The politics of special purpose trust funds*

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Paper prepared for the Annual Meeting of the
Midwest Political Science Association (Chicago, April 3-6, 2014)

First version: July 2013, this version: March 25, 2014

Abstract

Donors increasingly earmark their voluntary contributions to multilateral organizations to finance their priorities. Earmarked or multi-bi aid finances thematic, region-, country- or project-specific priorities and is kept in separate accounts, the special purpose trust funds, set up under the auspices of multilateral institutions. The donor practice of earmarking raises the question of when do governments choose to delegate the distribution of their aid to special purpose trust funds instead of providing bilateral or multilateral aid?

To make a foray into understanding these decisions by donors we propose a game-theoretical model in which a multilateral organization offers

*An earlier version was presented at a seminar at the Hertie School of Governance (Berlin, October 17, 2013), at the Internal Seminar of the Alfred Weber Institute for Economics at the Heidelberg University (Heidelberg, December 12, 2013) and at the Political Economy of International Organizations (PEIO) Conference at Princeton University (Princeton, January 18 2014). Extremely helpful comments by the participants of these events and partial financial support by the Swiss Network for International Studies is gratefully acknowledged.

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to his multiple principals (i.e., the donor governments) to limit its discretion in fund allocation. Upon approval, the multilateral agent decides to learn about the effectiveness of its projects. Conditional on the agent's discretion, each donor chooses his preferred channel of aid provision. In this version of the model, we analyze aid allocation under two stylized decision rules, namely unanimity and majority decisions. We show that these rules interact with aid allocation decisions by donors and that the presence of special purpose trust funds changes the allocation.

1 Introduction

Over the last two decades, bilateral donors have increased voluntary contributions to multilateral organizations, mostly earmarked for specific purposes. Despite the rapid increase in the volume held in earmarked aid and the number of trust funds accounts in which it is held, evaluations of the reasons for and consequences of these trends are still largely missing.[1] 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 of aid giving i.e., bilateral or traditional multilateral channels. To do so we propose a game-theoretical model that allows us to show how the decision rule of the multilateral organization, namely unanimity and majority rule, interacts with donors' aid allocation when earmarking is possible and when it is not. Earmarking implies that funds are pre-specified for their use, typically targeted at specific issues or countries. Earmarked aid is kept in separate accounts, the special purpose trust funds (SPTFs). "Traditional multilateral'" aid, the contributions to the core account of the multilateral organization, consists of assessed contributions (membership fees) and non-earmarked voluntary contributions, is pooled by the organization and its allocation is determined jointly according to the organization's decision rule. By using SPTFs instead of providing (non-earmarked) core aid to the multilateral aid institutions (MAIs), bilateral donors may avoid the sometimes wearisome multilateral[2] processes. Moreover, they may increase the visibility of aid to the national constituency and enhance 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.

[1] For some first results see Eichenauer & Reinsberg (2013),

[2] Multilateralism minimally involves the coordination of policies among three or more states, but need not involve a formal international institution (Ruggie 1993).

Earmarked voluntary contributions to MAIs have been labeled multi-bi aid[3] because they exhibit characteristics of bilateral[4] and multilateral aid. Other labels for multi-bi aid, used as synonyms in this paper, are non-core aid and special purpose trust funds, where the latter are, to be precise, the institutional form earmarked aid takes. For MAIs, multi-bi aid presents challenges and opportunities alike. On the one hand, 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[5] to MAIs (United Nations 2011, Alumni 2012). Increasingly, multilateral institutions rely on earmarked contributions to maintain their budget.

Special purpose trust funds are set up by one or several donors and support thematic, country- or region-specific priorities or any combination thereof (e.g., the Sub-Saharan Africa Transport Program or the Indonesia Multi-Donor Trade and Investment Trust Fund). Earmarking has taken distinct institutional forms both across and within MAIs.[6] Trust funds are formed through negotiations between the MAI and the donor(s) over the range of activities that might be financed, as well as over the respective responsibilities and procedures.[7] These negotiations are cumbersome for the MAI and donor(s) alike and, once set up,

[3]According 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).

[4]Bilateral policies are not coordinated with other countries and engage with one other country alone.

[5]Core 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).

[6]Earmarking 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), labeled soft earmarking see (Eichenauer & Reinsberg 2013). We think that the logic and the implications of earmarking as modeled by special purpose trust funds speak to different types of earmarking.

[7]Most multilateral SPTFs are formed through a series of negotiations 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).

require additional monitoring efforts by the donor(s) involved. Thus, it is yet to be explained why donors (increasingly) channel their foreign aid through trust funds over which their control is incomplete and principals are numerous?

In the next section we first describe the relevance and the evolution of multi-bi aid. Furthermore, we seek to explain the considerable differences between donors' use of multi-bi aid. We then look at the principal-agent literature on earmarking in a domestic context before discussing the strand of this literature that is more closely related to our work, namely how earmarking affects agents. We also discuss the motives of donor countries for providing foreign aid in general and multilateral aid in particular. In section four we make use of our discussion and present a game-theoretical model that we analyze for its equilibrium characteristics. In section five we present several propositions based on the equilibria we derive. 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

Over the last two decades, multi-bi aid has become an important source of funding for multilateral institutions. In 2010, almost one third of the Official Development Aid channeled through the multilateral system may be counted as multi-bi aid.[8] While we make an effort for being as parsimonious as possible with descriptive statistics, we seek to convincingly illustrate the increased relevance of multi-bi aid, the speed of change, and the implications for the receiving organizations. 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). Both organizations experienced massive increases in multi-bi aid while core budgets remained constant in real terms.

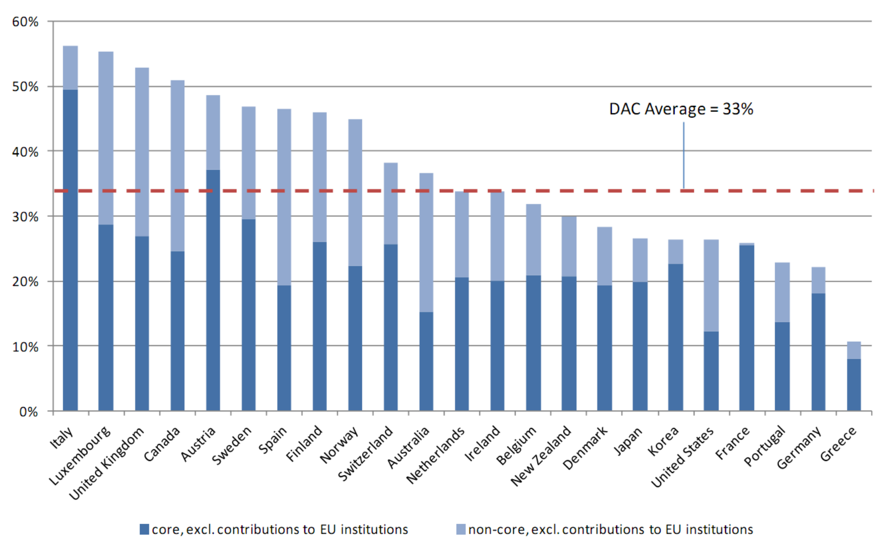
The World Bank is both a significant manager and recipient of multi-bi aid.[9]

[8] In 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 percent of total ODA in 2010). Together, core and non-core use of the multilateral system accounted for 40 percent of gross ODA (OECD 2012, 4).

[9] 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 (including non-sovereign donors) (IEG 2011, 8). Note that the fiscal year of the World Bank start July 1 of each year and ends on June 30 of the following year.

Since 2003, trust funds at the World Bank received more contributions than the International Development Association (IEG 2011, 12). The proliferation of trust funds challenges MAIs' ways of operating as exemplified by the World Bank's constant efforts for consolidation of the number of trust 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 growth of these resources is similarly impressive. Between 1994 and 2009, non-core resources grew by 208 percent (United Nations 2011) whereas in this same period core resources (i.e., voluntary unearmarked and mandatory contributions) to the UN stagnated. In 2010, some 74 percent of funding was non-core aid, "characterized by varying degrees of restrictions with regard to their application and use" (United Nations 2012, 1). Given the scale of the changes in funding for these two large international organizations and the associated challenges, exploring the politics of providing and receiving non-core aid in more detail is worthwhile.

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

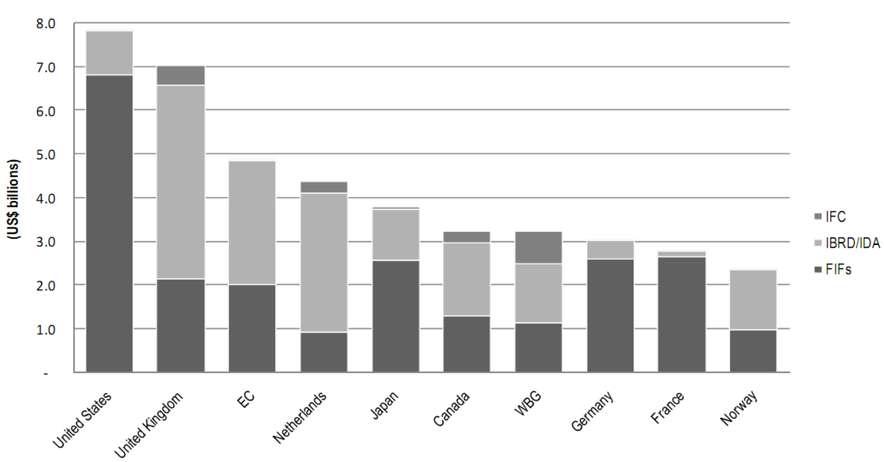


Source: OECD (2012, 11)

What drives this trend to earmarking? Inspection of individual donors use of multi-bi aid suggests the existence of heterogeneous preferences. Donors differ with regard to their use of multi-bi aid. They also seem to prefer different types of multi-bi aid. This is in line with the observation (e.g., by Milner 2006) that the use of the multilateral system varies across donors. As depicted in figure 1, France, Korea and Germany designate less than five percent of their aid budget as multi-bi aid whereas Spain, Australia, and Canada designate more than 20 percent of their aid budget as earmarked aid to MAIs in 2010.

