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Information transmission and ownership consolidation in aid programs

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Abstract: We investigate the degree of leeway donors of foreign aid should grant to recipient governments when their preferences over how to implement the aid are different, and both the donor and recipient possess some private information about the most effective policies. Intuitively, our model shows that donors should stay in control of how their aid is spent when their own private information is more important than the private information of the recipient. Less obviously, an increase in the difference of preferences between donors and recipients can increase rather than decrease the leeway that donors should grant the recipients, as the recipients' information gains in importance relative to those of the donors, and recipients become less likely to communicate truthfully. We test the model using dyadic data for 28 bilateral aid donors and 112 recipients, over the 1995-2010 period. Our proxy for “centralized” aid is project aid, while budget aid leaves more leeway to the recipient and thus proxies for “decentralized” aid. In line with the model, misaligned interests and informational asymmetries indeed influence the shares of aid given as budget and project aid.

Keywords: *Delegation, communication, ownership, foreign aid*

JEL Classifications: *C23, D82, F33, O1*

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1 Introduction

Over the last twenty years geopolitical and global economic developments have modified the way official foreign aid is given. The so-called “new rhetoric on aid” has recognized the importance of encouraging greater ownership of development programs in recipient countries (e.g., see the Paris Declaration on Aid Effectiveness, OECD 2005). In particular, ownership has been seen as crucial for the successful implementation of conditional reform programs and basing reform designs on context-specific knowledge could be one way to stimulate recipient countries’ ownership.¹

Donors that aim at maximizing ownership could be expected to grant substantial leeway to the recipients of their aid. Donor and recipient preferences on how to use aid can however differ. Donors use parts of their aid to promote development and improve policies and institutions (Fleck and Kilby 2010), while recipients might want to use it to grant political favors to their preferred constituencies or delay the implementation of reforms (Dreher *et al.* 2014). These differences in preferences give donor countries incentives to keep control of how recipients spend the aid. The differences in preferences about how to use aid imply a trade-off when deciding about whether and to what extent control over the aid should be given to the recipient or kept with the donor. The trade-off is complicated by the role that donor and recipient country information—and the way such information is exchanged between them—plays in how to make best use of the aid with respect to developmental outcomes. The link between the difference in preferences of donors and recipients in how to use aid, the relative importance of donor and recipient information, and whether and to what extent this information is communicated between them, is the focus of this paper.²

Countries’ local knowledge often consists of unverifiable information (or verifiable only at a cost) and so the quality of the information the recipients provide to the donors crucially depends on the conflict of interest between the recipient (the sender of the information) and the donor (the receiver). Communication is complicated by the fact that donors also own some private information that is relevant to the implementation of effective policies. In this setting, mutual communication is important as the donor possesses skills and information

¹In the words of Koeberle (2005: 67) ownership is the “commitment to aid-supported reforms by country authorities and a majority of domestic stakeholders.” According to Khan and Sharma (2001: 13) ownership “refers to a situation in which the policy content of the program is similar to what the country itself would have chosen in the absence of IMF involvement.” The International Monetary Fund (IMF, 2001: 6) defines it as “a willing assumption of responsibility for an agreed program of policies, by officials in a borrowing country who have the responsibility to formulate and carry out those policies, based on an understanding that the program is achievable and is in the country’s own interest.”

²The mechanisms and circumstances under which such information should be transferred by recipient countries to donors (or lenders) have rarely been investigated. An exception is Marchesi *et al.* (2011) who analyzed the specific case of communication between the IMF and a borrowing country.

which are useful in processing the country’s local information. Thus a combination of the private information of the donor with those of the recipient is required for the design of the “optimal” policy package. The analytical setting is one of two-sided incomplete information where agency problems have the indirect negative effect of preventing full communication between the sender and the receiver.

As in Marchesi *et al.* (2011) we model the transmission of information between the donor and the recipient country as a cheap talk game (Crawford and Sobel 1982). Information is assumed to be “soft” and the transmission of information to be costless. We compare two types of incentive schemes (delegation vs. centralization) relative to the quality of the transmitted information. We define “centralization” as a framework in which control rights over policies are assigned to the donor. On the contrary, we define “delegation”—or “decentralization”—as a framework in which the recipient country is left with considerable freedom to devise its own policy actions.

We consider a situation in which the recipient is biased in favor of the “status quo,” whereas the donor is biased in favor of more (or deeper) policy reforms relative to the recipient. What we have in mind here is a situation where recipient governments might be corrupt and incompetent, maintain unsustainable economic policies like high inflation and budget deficits, or repress minorities. We assume donors want to use their aid to achieve changes to the status quo, but face resistance by the recipient government. In both delegation and centralization, such misalignment of interests prevents full communication. Therefore, the optimal allocation of control rights over policies from the donor’s perspective will depend on the relative importance of the two parties’ information. It will also depend on the degree to which donor and recipient preferences differ (which we refer to as the “agency bias”), simultaneously affecting the amount of information transmitted and the degree of reforms implemented.

In line with Marchesi *et al.* (2011), the main theoretical findings are as follows. For a given agency bias, when recipient’s local knowledge is more important than the donor’s information, their discretion in the choice of policies (delegation) should be increased. Conversely, there should be less freedom in designing policies (centralization) when the donor’s information is more relevant. As far as the effect of the agency bias is concerned, there are two opposing effects. Intuition would suggest that an increase in the conflict of interest between the donor and the recipient would make the donor more inclined towards “centralization.” The agency bias, however, also affects the quality of communication and—since an increase in the bias reduces the amount of information transferred to the donor by the recipient—the donor’s incentive to delegate may increase, particularly when local knowledge is crucial for

designing the donor’s preferred policies.

An immediate empirical implication of the model is to investigate the way in which aid is committed in relation to information transmission problems. We focus on two distinct ways of delivering aid, budget support and project aid. Budget support increases the involvement of the recipient governments in the decision-making process and is thus an example of a “delegation-scheme.” This is because budget aid is directly transferred to the recipient government and can be used by the recipient at some discretion.³ Conversely, project aid represents a more “centralized” type of aid. Donors and recipients negotiate the specific projects the aid is given for. What is more, donors are usually involved in the details of preparing and implementing the project, leaving little discretion on how to use the aid. We therefore consider the relative importance of donor and recipient private information—and the difference in their preferences on how to use the aid—as determinants of project and budget aid.

