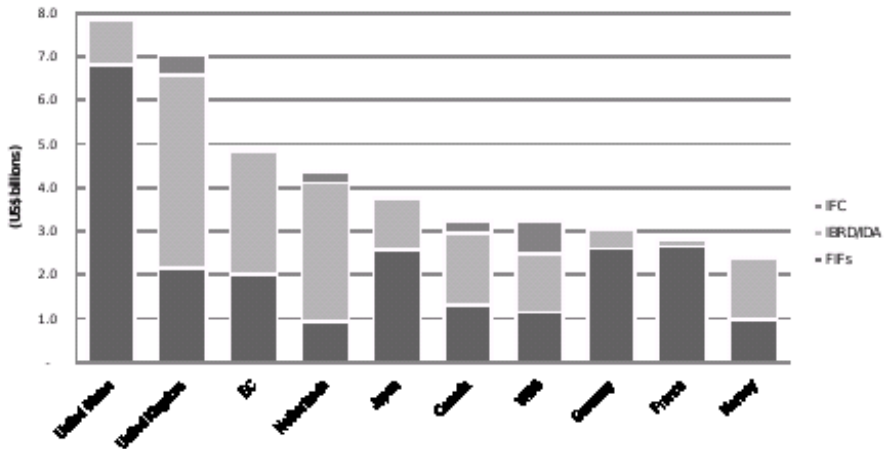
Figure 2: Total use of the multilateral system as % gross ODA disbursements (2010) (excluding debt relief and contributions from EU Institutions, in constant 2010 prices)



Source: OECD (2012, 11)

Less surprising, donors' interest are heterogeneous: they choose different SPTFs to channel their foreign assistance. (Figure 3). For example, the US is the largest donor that contributes primarily to Financial Intermediary Funds, while the United Kingdom is by far the largest donor to World Bank-managed Trust Funds. (IEG 2011, 16). We interpret the empirical patterns of donors' aid allocation behavior as revealing heterogeneous preferences about, on the one hand, core versus non-core funding and, on the other hand, of heterogeneous preferences with regard to the specific issues and countries financed by SPTFs.

Figure 3: Two of the Top 10 Donors Account for a Quarter of All Trust Fund Contributions, But They Direct Their Resources in Starkly Different Ways (FY02-10)



Source: IEG (2011, 16)

Given the scale of the funding changes in the two largest international organizations and the challenges it poses to MAIs, exploring the politics of providing and receiving non-core aid in more detail is worthwhile. We model donors with heterogeneous preferences and the trade-off faced by MAIs that accept hosting SPTFs.⁹

⁹Applying the World Bank typology, one can argue that the model we propose captures the politics related to free-standing Bank-Executed Trust Funds set up as Multi-Donor Trust Funds particularly well. At the World Bank, Multi-Donor TFs are of increasing importance and account for 50 percent of active Trust Funds in the fiscal year 2012 compared to 30 percent five years before (World Bank 2013, i).

3 Existing literature

Our paper relates to three strands of literature. First, we draw from the public finance literature because earmarking is a longstanding practice in national taxation. Second, we relate to principal-agent models, in particular models with multiple principals. Finally, we relate to the literature on foreign aid in general and multilateral aid in particular.

The term earmarking originates from the public finance literature where it describes the “practice of designating or dedicating specific revenues to the financing of specific public services” (Adugna 2009, i). In domestic politics, earmarking is used by governments to avoid the normal procedure where tax revenue is pooled into a general fund before it is allocated across separate spending programs. Some of the advantages and disadvantages discussed by the literature are also relevant for our research topic: Supporters consider earmarking as a good way to guarantee a steady and reliable funding source for the favored programs because earmarks constrain the legislatures (i.e., in our case the multilateral agent and its governing organs) ability to reduce or even eliminate funding for the benefited program. In the international public goods and development context, this commitment function might be of particular relevance when policy trends may lead to volatile funding that risks impeding the effectiveness and sustainability of programs. At the same time, earmarking, as critics contend, restrains the legislatures budgetary flexibility and, thereby, impedes the ability to draft an overall budget that is based on funding priorities and that accounts for changes in circumstances and assessments. This may lead to misallocation of funds. Moreover, earmarks can increase administrative and compliance costs.

Early models dealing with tax-earmarking assumed that the relative shares of resources from the general fund spent on various public goods were exogenously fixed (Buchanan 1963). However, as these models also assume that citizens might influence spending on the various public goods with earmarked taxes, this assumption appears rather odd, as it implies citizen control over the level of taxes only and complete lack of control over allocation decisions (see for this critique Goetz 1968, Goetz & McKnew 1972, Browning 1975, Athanassakos 1990). Implicitly, the same assumption characterizes models dealing with (non-)earmarked contributions to charities/NGOs (e.g., Bilodeau & Slivinski 1997, Toyasaki & Wakolbinger 2011). Here, obviously, the relative share of funds spent on particu-

lar projects is decided by the charities/NGOs themselves (normally) without any input from donors.

This assumption of an exogenous budget allocation of the general fund is problematic if these models are adapted to funding decisions of MAIs and their work. What money from general funds of an MAI can be spent for is either set out in the charter setting up the organization, or involves the member states in the MAI in one way or another (for a discussion of these principles, mostly in the context of the UN, see Hüfner 2003, Graham 2012, 2013). Consequently, funding decisions are better conceived as collective decisions reached by the member states of an MAI.¹⁰

More recent work on earmarking (e.g., Anesi 2006, Jackson 2013) focuses on the legislative decision-making and argues that earmarking ensures funding of particular public goods over several legislative periods, which is not the case for public goods financed through the general fund. Thus, earmarking allows to tie decision-makers' hands.¹¹

The second strand of literature we relate to, are principal-agent models. While general principal-agent models rely on one principal and one agent, Bernheim & Whinston (1986) propose a general model of common agency, i.e., a situation where an agent's action is influenced by multiple principals.¹² More tailored to the question of bureaucratic autonomy Hammond & Knott (1996) propose using the core defined by the legislative decision-makers to assess how much autonomy an agent has.¹³ The principal-agent literature with multiple (and thus heterogeneous) principals suggests that preference heterogeneity among members will

¹⁰Lyne, Nielson & Tierney (2006) address this issue at the empirical level by determining what characterizes the preferences of various coalitions possible for adopting a particular lending decision.

¹¹This is less if at all the case when earmarking occurs in aid, as the funds are always limited in time (i.e. earmarked and unearmarked funds are provided upon call for funds in emergency situations, for each year, for replenishment of a fund).

¹²Surprisingly Lake & McCubbins (2006, 362, footnote 12) argue that “[t]he closest analog to multiple principals is the practice of voluntary contributions to MAIs, as opposed to assessed dues, that allow each member to make their payments contingent on certain activities or conditions.” This argument is only correct if we assume that such voluntary contributions are managed in a large pot without individual accounting. Thus, dependent on the exact way in which voluntary contributions are handled, it might, in most cases, be much closer to multiple simple one-principal one-agent relationships, possibly with strategic interactions between principals which is gets interesting when increasing returns of scale or scope are present

¹³They show especially that simple empirical assessments of the influence of various principals are misleading (for the US context see as well Calvert, McCubbins & Weingast 1989, Kiewiet & McCubbins 1991).

result in an agent having great discretion and make it more difficult to control the agent (Nielson & Tierney 2003, Lyne, Nielson & Tierney 2006, Graham 2013).¹⁴ Copelovitch (2010) argues that heterogeneity of the largest shareholders in the International Monetary Fund (IMF) might lead to distributional conflict or “log-rolling” in some circumstances while in others it increases the autonomy of the staff. In contrast, Bresslein & Schmaljohann (2013) argue that in presence of heterogeneous trade interests among large shareholders, powerful countries get their way at the World Bank. For the Inter-American Development Bank, Hernandez (2013) finds that heterogeneity among the largest shareholders leads to distributional conflict so that none of these countries is able to push its point through.

Finally, we relate to the literature on the provision of multilateral aid and the financing of international organizations. As to the motivation of governments for providing foreign aid two main explanations are advanced: a desire to satisfy recipient’s needs and/or to advance political and economic interests of the donor country (for an early discussion Frey 1984, 86ff). A large share of the literature finds that the nature and allocation pattern of foreign aid is explained not only by economic need variables but that donor’s strategic and economic interests play a significant role in the allocation among comparable countries. (e.g., Alesina & Dollar 2000, Kuziemko & Werker 2006, Dreher, Sturm & Vreeland 2009*a*, Dreher, Sturm & Vreeland 2009*b*). Theoretically, one might expect that multilateral aid is less politicized than bilateral aid because the multilateral agent enjoys more autonomy in his allocation decisions and might be pressured by heterogeneous interest groups (e.g., Keohane, Macedo & Moravcsik 2009). Milner (2006, 109) notes that “a good deal of research suggests [. . .] that bilateral aid is more tied to donor interest than is multilateral aid, which is often more needs-based in orientation.” This statement is questioned by McKeown (2009)’s qualitative analysis of key documents containing U.S. decision-makers’ assessment of their control of multilateral organizations. He finds that the US administration considers MAIs as instruments of their foreign policy. Under some circumstances, they deem MAIs the more appropriate mechanism than bilateral ways to influence international and other countries’ politics. Statistical analysis by Nunnenkamp & Thiele (2006) does not support the superiority of multilateral institutions’

¹⁴Our model (see below) suggests partially otherwise: with considerable preference heterogeneity donors have strong incentives to limit the MAI agent’s discretion.

allocation to the needy and deserving (i.e., “better” institutional environments).

Regarding explanations for multilateral aid provision, Milner (2006, 2) notes, “[t]heories and evidence about why governments choose multilateralism are few.” First, multilateral agencies are better in providing the collective good “information,” necessary in particular for recipient monitoring (Milner 2006, Schneider & Tobin 2011). Second, multilateral institutions can be seen as being less politicized and thus better able to impose conditionality (e.g., Lebovic & Voeten 2009). Specifically, “a multilateral institution may be seen as an aid giving cartel, designed to maximize the donors’ influence by presenting a unified front to the recipients” (Milner 2006, 109). Taking the domestic perspective, Keohane, Macedo & Moravcsik (2009) argue that multilateral development assistance limits the influence of domestic special interests that may otherwise seek to tie assistance to more political or commercial ends. For a hegemon in particular, Lake (2009) argues that he chooses multilateralism as a form of self constraint. Third, governments delegate when there is a need to pool resources for the provision or prevention of international public goods and bads respectively (Schneider & Tobin 2011). In this context, multilateral aid allows for burden sharing. As a final explanation, the results from a survey among donors by the Development Assistance Committee of the OECD suggest that the effectiveness and efficiency of MAIs matter (OECD 2012, 12).