As Figure 2 shows for the ten largest donors at the World Bank, governments also choose different SPTFs to channel their foreign assistance. For example, the US is the largest provider and contributes primarily to Financial Intermediary Funds, while the United Kingdom, the second largest donor, is by far the largest donor to World Bank-managed trust funds (IBRD/IDA/IFC Trust Funds)(IEG 2011, 16).[10]

Figure 2: Two of the Top 10 Donors Account for a Quarter of All Trust Fund Contributions, But They Direct Their Resources in Starkly Different Ways (fiscal years 2002-2010)



Source: IEG (2011, 16)

[10]The World Bank has its own categorization of trust funds. There, "Financial Intermediary Funds (FIFs) are multilateral financing arrangements for which the World Bank provides Trustee services that include committing and transferring funds to project implementers (generally international organizations such as multilateral development banks or UN agencies). In all cases the World Bank as Trustee is required to act in accordance with instructions of independent governing bodies." (see World Bank Group Finances, Funds: `https://finances.worldbank.org/funds`; accessed on march 24, 2014). IBRD, IDA, and IFC Trust Funds refer to trust funds that support World Bank activities only.

We interpret the empirical patterns of donors' aid allocation behavior as revealing heterogeneous preferences. On the one hand, their preferences differ with regard to core versus non-core funding. On the other hand, preferences about the specific issues and countries financed by SPTFs seem heterogeneous. Accordingly, we model donors with heterogeneous preferences that form both a multiple (for contributions to SPTFs) and a collective principal (when deciding according to some decision rule on aid allocation of the multilateral agent).

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 link our research to previous principal-agent models, in particular models with multiple principals. Finally, we draw on the literature on foreign aid in general and multilateral aid in particular.

The term earmarking originates from the literature on public finance 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 standard procedure whereby tax revenue is pooled into a general fund before it is allocated across separate spending programs. Earmarking thus constrains the legislatures (i.e., in our case the multilateral agent's and its governing organs') ability to reduce or even eliminate funding for a benefited program. As critics contend, earmarking may lead to a misallocation of funds. By diminishing the budgetary flexibility of the legislature, earmarking impedes the ability to draft an overall budget that is based on funding priorities and that accounts for changes in circumstances and assessments over time. Finally, earmarks can increase administrative and compliance costs due to, for example, separate management of cash flows and reporting. For supporters, the constraint on the legislature is the guarantee for a steady and reliable funding source of favored programs.[11] In the context of the financing of interna-

[11] 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 ties decision-makers' hands. This is less so the case when earmarking occurs in aid, as the funds are always limited in time (i.e., both earmarked and not-earmarked voluntary funds are provided upon call for funds in emergency situations, for each year, for

tional public goods and development, this commitment function of earmarking might be of particular relevance: If policy trends in international development change quickly (e.g., from microfinance to mitigation), earmarking of resources may result in high funding volatility for specific themes or countries from year to year. In multilateral organizations such planning uncertainty might impede the effectiveness and sustainability of programs.

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 citizens only have control over the level of taxes while they have no 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 particular 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 multilateral agents and their allocations to projects. The use of general fund contributions is either set out in the organization's charter, or involves the member states of 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. [12]

Principal-agent models constitute the second strand of literature relevant to this paper. While standard 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.[13] More tailored to the question of bureaucratic autonomy Hammond &

replenishment of a fund.

[12] Lyne, 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.

[13] Surprisingly Lake & McCubbins (2006, 362, footnote 12) argue that "[t]he closest analog

Knott (1996) propose using the core defined by the legislative decision-makers to assess how much autonomy an agent has.[14] The principal-agent literature with multiple (and thus heterogeneous) principals suggests that preference heterogeneity among members will 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).[15] Copelovitch (2010) however argues that the effect of heterogeneous preferences within a collective principal is theoretically undetermined. In the International Monetary Fund, heterogeneity among the largest shareholders might lead to distributional conflict or "log-rolling" in some circumstances while in others it increases the autonomy of the staff. For the Inter-American Development Bank, Hernandez (2013) finds that heterogeneity among the largest shareholders leads to distributional conflict so that none of the countries is able to get its own way. For the World Bank, however, Bresslein & Schmaljohann (2013) argue that in the presence of heterogeneous trade interests among large shareholders, powerful countries prevail.

Finally, we relate to the literature on the provision of foreign aid in general and the financing of international organizations in particular. As to the motivation of governments for providing foreign aid two main explanations are advanced: a desire to satisfy recipient's needs[16] and/or to advance political and economic interests of the donor country (for an early discussion, see Frey 1984, 86ff). Much of the empirical literature finds that the allocation pattern of foreign aid is not solely explained by variables of economic need but that donors' strategic and economic interests influence allocation among comparably poor countries. (e.g., Alesina & Dollar 2000, Kuziemko & Werker 2006, Dreher, Sturm & Vreeland

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 gets interesting when increasing returns of scale or scope are present

[14] They 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).

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

[16] One might argue that even "altruistic" aid is motivated by long-term interests because donors eventually benefit; as developing countries become stable and grow, global security improves, their demand for imports increases etc..

2009*a*, Dreher, Sturm & Vreeland 2009*b*). Theoretically, multilateral aid might be less politicized than bilateral aid because the multilateral agent enjoys more autonomy in her allocation decisions and because she might be pressured by more diverse interest groups [17] (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 put into perspective 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 to be instruments of their foreign policy, just like bilateral aid. Under some circumstances, the U.S. deem MAIs a more appropriate mechanism to influence international and other countries' politics than bilateral avenues.

Regarding explanations for multilateral aid provision, Milner (2006, 2) notes, "[t]heories and evidence about why governments choose multilateralism are few." Nevertheless, we will seek to explore some possibilities. First, multilateral agencies are better at providing "information," that collective good which is particularly necessary for recipient monitoring (Milner 2006, Schneider & Tobin 2011). Second, governments delegate when there is a need to pool resources for and to coordinate on the provision or prevention of international public goods and bads respectively (Schneider & Tobin 2011). In this context, multilateral aid allows for burden sharing. Third, Mavrotas & Villanger (2006) model how a strategic donor's pressure on a recipient influences another donor in her decision between multilateral or bilateral aid. As a final explanation, evidence from a survey among donors suggests 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 only matter under certain conditions (Milner 2006). In particular, 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 geopo-

[17] Because of their lower politicization, multilateral institutions are better able to impose and enforce conditionality (e.g., Lebovic & Voeten 2009). Specifically, Milner (2006, 109) argues that "a multilateral institution may be seen as an aid giving cartel, designed to maximize donors' influence by presenting a unified front to the recipients".

litical foreign policy goals, delegation to MAIs with multiple (i.e., heterogeneous and uncoordinated) principals, leads to uncertainty about whether the country can assert its interests (Copelovitch 2010). The literature on multilateral aid delegation has evolved. It once focused on a "dichotomous choice" (Schneider & Tobin 2011, 2) framework[18] where, typically, a cost-benefit analysis weighs the advantages of multilateral aid provision against the costs of delegation. A portfolio argument is now popular. The first approach tends to treat bilateralism as the default way of providing aid. In a more complex framework with several multilateral organizations, a donor may choose to provide multilateral aid to the organization with preferences most closely aligned to its own.[19] Most recently, Schneider & Tobin (2011) argue that governments not only take into account the existence of various aid institutions but build a portfolio to maximize efficiency and similarity of allocation policies between the government and MAI.

In our paper, we study yet another strategy for donors to minimize the trade-off between control[20] and effectiveness. The possibility to use MAIs' effective implementation capacity via purpose-specific trust funds opens up a massive number of new multilateral channels. In Schneider & Tobin (2011)'s parlance, this multiplies donor governments' possibilities for strategic portfolio building. Despite the large number of SPTFs, this new type of portfolio building should not entail high search and decision 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 agencies in recipient countries and thus rely mostly 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

[18]E.g.,Milner (2006) argues that multilateral aid allows the donor government to credibly signal to voters about the use of foreign aid and thus solves a principal-agent problem in domestic politics. Her empirical analysis seeks to explain the relative shares of bilateral and multilateral aid, with the public's view on development aid as explanatory factor. This might easily be adapted to a model looking at earmarked funding.

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

[20]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). According to them, material incentives are used to reward and punish actions and behavior. For example, through funding of specific departments, donors can influence the activities of the organization.

one of the 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 their delivery.[21]

For donors, earmarking is likely to increase their overall utility, as SPTFs allow them to target contributions based on their priorities, which should offset the possibly higher decision and monitoring costs. For donors, SPTFs thus seem to be a very cost-effective way of diversifying their funding portfolio to maximize effectiveness and address their preferences.

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 the 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
  - 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 (the 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 $\overline{s^A} \in [\underline{s^A}, 1]$.[22]

[21]Dreher & Marchesi (2013) argue that the agent's and the principal's respective information and their willingness to communicate with each other determine whether the principal opts for decentralization (budget aid) or centralization (project aid). Their model of information transmission could easily be adopted to explain the donor's decision between core and non-core aid because contributions to SPTFs entail no uncertainty about the use of funds.

[22]Consequently, she proposes either a range or a value for s^A that she will choose. This will

- D accepts or rejects this proposal (according to the decision rules that prevail in the governing body of the corresponding MAI).[23] 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 $d_i \in D$ $(i = 1, ..., n)$ 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 $c_{d_i}^{C_v} \geq 0)$ contributions[24] and to two special purpose (non-core) funds[25] for projects A and B $(c_{d_i}^{A}, c_{d_i}^{B}$ with $\forall i c_{d_i}^{A} \geq 0$ and $\forall i c_{d_i}^{B} \geq 0)$ 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,[26] and the budget is generated by tax rate t_{d_i} imposed on income y_{d_i}.

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 $d_i \in D$).

[23] We do not model this stage as a bargaining model, as might be done by drawing for instance on Fey, Meirowitz & Ramsay (2013).