We test our theory focusing on aid given by the 28 bilateral donors of the OECD’s Development Assistance Committee (DAC) to a maximum of 112 recipient countries over the 1995-2010 period, resulting in more than 45,000 observations at the donor-recipient-year-level. We measure the bias in donor and recipient preferences with a number of proxies, among them a measure based on how they vote in the United Nations General Assembly (UNGA) on a broad range of topics. Our proxies for the availability of information to the donor relate to how *transparent* recipient country policies, data, and local environments are for the donor. Controlling for the main donor- and recipient-country variables that determine the dyadic aid relationship, and donor-recipient-pair- as well as year-fixed effects, we find that misaligned interests and informational asymmetries differentially influence whether donors grant their aid as project aid or budget aid, in line with our theory.

The paper is organized as follows. Section 2 briefly describes the related literature. A sketch of the model is developed in Section 3. Section 4 introduces our data, while Section 5 describes the empirical model and our results. The final Section 6 concludes.

2 Related literature

This paper relates to two strands of literature. The first is the literature on aid allocation and selectivity. This literature tries to disentangle the various motives of donors when giving

³Koeberle *et al.* (2006) emphasize that budget support underlines greater country ownership and higher spending on services that countries prioritize in their own budgets. This does not imply that the aid transfer is necessarily unconditional. However, bilateral donors do not usually condition their aid on a large number of detailed conditions. If conditions are attached to the aid they usually refer to the general stance of a country’s policy, e.g., with respect to human rights conditions, democracy, or the absence of corruption.

aid, usually referring to commercial, geo-strategic, developmental, and “good policy”-related motives (see, e.g., Alesina and Dollar 2000, Kuziemko and Werker 2006, Dreher *et al.* 2009a, 2009b). Most directly related to the question we focus on in this paper are studies that address the choice between project and budget aid (see, for example, Hefeker 2006, Koeberle *et al.* 2006, Morrissey 2006, Mosley and Abrar 2006, Cordella and dell’Ariccia 2007, Uttara and Strobl 2008, Clist *et al.* 2012, Chauvet *et al.* 2013).

Cordella and dell’Ariccia (2007) relate the choice between project aid and conditional budget support to the different preferences between donors and recipients. They show that budget support is preferable to project aid when the donor’s preferences are close to those of the recipient and the amount of aid is small relative to the recipients’ own resources. Morrissey (2006) also finds that budget support can safely be granted if recipients allocate spending broadly as agreed with their donors. Rather than imposing prior actions on the recipient, donors should then focus on the effectiveness of such spending when determining eligibility to budget support.⁴ In a similar vein, Mosley and Abrar (2006) show that trustful relations between donors and recipients are fundamental for the effectiveness of conditionality, and in particular for those of budget support.

More recently, Chauvet *et al.* (2013) have also related the existence of a conflict of interest between donors and recipients to the choice of (donors’ supervision of) project aid. Applying principal-agent theory to the performance of aid projects they show that in a wide range of circumstances the donor should put greater effort into supervision when the difference between the agent’s preferences and its own is greater. They test this prediction using data on World Bank project performance and—consistent with their theory—find that donor supervision of projects is significantly more effective in improving project performance when interests are widely divergent. Like we do in this paper, Cordella and dell’Ariccia (2007) and Chauvet *et al.* (2013) use a principal-agent framework and relate the conflict of interest between donors and recipients to the choice of whether to give aid as budget support or project aid. None of them, however, has considered the importance of communication between the donor and the recipient for the design of policies, nor have they related the choice between these different aid schemes to the importance of fostering communication between the two.

The second strand of literature to which this paper relates is primarily concerned with the role of donors (or lenders) in designing development reforms and thus to the importance of enhancing recipients’ ownership.⁵ The principle that ownership is crucial for the (successful)

⁴In a dynamic framework, Bougheas *et al.* (2007) also address the choice between conditional and unconditional transfers. They show that conditionality is self-perpetuating even when it is not optimal. The results in Bougheas *et al.* thus question the wisdom of conditionality at large. Also see Dreher (2009).

⁵More generally, the relationship between decentralization and development has been analyzed, among

implementation of reforms is now well established. As emphasized by various studies including Easterly (2008), Dixit (2009), Besley and Persson (2011), and Marchesi *et al.* (2011), institutions and policies are context-specific and donors and lenders do well to base their policies on a good knowledge of the recipient country’s characteristics, which in turn implies greater ownership of policies in recipient countries.⁶ Nevertheless, the mechanisms and circumstances under which such knowledge should be transferred have rarely been investigated.⁷

Aid ownership has also been addressed by Hagen (2015). In his model, increasing delegation in aid flows would be associated to giving money either with “no-conditions-attached” or with conditions being limited to achieving certain outcomes. Since donors are more willing to donate to countries whose policy choices are more aligned with their preferences, in order to maximize aid flows, conformity in policy-choices with the donor (even under full delegation) may be the equilibrium. Thus, even if real ownership may be a possibility, conformity will be more likely (“the H-street waltz”).

We contribute to this literature both theoretically and empirically. Regarding theory, we analyze the transmission of information in the allocation of aid. To our knowledge, it is the first time that communication is explicitly introduced to the context of foreign aid. With respect to our empirical models, even though some papers have considered the importance of distinguishing among different types of aid flows and some have empirically investigated the determinants of budget support, we are the first to test whether this choice is responsive to communication between the donor and the recipient.

3 Theoretical framework

The framework relies on the model of Marchesi *et al.* (2011), which we modify in order to be applicable to the issues central to this paper. The main change with respect to Marchesi *et al.* (as well as to Harris and Raviv 2005) relates to the different environment in which we investigate the cheap talk.

To analyze whether the donor has an incentive to delegate the control of decision-making to recipient governments we focus on the aspects of the model that are central to derive our

others, by Bardhan (2002) and, more recently, Lessmann and Markwardt (2010).

⁶More recently, Basurto *et al.* (2015) have shown that a decentralized allocation of subsidies in rural Malawi may offer informational advantages, despite of being prone to elite capture.

⁷An exception is Marchesi *et al.* (2011), who—building on the cheap talk literature (Crawford and Sobel 1982, Dessein 2002, Harris and Raviv 2005, 2008)—have identified and tested the conditions under which it is optimal for the IMF to delegate control to a recipient country in order to maximize the quality of a reform program. More recently, and in a different context, Dreher *et al.* (2016a) explore the role of information transmission in explaining the optimal degree of decentralization across countries.

hypotheses. For reasons of clarity, all detailed derivations and proofs are however shown in the Online Appendix.⁸ The model features two players—the donor and recipient country’s governments—that own different types of information both required for the optimal choice of policies in the recipient country (in the context of disbursing aid), denoted by p . The recipient country’s welfare is proxied by $Y(p)$ (i.e., the country’s per capita national income), which is a function of policy p . The policy maximizing $Y(p)$, is denoted by p^* . In turn, optimal policy is defined by $p^* = g + d$, where g and d are stochastic variables that proxy for information observed only by the recipient government and, respectively, the donor government; g and d are independently and uniformly distributed on the intervals $[0, G]$ and $[0, D]$, respectively. This captures that the larger the interval $[0, G]$ ($[0, D]$), the larger the informational advantage of the recipient (donor).