Despite these potential advantages of multilateral aid, most aid is still given bilaterally (Schneider & Tobin 2011). This suggests that these advantages matter only under conditions (Milner 2006). Moreover, the costs of delegation can easily exceed its benefits because of typical principal-agent problems. If a country provides foreign aid only to advance its economic, military, or geopolitical foreign policy goals, delegation to MAIs with multiple (i.e., heterogeneous and uncoordinated) principals, leads to uncertainty about whether it can assert its interests (see below and Copelovitch 2010). Answers to the puzzle of aid delegation to MAIs (i.e., why the loss of control to the principal (MAI) is acceptable to the agent (donor)) evolved in three steps:

1. In a “dichotomous choice” (Schneider & Tobin 2011) framework, choosing between bilateral and multilateral is typically framed as a cost-benefit analysis that weighs the advantages of multilateral aid provision against the costs of delegation. Typically, bilateralism is the default way of providing

aid. Milner (2006)¹⁵ argues that multilateral aid allows to credibly signal to voters about the use of foreign aid and thus solves a principal-agent problem in domestic politics. Again, aid decisions are framed as a dichotomous choice.

2. In a framework with multiple MAIs in the multilateral policy arena, a donor may choose to provide multilateral aid to the MAI with preferences most closely aligned to its own (i.e., shopping for funds).¹⁶
3. Schneider & Tobin (2011) argue that governments engage in portfolio building: they not only take into account the existence of various aid institutions but vary their contributions so as to “maximize efficiency and similarity of allocation policies between government and MAI.”

In our paper, we study yet another strategy of donors to minimize the trade-off between control and effectiveness. The possibility to use MAIs effective implementation capacity via purpose-specific Trust Funds opens up a massive number of new multilateral channels. This multiplies donor governments’ possibilities for strategic portfolio building. Despite the large number of SPTFs, this new type of portfolio building should not create high fixed costs for donors: first, SPTFs tend to have narrowly defined objectives. Thus, it is relatively easy for donors to check the overlap with their own priorities. Second, SPTFs do not have their own implementing capacities and rely on multilateral institutions such as the World Bank and UN agencies for implementation. Therefore, donors are already informed about the respective effectiveness of these MAIs, which is one allocation criteria for donors. Following Schneider & Tobin (2011) we assume that donors allocate their aid budgets according to two criteria, namely similarity in preferences and effectiveness in delivering. On the one hand, governments care about how well the agent’s aid allocation reflects their own (domestically determined) allocation preferences which are heterogeneous across donors. On the other hand, all donors have a preference for effectiveness in implementation and their decision to provide voluntary core funding depends on the implementing capacity of the

¹⁵Her empirical analysis trying to explain the relative shares of bilateral and multilateral aid, with as explanatory factor the public’s view on development aid. This might easily be adapted to a model looking at earmarked funding.

¹⁶The literature on charitable giving (e.g., Bilodeau & Slivinski 1997) also emphasizes this point.

MAI, generated through a learning process.¹⁷ For donors, earmarking might in fact be the most cost-effective way of diversifying their funding portfolio to maximize effectiveness and preferences. This is due to the tight control that donors keep over funds provided to the MAI via SPTFs, resulting in very high similarity with effectiveness being constant, given that the same institution is responsible for implementation. The paper’s argument thus has some similarity to the Trojan Horse argument by Sridhar & Woods (2013). In the global health sector, they observe a move away from the governance and funding of traditional multilateral institutions reflecting “a desire by participating governments, and others, to control multilateral agents more tightly” (Sridhar & Woods 2013, 1). More specifically, they argue that the new cooperation pattern in global health allows governments to enhance the control over a multilateral agent through the use of material incentives to reward and punish actions and behavior. For example, through funding of specific departments, donors can influence the activities of the organization. In contrast, governments are more constrained in their financial leverage if they have an obligation to pay into core budgets (through assessed contributions). It is exactly these strategic considerations by donor governments when deciding upon their aid allocation what our model aims at capturing.

4 A Model

To get a better understanding of the politics of special purpose trust funds we propose a game-theoretical model. This model builds on well-known models of principal-agent relationships, draws on the literature on tax-earmarking, and adds an explicit decision-making stage, where donors can influence the allocation of aid-funds. Our setup is quite general with a multilateral aid agency and a set of donors as players. The game is defined as follows:

- P(layers):
 - one MAI agent m

¹⁷Dreher & Marchesi (2013) argue that the agent’s and the principal’s respective information and their willingness to communicate that determines whether the principal opts for decentralization (budget aid) or centralization (project aid). Their model of information transmission could be easily adopted to explain the donor’s decision between core and non-core aid because contributions to the SPTFs entail no uncertainty about use of funds though about the overall outcome, namely through the, exogenously determined, effectiveness of the project chosen.

- a set of donor countries D with $\|D\| = n \geq 2$
- A(ctions) and sequence of play:
 - m proposes a level of autonomy corresponding to a range for s^A which corresponds to the share of the core fund net of costs (these costs incurred by m will be discussed below) devoted to project A (with s^B corresponding to the share devoted to project B and the property $s^A + s^B = 1$ that she agrees to implement (i.e., a set $(\underline{s}^A, \overline{s}^A)$ s.t. $\underline{s}^A \in [0, 1]$ and $\overline{s}^A \in [\underline{s}^A, 1]$).¹⁸
 - D accepts or rejects this proposal (according to the decision rules that prevail in the governing body of the corresponding MAI). In case of rejection we assume a default level of autonomy:

Assumption 1 *If m 's proposal for discretion is rejected by D the default level $\underline{s}^A = \overline{s}^A = \frac{1}{2}$ is imposed.*

We also assume

Assumption 2 *If donors are indifferent between the discretion proposal by m and $\underline{s}^A = \overline{s}^A = \frac{1}{2}$ (i.e., no discretion), they vote for no discretion.*

- Taking into account the level of autonomy granted to m each $d_i \in D$ ($i = 1, \dots, n$) contributes to the core fund ($c_{d_i}^C$) of the MAI through assessed ($c_{d_i}^{C_a}$) and voluntary ($c_{d_i}^{C_v}$, with $\forall i c_{d_i}^C = c_{d_i}^{C_a} + c_{d_i}^{C_v}$ and $c_{d_i}^{C_a} > 0$ and $c_{d_i}^{C_v} \geq 0$) contributions¹⁹ and to two special purpose (non-core)

¹⁸Consequently, she proposes either a range or a value for s^A that she will choose. This will also allow for an extension where the set D may monitor the value of s^A and punish m in case of non-compliance (the proposal by m might also comprise a schedule of assessed contributions for each $d_i \in D$).

¹⁹At first appearance, voluntary core contributions give essentially the same discretion to MAIs as over assessed contributions because the allocation of both voluntary un earmarked and assessed contributions are subject to the decisions by the MAI's governing body where donors are represented. However, this first appearance deceives: voluntary contributions constitute a mechanism of control because donors have the right to supply their contribution (or not) as they see fit. For example, each state can determine for itself what the proper goal of the United Nations Development Programme (UNDP) is, and if it disagrees with its objectives or is dissatisfied with its performance, it is unconstrained by others in adapting its funding amounts accordingly. Therefore, the level of the core budget is not a formal decision by multilateral governing bodies, but is instead the aggregate outcome of donors' decisions (Graham 2013).

funds for projects A and B ($c_{d_i}^A, c_{d_i}^B$ with $\forall c_{d_i}^A \geq 0$ and $\forall c_{d_i}^B \geq 0$) as well bilaterally to projects A and B (b_i^A, b_i^B) subject to a binding and exhausted budget constraint formed by $y_{d_i} \times t_{d_i} \times a_{d_i}$, where a_{d_i} is the share of the budget devoted to aid,²⁰ and the budget is generated by tax rate t_{d_i} imposed on income y_{d_i} .

- Based on the allocation decisions by all $d_i \in D$, m decides whether to obtain information about how aid translates into output (i.e., invests money (\overline{c}_m) to learn the value of $k \in \{\underline{k}, \overline{k}\}$). For these variables we assume the following:

Assumption 3 $\sum_{d_i} c_{d_i}^{C_a} \geq 2\overline{c}_m$

Assumption 4 $-\underline{k} = \overline{k} \in (0, 1)$

Assumption 3 assures first of all that learning by m is not constrained by the available funds, and second insures that there are at least for some values of \overline{k} values for \overline{s}^A such that m will actually have an incentive to learn the value of k . Assumption 4, on the other hand, restricts the differences in aid outputs across projects A and B .²¹

- Based on the private information about the value of k (i.e., $c_m = \overline{c}_m$) or not ($c_m = 0$) m chooses s^A and s^B (subject to the rule adopted by D , i.e. $s^A \in [\underline{s}^A, \overline{s}^A]$). Jointly with SPTF contributions from donors, this determines multilateral aid allocations $a^A = s^A(\sum_{d_i} c_{d_i}^C - c_m) + \sum_{d_i} c_{d_i}^A$ and $a^B = s^B(\sum_{d_i} c_{d_i}^C - c_m) + \sum_{d_i} c_{d_i}^B$ to projects A , resp. B . The aid input produces “development” output according to the value of k : $o^A = (1+k)a^A + (1-k)\sum_{d_i} b_{d_i}^A$ and $o^B = (1-k)a^B + (1-k)\sum_{d_i} b_{d_i}^B$.²² These expressions include also the contributions to projects A and B which are made bilaterally. While this bilateral aid also produces aid output, we consider it to be less “efficient” by having contributions weighted by $(1 - \overline{k})$.²³ We assume

²⁰ a_{d_i} might also be considered as optimal choice given reelection considerations.

²¹As a consequence of this assumption one of the two projects always provides “more bang for the buck,” and each project provides at least some “bang for the buck.”

²² $\frac{1}{1+k}$ and $\frac{1}{1-k}$ thus correspond to unit prices of aid output for multilateral aid.

²³This imposes an order in terms of aid effectiveness: core contributions, under the assumption of m learning translate via the factor $(1 + \overline{k})$ into aid output, multi-bi aid by factor 1 and bilateral aid by factor $(1 - \overline{k})$. As we discuss below, however, we assume bilateral aid to generate a “premium” in voter support to donor governments.

Assumption 5 *If m is indifferent among all $s^A \in [\underline{s}^A, \overline{s}^A]$ then $s^{A*} = \frac{\underline{s}^A + \overline{s}^A}{2}$.*

- I(nformation)
 - complete and perfect information except that m and $d \in D$ have a common prior belief about the value k ($p(k = \bar{k}) = \frac{1}{2}$), while m may invest \overline{c}_m to learn the value of k .
- S(trategies)
 - each $d_i \in D$ chooses $b_{d_i}^A, b_{d_i}^B, c_{d_i}^A, c_{d_i}^B$ and $c_{d_i}^{C_v}$ as well as a voting rule indicating which proposals of ranges for s^A (and thus also for s^B) are accepted, and which are not.
 - m chooses whether to spend \overline{c}_m and based on the information obtained (or not) selects $s^A \in [\underline{s}^A, \overline{s}^A]$ (and thus also $s^B = 1 - s^A$).