[24] At first appearance, voluntary core contributions give essentially the same discretion to MAIs as over assessed contributions because the allocation of both voluntary unearmarked 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).

[25] Applying 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).

[26] a_{d_i} might also be considered as optimal choice given reelection considerations.

– 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 some values of $\overline{k}$ for values of $\overline{s^A}$ 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.[27]

– 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 and B respectively. The aid input produces "development" output according to the value of k: $o^A = (1+k)a^A + (1-\overline{k})\sum_{d_i} b_{d_i}^A$ and $o^B = (1-k)a^B + (1-\overline{k})\sum_{d_i} b_{d_i}^B$.[28] These expressions also include 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 weighting contributions by $(1-\overline{k})$.[29] We assume

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)

[27]As 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."

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

[29]This 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 generates a "premium" in voter support to donor governments.

- complete and perfect information except that m and $d \in D$ have a common prior belief about the value k with $p(k = \overline{k}) = \frac{1}{2}$, while m may invest $\overline{c_m}$ to learn the value of k.

- S(trategies)
  - each $d_i \in D$ chooses $b^A_{d_i}$, $b^B_{d_i}$, $c^A_{d_i}$, $c^B_{d_i}$ and $c^{C_v}_{d_i}$ 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 $\{d_1, d_2, ...d_n\}$ with $d_1 = 1$ and $d_n = n$ with the following general utility function:
    $U_{d_i}(o^A, o^B|d_i) = f_{d_i}o^A + (1 - f_{d_i})o^B + v_{d_i}(b^A_{d_i} + b^B_{d_i})$
    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, e.g., by increased voter support or by satisfying domestic interest groups. While we could allow for donor-government-specific values for v_{d_i}, in what follows we will use the value v for all donors and make the following assumption

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

    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_is becomes
    $U_{d_i}(o^A, o^B|d_i) = \frac{d_i-1}{n-1}o^A + \frac{n-d_i}{n-1}o^B + v_{d_i}(b^A_{d_i} + b^B_{d_i})$

– utility function of m is defined as follows:[30]

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

- O(utcomes)

  – aid outputs o^A and o^B (as defined above).

- E(quilibrium)

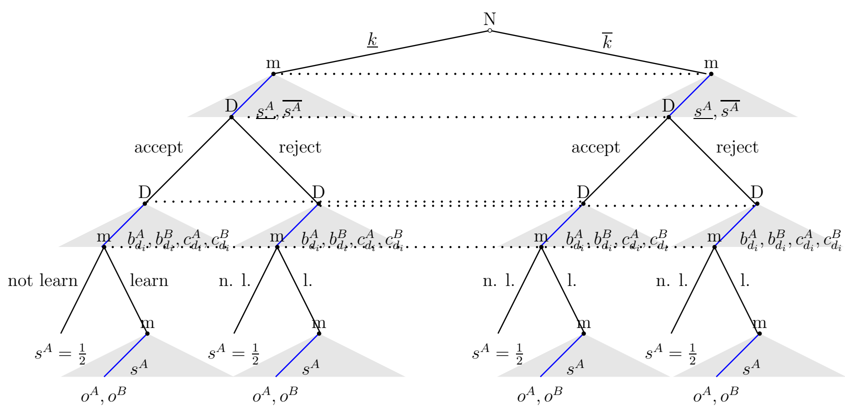
  – perfect Bayesian[31]

Figure 3 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 ($b^A_{d_i}, b^B_{d_i}, c^A_{d_i}, c^B_{d_i}$)) 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 ($c^{C_v}_{d_i}$). After observing these funding decisions m chooses whether or not to collect information on the value of k and then, depending on knowing or not the efficiency of the potential projects, decides on the aid allocation ($s^A \in [\underline{s^A}, \overline{s^A}]$).

[30]As 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.

[31]In 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 3: Game tree



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4.1 Analysis: Implications

The game proposed above allows us to get numerous insights into the interplay between donor decisions and decision-making in MAIs. We present 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 discretion obtained by the agent m.[32]

To arrive at these results we solve the game by backwards 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., $\underline{s^A} = 1 - \overline{s^A}$)[33] we first assess the expected utility for m in the case where she refrains from collecting information ($c_m = 0$): We find that m is indifferent between all combinations of s^A and s^B and by assumption 5 she chooses $s^A = \frac{1}{2} = s^B$. [34]

Assuming now that $c_m = \overline{c_m}$, the agent m's expected utility has to be calculated conditional on the information she obtains (using the property that $s^B = 1 - s^A$).[35]

Comparing the expected utilities for these two cases allows us to determine the conditions under which m will acquire information, namely if[36]

[32]In the appendix we characterize the equilibrium conditions for an arbitrary number of donors n.

[33]Assumption 7 imposing a symmetric distribution on d_is' preferences ensures that this is part of any possible equilibrium.

[34]We present the derivations of this and the following findings in the appendix.

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

[36]We assume that in case of indifference m will collect information.

$$
\begin{aligned}
EU_m(c_m = \overline{c_m}) &\geq EU_m(c_m = 0) \\
\sum_{d_i} c^C_{d_i}(2\overline{k}s^* - \overline{k}) - \overline{c_m}(1 - \overline{k} + 2\overline{k}s^*) &\geq 0 \\
\frac{\sum_{d_i} c^C_{d_i}(2\overline{k}s^* - \overline{k})}{1 - \overline{k} + 2\overline{k}s^*} &\geq \overline{c_m} \qquad (1)
\end{aligned}
$$

Assuming fixed $\sum_{d_i} c^C_{d_i}$ we may use equation 1 to determine the lowest value for s^* so that m will collect information. This is the case when $s^* = \frac{\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + \overline{c_m}}{2\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m})}$. 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 strictly larger than $\frac{1}{2}$.[37] This result we can state in the following proposition as a set of comparative statics analyses:

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

The proof of proposition 1 immediately follows from equation 1 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.[38] To do so we first derive the optimal allocation rules for the five donors. These depend on the discretion ($\overline{s^A}$) given to m, the utility donors obtain from voters by giving bilateral aid (v) and the importance of m's knowledge ($\overline{k}$).[39] We depict in figures 4-6 the optimal voluntary aid allocations for possible values of $\overline{k}$.

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

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

[39]We present the derivation of these allocation rules in the appendix.

Figure 4: Aid allocation decisions of donor d_1 and d_5 in equilibrium

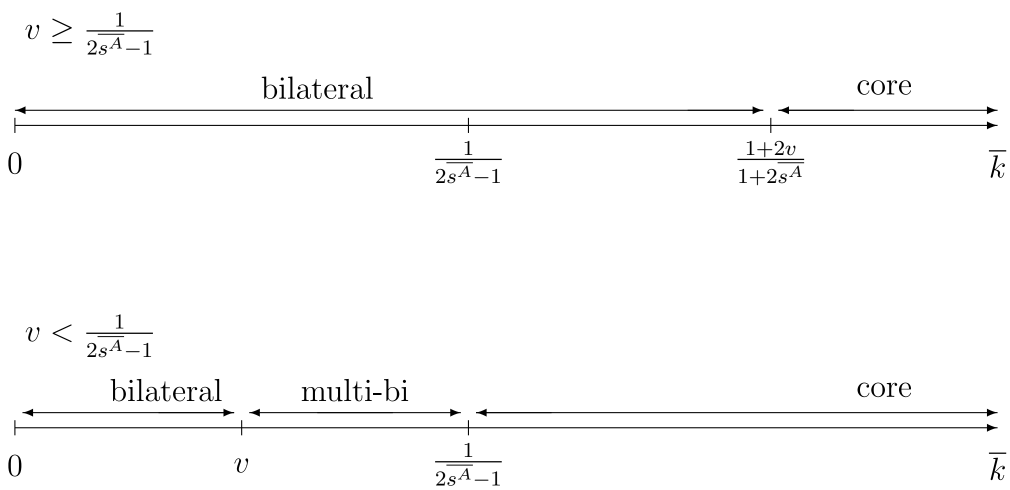


Figure 5: Aid allocation decisions of donor d_2 and d_4 in equilibrium

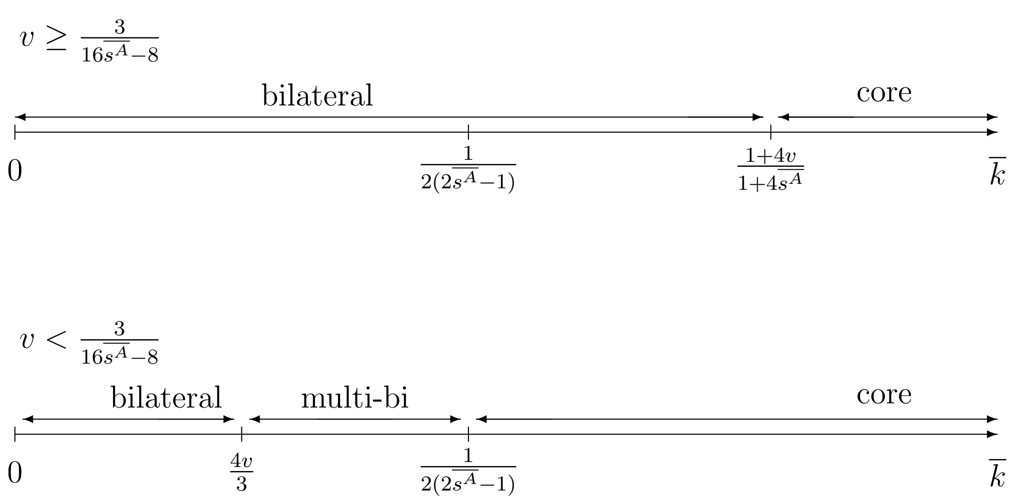
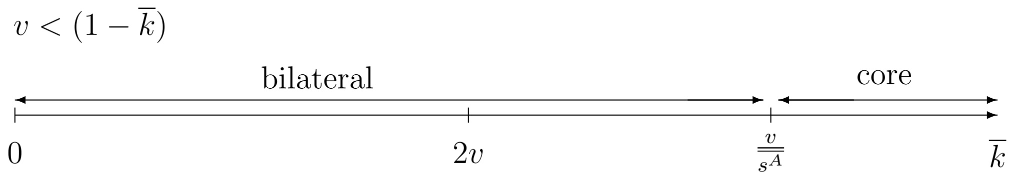