The recipient’s superior information over g represents the local knowledge (for instance information about the country’s economy and socio-political characteristics or better knowledge about the risks and opportunities of local investment projects), which can be seen as deriving from its closer proximity to the country’s culture and business environment as compared to the donor. The recipient’s informational advantage may depend not only on how relevant its knowledge is per se, but also on how valuable such information is relative to the donor. For example, in highly intransparent environments such informational advantages would be more salient compared to more transparent ones.

On the other hand the donor’s informational advantage d is derived from its cross-country knowledge. For example, a donor that has implemented projects in the health sector in a number of different countries has accumulated project-related knowledge that will be valuable for the implementation of health projects in the recipient country. Both types of information are assumed to be (at least partly) “soft,” that is, they cannot easily be certified.

Events unfold in three stages: allocation of control rights by the donor, communication, and policy implementation.⁹ In the first stage, the donor either allocates authority over the choice of the policy vector to the government or retains authority. Centralization refers to the scheme in which the donor decides on the policy vector, whereas under decentralization control rights are allocated to the recipient government. After the first stage of the game, the real state of the world is revealed to both players. In the second stage, communication takes

⁸Specifically, Appendix A defines and shows the properties of the communication game, Appendix B derives the ex ante expected losses of the federal and local governments, while Appendix C contains proofs of the statements made in Section 3.1 below.

⁹The analytics feature the case in which the donor cannot commit to an incentive-compatible decision rule in which the revelation principle applies. This assumption fits in well with the specific relationship between a donor and a recipient government in which the principal cannot use a standard mechanism to elicit private information from the agent.

place. Under centralization, the government sends a ‘message’ to the donor regarding its ‘local knowledge’. Upon receiving the message, the donor updates its beliefs and chooses the policy vector. Under decentralization, the donor sends a message to the recipient concerning its private knowledge of the state of the world. In this case, the government updates its beliefs and chooses the policy vector. Finally, in the third stage, the policy is implemented and outcomes are realized.

The donor is benevolent and assumed, for simplicity (and analytical tractability), to maximize the following objective function:

$$U^D = U_0^D - (p - p^*)^2, \quad (1)$$

where U^D decreases with the distance between the actually implemented policy p and the optimal policy p^* , and $U_0^D = U^D(p^*)$.¹⁰ As we assume a benevolent donor, we do not consider the donor’s geopolitical distortions in giving aid, their desire to give aid to assure access to markets or natural resources, or that they may otherwise care about spillover effects of recipients’ policies (e.g., Alesina and Dollar 2000, Kuziemko and Werker 2006, Dreher *et al.* 2011). This assumption is strong but allows us to focus on the role of information transmission for the choice of centralization vs. delegation. We should emphasize that in a slightly modified framework the influence of donor interests could be easily included by allowing a donor’s preferred policy to be different from p^* . While this assumption would be more realistic, it would not change the main conclusions of the model.

The recipient country’s government maximizes:

$$U^G = U_0^G - (p - p_G^*)^2, \quad (2)$$

which is decreasing in the distance between the implemented policy p , and the recipient government’s preferred policy p_G^* , with $U_0^G = U^G(p_G^*)$.¹¹ The optimal policy choice of the government deviates from the optimal policy p^* by a factor $B > 0$ (i.e., $p_G^* = p^* - B$). The recipient government cares about its national per capita income, but its choice may be constrained by the influence of some interest groups benefitting from structural distortions (e.g., Drazen 2002). $B > 0$ captures the extent to which the policy choice of the recipient may deviate from its optimal level p^* due to the pressures of interest groups opposing policy

¹⁰The utility function (1) can be derived from a more general objective function $\widehat{U}^D = Y(p)$. Taking a Taylor expansion of $\widehat{U}^D(p)$ up to the second term, one obtains the form in (1).

¹¹The more general function is $\widehat{U}^G = Y(p) + \theta C(p)$, where C are contributions from special interest groups. We assume that C decreases with p and that the parameter θ ($0 \leq \theta \leq 1$) denotes the importance of lobbies. Using a Taylor expansion of $\widehat{U}^G(p)$ up to the second term, one obtains (2).

reforms.¹²

Therefore, the difference in optimal policies is given by

$$p_D^* - p_G^* = p^* - (p^* - B) = B, \quad (3)$$

where B reflects the extent of policy bias which proxies for all factors that might lead to a deviation of the recipient government's preferences from p^* ; the pressure of local interest groups and re-election concerns, among others.

3.1 Communication game

The donor can choose between centralization or delegation. Opting for centralization, the donor minimizes the costs of misaligned incentives and makes full use of its private knowledge. At the same time, it under-utilizes the recipient's information. Under delegation, the donor allocates policy decision-making to the recipient. While in this case the recipient's private knowledge is fully exploited, the results can deviate from the donor's optimal policy (loss of control).

In the communication equilibrium, the recipient government only learns the interval to which the realization of d belongs, and hence obtains only incomplete information about the donor's knowledge. The smaller the size of the partition interval, the more informative the donor's message. We denote the maximum number of intervals— $N(D, B)$ —as a function of the bias B and the length of the partition of the donors' knowledge D . Following Crawford and Sobel (1982), the most informative equilibrium—in which the number of intervals N is maximal—always exists and is a focal equilibrium of the communication game.

In the focal equilibrium, the donor's ex ante expected welfare loss increases with the importance of the donor's private information D , since the donor's private information is not fully exploited under delegation. Finally, for any given D , the maximum precision of the information transmitted by the donor decreases with the extent of the bias B (i.e., the larger the bias B , the less precise and informative cheap talk will be). On the other hand, if the donor chooses centralization, it fully exploits its own information D and chooses its preferred policy vector p^* . As centralization results in an underutilization of the recipient's information G , the donor's ex ante expected loss is increasing with the recipient's informational advantage.