- P(ayoffs)
 - D is the set $\{d_1, d_2, \dots, d_n\}$ with $d_1 = 1$ and $d_n = n$ with the following general utility function:

$$U_{d_i}(o^A, o^B | d_i) = f_{d_i} o^A + (1 - f_{d_i}) o^B + v_{d_i} (b_{d_i}^A + b_{d_i}^B)$$

where f_{d_i} is a weighting factor for the two types of aid outputs, while v_{d_i} reflects the fact that bilateral aid may generate benefits to a donor government independent of aid output, namely by increased voter support. While we allow for donor governments specific values for v_{d_i} , in what follows we will use for all donors the value of v and make the following assumption

Assumption 6 $v < 1 - \bar{k}$

Under this assumption we are sure that the “effectiveness” of bilateral aid is weakly “worse” than all possible expected “efficiencies” for contributions to special purpose trust funds.

In the present paper we also impose a symmetric and uniform distribution of the weighting factors by adopting the following assumption:

Assumption 7 $f_{d_i} = \frac{d_i - 1}{n - 1}$

Thus, based on assumption 7 the utility function for all d_i s becomes

$$U_{d_i}(o^A, o^B | d_i) = \frac{d_i-1}{n-1}o^A + \frac{n-d_i}{n-1}o^B + v_{d_i}(b_{d_i}^A + b_{d_i}^B)$$

– utility function of m is defined as follows:²⁴

$$U_m(o^A, o^B) = o^A + o^B$$

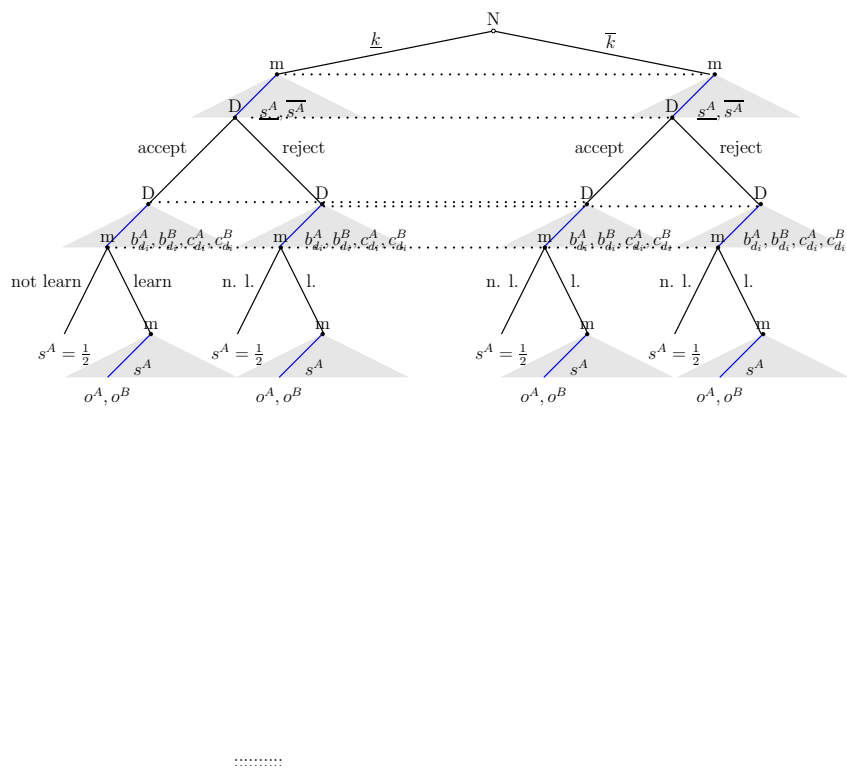
- O(utcomes)
 - aid outputs o^A and o^B (as defined above).
- E(quilibrium)
 - perfect Bayesian²⁵

Figure 4 depicts a simplified extensive form of our game. The game starts with nature (N) choosing the value of k . Without knowing this value m proposes a constraint for her budget allocation $(\underline{s}^A, \overline{s}^A)$. The set of donors D then decides whether or not to accept this constraint, followed by them making aid allocation decisions (i.e., choosing their bilateral and SPTF contributions to projects A and B ($b_{d_i}^A, b_{d_i}^B, c_{d_i}^A, c_{d_i}^B$)) while the remainder of the aid budget ($y_{d_i} \times t_{d_i} \times a_{d_i}$) goes as voluntary contributions to the core fund ($c_{d_i}^{Cv}$). After observing these funding decisions m chooses whether or not to collect information on the value of k and then either based or not based on this information decides on the aid allocation ($s^A \in [\underline{s}^A, \overline{s}^A]$).

²⁴As the information gathering cost born by m (i.e., \overline{c}_m) reduces the possible aid output, these costs indirectly reduce m 's utility. Consequently, m might be considered as a “benevolent” aid allocator. At a later stage we might consider a more budget-maximizing version, e.g., $U_m(a^A, a^B, c_m) = a^A + a^B - c_m$. The utility function specified for m assumes risk-neutrality, which might be justified by the fact that m only cares about output generated by funds made available by other actors than herself, and she has to exhaust the available funds for aid.

²⁵In the current formulation of the game the asymmetric information cannot lead to any updating of prior beliefs. Thus, strictly speaking we solve the game for subgame perfect equilibria.

Figure 4: Game tree



4.1 Analysis: Implications

The game proposed above allows for numerous insights on the interplay between donor decisions and decision-making in MAIs. We propose in what follows three results, one concerning the general conditions under which m will collect information, and then for the case where there are five donors, insights about the donors' aid allocation decisions and the interplay of these decisions with the leeway of the agent m .

To arrive at these results we solve the game by backward induction and analyze m 's last two decision nodes (information collection and aid allocation) jointly. Under the assumption that the range of autonomy is centrally located among the preferences of the set D (i.e., $\underline{s}^A = 1 - \overline{s}^A$)²⁶ we assess first the expected utility for m for the case where she refrains from collecting information ($c_m = 0$):

$$\begin{aligned}
EU_m(c_m = 0) &= \frac{1}{2}[(1 + \bar{k})(s^A \sum_{d_i} c_{d_i}^C + (1 - \bar{k}) \sum_{d_i} b_{d_i}^A + \sum_{d_i} c_{d_i}^A) + \\
&\quad (1 - \bar{k})(s^B \sum_{d_i} c_{d_i}^C + (1 - \bar{k}) \sum_{d_i} b_{d_i}^B + \sum_{d_i} c_{d_i}^B)] + \\
&\quad \frac{1}{2}[(1 + \underline{k})(s^A \sum_{d_i} c_{d_i}^C + (1 - \underline{k}) \sum_{d_i} b_{d_i}^A + \sum_{d_i} c_{d_i}^A) + \\
&\quad (1 - \underline{k})(s^B \sum_{d_i} c_{d_i}^C + (1 - \underline{k}) \sum_{d_i} b_{d_i}^B + \sum_{d_i} c_{d_i}^B)] \\
&= s^A \sum_{d_i} c_{d_i}^C + (1 - \bar{k}) \sum_{d_i} b_{d_i}^A + (1 - \bar{k}) \sum_{d_i} b_{d_i}^B + \sum_{d_i} c_{d_i}^A + \sum_{d_i} c_{d_i}^B + \\
&\quad (1 - s^A) \sum_{d_i} c_{d_i}^C \\
&= \sum_{d_i} c_{d_i}^C + (1 - \bar{k}) \sum_{d_i} b_{d_i}^A + (1 - \bar{k}) \sum_{d_i} b_{d_i}^B + \sum_{d_i} c_{d_i}^A + \sum_{d_i} c_{d_i}^B \quad (1)
\end{aligned}$$

Thus, m is indifferent among all combinations of s^A and s^B and by assumption 5 she chooses $s^A = \frac{1}{2} = s^B$.

Assuming now that $c_m = \bar{c}_m$ then m 's expected utility has to be calculated conditional on the information she obtains (using the property that $s^B = 1 - s^A$). Strictly speaking, for the two conditional utilities (depending on the value of

²⁶Assumption 7 imposing a symmetric distribution on d_i 's preferences ensures that this is part of any possible equilibrium.

k) we also have two sets of conditional share parameters (i.e., $s^A|(k = \bar{k})$ and $s^B|(k = \bar{k})$, resp. $s^A|(k = \underline{k})$ and $s^B|(k = \underline{k})$). By symmetry we know that $s^A|(k = \bar{k}) = 1 - s^B|(k = \bar{k})$ and the same for $k = \underline{k}$. As the values for k are such that $\underline{k} = -\bar{k}$ we also know that $s^A|(k = \bar{k}) = s^B|(k = \underline{k})$ (i.e., irrespective of which project yields more “bang for the buck”, the share devoted to the more effective one will be the same). Thus, in what follows we replace $s^A|(k = \bar{k}) = s^B|(k = \underline{k})$ with s^* and $s^B|(k = \bar{k}) = s^A|(k = \underline{k})$ with $1 - s^*$ (by symmetry). In addition, in what follows, we will systematically use \bar{k} for situations where the value of k is known (and by assumption 4 we can replace \underline{k} with $1-\bar{k}$). Consequently,

$$\begin{aligned}
EU_m(c_m = \bar{c}_m, k = \bar{k}) &= (1 + \bar{k})[s^*(\sum_{d_i} c_{d_i}^C - \bar{c}_m) + (1 - \bar{k}) \sum_{d_i} b_{d_i}^A + \sum_{d_i} c_{d_i}^A] + \\
&\quad (1 - \bar{k})[(1 - s^*)(\sum_{d_i} c_{d_i}^C - \bar{c}_m) + (1 - \bar{k}) \sum_{d_i} b_{d_i}^B + \sum_{d_i} c_{d_i}^B] \quad (2) \\
EU_m(c_m = \bar{c}_m, k = \underline{k}) &= (1 - \bar{k})[(1 - s^*)(\sum_{d_i} c_{d_i}^C - \bar{c}_m) + (1 - \bar{k}) \sum_{d_i} b_{d_i}^A + \sum_{d_i} c_{d_i}^A] + \\
&\quad (1 + \bar{k})[s^*(\sum_{d_i} c_{d_i}^C - \bar{c}_m) + (1 - \bar{k}) \sum_{d_i} b_{d_i}^B + \sum_{d_i} c_{d_i}^B] \quad (3)
\end{aligned}$$

Consequently, the unconditional expected utility reduces to

$$\begin{aligned}
EU_m(c_m = \bar{c}_m) &= (1 + \bar{k})[s^*(\sum_{d_i} c_{d_i}^C - \bar{c}_m)] + (1 - \bar{k})(1 - s^*)(\sum_{d_i} c_{d_i}^C - \bar{c}_m) + \\
&\quad \frac{1}{2}(1 + \bar{k})((1 - \bar{k}) \sum_{d_i} b_{d_i}^A + \sum_{d_i} c_{d_i}^A) + \\
&\quad \frac{1}{2}(1 - \bar{k})((1 - \bar{k}) \sum_{d_i} b_{d_i}^A + \sum_{d_i} c_{d_i}^A) + \\
&\quad \frac{1}{2}(1 - \bar{k})((1 - \bar{k}) \sum_{d_i} b_{d_i}^B + \sum_{d_i} c_{d_i}^B) + \\
&\quad \frac{1}{2}(1 - \bar{k})((1 - \bar{k}) \sum_{d_i} b_{d_i}^B + \sum_{d_i} c_{d_i}^B) \\
&= 2\bar{k}s^*(\sum_{d_i} c_{d_i}^C - c_m) + \sum_{d_i} c_{d_i}^C - \bar{c}_m - \bar{k}(\sum_{d_i} c_{d_i}^C - c_m) + \sum_{d_i} c_{d_i}^A + \\
&\quad (1 - \bar{k}) \sum_{d_i} b_{d_i}^A + \sum_{d_i} c_{d_i}^B + (1 - \bar{k}) \sum_{d_i} b_{d_i}^B \\
&= (1 - \bar{k}) \sum_{d_i} b_{d_i}^A + (1 - \bar{k}) \sum_{d_i} b_{d_i}^B + \sum_{d_i} c_{d_i}^A + \sum_{d_i} c_{d_i}^B + \sum_{d_i} c_{d_i}^C - \\
&\quad \bar{c}_m(1 - \bar{k} + 2\bar{k}s^*) + \sum_{d_i} c_{d_i}^C(2\bar{k}s^* - k) \tag{4}
\end{aligned}$$