Figure 6: Aid allocation decisions of donor d_3 in equilibrium



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 $\overline{s^A}$ can be at most 1 and v is smaller than 1 by assumption 6, it is clear from figure 4 that d_1 and d_5 will never give voluntary core contributions. This leads directly to our proposition regarding the equilibrium under unanimity rule:

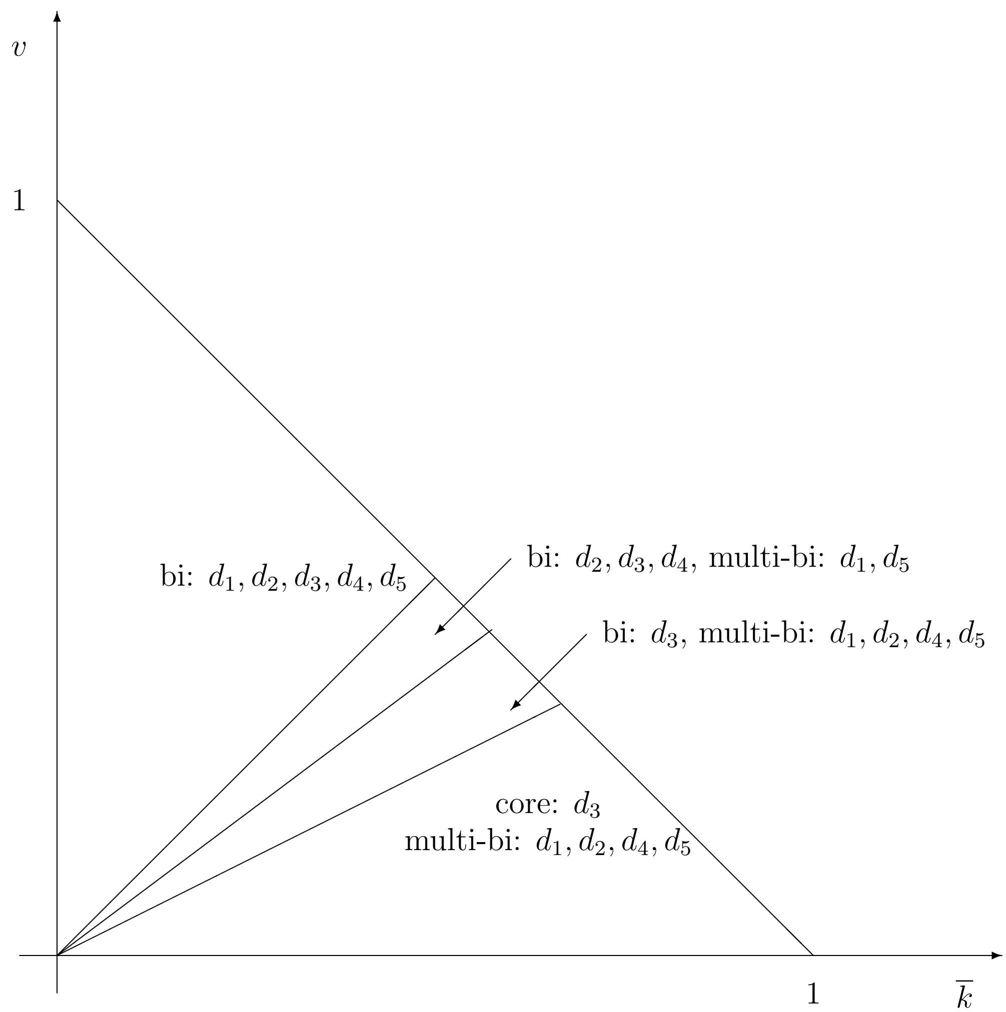
Proposition 2 *Under unanimity rule no discretion is granted to m* $(\overline{s^A} = \frac{1}{2})$*, who will refrain from learning the value of* k*.*

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 $\overline{s^A}$, by assumption 2 d_1 and d_5 will reject any level of discretion leading to $\overline{s^A} = \frac{1}{2}$. *Q.E.D.*

Using the equilibrium value for $\overline{s^A}$, namely $\frac{1}{2}$, and employing the insights depicted in figures 4-6 we can easily generate the equilibrium aid allocations for the five donors as a function of $\overline{k}$ and v. Figure 7 depicts all possible combinations of these two variables the aid allocation decisions made by the five donors under unanimity.

Figure 7 shows that when the gain through the knowledge of m ($\bar{k}$) would be large (or the effectiveness of bilateral aid is small), compared to the utility a donor might get from voters through v, multi-bi aid is the most attractive option for 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 7: Equilibrium candidates under unanimity, which implies $\overline{s^A} = \frac{1}{2}$



Proposition 2 suggests that only under majority rule can a subset of the five donors adopt sufficient discretion for m to engage in learning. As m's utility is strictly increasing in $\overline{s^A}$ and in $\sum_{d_i} c^C_{d_i}$ we first derive the conditions under which the donors will contribute core funds under the assumption of $\overline{s^A} = 1$. Under this assumption the following proposition follows rather simply:[40]

Proposition 3 *Under majority rule $\overline{s^A} = 1$ 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 $v < min(1 - \overline{k}, \frac{3}{8})$ and $\overline{k} > \frac{1}{2}$ ¿¡ ii) $v < 1 - \overline{k}$ and $\frac{3}{8} < v < \frac{5\overline{k}-1}{4}$

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 ($\overline{s^A} < 1$) 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 $\overline{k}$ and v no majority will support a discretion proposal different from $\overline{s^A} = \frac{1}{2}$. Based on this figure 8 depicts for all possible combinations of $\overline{k}$ and v what discretion levels will be adopted by majority rule and the resulting aid allocation decisions.

Figure 8 (in comparison with figure 7)shows how decision-making rules affect aid allocation decisions and the use of multi-bi aid by donors. Under unanimity (figure 7) 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. Donor d_3 makes either voluntary core or bilateral contributions. Under majority rule there is a range for high values of $\overline{k}$ such that a majority of donors gives m maximum discretion and as a consequence the donors make voluntary core contributions (figure 8). As $\overline{k}$ decreases 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 $\overline{k}$, first this median donor switches to bilateral aid, before the remaining donors start joining them. Finally, all donors give bilateral aid (for relatively high values for v compared to $\overline{k}$). Under unanimity m is less likely to

[40]The proof of proposition 3 appears in the appendix.

receive voluntary core contributions at all and, if she receives any, she gets less of them. This occurs because under unanimity only d_3 contributes voluntary core resources and even she contributes more under a majority regime where discretion is granted to m. The other side of the coin then is that donors use multi-bi aid less in the majority rule situation.

Figures 9 and 10 show the allocation decisions[41] for a situation without multi-bi aid. Comparing these figures with each other first, we see that under majority rule, voluntary core contributions are more likely because a majority of donors still contributes to m when the extremist donors already switched to bilateral aid. For both decision rules, the absence of SPTFs changes donors' allocations. Specifically, extremist donors contribute voluntary core for high $\overline{k}$ when no SPTFs exist whereas they never contributed any when multi-bi aid is a possibility. It thus seems that in order to maximize voluntary core contributions, the multilateral organization m should not accept SPTFs.

[41] See the appendix for derivation.