The donor determines whether or not to retain its control rights over policies by comparing

¹²More generally, conflicts of interest over desired policy may reflect various causes (among others, Tabellini and Alesina 1990, Alesina and Drazen 1991, Fernandez and Rodrik 1991) and, in principle, could also influence the donor's decisions. In this paper, in order to focus on communication, we assume a benevolent donor, in contrast to a recipient which we assume to be more responsive to private interests.

its ex ante expected loss under delegation with its expected loss under centralization. Since both are increasing in D (under delegation) and G (under centralization), we can identify cut-off values of D and G at which the scheme choice switches. The scheme choice, thus, depends on the extent of the conflict of interest (B) and the relative importance of the two players' respective informational advantage (D, G).

INSERT FIGURE 1 HERE

Figure 1 represents the choice between centralization and delegation as a function of D and G . The threshold $D(G, B)$ is upward sloping, and divides the (G, D) plane into two regions (centralization and delegation) lying below the 45° line. The donor will opt for delegation only if the recipient's private information G is (strictly) greater than its own private information D and greater than the threshold level $D(G, B)$. The delegation region is smaller than the centralization region: the agency bias B requires G to be strictly greater than D in order for delegation to be optimal. This holds because the loss due to underutilization of the recipient's information is compensated for by the elimination of the bias and the full exploitation of the donor's own private information D . Conversely, the donor always chooses centralization whenever its private information D is more important than the recipient's private information (that is, $D > G$). Additionally, it opts for centralization if $D(G, B) \leq D < G$, that is, even when the recipient's informational advantage G is greater than D , but smaller than the threshold value $D(G, B)$.¹³

In general, as Figure 1 shows, the threshold $D(G, B)$ is not monotone in the bias B , as an increase in B has both direct and indirect effects. Directly, an increase in B increases the agency problem, thus reducing the donor's incentive to delegate. Indirectly, an increase in B also reduces the equilibrium amount of information transferred by the recipient to the donor under centralization, thus making delegation a better choice. Therefore, an increase in the agency bias, while making the recipient's choice less attractive to the donor, can also decrease the incentives of the recipient to communicate its private information in the centralization game more than in the delegation game. The net effect can result in switching from centralization to delegation with an increase in the bias, in order to make full use of the recipient's private knowledge.¹⁴

¹³This is to some extent similar to Bougheas *et al.* (2007) who, in a dynamic setting, find that conditional aid could be self-perpetuating but not necessarily optimal.

¹⁴Since the derivative of $D(G, B)$ with respect to B cannot be analytically derived, this result is obtained by numerical simulations (see Harris and Raviv 2005).

3.2 Empirical implications

The model provides some normative indications regarding the allocation of control rights over policy actions in the donor-recipient relationship, and testable implications can be derived from the theory. The main prediction of the model is that delegation should prevail when the “loss of information” dominates the “loss of control.” That is, when the importance of the recipient’s knowledge—to be partially lost under centralization—dominates the size of the bias and the importance of the donor’s private information. To the contrary, centralization should prevail when the size of the agency bias and the importance of the donors’ knowledge dominates the role of the recipient’s local knowledge.

Since budget support increases the involvement of recipient governments in the decision-making process, it is an example of “delegation” in the sense of our model. Aid in the form of budget support is directly given to the recipient, so that control over the aid money rests with the government of the recipient country rather than the donor.¹⁵ Alternatively, project aid represents a good example for a more centralized provision of aid. Projects are usually selected in close collaboration with the donor, and are closely supervised, or even directly implemented by the donor, thus leaving less influence for the recipient government.¹⁶

We empirically investigate whether or not the share of project aid and budget aid (to overall aid commitments) are affected by variables related to the relative importance of donor-recipient informational asymmetry and by variables capturing the size of the agency bias, holding recipient country characteristics, their economic performance, and the dyadic relation between the donors and recipients (as well as donors’ political motivations) constant. Specifically, for any given bias, we expect to find budget support (or delegation) to be preferred in countries whose local knowledge is relatively more important. Conversely, we expect that project aid (or centralization) will prevail when the recipient’s local information is less crucial.

¹⁵Some donors make their aid conditional on the implementation of certain policies, or on the absence of corruption, human rights violations, or restrictions on democracy. This holds in particular for multilateral donors like the IMF or the World Bank that we do not focus on in this paper. Some bilateral aid agencies also attach conditions. For example, the United States’ Millennium Challenge Corporation conditions its aid on the absence of corruption, government effectiveness, and low inflation, among others. This does not restrict the recipient governments on deciding about what to use the aid for, however. The same holds for those parts of aid that are restricted to be spent in the donor country (so-called tied aid). While tying aid reduces its value for the recipient, the recipient government is free to decide about which projects or purposes to use the aid for.

¹⁶This assumes that aid is not fully fungible, which is supported by the recent literature. For example, Van de Sijpe (2013: 26) shows “little evidence that aid is fully or even largely fungible; rather, most point estimates suggest limited fungibility.” As we focus on donor choices rather than recipient country policies it is sufficient for our analysis that donors expect aid not to be fully fungible, independent of whether or not it is in fact fungible after the donors delivered the aid.

A second important feature of the model is the presence of a non-monotonic relationship between delegation and the misalignment of interests between the donor and recipient. The bias has both direct and indirect effects working in opposite directions. The donor’s informational advantage may depend not only on the relevance of its knowledge *per se*, but also on how valuable such information is relative to those of the donor. In less transparent countries informational advantages are arguably more salient as compared to more transparent ones. Less transparency decreases the share of “hard” information that can easily be transferred and increases the importance of private “soft” knowledge. The relative share of “soft” to “hard” information also depends on the quality of the communication infrastructure. The quality of information transmission can make the existing informational asymmetry, *ceteris paribus*, more (or less) salient, leading to more (or less) delegation of control rights over policies.

Therefore, we expect that the indirect effect of the bias on delegation should prevail in highly intransparent environments, where the information transferred by the recipient is of higher value to the donor. As a consequence, given the trade-off between loss of control and loss of information faced by the donor we would expect to find a negative (or insignificant) interaction between the bias and transparency, as the importance of local information for the donor decreases with transparency. The easier donors can access specific local knowledge, the lower the likelihood that they are willing to delegate decision-making authority based on the importance of this knowledge. Budget aid therefore becomes less, and project aid more likely.