Comparing the expected utilities for these two cases allows us to determine the conditions under which m will acquire information, namely if²⁷

$$\begin{aligned}
EU_m(c_m = \bar{c}_m) &\geq EU_m(c_m = 0) \\
\sum_{d_i} c_{d_i}^C(2\bar{k}s^* - \bar{k}) - \bar{c}_m(1 - \bar{k} + 2\bar{k}s^*) &\geq 0 \\
\frac{\sum_{d_i} c_{d_i}^C(2\bar{k}s^* - \bar{k})}{1 - \bar{k} + 2\bar{k}s^*} &\geq \bar{c}_m \tag{5}
\end{aligned}$$

Assuming fixed $\sum_{d_i} c_{d_i}^C$ we may use equation 5 to determine what the lowest value for s^* is so that m will collect information. This is the case when $s^* = \frac{\bar{k}(\sum_{d_i} c_{d_i}^C - \bar{c}_m) + \bar{c}_m}{2\bar{k}(\sum_{d_i} c_{d_i}^C - \bar{c}_m)}$. As by assumption 3 the minimal amount to be found in the core fund through assessed contributions is larger than the costs for collecting information, and the latter costs are strictly positive, this minimal value for s^* is

²⁷We assume that in case of indifference m will collect information.

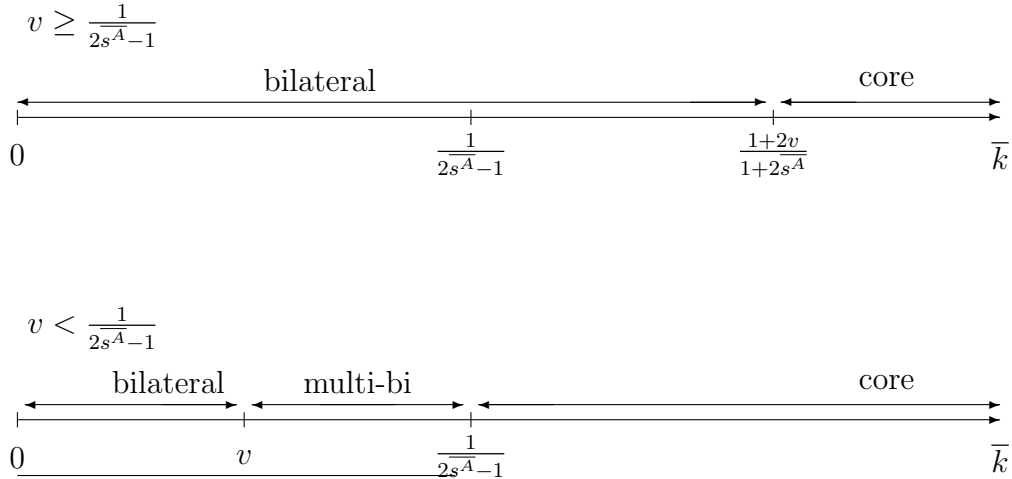
strictly larger than $\frac{1}{2}$.²⁸ This result we can state in the following proposition as a set of comparative statics analyses:

Proposition 1 *With increasing core funds ($\sum_{d_i} c_{d_i}^C$), higher values for \bar{k} and \bar{s}^A m is more likely to collect information, provided, in the two former cases, the condition $\bar{s}^A > \frac{1}{2}$ holds.*

The proof of proposition 1 immediately follows from equation 5 and taking derivatives with respect to the three variables. *Q.E.D.*

In a next step, under the assumption that there are five donors, we solve the game for its equilibria under two decision-making rules, namely unanimity and majority rule.²⁹ To do so we first derive the optimal allocation rules for the five donors. These depend on the discretion (\bar{s}^A) given to m , the utility donors obtain from voters by giving bilateral aid (v) and the importance of m 's knowledge (\bar{k}).³⁰ We depict in figures 5-7 the optimal voluntary aid allocations for possible values of \bar{k} .

Figure 5: Aid allocation decisions of donor d_1 and d_5 in equilibrium



²⁸Assumption 3 in addition guarantees that some \bar{k} exist such that this lower bound for \bar{s}^A does not exceed 1. This is used as part of the proof of proposition 3 in the appendix.

²⁹Five is the lowest uneven number for which unanimity and majority rule lead to different outcomes.

³⁰We present the derivation of these allocation rules in the appendix.

Figure 6: Aid allocation decisions of donor d_2 and d_4 in equilibrium

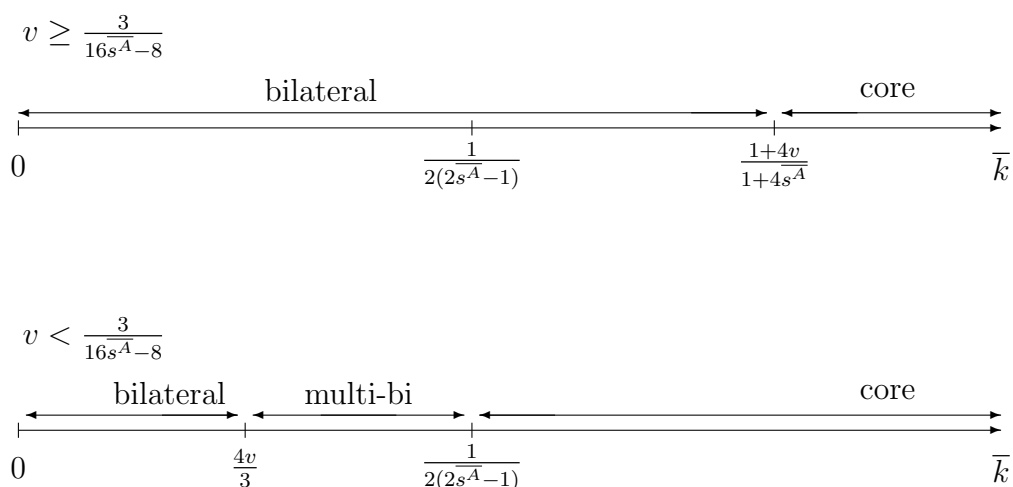
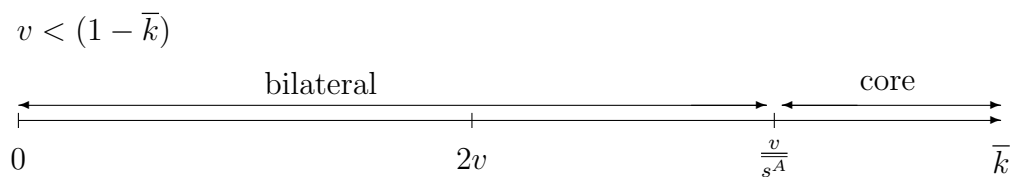


Figure 7: Aid allocation decisions of donor d_3 in equilibrium



The figures suggest that all donors, for particular values of the relevant variables, might give each type of the three voluntary aid categories, with the exception of donor d_3 who only chooses, in equilibrium, between bilateral and voluntary core contributions. An additional exception is generated by assumption 6 for donors d_1 and d_5 . As \bar{s}^A can be at most 1 and v is smaller than 1 by assumption 6, it follows easily from figure 5 that d_1 and d_5 will never give voluntary

core contributions. From this follows immediately our proposition regarding the equilibrium under unanimity rule:

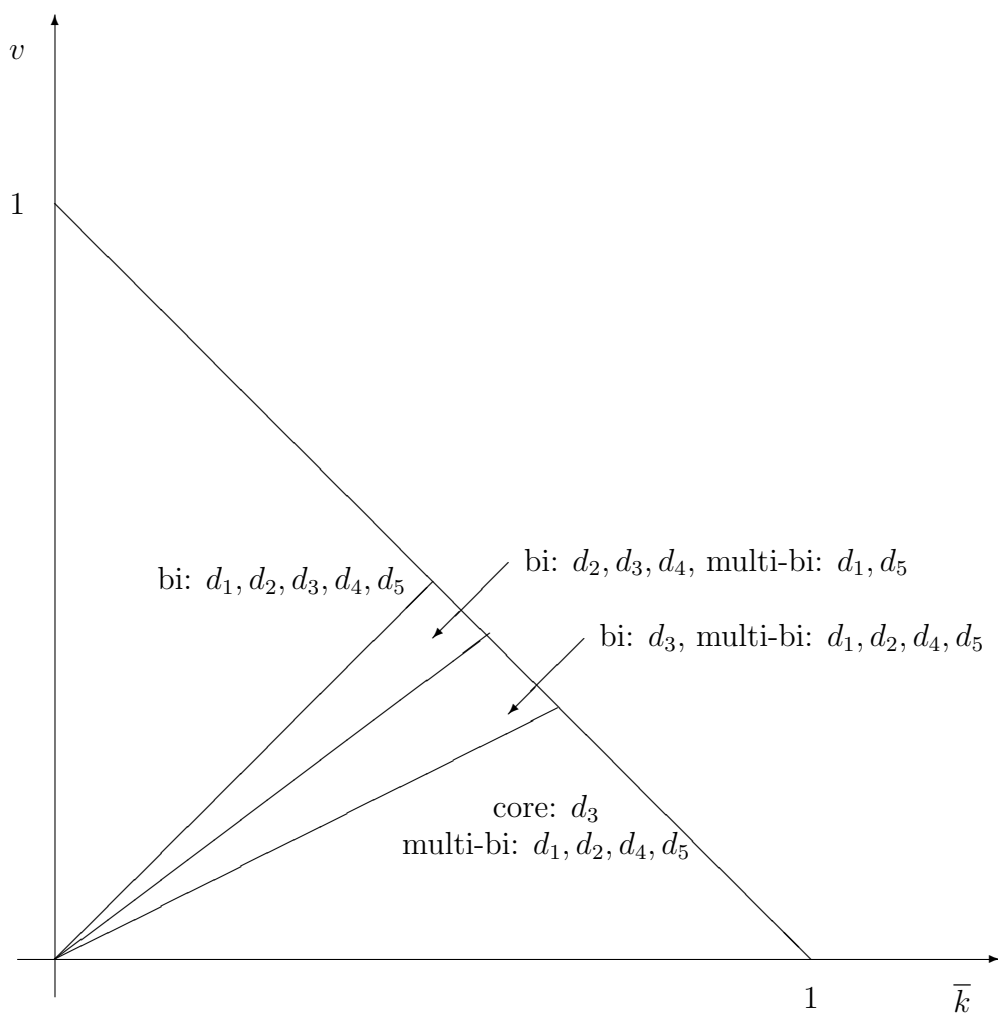
Proposition 2 *Under unanimity rule no discretion is granted to m ($\bar{s}^A = \frac{1}{2}$), who will refrain from learning the value of k .*

This proposition follows immediately from the observation that d_1 and d_5 will make no voluntary core contributions. As it is only through the latter that donors' utility is affected by \bar{s}^A , by assumption 2 d_1 and d_5 will reject any level of discretion leading to $\bar{s}^A = \frac{1}{2}$. *Q.E.D.*

Using the equilibrium value for \bar{s}^A , namely $\frac{1}{2}$, and employing the insights depicted in figures 5-7 we can easily generate the equilibrium aid allocations for the five donors as a function of \bar{k} and v . Figure 8 depicts for all possible combinations of these two variables the aid allocation decisions made by the five donors under unanimity.