Figure 8: Equilibrium candidates under majority rule

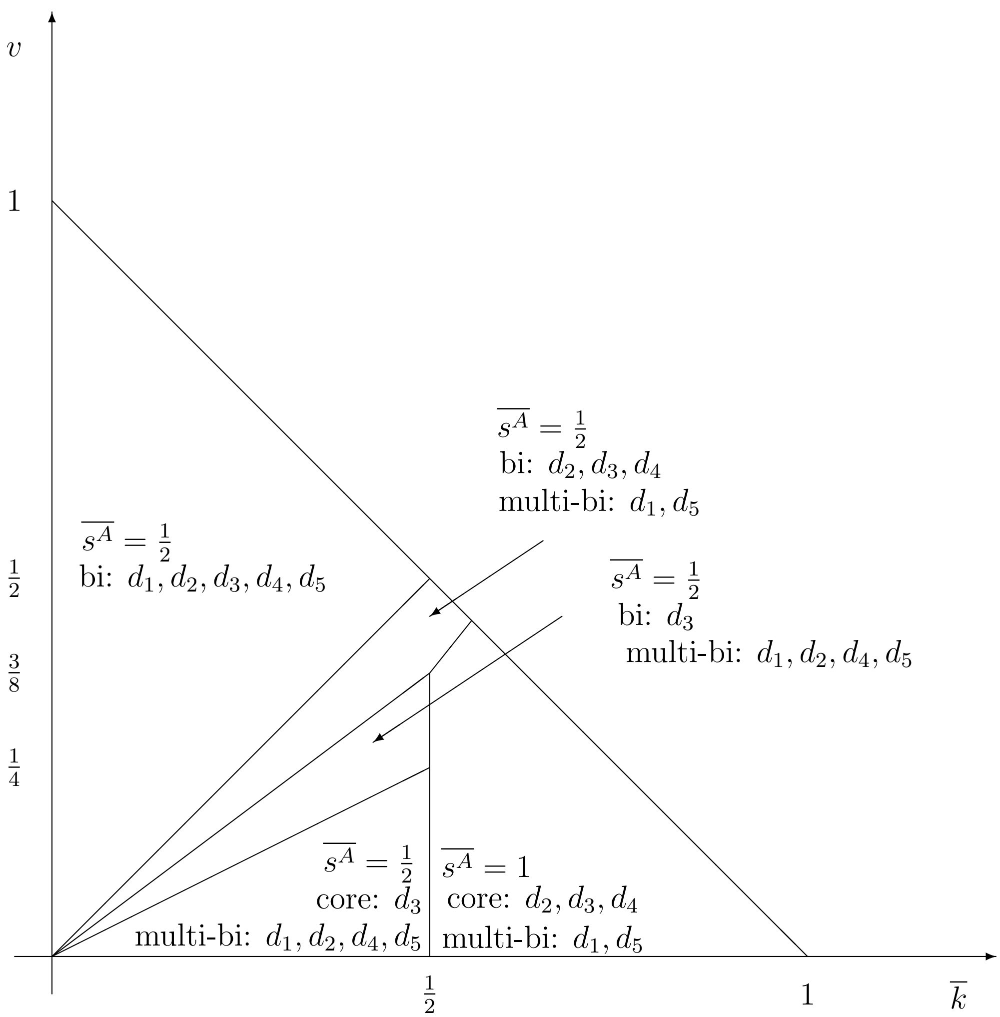


Figure 9: Equilibrium candidates under unanimity rule without SPTFs

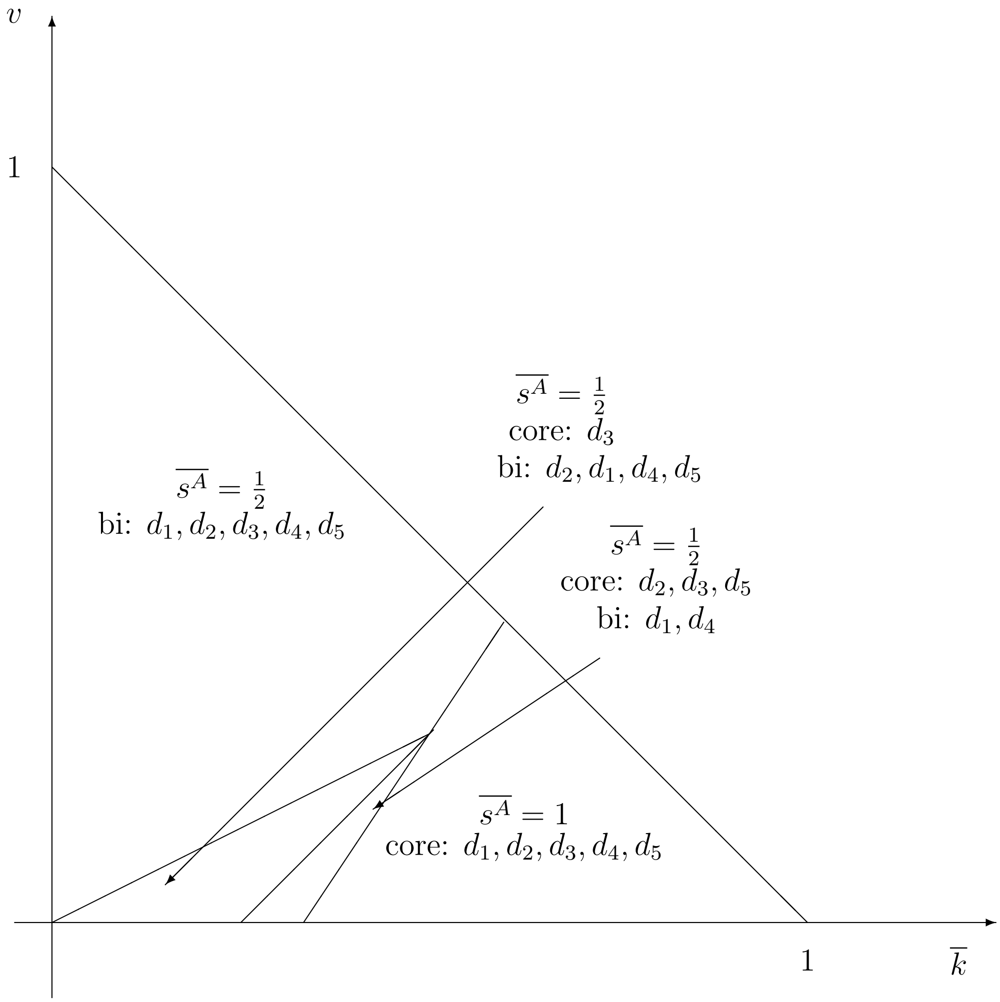
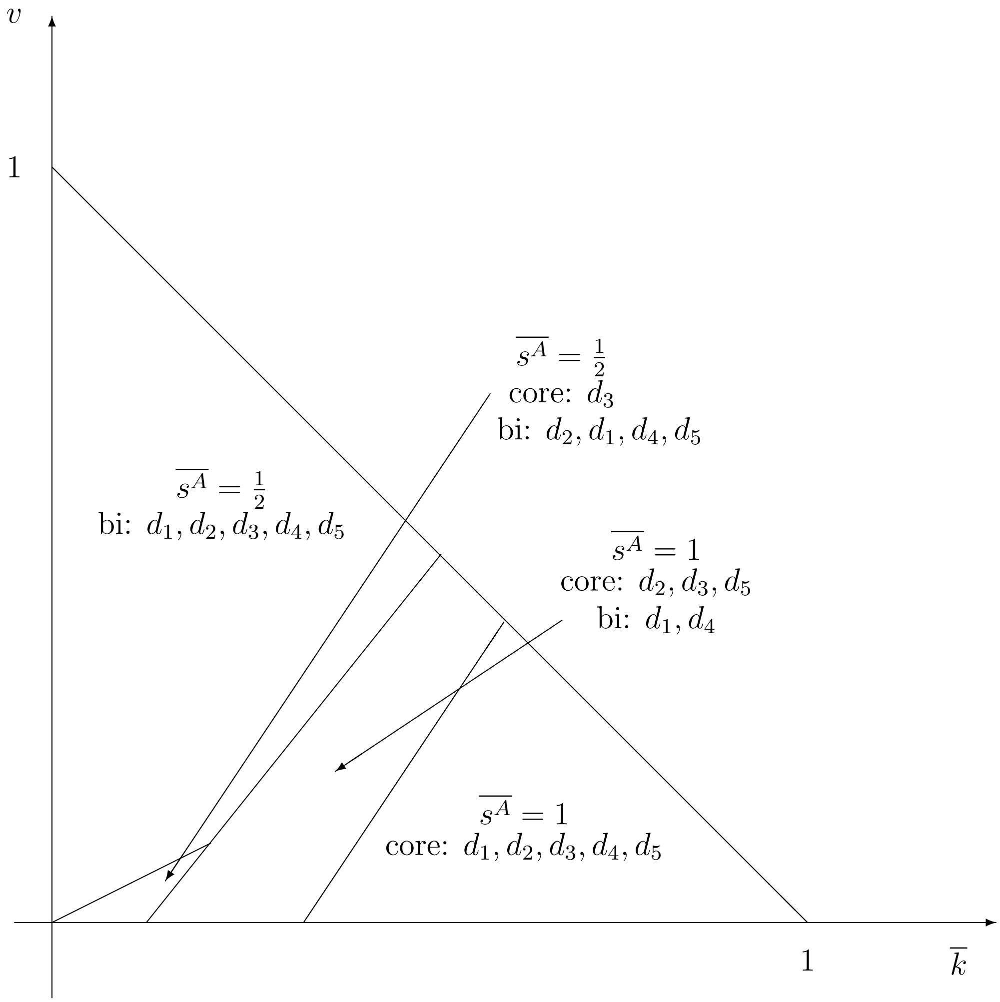


Figure 10: Equilibrium candidates under majority rule without SPTFs



Comparing figures 9 and 10 to 7 and 8 shows that the absence of SPTFs has divergent consequences. Under unanimity the absence of SPTFs leads to more situations where voluntary core contributions are given and in addition this involves almost always more donors. As the same time, bilateral aid also experiences an increase. Thus if the agent has a strict preference for voluntary core contributions having no SPTFs is preferrable under unanimity. If, however, the agent wants to diminish the role of bilateral aid, then under unanimity the absence of SPTFs is not the right tool. Under majority rule the same pattern holds, but as discussed above core contributions are more prevalent.

5 Discussion

The results of our game-theoretical model clearly show that decision rules in MAIs and aid allocation decisions interact. This interaction also offers an explanation for the conditions under which SPTFs are attractive for donors. SPTFs are an appealing alternative when core contributions are not substantially more effective and voters generate only little utility due to bilateral aid. If the latter factor increases, bilateral aid becomes more attractive. It is therefore clear that donors want to take advantage of MAIs' expertise when using SPTFs, but if this expertise is considerably higher for core contributions, the latter will 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, only if all donors obtain at least some utility from each of the two projects, an equilibrium under unanimity exists allowing for some discretion to be 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

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 be obtained. If the distribution were asymmetrical, however, the combinations of $\overline{k}$ 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 functions (and thus a continuous distribution of donor types), the same qualitative results would be obtained, however, with a continuous distribution of donor decisions implied. Thus for each of the decisions rules, similar zones are generated for combinations of $\overline{k}$ and v under which full discretion is granted 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 organizations. These consequences are, however, hard to ascertain 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, and compares how the existence of special purpose trust funds influences allocation decisions. We propose a simple game-theoretical model as a first stepping-stone towards understanding this complex situation. The model allows donors not only to provide voluntary contributions (beyond the assessed contributions) to a core fund, but also 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 that it has learned are more efficient. In addition to allowing donors to allocate their "multilateral" aid to the core fund, to a special purpose trust fund, or to spend it bilaterally, the donors jointly decide the discretion that the multilateral agent has in allocating her budget. We show that the allocation decisions depend upon the decision rule.

Given a situation with five donors and symmetry we can derive insights into 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 and even she only does so when voters give little utility. The other four donors provide either multi-bi or bilateral aid. The situation is quite different in a 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 for all donors increase simultaneously, the agent asks for less than full discretion. A majority of donor still approves the agents proposal for less than full discretion and donors continue to provide voluntary core contributions. With further increases in domestic payoffs, donors only provide bilateral aid, 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.