4 Data

We examine the determinants of budget aid and project aid in a dyadic donor-recipient setting. Data on general budget support and project aid are from the DAC’s Creditor Reporting System (CRS, OECD 2016). These data are not reported for years prior to 1995. We estimate separate regressions for the two types of aid rather than using the ratio of the two, which could reflect their relative importance in one regression. The reason is that many countries receive no aid from a particular donor, while others receive aid in only one of the two types. Zero aid could then not be separated from aid of the category we would put on the numerator; zero aid in the denominator would make the share approach infinity. We avoid both problems by investigating the two types of aid in separate regressions, and comparing the relative influence of our variables of interest in determining the shares of these flows in

overall aid commitments.¹⁷ In the following, we propose a number of proxies to measure the extent of the agency bias and the relative informational advantages of the donor and recipient governments.

4.1 Variables of interest

Our variables of interest are meant to capture the extent of the agency bias, the donor country’s general knowledge and the recipient country’s local knowledge—and how easily this information is available. We introduce them in turn.

Agency bias. Empirically, we are interested in a bias in the objective function of the recipient country’s authorities relative to the preferences of the donor. According to the political economy literature, measures of political instability, polarization and social division (e.g., Tabellini and Alesina 1990, Alesina and Drazen 1991) account for a country’s “resistance” against reforms (or status quo bias).¹⁸ For any given policy environment, such countries will find it more difficult to make changes to their policies to reduce a given agency bias. With this in mind, we included proxies for *Government Capability* and *Ethnic Tensions*, taken from the International Country Risk Guide (ICRG). *Government Capability* ranges from zero to 12 and is “a measure of the government’s capability in carrying out its declared programs/policies and its ability to stay in office.” Higher values on this measure of institutional capacity imply that it is easier for the government to overcome internal resistance and implement reforms. The status quo bias is thus lower. We include *Ethnic Tensions*, which ranges from zero to six, with higher values indicating more tensions. *Ethnic Tensions* measure “the degree of tension within a country which can be attributable to racial, cultural and language divisions” (PRS Group 1998).¹⁹ It is thus a proxy for polarization and social division, which the previous literature has shown to inhibit reforms. At the same time, highly polarized countries tend to exhibit a certain degree of “favoritism” in their preferred policies (Franck and Rainer 2012), arguably in opposition to the average donor’s preferences.

In order to capture the dyadic component of the agency bias between specific donor-recipient-pairs, we include UNGA voting alignment (*UNGA Distance*), which captures the political

¹⁷As the share of project (budget) aid to overall commitments is larger than one for some observations, we replicate our main regressions excluding those observations. Our results are robust to this change.

¹⁸In Tabellini and Alesina (1990), given a situation of political instability and polarization, a balanced budget does not represent a political equilibrium. This is because the current majority does not internalize the costs of budget deficits and the more this is the case, the greater the difference between its preferences and the expected preferences of future majorities. Alesina and Drazen (1991) find that when stabilization has significant distributional implications a “war of attrition” among different socioeconomic groups may delay stabilization.

¹⁹We alternatively include a binary indicator for *Autonomous Regions* and the share of *Sub-national Expenditures/Total Expenditures* as proxies for stronger regional vetoes and thus a larger status quo bias.

distance between the donor and recipient. Specifically, we include the dyadic distance between ideal points of voting behavior in the UNGA (Bailey, Strezhnev, and Voeten 2015). These ideal points are constructed to measure government’s preferences on a broad range of topics, and to be comparable over time. They are thus well-suited to measure differences in preferences over policy, broadly defined.²⁰

According to our model, the effect of the agency bias on the extent of reforms can go either way. As we described above, an increase in the agency bias per se has both direct and indirect effects which could either reduce or increase the incentive to delegate, depending on which of the two effects dominates, on average.

Information. We expect the importance of a recipient’s local knowledge to increase with the salience of the informational asymmetry between donors and recipients. In particular, local knowledge is crucial for intransparent countries as less transparency decreases the share of “hard” knowledge and increases the importance of “soft” knowledge to be obtained by the recipient. In this context, facing the trade-off between loss of control and loss of information, donors might decide to give more importance to information and, in turn, give greater control to the recipient. If this is the case, donors will prefer budget aid to project aid. In order to measure the importance of a recipient’s local knowledge, our main index follows Hollyer *et al.* (2011), who suggest missing data on standard economic indicators (relating to economic policy and debt) as indicators of (lack of) transparency. As Hollyer *et al.* (2011: 1198) point out, this “measure of transparency [...] directly reflects government decisions to release accurate economic data.” Rather than choosing any arbitrary data series we evaluate all 1260 series included in the World Bank’s World Development Indicators (2013). Our resulting indicator for *Transparency* shows the share of series for which there are data available in a given country and year.²¹ As we therefore treat missing data as information, the resulting

²⁰As an alternative measure for the dyadic bias we use a binary variable on *Democratic Distance* relying on the Polity IV index of democracy. We calculate *Democratic Distance* between the donor and recipient as one if either the donor or the recipient is a democracy (i.e., a Polity IV index larger than five), while the respective other country is not a democracy (i.e., has a value below six). We expect the agency bias to be smaller among democracies, as democratic countries tend to agree on a broad set of principles regarding political and economic liberalism (Voeten 2000). Furthermore, we use an indicator of *Ideological Distance*, measured as the absolute difference between the donor and recipient government on a left-to-right spectrum.

²¹Missing data entries can result from a number of reasons. For example, (i) the recipient government might have the data but does not report them, (ii) the recipient government does not have the information, or (iii) the recipient reports the data to the World Bank but Bank staff chooses to not report them, for example because they consider them insufficiently reliable. In all these cases missing data proxy for intransparent environments that make the recipient’s private information more important relative to the donor’s. This would not be the case if data that have been missing at the time the decisions about how to give aid have been made had later been included to the database. In this case we would report *Transparency* to be too high. However, the correlation between our missing indicator variable and an indicator constructed in analogy based on an earlier—2005—version of the World Development Indicators is very high. Correlation between

indicator has the advantage that it is available for all countries and years.