Figure 8 nicely shows that when the gain through the knowledge of m (\bar{k}) would be large (or the effectiveness of bilateral aid small), compared to the utility a donor might get from voters through v , multi-bi aid is most attractive for the donors. As the voters loom larger compared to the gain due to knowledge, bilateral aid, first for “moderate” donors and then increasingly for more extremist donors, becomes more attractive.

Figure 8: Equilibrium candidates under unanimity, which implies $\overline{s^A} = \frac{1}{2}$



Proposition 2 suggests that only under majority rule a subset of the five donors might adopt sufficient discretion for m to engage in learning. As m 's utility is strictly increasing in \bar{s}^A and in $\sum_{d_i} c_{d_i}^C$ we first derive the conditions under which the donors will contribute core funds under the assumption of $\bar{s}^A = 1$. Under this assumption the following proposition follows rather easily:³¹

Proposition 3 *Under majority rule $\bar{s}^A = 1$ is accepted by donors d_2, d_3 and d_4 who will give core contributions if and only if either of the following two sets of conditions is fulfilled:*

- i) if $v < \min(1 - \bar{k}, \frac{3}{8})$ and $\bar{k} > \frac{1}{2}$*
- ii) $v < 1 - \bar{k}$ and $\frac{3}{8} < v < \frac{5\bar{k}-1}{4}$*

An additional lemma allows us to generate the full equilibrium aid allocation decisions:

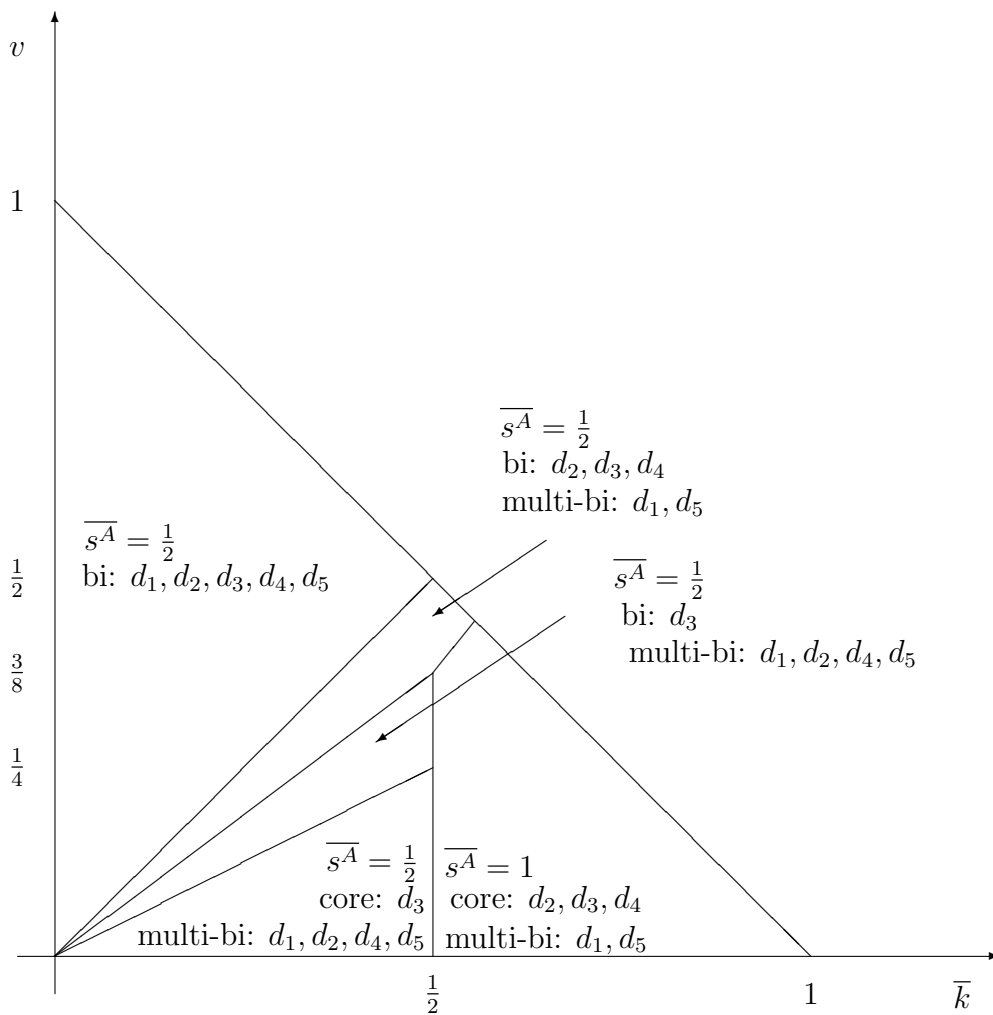
Lemma 1 *Under majority rule m cannot offer less than full discretion ($\bar{s}^A < 1$) and induce donors d_2, d_3 and d_4 to make core contributions under other conditions than those specified in proposition 3.*

From this lemma it follows that for all other combinations of values for \bar{k} and v no majority will support a discretion proposal different from $\bar{s}^A = \frac{1}{2}$. Based on this figure 9 depicts for all possible combinations of \bar{k} and v what discretion levels will be adopted by majority rule and the resulting aid allocation decisions.

Figure 9 (in comparison with figure 8) nicely shows how decision-making rules affect aid allocation decisions and the use of multi-bi aid by donors. Under unanimity (figure 8) we noted that for important gains due to knowledge compared to the importance of voters, multi-bi aid is attractive to all donors, except the median donor d_3 . Under majority rule there is a range for high values of \bar{k} such that a majority of donors gives m maximum discretion and as a consequence the donors make voluntary core contributions (figure 9). If \bar{k} is smaller a majority can no longer be found to support any type of discretion. Thus, for low values of v , as under unanimity, multi-bi is attractive for all donors except the median one. As v becomes more important, relative to \bar{k} , first this median donor switches to bilateral aid, before the remaining donors, as a function of their preferences, start joining them until all of them only give bilateral aid (for relatively high values for v compared to \bar{k}).

³¹The proof of proposition 3 appears in the appendix.

Figure 9: Equilibrium candidates under majority rule (finally the correct one)



5 Discussion

The results of our game-theoretical model clearly show that decision rules in MAIs and aid allocation decisions interact. This interaction offers also an explanation for the conditions under which SPTFs are attractive for donors. SPTFs are an attractive alternative when the latter are not too strongly disadvantaged compared to core contributions in terms of effectiveness and voters generate only little utility due to bilateral aid. If the latter increases, bilateral aid becomes more attractive. Thus clearly, donors want to take advantage of MAIs' expertise when using SPTFs, but if this expertise is considerably higher for core contributions, the latter supplant SPTFs.

We offer also a series of conjectures which follow quite directly from our derivation of the equilibria. First, the behavior of the two extreme donors is a limiting case. They do not care about one of the projects which makes contributing voluntarily to the core fund pointless. Consequently, if all donors obtain at least some utility from each of the two projects, an equilibrium under unanimity exists allowing for some discretion given to m .

Similarly, the median donor profits the most from core contributions as she values both projects equally. Thus, multi-bi aid, which favors one project and takes advantage of m 's specialization is pointless, as long as core contributions achieve the same goal.

Second, if we were to assume more than five donors with the same set of "ideal-points" as those of the five assumed above (i.e., several donors would have the same "ideal-point"), as long as the distribution is symmetrical around the median, qualitatively the same results would obtain. If the distribution were asymmetrical, however, the various combinations of \bar{k} and v allowing for various aid allocations would change.

Third, if we were to assume a continuous distribution of weighting factors of the two aid outputs in the donors' utility function (and thus a continuous distribution of donor types), the same qualitative results would obtain, however, with a continuous distribution of donor decisions implied. Thus, similar zones would be generated indicating the combinations for \bar{k} and v which under specific decision rules in the MAI would generate full discretion or not.

6 Conclusion

The increasing importance of special purpose trust funds raises a series of questions concerning their consequences for aid effectiveness, recipient countries, and multilateral organisations. These consequences are, however, hard to answer in the absence of a clear understanding of what leads donors to eschew traditional channels for aid-giving, i.e., bilateral or traditional multilateral channels. In particular, this version considers two different governance mechanisms, the unanimity and the majority rule, as, approximately, present in the two multilateral organisations where multi-bi aid is most prevalent, the United Nations and the World Bank respectively. For this analysis, we suggest a simple game-theoretical model as a first stepping stone to gain a clearer understanding. The model allows donors not only to provide voluntary contributions (beyond the assessed contributions) to a core fund, but to disburse additional aid to special purpose trust funds. For simplicity we assumed that the latter only use the money to finance one specific project, while the multilateral aid agency may divert the core fund (inside approved bounds) to projects about which it has learned that they are more efficient. In addition to allowing donors to allocate their “multilateral” aid to the core fund, to a special purpose trust funds, or to spend it bilaterally, the donors jointly decide the leeway that MAI agent has in allocating her budget. We show that the allocation decisions depend upon the decision rule.

Focusing on a situation with five donors and symmetry we can derive insights on allocation behavior under unanimity and under majority rule. Under the former regime, no discretion is granted as only the donor with centrist preferences contributes voluntary core aid when voters contribute little utility. The other four donors provide either multi-bi or bilateral aid. The situation is quite different in an multilateral institution with a majority decision rule. First, the donor with centrist preferences contributes either bilateral or core aid but never gives to special purpose trust funds. The four donors with non-centrist preferences may contribute to any of the three aid modalities. In an important subset of situations, the multilateral institution proposes and receives full discretion. However, as domestic benefits rise simultaneously for all donors, the agent asks for less than full discretion. A majority of donor approves still approves this and they continue to provide voluntary core contributions. With further increases in domestic payoffs, donors provide bilateral aid only, no matter what the agent proposes.

Appendix

In this appendix we first derive the donors' optimal allocation rules for the game with $\|D\| = 5$ before presenting the proofs of the propositions and the lemma presented without proofs in the main text.