6.1 Derivation of the agent's utility

The expected utility of m when she abstains from collecting information:

$$\begin{aligned}
EU_m(c_m = 0) &= \frac{1}{2}[(1+\overline{k})(s^A \sum_{d_i} c^C_{d_i} + (1-\overline{k}) \sum_{d_i} b^A_{d_i} + \sum_{d_i} c^A_{d_i}) + \\
&\quad (1-\overline{k})(s^B \sum_{d_i} c^C_{d_i} + (1-\overline{k}) \sum_{d_i} b^B_{d_i} + \sum_{d_i} c^B_{d_i})] + \\
&\quad \frac{1}{2}[(1+\underline{k})(s^A \sum_{d_i} c^C_{d_i} + (1-\overline{k}) \sum_{d_i} b^A_{d_i} + \sum_{d_i} c^A_{d_i}) + \\
&\quad (1-\underline{k})(s^B \sum_{d_i} c^C_{d_i} + (1-\overline{k}) \sum_{d_i} b^B_{d_i} + \sum_{d_i} c^B_{d_i})] \\
&= s^A \sum_{d_i} c^C_{d_i} + (1-\overline{k}) \sum_{d_i} b^A_{d_i} + (1-\overline{k}) \sum_{d_i} b^B_{d_i} + \sum_{d_i} c^A_{d_i} + \sum_{d_i} c^B_{d_i} + \\
&\quad (1-s^A) \sum_{d_i} c^C_{d_i} \\
&= \sum_{d_i} c^C_{d_i} + (1-\overline{k}) \sum_{d_i} b^A_{d_i} + (1-\overline{k}) \sum_{d_i} b^B_{d_i} + \sum_{d_i} c^A_{d_i} + \sum_{d_i} c^B_{d_i} \qquad (2)
\end{aligned}$$

The expected utility of m when she collects information:

$$\begin{aligned}
EU_m(c_m = \overline{c_m}, k = \overline{k}) &= (1+\overline{k})[s^*(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + (1-\overline{k}) \sum_{d_i} b^A_{d_i} + \sum_{d_i} c^A_{d_i})] + \\
&\quad (1-\overline{k})[(1-s^*)(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + (1-\overline{k}) \sum_{d_i} b^B_{d_i} + \sum_{d_i} c^B_{d_i}] \quad (3) \\
EU_m(c_m = \overline{c_m}, k = \underline{k}) &= (1-\overline{k})[(1-s^*)(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + (1-\overline{k}) \sum_{d_i} b^A_{d_i} + \sum_{d_i} c^A_{d_i})] + \\
&\quad (1+\overline{k})[s^*(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + (1-\overline{k}) \sum_{d_i} b^B_{d_i} + \sum_{d_i} c^B_{d_i}] \qquad (4)
\end{aligned}$$

Consequently, this unconditional expected utility reduces to (taking into account the notation introduced above)

$$
\begin{aligned}
EU_m(c_m = \overline{c_m}) &= (1+\overline{k})[s^*(\sum_{d_i} c^C_{d_i} - \overline{c_m})] + (1-\overline{k})(1-s^*)(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + \\
&\quad \frac{1}{2}(1+\overline{k})((1-\overline{k})\sum_{d_i} b^A_{d_i} + \sum_{d_i} c^A_{d_i}) + \\
&\quad \frac{1}{2}(1-\overline{k})((1-\overline{k})\sum_{d_i} b^A_{d_i} + \sum_{d_i} c^A_{d_i}) + \\
&\quad \frac{1}{2}(1-\overline{k})((1-\overline{k})\sum_{d_i} b^B_{d_i} + \sum_{d_i} c^B_{d_i}) + \\
&\quad \frac{1}{2}(1-\overline{k})((1-\overline{k})\sum_{d_i} b^B_{d_i} + \sum_{d_i} c^B_{d_i}) \\
&= 2\overline{k}s^*(\sum_{d_i} c^C_{d_i} - c_m) + \sum_{d_i} c^C_{d_i} - \overline{c_m} - \overline{k}(\sum_{d_i} c^C_{d_i} - c_m) + \sum_{d_i} c^A_{d_i} + \\
&\quad (1-\overline{k})\sum_{d_i} b^A_{d_i} + \sum_{d_i} c^B_{d_i} + (1-\overline{k})\sum_{d_i} b^B_{d_i} \\
&= (1-\overline{k})\sum_{d_i} b^A_{d_i} + (1-\overline{k})\sum_{d_i} b^B_{d_i} + \sum_{d_i} c^A_{d_i} + \sum_{d_i} c^B_{d_i} + \sum_{d_i} c^C_{d_i} - \\
&\quad \overline{c_m}(1-\overline{k}+2\overline{k}s^*) + \sum_{d_i} c^C_{d_i}(2\overline{k}s^* - k) \qquad (5)
\end{aligned}
$$

Derivation of the donors' allocation rules

For d_1, we have expected utility

$$
\begin{aligned}
EU_{d_1} &= \frac{0}{4}[\frac{1}{2}(1-\overline{k})[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_1} + \sum_{d_i} c^C_{d_i} - c_m] + \frac{1}{2}(1+\overline{k})[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_1} + \sum_{d_i} c^C_{d_i} - c_m] \\
&\quad +(1-\overline{k})b^A_{d_1}] + \frac{4}{4}[\frac{1}{2}(1-\overline{k})[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_1} + \sum_{d_i} c^C_{d_i} - c_m] \\
&\quad +\frac{1}{2}(1+\overline{k})[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_1} + \sum_{d_i} c^C_{d_i} - c_m] + (1-\overline{k})b^B_{d_1}] + v(b^A_{d_1} + b^B_{d_1}) \\
&= [\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_1} + (\sum_{d_i} c^C_{d_i} - c_m)(\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2}) + (1-\overline{k})b^B_{d_1}] + v(b^A_{d_1} + b^B_{d_1}) \qquad (6)
\end{aligned}
$$

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

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

For d_2 we have

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

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

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

For d_3, we have the expected utility

$$
\begin{aligned}
EU_{d_3} &= \frac{1}{2}[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_3} + (\sum_{d_i} c^C_{d_i} - c_m)(\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2}) + (1-\overline{k})b^A_{d_3})] \\
&+\frac{1}{2}[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_3} + (\sum_{d_i} c^C_{d_i} - c_m)(\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2}) + (1-\overline{k})b^B_{d_3}] \\
&+v[b^A_{d_3} + b^B_{d_3}] \qquad (10)
\end{aligned}
$$

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

$$
\begin{aligned}
\frac{\delta EU_{d_3}}{\delta c^{C_v}_{d_3}} &= \overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} \\
\frac{\delta EU_{d_3}}{\delta c^{A}_{d_3}} &= \frac{1}{2} \\
\frac{\delta EU_{d_3}}{\delta c^{B}_{d_3}} &= \frac{1}{2} \\
\frac{\delta EU_{d_3}}{\delta b^{A}_{d_3}} &= \frac{1}{2}(1-\overline{k}) + v \\
\frac{\delta EU_{d_3}}{\delta b^{B}_{d_3}} &= \frac{1}{2}(1-\overline{k}) + v \qquad (11)
\end{aligned}
$$

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., $c^{C_v}_{d_1} > 0$) if $\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} > 1$ and $\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} > (1-\overline{k}) + v$. The relevant limits for $\overline{k}$ are:

$$
\begin{aligned}
\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} &> 1 \\
2\overline{k}\overline{s^A} - \overline{k} &> 1 \\
\overline{k} &> \frac{1}{2\overline{s^A} - 1} \qquad (12)
\end{aligned}
$$

and

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

From this, we may determine the value of v that makes one or the other of these $\overline{k}$ binding,

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

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

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

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

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

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

Determining the respective v we find:

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

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

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

and

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

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

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

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

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

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

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

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

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

and

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

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

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

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., $c^{C_v}_{d_3} > 0$) if $\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} > \frac{1}{2}$ and $\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} > \frac{1-\overline{k}}{2} + v$. The relevant $\overline{k}$ are:

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

This inequality always holds for $\overline{k} > 0$ (because $\overline{s^A} > \frac{1}{2}$ 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.

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

Second, d_3 provides funds to the special fund B (i.e., $c^B_{d_3} > 0$) if $\frac{1}{2} > \overline{k}\overline{s^A} + \frac{1-\overline{k}}{2}$ and $\frac{1}{2} > \frac{1}{2}(1-\overline{k}) + v$ 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., $b^B_{d_3} > 0$) if $\frac{1-\overline{k}}{2} + v > \overline{k}\overline{s^A} + \frac{1-\overline{k}}{2}$ and $\frac{1}{2}(1-\overline{k}) + v > \frac{1}{2}$. For the first inequality to hold, we need $\overline{k}$ such that

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

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

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

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 $\overline{s^A}$ (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 $\overline{s^A}$ and $\sum_{d_i} c^C_{d_i}$. Thus, it is in m's interest to set (if possible) $\overline{s^A} = 1$ and have all donors to contribute to $\sum_{d_i} c^C_{d_i}$. 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 $1-\overline{k} > v > \frac{1}{2\overline{s^A}-1}$ and $\overline{k} > \frac{1+2v}{1+2\overline{s^A}}$ or $v < \frac{1}{2\overline{s^A}-1}$ (and $v < 1-\overline{k}$) and $\overline{k} > \frac{1}{2\overline{s^A}-1}$. The first condition implies that $1-\overline{k} > \frac{1}{2\overline{s^A}-1}$ or after rearranging that $\overline{k}(1-2\overline{s^A}) > 1-2\overline{s^A}$. This condition can never hold, as the expression in parenthesis if strictly smaller than 0 for all $\overline{s^A} > \frac{1}{2}$ while the right hand side of the expression is strictly positive for all values for $\overline{s^A}$. Regarding the second set of conditions the constraint that $\overline{k} > \frac{1}{2\overline{s^A}-1}$ is never fulfilled as both $\overline{k}$ and $\overline{s^A}$ 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 $\overline{s^A} \neq \frac{1}{2}$.