As an additional proxy for the availability of information we use the number of *Telephone Lines* (per 100 people), which is also widely available. As we explain in Dreher *et al.* (2016a), this variable can be seen to proxy for all kinds of technological barriers to information transmission. Which technology is most relevant to capture information transmission varies over time, so that the easy availability of internet access or mobile phones will better proxy for information transmission in more recent years, but not in the earlier years of our sample. According to the results in Chung *et al.* (2013), *Telephone Lines* exerted the strongest effect on trade among a number of alternative proxies for the quality of information and communication technology. As Dreher *et al.* (2016a) point out, the number of *Telephone Lines* is highly correlated with a combined media access variable ($\rho=0.80$) and a variable capturing the number of computers per capita ($\rho=0.87$) in those periods where both are available.²²

An additional way of measuring the salience of the informational asymmetry is by including information on the dyadic relationship between specific donors and recipients. We therefore construct a measure for *Bilateral Experience*, calculated by the number of years since a donor has first given aid to a specific recipient country.²³ When countries have a longer bilateral aid relationship the recipient's local knowledge seems less important compared to the donor's knowledge. This is because the donor has gathered experience through previous aid projects and is thus better informed than without having this country-specific experience, on average. The need for delegation is therefore reduced by the number of years since the donor had first committed aid to the recipient. Similar to *Bilateral Experience*, *Bilateral Trade* proxies for dyadic donor-specific information about the recipient country. The importance of information costs in determining trade is well-established (e.g., Fink *et al.* 2005). While causality between information and trade can be either way, we thus interpret *Bilateral Trade* as an additional informational variable at the dyadic level.

our indicator and those of Hollyer *et al.* (2011) is 0.80 and our results are robust to using their index instead of ours. Our indicator is also significantly correlated with the *HRV Index* of transparency (Hollyer *et al.* 2014), which uses patterns in the missing data to model transparency as a latent variable, and a *Combined Transparency* indicator based on 29 sources taken from Williams (2015).

²²*Media Access* is a composite indicator including access to TV, radio, papers, and internet (using data from Banks 2011). *Internet Users* and *Telephone Lines* are also highly correlated ($\rho=0.64$), but sample size is reduced substantially when we include *Internet Users*. We test robustness to using *Newspapers* in circulation (per 1000 inhabitants) and the number of *Internet Users* per 100 people. Interestingly, the correlation between *Telephone Lines* and *Transparency* is weak, indicating that these measures account for different aspects of transparency (see Hollyer *et al.* 2013 for a detailed discussion of these differences). We therefore include these two measures at the same time rather than separately.

²³Due to data availability, we compute the number from 1970, leading to a maximum experience of 40 years.

Poor quality of recipient government staff could also be a reason for a recipient to seek a donor’s technical advice and could thus explain the choice of project aid over budget aid. In order to capture the quality of recipient government staff, we include the ICRG index of *Bureaucratic Quality*. *Bureaucratic Quality* ranges from zero to four, with higher values showing “better” environments. High scores in *Bureaucratic Quality* indicate that the bureaucracy has the strength and expertise to govern, without the necessity for drastic changes in policy or interruptions in government services.

Finally, as a measure that is specific to the donor, rather than the recipient, we calculate the number of recipients a donor gives aid to in a particular year to proxy for the donor’s most recent cross-country knowledge. The number of recipients a donor gives aid to at the same time proxies for the donor’s information about development policies implemented in different countries and contexts and the global environment in which these policies are embedded at a particular point in time (*Donor Experience*).

4.2 Control variables

Much of the literature on aid allocation has evaluated whether and to what extent commercial and political donor interests have shaped the allocation of aid, but recipient country “need” and “merit” have also featured prominently (Dollar and Levin 2006, Claessens *et al.* 2009, Fleck and Kilby 2010, Höffler and Outram 2011). Our main specification is parsimonious, controlling for (log) *GDP per capita* to take account of development, and the (log) of *Population* which also captures “need,” but can as well be taken as proxy for the ease of obtaining a country’s political cooperation (as smaller countries are easier to “buy”; see, e.g., Boone 1996), and is thus a proxy for the donors’ political interests.²⁴

We provide the details of the definitions and sources of the variables included in the regressions and descriptive statistics in Appendices D and E. Appendix F shows the correlations of the variables included in the analysis.

5 Method and results

We use data for the 1995-2010 period and a maximum of 112 countries, due to data availability. The regressions are estimated using fixed effects OLS at the donor-recipient-year-level.²⁵

²⁴We tested robustness by including other control variables. We included the World Bank’s Country Policy and Institutional Assessment (*CPIA*) in order to control for “recipient merit.” We included the recipient country’s *KOF Index of Globalization* (Dreher 2006) to capture its general openness. None of our results is changed by the inclusion of these variables.

²⁵In a previous version of this paper we estimated our regression using Poisson Pseudo Maximum Likelihood (PPML) at the recipient-country-level, with project aid and budget aid in levels rather than shares (Dreher

The dependent variables are defined as shares of total dyadic aid commitments. We estimate the model with country-pair-fixed effects (and cluster the standard errors at the country-pair-level), include year-fixed effects, and lag the explanatory variables by one year. We therefore control for unobserved effects that exclusively vary at the country-pair- and year-level, substantially reducing concerns over endogeneity.²⁶ The regression equations are:

$$P_{i,j,t} = \beta_1 X_{1i,t} + \beta_2 X_{2i,j,t} + \eta_{i,j} + \tau_t + u_{i,j,t}, \quad (4)$$

and

$$B_{i,j,t} = \beta_1 X_{1i,t} + \beta_2 X_{2i,j,t} + \eta_{i,j} + \tau_t + u_{i,j,t}, \quad (5)$$

where $P_{i,j,t}$ and $B_{i,j,t}$ represent project aid and budget aid as a share of overall commitments from donor j to recipient i in year t , and X_1 and X_2 are vectors containing the variables introduced above. While X_1 is the vector of recipient-specific variables, X_2 includes variables that vary over donor-recipient-pairs. In one set of regressions X_1 and X_2 include interactions between *Transparency* and our dyadic proxy for the agency bias, allowing us to disentangle the average effect of the bias according to whether transparency is high or low. Finally, $\eta_{i,j}$ and τ_t are donor-recipient-pair- and year-fixed effects, respectively, while $u_{i,j,t}$ is the error term.

Contrary to most of the aid allocation literature, we estimate rather conservative models, which include country-pair- and year-fixed effects.²⁷ What is more, we investigate aid provided by all 28 bilateral DAC donors rather than aid from a particular donor. We can therefore account for a variety of observable indicators at the recipient- and donor-level as well as on the donor-recipient-pair-level, including information on historical, political and economic ties. While this does not provide a bullet-proof identification strategy, we are more conservative than most of the related literature.²⁸ Still, we prefer to interpret the coefficients in the models below as conditional correlations rather than causal effects.

and Marchesi 2013). Results were in line with the model’s predictions. One might also think of using alternative models such as Tobit or Heckman—two commonly used methods in the aid allocation literature—but their use would be problematic with our data (see Sigelman and Zeng 1999). Tobit may lead to biased estimates when zero observations are not the result of censoring mechanisms, while Heckman is inefficient when the dependent variable is exclusively nonnegative. What is more, in our short sample the dyadic-fixed effects Tobit estimates are biased due to the incidental parameter problem.