Derivation of the donors' allocation rules

For d_1 , we have expected utility

$$\begin{aligned}
EU_{d_1} &= \frac{0}{4} \left[\frac{1}{2} (1 - \bar{k}) \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_1}^A + \sum_{d_i} c_{d_i}^C - c_m \right] + \frac{1}{2} (1 + \bar{k}) \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_1}^A + \sum_{d_i} c_{d_i}^C - c_m \right] \right. \\
&\quad \left. + (1 - \bar{k}) b_{d_1}^A \right] + \frac{4}{4} \left[\frac{1}{2} (1 - \bar{k}) \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_1}^B + \sum_{d_i} c_{d_i}^C - c_m \right] \right. \\
&\quad \left. + \frac{1}{2} (1 + \bar{k}) \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_1}^B + \sum_{d_i} c_{d_i}^C - c_m \right] + (1 - \bar{k}) b_{d_1}^B \right] + v (b_{d_1}^A + b_{d_1}^B) \\
&= \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_1}^B + \left(\sum_{d_i} c_{d_i}^C - c_m \right) (\bar{k} s^A + \frac{1 - \bar{k}}{2}) \right] + (1 - \bar{k}) b_{d_1}^B + v (b_{d_1}^A + b_{d_1}^B) \quad (6)
\end{aligned}$$

Partial derivatives of EU_{d_1} with respect to d_1 's choice variables are

$$\begin{aligned}
\frac{\delta EU_{d_1}}{\delta c_{d_1}^{C_v}} &= \bar{k} s^A + \frac{1 - \bar{k}}{2} \\
\frac{\delta EU_{d_1}}{\delta c_{d_1}^A} &= 0 \\
\frac{\delta EU_{d_1}}{\delta c_{d_1}^B} &= 1 \\
\frac{\delta EU_{d_1}}{\delta b_{d_1}^A} &= v \\
\frac{\delta EU_{d_1}}{\delta b_{d_1}^B} &= (1 - \bar{k}) + v \quad (7)
\end{aligned}$$

For d_2 we have

$$\begin{aligned}
EU_{d_2} &= \frac{1}{4} \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_2}^A + \left(\sum_{d_i} c_{d_i}^C - c_m \right) (\overline{ks^A} + \frac{1 - \bar{k}}{2}) + (1 - \bar{k}) b_{d_2}^A \right] \\
&+ \frac{3}{4} \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_2}^B + \left(\sum_{d_i} c_{d_i}^C - c_m \right) (\overline{ks^A} + \frac{1 - \bar{k}}{2}) + (1 - \bar{k}) b_{d_2}^B \right] \\
&+ v(b_{d_2}^A + b_{d_2}^B)
\end{aligned} \tag{8}$$

Partial derivatives of EU_{d_2} with respect to d_2 's choice variables are

$$\begin{aligned}
\frac{\delta EU_{d_2}}{\delta c_{d_2}^{C_v}} &= \overline{ks^A} + \frac{1 - \bar{k}}{2} \\
\frac{\delta EU_{d_2}}{\delta c_{d_2}^A} &= \frac{1}{4} \\
\frac{\delta EU_{d_2}}{\delta c_{d_2}^B} &= \frac{3}{4} \\
\frac{\delta EU_{d_2}}{\delta b_{d_2}^A} &= \frac{1}{4}(1 - \bar{k}) + v \\
\frac{\delta EU_{d_2}}{\delta b_{d_2}^B} &= \frac{3}{4}(1 - \bar{k}) + v
\end{aligned} \tag{9}$$

For d_3 , we have the expected utility

$$\begin{aligned}
EU_{d_3} &= \frac{1}{2} \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_3}^A + \left(\sum_{d_i} c_{d_i}^C - c_m \right) (\overline{ks^A} + \frac{1 - \bar{k}}{2}) + (1 - \bar{k}) b_{d_3}^A \right] \\
&+ \frac{1}{2} \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_3}^B + \left(\sum_{d_i} c_{d_i}^C - c_m \right) (\overline{ks^A} + \frac{1 - \bar{k}}{2}) + (1 - \bar{k}) b_{d_3}^B \right] \\
&+ v[b_{d_3}^A + b_{d_3}^B]
\end{aligned} \tag{10}$$

Partial derivatives of EU_{d_3} with respect to d_3 's choice variables are

$$\begin{aligned}
\frac{\delta EU_{d_3}}{\delta c_{d_3}^{C_v}} &= \overline{ks^A} + \frac{1 - \bar{k}}{2} \\
\frac{\delta EU_{d_3}}{\delta c_{d_3}^A} &= \frac{1}{2} \\
\frac{\delta EU_{d_3}}{\delta c_{d_3}^B} &= \frac{1}{2} \\
\frac{\delta EU_{d_3}}{\delta b_{d_3}^A} &= \frac{1}{2}(1 - \bar{k}) + v \\
\frac{\delta EU_{d_3}}{\delta b_{d_3}^B} &= \frac{1}{2}(1 - \bar{k}) + v
\end{aligned} \tag{11}$$

For d_4 and d_5 , the partial derivatives are symmetric to d_2 and d_1 respectively, only that the former preferences lean towards B whereas the later prefer A.

Conditions determining allocation decisions

Now, we look at the determinants of each donor's aid allocation.

First, donor d_1 provides voluntary core resources (i.e., $c_{d_1}^{C_v} > 0$) if $\overline{ks^A} + \frac{1 - \bar{k}}{2} > 1$ and $\overline{ks^A} + \frac{1 - \bar{k}}{2} > (1 - \bar{k}) + v$. The relevant limits for \bar{k} are:

$$\begin{aligned}
\overline{ks^A} + \frac{1 - \bar{k}}{2} &> 1 \\
2\overline{ks^A} - \bar{k} &> 1 \\
\bar{k} &> \frac{1}{2s^A - 1}
\end{aligned} \tag{12}$$

and

$$\begin{aligned}
\overline{ks^A} + \frac{1 - \bar{k}}{2} &> (1 - \bar{k}) + v \\
2\overline{ks^A} + \bar{k} &> 1 + 2v \\
\bar{k} &> \frac{1 + 2v}{2s^A + 1}
\end{aligned} \tag{13}$$

From this, we may determine the value of v that makes one or the other of

these \bar{k} binding,

$$\begin{aligned}\frac{1}{2s^A - 1} &> \frac{1 + 2v}{2s^A + 1} \\ \frac{1}{2s^A + 1} &> \frac{1 + 2v}{2s^A + 4s^A v - 1 - 2v} \\ \frac{1}{2s^A - 1} &> v\end{aligned}\tag{14}$$

Second, the SPTF for project B will receive funds (i.e., $c_{d_2}^B > 0$) if $1 > 1 - \bar{k} + v$ and $1 > \bar{k}s^A + \frac{1 - \bar{k}}{2}$. The first inequality holds for $\bar{k} > v$. For the second inequality we obtain:

$$\begin{aligned}1 &> \bar{k}s^A + \frac{1 - \bar{k}}{2} \\ \frac{1}{2s^A - 1} &> \bar{k}\end{aligned}\tag{15}$$

Thus, we find that for $\frac{1}{2s^A - 1} > v$, multi-bi aid is provided if $\frac{1}{2s^A - 1} > \bar{k} > v$.

Finally, d_1 provides bilateral aid for project B (i.e., $b_{d_1}^B > 0$) if $1 - \bar{k} + v > 1$ and $1 - \bar{k} + v > \bar{k}s^A + \frac{1 - \bar{k}}{2}$. The first inequality holds for $v > \bar{k}$. For the second inequality we obtain:

$$\begin{aligned}1 - \bar{k} + v &> \bar{k}s^A + \frac{1 - \bar{k}}{2} \\ 1 + 2v &> 2\bar{k}s^A + \bar{k} \\ \frac{1 + 2v}{2s^A + 1} &> \bar{k}\end{aligned}\tag{16}$$

Determining the respective v we find:

$$\begin{aligned}\frac{1 + 2v}{2s^A + 1} &> v \\ 1 + v &> 2v\bar{s}^A \\ \frac{1}{1s^A - 1} &> v\end{aligned}\tag{17}$$

Donor d_2 provides voluntary core funds (i.e., $c_{d_2}^{C_v} > 0$) if $\bar{k}s^A + \frac{1 - \bar{k}}{2} > \frac{3}{4}$ and $\bar{k}s^A + \frac{1 - \bar{k}}{2} > \frac{3}{4}(1 - \bar{k}) + v$. We now look for the values of \bar{k} for which d_2 provides voluntary core funds.

$$\begin{aligned}\bar{k}s^A + \frac{1 - \bar{k}}{2} &> \frac{3}{4} \\ 4\bar{k}s^A - 2\bar{k} &> 1 \\ \bar{k} &> \frac{1}{4s^A - 2}\end{aligned}\tag{18}$$

and

$$\begin{aligned}
\overline{k}s^A + \frac{1 - \overline{k}}{2} &> \frac{3}{4}(1 - \overline{k}) + v \\
4\overline{k}s^A + \overline{k} &> 1 + 4v \\
\overline{k} &> \frac{1 + 4v}{4s^A + 1}
\end{aligned} \tag{19}$$

From this, we may determine the value of v that determines which one of these \overline{k} is binding,

$$\begin{aligned}
\frac{1}{4s^A - 2} &> \frac{1 + 4v}{4s^A + 1} \\
4s^A + 1 &> 4s^A + 16s^A v - 2 - 8v \\
\frac{3}{16s^A - 8} &> v
\end{aligned} \tag{20}$$

Second, d_2 contributes to the special fund B (i.e., $c_{d_2}^B > 0$) if $\frac{3}{4} > \overline{k}s^A + \frac{1 - \overline{k}}{2}$ and $\frac{3}{4} > \frac{3}{4}(1 - \overline{k}) + v$. The relevant constraints for \overline{k} are:

$$\begin{aligned}
\frac{3}{4} &> \overline{k}s^A + \frac{1 - \overline{k}}{2} \\
1 &> \overline{k}(4s^A - 2) \\
\frac{1}{4s^A - 2} &> \overline{k}
\end{aligned} \tag{21}$$

and

$$\begin{aligned}
\frac{3}{4} &> \frac{3}{4}(1 - \overline{k}) + v \\
3 &> 3 - 3\overline{k} + 4v \\
\overline{k} &> \frac{4v}{3}
\end{aligned} \tag{22}$$

From this, we may again determine the value of v , for which these limits on \overline{k} are binding

$$\begin{aligned}
\frac{1}{4s^A - 2} &> \overline{k} > \frac{4v}{3} \\
3 &> 4v(4s^A - 2) \\
\frac{3}{16s^A - 8} &> v
\end{aligned} \tag{23}$$

Finally, d_2 provides bilateral aid to project B (i.e., $b_{d_2}^B > 0$) if $\frac{3}{4}(1 - \bar{k}) + v > \bar{k}s^A + \frac{1-\bar{k}}{2}$ and $\frac{3}{4}(1 - \bar{k}) + v > \frac{3}{4}$. The relevant values for the limits on \bar{k} are:

$$\begin{aligned} \frac{3}{4}(1 - \bar{k}) + v &> \bar{k}s^A + \frac{1 - \bar{k}}{2} \\ 1 + 4v &> 4\bar{k}s^A + \bar{k} \\ \frac{1 + 4v}{4s^A + 1} &> \bar{k} \end{aligned} \tag{24}$$

and

$$\begin{aligned} \frac{3}{4}(1 - \bar{k}) + v &> \frac{3}{4} \\ 3 - 3\bar{k} + 4v &> 3 \\ \frac{4v}{3} &> \bar{k} \end{aligned} \tag{25}$$

Next, we determine the values of v that determine which these limits on \bar{k} is binding:

$$\begin{aligned} \frac{1 + 4v}{4s^A + 1} &> \frac{4v}{3} \\ 3 + 12v &> 16\bar{v}s^A + 4v \\ \frac{3}{16s^A - 8} &> v \end{aligned} \tag{26}$$

Donor d_2 may provide voluntary core contributions to the multilateral, give to SPTFs for project B or provide bilateral aid for project B.