As any discretion under unanimity is rejected it follows that all donors will make their aid allocation decision based on $\overline{s^A} = \frac{1}{2}$. Figure 7 in the main text depicts, based on the optimal allocation rules presented above the outcomes as a function of $\overline{k}$ 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:

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

and

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

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

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

Conditions under which donor d_3 contributes to the core fund

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

Combining the two (under the assumption of maximum discretion, i.e. $\overline{s^A} = 1$) results in the constraint that $v < \overline{k}$ and $\overline{k} < 1-v$. Consequently, in a space defined by $\overline{k}$ horizontally and v vertically, the set of values below both diagonals form the set of values for $\overline{k}$ 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., $v < 1 - \overline{k}$ and $\overline{k} > \frac{v}{\overline{s^A}}$ and $1 - \overline{k} > v > \frac{3}{16\overline{s^A}-8}$ and $\overline{k} > \frac{1+4v}{1+4\overline{s^A}}$) implies that
$1 - \overline{k} > v > \frac{3}{16\overline{s^A}-8}$
Solving for $\overline{k}$ results in the constraint $\overline{k} < \frac{16\overline{s^A}-11}{16\overline{s^A}-8}$ which equals $\frac{5}{8}$ under the assumption of $\overline{s^A} = 1$. Consequently if $\overline{k} < \frac{5}{8}$ and $v > \frac{3}{8}$ then d_2 will give core if $v < \frac{5\overline{k}-1}{4}$ from $\overline{k} > \frac{1+4v}{1+4\overline{s^A}}$ with $\overline{s^A} = 1$. This last constraint holds simultaneously with $v > \frac{3}{8}$ only if $\overline{k} > \frac{1}{2}$. This is the small upper-most spike of the triangle on the right side with $\overline{s^A} = 1$.

2. The second possible combination (i.e., $v < 1-\overline{k}$ and $\overline{k} > \frac{v}{\overline{s^A}}$ and $v < \frac{3}{16\overline{s^A}-8}$ and $\overline{k} > \frac{1}{4\overline{s^A}-2}$) implies (combining the first and the last constraint) that
$1 - v > \overline{k} > \frac{1}{4\overline{s^A}-2}$ (i.e. $\overline{k} > \frac{1}{2}$) or after rearranging
$\frac{4\overline{s^A}-3}{4\overline{s^A}-2} > v$
As v has to be positive, this implies that $\overline{s^A} > \frac{3}{4}$. As at the same time $v < \frac{3}{16\overline{s^A}-8}$ under the assumption that $\overline{s^A} = 1$ this second constraint is binding (it can be shown that this latter constraint is binding if $\overline{s^A} > \frac{15}{16}$ 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 $\overline{s^A} = 1$, d_2 will give core aid if $\overline{k} > \frac{1}{2}$, and $v < min(\frac{3}{8}, 1 - \overline{k})$.

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 $\overline{k} > \frac{1}{2\overline{s^A}-1}$. For all values of $\overline{s^A} \in [\frac{1}{2}, 1]$ this lower limit for $\overline{k}$ 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 $\overline{s^A} = 1$:

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

ii) if $\overline{k} < min(v, \frac{1}{2})$ or $\frac{1}{2} < \overline{k}$ and $\frac{5\overline{k}-1}{4} < v < 1 - \overline{k}$ 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 $\overline{s^A} = 1$ and that m learned the value of k we next determine the conditions under which each donor prefers m to spend $\overline{c_m}$ 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:

$$
\begin{aligned}
E(U_{d_2}|\overline{s^A} = 1, \underline{s^A} = 0) &= \frac{1}{4}[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_2} + \frac{1}{2}(1+\overline{k})(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + (1-\overline{k})b^A_{d_2}] \\
&\quad + \frac{3}{4}[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_2} + \frac{1}{2}(1+\overline{k})(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + (1-\overline{k})b^B_{d_2}] \\
&\quad + v(b^A_{d_2} + b^B_{d_2}) \\
&= \frac{1}{4}[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_2}] + \frac{1}{2}(1+\overline{k})(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + \frac{1}{4}(1-\overline{k})b^A_{d_2} \\
&\quad + \frac{3}{4}[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_2}] + \frac{3}{4}(1-\overline{k})b^B_{d_2} + v(b^A_{d_2} + b^B_{d_2}) \qquad (31)
\end{aligned}
$$

$$
\begin{aligned}
E(U_{d_2}|\overline{s^A} = \frac{1}{2}, \underline{s^A} = \frac{1}{2}) &= \frac{1}{4}[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_2} + \frac{1}{2}\frac{1}{2}(1+\overline{k})\sum_{d_i} c^C_{d_i} + \frac{1}{2}\frac{1}{2}(1-\overline{k})\sum_{d_i} c^C_{d_i} \\
&\quad + (1-\overline{k})b^A_{d_2}] + \frac{3}{4}[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_2} + \frac{1}{4}(1+\overline{k})\sum_{d_i} c^C_{d_i} \\
&\quad + \frac{1}{4}(1-\overline{k})\sum_{d_i} c^C_{d_i} + (1-\overline{k})b^B_{d_2}] + v(b^A_{d_2} + b^B_{d_2}) \\
&= \frac{1}{4}[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_2}] + \frac{1}{2}\sum_{d_i} c^C_{d_i} + \frac{1}{4}(1-\overline{k})b^A_{d_2} \\
&\quad + \frac{3}{4}[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_2}] + \frac{3}{4}(1-\overline{k})b^B_{d_2} + v(b^A_{d_2} + b^B_{d_2}) \qquad (32)
\end{aligned}
$$

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

$$
\begin{aligned}
\frac{1}{2}(1+\overline{k})(\sum_{d_i} c^C_{d_i} - \overline{c_m}) &> \frac{1}{2}\sum_{d_i} c^C_{d_i} \\
\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m}) &> \overline{c_m} \\
\overline{k} &> \frac{\overline{c_m}}{\sum_{d_i} c^C_{d_i} - \overline{c_m}} \qquad (33)
\end{aligned}
$$

Same procedure for d_3:

$$\begin{aligned}
E(U_{d_3}|\overline{s^A}=1,\underline{s^A}=0) &= \frac{1}{2}[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_3} + \frac{1}{4}(1+\overline{k})(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + (1-\overline{k})b^A_{d_3})] \\
&\quad + \frac{1}{2}[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_3} + \frac{1}{4}(1+\overline{k})(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + (1-\overline{k})b^B_{d_3}] \\
&\quad + v[b^A_{d_3} + b^B_{d_3}] \\
&= \frac{1}{2}[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_3}] + \frac{1}{2}(1+\overline{k})(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + \frac{1}{4}(1-\overline{k})b^A_{d_3} \\
&\quad + \frac{1}{2}[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_3}] + \frac{1}{2}(1-\overline{k})b^B_{d_3} + v(b^A_{d_3} + b^B_{d_3}) \qquad (34)
\end{aligned}$$

$$\begin{aligned}
E(U_{d_3}|\overline{s^A}=\frac{1}{2},\underline{s^A}=\frac{1}{2}) &= \frac{1}{2}[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_3} + \frac{1}{4}(1+\overline{k})\sum_{d_i} c^C_{d_i} + \frac{1}{4}(1-\overline{k})\sum_{d_i} c^C_{d_i} \\
&\quad + (1-\overline{k})b^A_{d_3})] + \frac{1}{2}[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_3} + \frac{1}{4}(1+\overline{k})\sum_{d_i} c^C_{d_i} + \\
&\quad + \frac{1}{4}(1-\overline{k})\sum_{d_i} c^C_{d_i} + (1-\overline{k})b^B_{d_3}] + v[b^A_{d_3} + b^B_{d_3}] \\
&= \frac{1}{2}[\sum_{d_{i\neq 1}} c^A_{d_i} + c^A_{d_3}] + \frac{1}{2}\sum_{d_i} c^C_{d_i} + \frac{1}{2}(1-\overline{k})b^A_{d_3} \\
&\quad + \frac{1}{2}[\sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_3}] + \frac{1}{2}(1-\overline{k})b^B_{d_3} + v(b^A_{d_3} + b^B_{d_3}) \qquad (35)
\end{aligned}$$

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

$$\begin{aligned}
\frac{1}{2}(1+\overline{k})(\sum_{d_i} c^C_{d_i} - \overline{c_m}) &> \frac{1}{2}\sum_{d_i} c^C_{d_i} \\
\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m}) &> \overline{c_m} \\
\overline{k} &> \frac{\overline{c_m}}{\sum_{d_i} c^C_{d_i} - \overline{c_m}} \qquad (36)
\end{aligned}$$

Finally, the same procedure for d_1:

$$\begin{aligned}
E(U_{d_1}|\overline{s^A}=1,\underline{s^A}=0) &= \sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_1} + (1+\overline{k})(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + (1-\overline{k})b^B_{d_1} \\
&\quad + v[b^A_{d_1} + b^B_{d_1}] \qquad (37)
\end{aligned}$$

$$E(U_{d_1}|\overline{s^A}=\frac{1}{2},\underline{s^A}=\frac{1}{2}) = \sum_{d_{i\neq 1}} c^B_{d_i} + c^B_{d_1} + \frac{1}{2}(1+\overline{k})\sum_{d_i} c^C_{d_i} + \\ +\frac{1}{2}(1-\overline{k})\sum_{d_i} c^C_{d_i} + (1-\overline{k})b^B_{d_1} + v[b^A_{d_1}+b^B_{d_1}] \quad (38)$$

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

$$(1+\overline{k})(\sum_{d_i} c^C_{d_i} - \overline{c_m}) > \sum_{d_i} c^C_{d_i}$$

$$\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m}) > \overline{c_m}$$

$$\overline{k} > \frac{\overline{c_m}}{\sum_{d_i} c^C_{d_i} - \overline{c_m}} \quad (39)$$

Conditions under which all actors prefer agent learning

Thus, all donors prefer that m learns whenever $\overline{k} > \frac{\overline{c_m}}{\sum_{d_i} c^C_{d_i} - \overline{c_m}}$. By assumption 3 we know that the lower bound for $\overline{k}$ 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 $\frac{\sum_{d_i} c^C_{d_i}(2\overline{k}s^* - \overline{k})}{1-\overline{k}+2\overline{k}s^*} \geq \overline{c_m}$. In the main text we have shown that the following value for s^* is the lowest which ensures that m will engage in learning:

$s^* = \frac{\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + \overline{c_m}}{2\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m})}$

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

$$\frac{\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m}) + \overline{c_m}}{2\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m})} < 1$$

$$\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m})\overline{c_m} < 2\overline{k}(\sum_{d_i} c^C_{d_i} - \overline{c_m})$$

$$\frac{\overline{c_m}}{\sum_{d_i} c^C_{d_i} - \overline{c_m}} < \overline{k} \quad (40)$$

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 $\overline{s^A}$ and thus might induce m to offer less than full discretion, namely that $v < \frac{3}{16\overline{s^A}-8}$ and $\frac{1}{4\overline{s^A}-2} < \overline{k}$ Together these two conditions generate an upper and a lower bound for $\overline{s^A}$ of the following form:

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

Solving for v generates the condition $v < \frac{3\overline{k}}{4}$. For the upper bound for $\overline{s^A}$ to be smaller than 1 requires that $\frac{3}{8} < v$ and for the lower bound to be smaller than 1 $\frac{1}{2} < \overline{k}$ has to hold. These three conditions, however, generate a subset of the values of $\overline{k}$ and v contained in proposition 3. Thus, there are no values of $\overline{k}$ 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.*

Results for majority and unanimity rules without SPTFs

The partial derivatives with respect to each donor's choice variables (except that $c_{d_1}^A$ and $c_{d_1}^B$ are no choice variables anymore).

- Donor d_3 contributes voluntary core funds iff $\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} > \frac{1}{2}(1-\overline{k}) + v$. Rearranging gives that d_3 contributes core funds if $\overline{k} > \frac{v}{\overline{s^A}}$
- Donors d_2 and d_4 contribute core funds iff $\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} > \frac{3}{4}(1-\overline{k}) + v$. Rearranging gives that d_2 contributes core funds if $\overline{k} > \frac{1+4v}{1+4\overline{s^A}}$
- Donors d_1 and d_5 contribute core funds iff $\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} > (1-\overline{k}) + v$. Rearranging gives that d_1 contributes core funds if $\overline{k} > \frac{1+2v}{1+2\overline{s^A}}$

Conditions under which d_3 contributes to the core fund

For $\overline{s^A} = 1$, d_3 contributes if $v < \overline{k}$. For $\overline{s^A} = \frac{1}{2}$, d_3 contributes if $v < \frac{\overline{k}}{2}$.

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

For $\overline{s^A} = 1$, d_3, d_2 and d_4 contribute if $\overline{k} > \frac{1+4v}{5}$. Here, we have majority in favor of full discretion. The function $v = \frac{5\overline{k}-1}{4}$ cuts $v = 1-\overline{k}$ at $\overline{k} = \frac{5}{9}$.

For $\overline{s^A} = \frac{1}{2}$, d_3, d_2 and d_4 contribute if $\overline{k} > \frac{1+4v}{3}$. Here, we have majority in favor of full discretion. The function $v = \frac{3\overline{k}-1}{4}$ cuts $v = 1-\overline{k}$ at $\overline{k} = \frac{5}{7}$.

Conditions under all donors contribute to the core fund

For $\overline{s^A} = 1$, all donors contribute if $\overline{k} > \frac{1+2v}{3}$. Here, we have unanimity in favor of full discretion. The function $v = \frac{3\overline{k}-1}{2}$ cuts $v = 1-\overline{k}$ at $\overline{k} = \frac{3}{5}$.

Graphical Illustration

See main text.

Solving for n uniformly distributed donors

The general utility function is $U_{d_i}(o^A, o^B|d_i) = f_{d_i}o^A + (1-f_{d_i})o^B + v_{d_i}(b^A_{d_i} + b^B_{d_i})$ The general expected utility for donor d_i is

$$\begin{aligned} EU_{d_i} &= \frac{d_i - 1}{n-1}[\frac{1}{2}((1-\overline{k})(\sum_{d_{j\neq i}} c^A_{d_j} + c^A_{d_i} + (1-\overline{s^A})(c^C_{d_i} - \overline{c_m})) + \\ &\quad +(1+\overline{k})(\sum_{d_{j\neq i}} c^A_{d_j} + c^A_{d_i} + \overline{s^A}(c^C_{d_i} - \overline{c_m})) + (1-\overline{k})b^A_{d_i}] + \\ &\quad +\frac{n-d_i}{n-1}[\frac{1}{2}((1-\overline{k})(\sum_{d_{j\neq i}} c^B_{d_j} + c^B_{d_i} + (1-\overline{s^A})(c^C_{d_i} - \overline{c_m})) + \\ &\quad +(1+\overline{k})(\sum_{d_{j\neq i}} c^B_{d_j} + c^B_{d_i} + \overline{s^A}(c^C_{d_i} - \overline{c_m})) + (1-\overline{k})b^B_{d_i}] + \\ &\quad +v(b^A_{d_i} + b^B_{d_i}) \end{aligned} \tag{41}$$

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

$$\begin{aligned} \frac{\delta EU_{d_i}}{\delta c^{C_v}_{d_i}} &= \overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} \\ \frac{\delta EU_{d_i}}{\delta c^A_{d_i}} &= \frac{d_i - 1}{n-1} \\ \frac{\delta EU_{d_i}}{\delta c^B_{d_i}} &= \frac{n-d_i}{n-1} \\ \frac{\delta EU_{d_i}}{\delta b^A_{d_i}} &= \frac{d_i - 1}{n-1}(1-\overline{k}) + v \\ \frac{\delta EU_{d_i}}{\delta b^B_{d_i}} &= \frac{n-d_i}{n-1}(1-\overline{k}) + v \end{aligned} \tag{42}$$

Conditions determining allocation decisions

Donor d_i prefers project A if $\frac{d_i-1}{n-1} > \frac{n-d_i}{n-1}$ and project B otherwise. Donor d_i contributes voluntary core funds for project A if $c^{C_v}_{d_i} > c^A_{d_i}$ and $c^{C_v}_{d_i} > b^A_{d_i}$

$$\begin{aligned}
c_{d_i}^{C_v} &> c_{d_i}^{A} \\
\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} &> \frac{d_i - 1}{n-1} \\
\overline{k} &> \frac{2d_i - n - 3}{(n-1)(2\overline{s^A} - 1}
\end{aligned} \tag{43}$$

$$\begin{aligned}
c_{d_i}^{C_v} &> b_{d_i}^{A} \\
\overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} &> \frac{d_i - 1}{n-1}(1-\overline{k}) + v \\
\overline{k} &> \frac{2d_i + 2nv - 2v - n - 3}{2\overline{s^A}n + 2d_1 - 2\overline{s^A} - 1}
\end{aligned} \tag{44}$$

From this, we may determine the value of v that makes one or the other of these $\overline{k}$ binding,

$$\frac{2d_i - n - 3}{(n-1)(2\overline{s^A} - 1} > \frac{2d_i + 2nv - 2v - n - 3}{2\overline{s^A}n + 2d_1 - 2\overline{s^A} - 1}$$

$$\frac{(2n+6)(1-d_i)}{4\overline{s^A}n^2 - 2n^2 - 6\overline{s^A}n + 4n + 4\overline{s^A} - 2} > v \tag{45}$$

Therefore, if v is below the value just derived, then d_i will, having terminated to provide voluntary core funds, give to SPTF A before switching to bilateral aid provision later on. Above this value for v, d_i will provide either bilateral or core funds but never multi-bi aid.

For completeness and because it probably is needed for interpretation.

$$\begin{aligned}
c_{d_i}^{A} &> b_{d_i}^{A} \\
\frac{d_i - 1}{n-1} &> \frac{d_i - 1}{n-1}(1-\overline{k}) + v \\
\overline{k} &> \frac{vn - v}{d_i - 1}
\end{aligned} \tag{46}$$

Donor d_i contributes voluntary core funds for project B if $c_{d_i}^{C_v} > c_{d_i}^{B}$ and $c_{d_i}^{C_v} > b_{d_i}^{B}$

$$\begin{aligned} c_{d_i}^{C_v} &> c_{d_i}^{B} \\ \overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} &> \frac{n-d_i}{n-1} \\ \overline{k} &> \frac{n+1-2d_i}{2\overline{s^A}n - 2\overline{s^A} + 1 - n} \end{aligned} \tag{47}$$

$$\begin{aligned} c_{d_i}^{C_v} &> b_{d_i}^{B} \\ \overline{k}\overline{s^A} + \frac{1-\overline{k}}{2} &> \frac{n-d_i}{n-1}(1-\overline{k}) + v \\ \overline{k} &> \frac{2nv + 2d_i + 1 - 2v - 3n}{2\overline{s^A}n - 2\overline{s^A} + 2n^2 + 1 - 2nd_i - n} \end{aligned} \tag{48}$$

From this, we may determine the value of v that makes one or the other of these $\overline{k}$ binding,

$$\frac{n+1-2d_i}{2\overline{s^A}n - 2\overline{s^A} + 1 - n} > \frac{2nv + 2d_i + 1 - 2v - 3n}{2\overline{s^A}n - 2\overline{s^A} + 2n^2 + 1 - 2nd_i - n}$$

$$\frac{8\overline{s^A}(n^2 - n - nd_j + d_j) + 2n(n^2 - n - 1 + d_j) + 2d_j(2nd_j - 3n^2 - 4)}{4\overline{s^A}(n^2 - 2n + 1) + 4n - 2n^2 - 2} > v \tag{49}$$

For completeness and because it probably is needed for interpretation.

$$\begin{aligned} c_{d_i}^{B} &> b_{d_i}^{B} \\ \frac{n-d_i}{n-1} &> \frac{n-d_i}{n-1}(1-\overline{k}) + v \\ \overline{k} &> \frac{vn - v}{n-d_i} \end{aligned} \tag{50}$$

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