²⁶We replaced the country-pair-fixed effects with a number of alternative fixed effects. When we replace them with fixed effects at the recipient- and donor-level our results are mostly unchanged. We also replaced them with recipient-year- and donor-year-fixed effects, and finally also added donor-recipient-fixed effects to this specification. Unsurprisingly, most coefficients are no longer significant at conventional levels in this specification, with the exception of those variables that vary at the recipient-donor-year-level.

²⁷See, for example, Alesina and Dollar (2000), Dollar and Levin (2006), and Nordtveit (2012).

²⁸Again, Alesina and Dollar (2000), or Dollar and Levin (2006) are useful examples. Also see Dreher *et al.* (2011).

TABLE 1 HERE

We report the basic results in Table 1. Column 1 shows the results for project aid excluding the dyadic variables, while column 2 shows those for budget aid instead. Columns 3 to 6 include characteristics of the country-pair—the dyadic transparency indicators in columns 3 and 4 and *UNGA Distance* in columns 5 and 6. Even column numbers focus on project aid, while odd column numbers refer to budget aid (both measured as a share of overall dyadic commitments). Across regressions, the share of budget aid increases with *GDP per capita* and *Population*, while there are no consistent correlations of these control variables with the share of project aid, at conventional levels of significance.

As can be seen in Table 1, the results are in line with our hypotheses regarding the effect of what we call “informational variables,” on the provision of aid. In all regressions, budget aid and project aid increase with greater *Transparency*. The coefficients for project aid are however larger compared to those of budget aid in all regressions, indicating that donors prefer a type of aid that allows them to keep control when it is comparably easier for them to access recipient information. Project aid—but not budget aid—increases with the availability of *Telephone Lines* and greater *Donor Experience* as well, indicating the importance of the informational infrastructure for donors’ preference of project aid over budget aid. Quantitatively, an increase in *Transparency* of 1 (the mean being 0.65 in column 1) increases the share of project aid in overall aid commitments by 0.19-0.35 percentage points. For the average recipient country in our sample this would roughly double the share of project aid. A standard deviation change in *Telephone Lines* (representing 13 telephone lines per 100 people) and a one standard deviation change in *Donor Experience* (representing 47 recipient-years) both lead to about a 30 percentage point increase in the share of project aid in overall aid commitments.

The results also show that donors prefer project aid over budget aid with a longer bilateral aid history in the recipient country, indicating that donors who are less in need of recipient information delegate less. The longer a donor has been giving aid to a recipient, the more experience and knowledge it has accumulated. Consequently, the informational advantage of the recipient is reduced, which leads to a positive correlation with project aid but not budget aid. Specifically, one more year of *Bilateral Experience* leads to an increase of 0.015 percentage points of overall aid commitments, which represents a yearly increase of four to five percent for the average recipient country. In a similar vein, we introduced *Bilateral Trade* as an additional proxy of dyadic information. Again, the results are as expected: *Bilateral Trade* reduces the amount of budget aid, in line with the prediction of the model regarding the importance of information for the choice of delegating aid policies.

As we are interested in the statistical significances of groups of variables rather than of individual variables, we rely on tests of their joint significance in order to evaluate our hypotheses. Specifically, we evaluate the relative importance of the transparency variables based on their joint significance in the budget aid—compared to the project aid—regressions. An F-test indicates that all transparency variables are jointly highly significant for project aid (column 5), but only marginally significant for budget aid (column 6).

While we consider tests for the joint significance of our variables of interest to be most appropriate to test our hypotheses, note that most of the variables are also individually significant. The exception is *Bureaucratic Quality*, which is completely insignificant in all regressions, with no significant differences between project aid and budget aid. The correlation between budget aid and *Transparency* is significant at the one percent level in column 1, but much weaker in significance when we add the dyadic proxies for transparency, as could be expected. The correlation between *Telephone Lines* and project aid, as well as those between *Donor Experience* and project aid, is significant at the one percent level in all regressions though (and insignificant for budget aid). *Bilateral Experience* is significant at the one percent level for project aid, but weakly significant or insignificant for budget aid, while *Bilateral Trade* is (negatively) significant at the one percent level for budget aid only.

In summary, we find strong evidence that donors allocate their aid in line with the “transparency”-related predictions of our model. Since transparency indicates the relative importance of the recipient’s knowledge (as compared to the donor’s knowledge), more transparent countries receive more project but not budget aid, as our theory implies. Donor countries do not need to rely on the recipient’s local knowledge if transparency is high.

Our model is less clear-cut when it comes to making predictions about the differences in donor and recipient preferences (“bias”). As we have outlined above, the effect of the bias on delegation could be either direct (reducing delegation) or indirect (increasing delegation by reducing the amount of communication under centralization). We thus do not have strong predictions for the effect of the “bias-related” variables, on average.

According to the results in Table 1, the recipient-specific measures for the agency bias do not turn out to be significant determinants of the choice between project and budget aid, on average. We find no effect of the recipient country’s *Government Capability* and *Ethnic Tensions*. We find however significant coefficients for our dyadic proxy—distance in UNGA voting. Specifically, while the share of budget aid decreases with *UNGA Distance*, project aid is unaffected. Centralization thus dominates delegation when the bias of the recipient country relative to the donor is too large according to this dyadic measure.²⁹ The direct

²⁹We should stress here that the influence of the agency bias on the amount of budget aid and project

effect (reducing delegation) thus dominates the indirect effect (increasing delegation), on average.³⁰

TABLES 2 & FIGURES 2-3 HERE

In order to disentangle the direct and indirect effects of the bias on delegation, we investigate how transparency and agency bias interact. We focus on the interaction between *UNGA Distance* and the level of transparency. Table 2 presents the results on the differential effect of the agency bias (*UNGA Distance*) conditional on the level of *Transparency* and *Telephone Lines*.

Columns 1 and 2 interact *Transparency* with *UNGA Distance*. As can be seen, the effect of *UNGA Distance* on project aid decreases with *Transparency* (column 1), while its effect on budget aid becomes stronger (column 2), at least at the ten percent level of significance. Results are similar but statistically weaker when we turn to the interaction of *Telephone Lines* with *UNGA Distance* in columns 3 and 4. While the direct or indirect effect could dominate according to our model on average, the indirect effect of the bias should prevail in highly intransparent environments, where the information transferred by the recipient is of higher value to the donor. As we are interested in how the marginal effect of the agency bias changes over the range of the transparency indicators, we calculate average marginal effects and show them in Figures 2 (project aid) and 3 (budget aid), in tandem with 90-percent confidence intervals.