Because of perfect symmetry, d_4 and d_5 face exactly the same constraints as d_1 and d_2 .

First, donor d_3 will provide core contributions (i.e., $c_{d_3}^{C_v} > 0$) if $\bar{k}s^A + \frac{1-\bar{k}}{2} > \frac{1}{2}$ and $\bar{k}s^A + \frac{1-\bar{k}}{2} > \frac{1-\bar{k}}{2} + v$. The relevant \bar{k} are:

$$\begin{aligned} \bar{k}s^A + \frac{1 - \bar{k}}{2} &> \frac{1}{2} \\ 2\bar{k}s^A - \bar{k} &> 0 \end{aligned} \tag{27}$$

This inequality always holds for $\bar{k} > 0$ (because $s^A > \frac{1}{2}$ by assumption). Therefore, d_3 will always prefer to give core funding to contributing through any of the SPTF. We now look at the inequality determining the threshold for which d_3 prefers core over bilateral contributions.

$$\begin{aligned}\bar{k}s^A + \frac{1 - \bar{k}}{2} &> \frac{1 - \bar{k}}{2} + v \\ \bar{k} &> \frac{v}{s^A}\end{aligned}\tag{28}$$

Second, d_3 provides funds to the special fund B (i.e., $c_{d_3}^B > 0$) if $\frac{1}{2} > \bar{k}s^A + \frac{1 - \bar{k}}{2}$ and $\frac{1}{2} > \frac{1}{2}(1 - \bar{k}) + v$. Because the first inequality never holds (see above), d_3 never contributes to SPTF B (nor A).

Finally, donor d_3 supports project B bilaterally (i.e., $b_{d_3}^B > 0$) if $\frac{1 - \bar{k}}{2} + v > \bar{k}s^A + \frac{1 - \bar{k}}{2}$ and $\frac{1}{2}(1 - \bar{k}) + v > \frac{1}{2}$. For the first inequality to hold, we need \bar{k} such that

$$\begin{aligned}\frac{1 - \bar{k}}{2} + v &> \bar{k}s^A + \frac{1 - \bar{k}}{2} \\ \frac{v}{s^A} &> \bar{k}\end{aligned}\tag{29}$$

As for the later inequality, d_3 will provide bilateral aid whenever $2v > \bar{k}$. Looking at the values of v for the \bar{k} , we get

$$\begin{aligned}\frac{v}{s^A} &> 2v \\ \frac{1}{2} &> \bar{k}\end{aligned}\tag{30}$$

By assumption, this will never happen. Thus, d_3 never gives multi-bi aid for any value of v . Donors d_1 and d_5 will never make core contributions independent of the values of \bar{s}^A (and all other variables).

Proof of proposition 3

We know (from above) that if m obtains information on the value of k her utility is strictly increasing in \bar{s}^A and $\sum_{d_i} c_{d_i}^C$. Thus, it is in m 's interest to set (if possible) $\bar{s}^A = 1$ and have all donors to contribute to $\sum_{d_i} c_{d_i}^C$. Consequently, in what follows we determine the conditions under which all donors, only two or only one contribute(s) to the core fund.

From above we know that d_1 contributes to the core fund under two conditions, namely if either $1 - \bar{k} > v > \frac{1}{2s^A - 1}$ and $\bar{k} > \frac{1 + 2v}{1 + 2s^A}$ or $v < \frac{1}{2s^A - 1}$ (and $v < 1 - \bar{k}$) and $\bar{k} > \frac{1}{2s^A - 1}$. The first condition implies that $1 - \bar{k} > \frac{1}{2s^A - 1}$ or after rearranging

that $\bar{k}(1 - 2\bar{s}^A) > 1 - 2\bar{s}^A$. This condition can never hold, as the expression in parenthesis is strictly smaller than 0 for all $\bar{s}^A > \frac{1}{2}$ while the right hand side of the expression is strictly positive for all values for \bar{s}^A . Regarding the second set of conditions the constraint that $\bar{k} > \frac{1}{2\bar{s}^A - 1}$ is never fulfilled as both \bar{k} and \bar{s}^A can never exceed 1. This proves that d_1 (and by symmetry d_5) will never contribute core funds. It also implies that under unanimity rule m will never get any discretion, as d_1 and d_5 will vote against any $\bar{s}^A \neq \frac{1}{2}$.

As any discretion under unanimity is rejected it follows that all donors will make their aid allocation decision based on $\bar{s}^A = \frac{1}{2}$. Figure 8 in the main text depicts, based on the optimal allocation rules presented above the outcomes as a function of \bar{k} and v .

For d_2 (and by symmetry d_4) we know that she will contribute to the core fund under two sets of conditions:

$$1 - \bar{k} > v > \frac{3}{16\bar{s}^A - 8} \text{ and } \bar{k} > \frac{1+4v}{1+4\bar{s}^A}$$

and

$$v < \frac{3}{16\bar{s}^A - 8} \text{ (and } v < 1 - \bar{k} \text{) and } \bar{k} > \frac{1}{4\bar{s}^A - 2}$$

For d_3 we know that she will contribute to the core fund under the following condition:

$$v < 1 - \bar{k} \text{ and } \bar{k} > \frac{v}{\bar{s}^A}$$

Conditions under which donor d_3 contributes to the core fund

For donor d_3 only two conditions are relevant, namely that $v < 1 - \bar{k}$ and $\bar{k} > \frac{v}{\bar{s}^A}$.

Combining the two (under the assumption of maximum discretion, i.e. $\bar{s}^A = 1$) results in the constraint that $v < \bar{k}$ and $\bar{k} < 1 - v$. Consequently, in a space defined by \bar{k} horizontally and v vertically, the set of values below both diagonals form the set of values for \bar{k} and v that leads d_3 to contribute core funds.

Conditions under which donor d_3 , d_2 and d_4 contribute to the core fund

To assess whether these three donors contribute to the core fund requires combining the conditions for d_3 with either of the two sets for donor d_2 .

1. The first possible combination (i.e., $v < 1 - \bar{k}$ and $\bar{k} > \frac{v}{\bar{s}^A}$ and $1 - \bar{k} > v > \frac{3}{16\bar{s}^A - 8}$ and $\bar{k} > \frac{1+4v}{1+4\bar{s}^A}$) implies that
$$1 - \bar{k} > v > \frac{3}{16\bar{s}^A - 8}$$

Solving for \bar{k} results in the constraint $\bar{k} < \frac{16\bar{s}^A - 11}{16\bar{s}^A - 8}$ which equals $\frac{5}{8}$ under the assumption of $\bar{s}^A = 1$. Consequently if $\bar{k} < \frac{5}{8}$ and $v > \frac{3}{8}$ then d_2 will give core if $v < \frac{5\bar{k}-1}{4}$ from $\bar{k} > \frac{1+4v}{1+4\bar{s}^A}$ with $\bar{s}^A = 1$. This last constraint holds simultaneously with $v > \frac{3}{8}$ only if $\bar{k} > \frac{1}{2}$. This is the small upper-most spike of the triangle on the right side with $\bar{s}^A = 1$.

2. The second possible combination (i.e., $v < 1 - \bar{k}$ and $\bar{k} > \frac{v}{\bar{s}^A}$ and $v < \frac{3}{16\bar{s}^A - 8}$ and $\bar{k} > \frac{1}{4\bar{s}^A - 2}$) implies (combining the first and the last constraint) that $1 - v > \bar{k} > \frac{1}{4\bar{s}^A - 2}$ (i.e. $\bar{k} > \frac{1}{2}$) or after rearranging

$$\frac{4\bar{s}^A - 3}{4\bar{s}^A - 2} > v$$

As v has to be positive, this implies that $\bar{s}^A > \frac{3}{4}$. As at the same time $v < \frac{3}{16\bar{s}^A - 8}$ under the assumption that $\bar{s}^A = 1$ this second constraint is binding (it can be shown that this latter constraint is binding if $\bar{s}^A > \frac{15}{16}$ while the former becomes binding if v is smaller). This is the rhomboid of the triangle on the right side, from $v = 0$ up to $v = \frac{3}{8}$.

Consequently, in the second combination and for $\bar{s}^A = 1$, d_2 will give core aid if $\bar{k} > \frac{1}{2}$, and $v < \min(\frac{3}{8}, 1 - \bar{k})$.

Conditions under which all donors contribute to the core fund

In order to have donor d_1 (and d_5) contribute core funds, we need $\bar{k} > \frac{1}{2\bar{s}^A - 1}$. For all values of $\bar{s}^A \in [\frac{1}{2}, 1]$ this lower limit for \bar{k} exceeds 1, implying that the two extreme donors will never make contributions to the core fund.

From this it follows that the following conditions lead to voluntary core contributions with $\bar{s}^A = 1$:

i) if $v < \min(1 - \bar{k}, \frac{3}{8})$ and $\bar{k} > \frac{1}{2}$ (Combination 2 before) or $v < 1 - \bar{k}$ and $\frac{3}{8} < v < \frac{5\bar{k}-1}{4}$ and $\bar{k} < \frac{5}{8}$ (Combination 1 before) then donors d_2, d_3, d_4 will make core contributions.

ii) if $\bar{k} < \min(v, \frac{1}{2})$ or $\frac{1}{2} < \bar{k}$ and $\frac{5\bar{k}-1}{4} < v < 1 - \bar{k}$ then only donor d_3 will make core contributions.

Conditions under which donors prefer agent learning

As the previous derivations were predicated on the assumption that $\bar{s}^A = 1$ and that m learned the value of k we next determine the conditions under which

each donor prefers m to spend \bar{c}_m and learn the value of k . We start with d_2 whose expected utilities for full discretion and agent-learning and for no discretion without learning of are the following:

$$\begin{aligned}
E(U_{d_2} | \bar{s}^A = 1, \underline{s}^A = 0) &= \frac{1}{4} \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_2}^A + \frac{1}{2} (1 + \bar{k}) \left(\sum_{d_i} c_{d_i}^C - \bar{c}_m \right) + (1 - \bar{k}) b_{d_2}^A \right] \\
&\quad + \frac{3}{4} \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_2}^B + \frac{1}{2} (1 + \bar{k}) \left(\sum_{d_i} c_{d_i}^C - \bar{c}_m \right) + (1 - \bar{k}) b_{d_2}^B \right] \\
&\quad + v(b_{d_2}^A + b_{d_2}^B) \\
&= \frac{1}{4} \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_2}^A \right] + \frac{1}{2} (1 + \bar{k}) \left(\sum_{d_i} c_{d_i}^C - \bar{c}_m \right) + \frac{1}{4} (1 - \bar{k}) b_{d_2}^A \\
&\quad + \frac{3}{4} \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_2}^B \right] + \frac{3}{4} (1 - \bar{k}) b_{d_2}^B + v(b_{d_2}^A + b_{d_2}^B) \quad (31)
\end{aligned}$$

$$\begin{aligned}
E(U_{d_2} | \bar{s}^A = \frac{1}{2}, \underline{s}^A = \frac{1}{2}) &= \frac{1}{4} \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_2}^A + \frac{1}{2} \frac{1}{2} (1 + \bar{k}) \sum_{d_i} c_{d_i}^C + \frac{1}{2} \frac{1}{2} (1 - \bar{k}) \sum_{d_i} c_{d_i}^C \right. \\
&\quad \left. + (1 - \bar{k}) b_{d_2}^A \right] + \frac{3}{4} \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_2}^B + \frac{1}{4} (1 + \bar{k}) \sum_{d_i} c_{d_i}^C \right. \\
&\quad \left. + \frac{1}{4} (1 - \bar{k}) \sum_{d_i} c_{d_i}^C + (1 - \bar{k}) b_{d_2}^B \right] + v(b_{d_2}^A + b_{d_2}^B) \\
&= \frac{1}{4} \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_2}^A \right] + \frac{1}{2} \sum_{d_i} c_{d_i}^C + \frac{1}{4} (1 - \bar{k}) b_{d_2}^A \\
&\quad + \frac{3}{4} \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_2}^B \right] + \frac{3}{4} (1 - \bar{k}) b_{d_2}^B + v(b_{d_2}^A + b_{d_2}^B) \quad (32)
\end{aligned}$$

Find \bar{k} such that $E(U_{d_2} | \bar{s}^A = 1, \underline{s}^A = 0) > E(U_{d_2} | \bar{s}^A = \frac{1}{2}, \underline{s}^A = \frac{1}{2})$

$$\begin{aligned}
\frac{1}{2} (1 + \bar{k}) \left(\sum_{d_i} c_{d_i}^C - \bar{c}_m \right) &> \frac{1}{2} \sum_{d_i} c_{d_i}^C \\
\bar{k} \left(\sum_{d_i} c_{d_i}^C - \bar{c}_m \right) &> \bar{c}_m \\
\bar{k} &> \frac{\bar{c}_m}{\sum_{d_i} c_{d_i}^C - \bar{c}_m} \quad (33)
\end{aligned}$$

Same procedure for d_3 :

$$\begin{aligned}
E(U_{d_3} | \overline{s^A} = 1, \underline{s^A} = 0) &= \frac{1}{2} \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_3}^A + \frac{1}{4} (1 + \bar{k}) \left(\sum_{d_i} c_{d_i}^C - \overline{c_m} \right) + (1 - \bar{k}) b_{d_3}^A \right] \\
&+ \frac{1}{2} \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_3}^B + \frac{1}{4} (1 + \bar{k}) \left(\sum_{d_i} c_{d_i}^C - \overline{c_m} \right) + (1 - \bar{k}) b_{d_3}^B \right] \\
&+ v [b_{d_3}^A + b_{d_3}^B] \\
&= \frac{1}{2} \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_3}^A \right] + \frac{1}{2} (1 + \bar{k}) \left(\sum_{d_i} c_{d_i}^C - \overline{c_m} \right) + \frac{1}{4} (1 - \bar{k}) b_{d_3}^A \\
&+ \frac{1}{2} \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_3}^B \right] + \frac{1}{2} (1 - \bar{k}) b_{d_3}^B + v (b_{d_3}^A + b_{d_3}^B) \quad (34)
\end{aligned}$$

$$\begin{aligned}
E(U_{d_3} | \overline{s^A} = \frac{1}{2}, \underline{s^A} = \frac{1}{2}) &= \frac{1}{2} \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_3}^A + \frac{1}{4} (1 + \bar{k}) \sum_{d_i} c_{d_i}^C + \frac{1}{4} (1 - \bar{k}) \sum_{d_i} c_{d_i}^C \right. \\
&+ \left. (1 - \bar{k}) b_{d_3}^A \right] + \frac{1}{2} \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_3}^B + \frac{1}{4} (1 + \bar{k}) \sum_{d_i} c_{d_i}^C + \right. \\
&+ \left. \frac{1}{4} (1 - \bar{k}) \sum_{d_i} c_{d_i}^C + (1 - \bar{k}) b_{d_3}^B \right] + v [b_{d_3}^A + b_{d_3}^B] \\
&= \frac{1}{2} \left[\sum_{d_i \neq 1} c_{d_i}^A + c_{d_3}^A \right] + \frac{1}{2} \sum_{d_i} c_{d_i}^C + \frac{1}{2} (1 - \bar{k}) b_{d_3}^A \\
&+ \frac{1}{2} \left[\sum_{d_i \neq 1} c_{d_i}^B + c_{d_3}^B \right] + \frac{1}{2} (1 - \bar{k}) b_{d_3}^B + v (b_{d_3}^A + b_{d_3}^B) \quad (35)
\end{aligned}$$

Find \bar{k} such that $E(U_{d_3} | \overline{s^A} = 1, \underline{s^A} = 0) > E(U_{d_3} | \overline{s^A} = \frac{1}{2}, \underline{s^A} = \frac{1}{2})$

$$\begin{aligned}
\frac{1}{2} (1 + \bar{k}) \left(\sum_{d_i} c_{d_i}^C - \overline{c_m} \right) &> \frac{1}{2} \sum_{d_i} c_{d_i}^C \\
\bar{k} \left(\sum_{d_i} c_{d_i}^C - \overline{c_m} \right) &> \overline{c_m} \\
\bar{k} &> \frac{\overline{c_m}}{\sum_{d_i} c_{d_i}^C - \overline{c_m}} \quad (36)
\end{aligned}$$

Finally, the same procedure for d_1 :

$$\begin{aligned}
E(U_{d_1} | \overline{s^A} = 1, \underline{s^A} = 0) &= \sum_{d_i \neq 1} c_{d_i}^B + c_{d_1}^B + (1 + \bar{k}) \left(\sum_{d_i} c_{d_i}^C - \overline{c_m} \right) + (1 - \bar{k}) b_{d_1}^B \\
&+ v [b_{d_1}^A + b_{d_1}^B] \quad (37)
\end{aligned}$$

$$\begin{aligned}
E(U_{d_1} | \bar{s}^A = \frac{1}{2}, \underline{s}^A = \frac{1}{2}) &= \sum_{d_i \neq 1} c_{d_i}^B + c_{d_1}^B + \frac{1}{2}(1 + \bar{k}) \sum_{d_i} c_{d_i}^C + \\
&+ \frac{1}{2}(1 - \bar{k}) \sum_{d_i} c_{d_i}^C + (1 - \bar{k})b_{d_1}^B + v[b_{d_1}^A + b_{d_1}^B] \quad (38)
\end{aligned}$$

Find \bar{k} such that $E(U_{d_1} | \bar{s}^A = 1, \underline{s}^A = 0) > E(U_{d_1} | \bar{s}^A = \frac{1}{2}, \underline{s}^A = \frac{1}{2})$

$$\begin{aligned}
(1 + \bar{k}) \left(\sum_{d_i} c_{d_i}^C - \bar{c}_m \right) &> \sum_{d_i} c_{d_i}^C \\
\bar{k} \left(\sum_{d_i} c_{d_i}^C - \bar{c}_m \right) &> \bar{c}_m \\
\bar{k} &> \frac{\bar{c}_m}{\sum_{d_i} c_{d_i}^C - \bar{c}_m} \quad (39)
\end{aligned}$$

Conditions under which all actors prefer agent learning

Thus, all donors prefer that m learns whenever $\bar{k} > \frac{\bar{c}_m}{\sum_{d_i} c_{d_i}^C - \bar{c}_m}$. By assumption 3 we know that the lower bound for \bar{k} is at most $\frac{1}{2}$. Thus for all conditions under which a majority of donors, namely d_2, d_3 and d_4 might give core contribution under the assumption of agent learning (see above), this lower bound is not binding.

Thus we only need to focus on the conditions under which m will acquire information, namely if $\frac{\sum_{d_i} c_{d_i}^C (2\bar{k}s^* - \bar{k})}{1 - \bar{k} + 2\bar{k}s^*} \geq \bar{c}_m$. In the main text we have shown that the following value for s^* is the lowest which ensures that m will engage in learning:

$$s^* = \frac{\bar{k}(\sum_{d_i} c_{d_i}^C - \bar{c}_m) + \bar{c}_m}{2\bar{k}(\sum_{d_i} c_{d_i}^C - \bar{c}_m)}$$

To be part of an equilibrium with full discretion, this value has to be smaller than 1:

$$\begin{aligned}
\frac{\bar{k}(\sum_{d_i} c_{d_i}^C - \bar{c}_m) + \bar{c}_m}{2\bar{k}(\sum_{d_i} c_{d_i}^C - \bar{c}_m)} &< 1 \\
\bar{k} \left(\sum_{d_i} c_{d_i}^C - \bar{c}_m \right) \bar{c}_m &< 2\bar{k} \left(\sum_{d_i} c_{d_i}^C - \bar{c}_m \right) \\
\frac{\bar{c}_m}{\sum_{d_i} c_{d_i}^C - \bar{c}_m} &< \bar{k} \quad (40)
\end{aligned}$$

As this is the same condition as the one for the donors, which is fulfilled for all conditions under which under majority rule core contributions are made by a majority of donors (under the assumption of agent learning), the conditions specified above characterize the subgame perfect equilibria. *Q.E.D.*

Proof of lemma 1

In the proof of proposition 3 there is only one set of conditions allowing for core aid given by d_2, d_3 and d_4 which includes an upper bound for \bar{s}^A and thus might induce m to offer less than full discretion, namely that $v < \frac{3}{16s^A-8}$ and $\frac{1}{4s^A-2} < \bar{k}$. Together these two conditions generate an upper and a lower bound for \bar{s}^A of the following form:

$$\frac{1+2\bar{k}}{4\bar{k}} < \bar{s}^A < \frac{3+8v}{16v}$$

Solving for v generates the condition $v < \frac{3\bar{k}}{4}$. For the upper bound for \bar{s}^A to be smaller than 1 requires that $\frac{3}{8} < v$ and for the lower bound to be smaller than 1 $\frac{1}{2} < \bar{k}$ has to hold. These three conditions, however, generate a subset of the values of \bar{k} and v contained in proposition 3. Thus, there are no values of \bar{k} and v under which m might by offering less than full discretion induce d_2 and d_4 to contribute core contributions, when full discretion would fail. *Q.E.D.*

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