Figures 2 and 3 show that the marginal effect of *UNGA Distance* on the amount of project aid decreases with the intensity of *Transparency*, while its effect on the amount of budget aid increases with *Transparency*. Both effects are significant for low levels of *Transparency*, but turn insignificant at conventional levels when *Transparency* is high. As transparency increases, the recipient's local knowledge becomes less relevant, so that donors prefer centralization (project aid) to delegation (budget support). Only when transparency is high, the size of the bias loses relevance in predicting the difference between project aid and budget aid. In highly transparent countries, donor countries do not depend on recipient government information and so depend on communication to a lower extent. Overall, these patterns fit our model's predictions well.³¹

aid is also consistent with the (theoretical) results of Cordella and dell'Araccia (2007) who find that budget support should be preferred to project aid when the donor's preferences are close to those of the recipient.

³⁰We considered the alternative monadic proxies (*Autonomous Regions* and *Sub-national Expenditures/Total Expenditures*) and dyadic proxies (*Democratic Distance* and *Ideological Distance*) and also obtained no robust results for these bias-related variables in either direction, on average.

³¹Appendix G shows similar figures focusing on the interaction between *UNGA Distance* and *Telephone Lines*. Overall, results are similar to those shown in Figures 2 and 3.

6 Conclusions

In this paper we have explored the role of information transmission between a donor and a recipient country in explaining how donors allocate budget aid and project aid. By relating the quality of the information supplied by a recipient country to the donor (and vice-versa) to the misalignment of interests between the two, we analyzed the properties of different aid schemes relative to the quality of the transmitted information. More specifically, we have compared an aid scheme in which control rights over policies are allocated to the donor, i.e., centralization (or project aid), with an aid scheme in which the recipient is left with more freedom to devise its own policy actions, i.e., delegation (or budget support).

The main theoretical findings are as follows. For a given agency bias, when recipients' local knowledge is more important than the donors' information, their discretion in the choice of reforms (delegation) should be increased. Conversely, there should be less freedom in designing reforms (centralization) when the donors' information is more relevant. The impact of the agency bias on determining the optimal lending scheme remains a priori undetermined as it can have two countervailing effects at the same time (a direct and an indirect one).

In the empirical section, we focused on two distinct ways of delivering aid, budget support and project aid. Budget support increases the involvement of the recipient government in the decision-making process and is thus an example of delegation. Conversely, project aid represents a more centralized type of aid. We investigated the role of the relative importance of donor and recipient information in determining which aid scheme is preferred. Controlling for countries' characteristics, their economic performance and dyadic relations between donors and recipients we find that transparency does influence the relative amount of project vs. budget aid. More specifically, as transparency increases, donors prefer project aid to budget support. As the agency bias is concerned, the results of our dyadic measure are in line with our theoretical predictions, according to which centralization should dominate delegation when the bias is too large. Finally, the marginal effects of the bias, conditional on transparency, point to the dominance of the direct over the indirect effect when transparency is low, leading to a centralization scheme.

Our model suggests that donors who allocate aid taking properly account of information and preferences will achieve the results they aim for more effectively. Whether an allocation of aid in line with the model is likely to increase economic growth or reduce poverty depends on whether, as we assume, the donor is sufficiently benevolent. According to parts of the aid effectiveness literature, however, both project aid and budget aid have not on average been effective with respect to achieving growth (e.g., Rajan and Subramanian 2008). This could imply that donors in reality allocate aid in line with other, geopolitical or commercial,

targets.³² It could also imply that the targeting of aid towards budget or project aid, while significant, is not yet sufficiently elaborated. To the extent that donors aim at increases in growth, a more careful allocation following the recommendations of our model should be able to improve outcomes with respect to growth. Future research might then want to investigate whether those parts of budget aid and project aid that are given in relation to informational advantages are indeed more effective in improving outcomes than those parts of such aid flows that are given due to other reasons. A differential analysis for (groups) of donors could also give additional insights as to which donors do and do not take account of information and bias, and whether these differences can explain potentially differential effects of these donors' aid. Finally, other types of delivering aid might also be investigated with respect to whether or not they are allocated in light of information and preferences.³³ We leave these questions for future research.

³²As shown in Dreher *et al.* (2016b), donors' geopolitical motives for grant aid reduce the effectiveness of aid in increasing economic growth.

³³As one example, our model could be used to explain the increasing amount of aid that is channeled via multilateral institutions as non-core aid ("multi-bi aid"), see Eichenauer and Reinsberg (2016).

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Table 1: Main results

	(1)	(2)	(3)	(4)	(5)	(6)
	Project Aid	Budget Aid	Project Aid	Budget Aid	Project Aid	Budget Aid
(log) GDP per capita (t-1)	-0.041 (0.290)	0.006*** (0.010)	-0.041 (0.304)	0.007*** (0.007)	-0.028 (0.511)	0.009*** (0.003)
(log) Population (t-1)	0.011 (0.809)	0.007** (0.046)	-0.080* (0.081)	0.007* (0.059)	-0.089* (0.058)	0.008** (0.039)
Transparency (t-1)	0.354*** (0.007)	0.018** (0.021)	0.250* (0.054)	0.017** (0.027)	0.191 (0.124)	0.014* (0.088)
Telephone Lines (t-1)	0.007*** (0.000)	-0.000 (0.250)	0.006*** (0.000)	-0.000 (0.149)	0.005*** (0.000)	-0.000 (0.102)
Donor Experience (t-1)	0.002*** (0.000)	-0.000 (0.883)	0.002*** (0.000)	-0.000 (0.844)	0.002*** (0.000)	-0.000 (0.921)
Bureaucratic Quality (t-1)	-0.001 (0.900)	-0.000 (0.900)	-0.006 (0.583)	-0.000 (0.845)	-0.003 (0.735)	-0.000 (0.652)
Bilateral Experience (t-1)			0.015*** (0.000)	0.000* (0.093)	0.015*** (0.000)	0.000 (0.190)
(log) Bilateral Trade (t-1)			-0.001 (0.557)	-0.000*** (0.008)	-0.001 (0.520)	-0.000*** (0.006)
Government Capability (t-1)	0.003 (0.536)	0.000 (0.336)	0.003 (0.555)	0.000 (0.350)	0.002 (0.659)	0.000 (0.252)
Ethnic Tensions (t-1)	0.003 (0.740)	-0.000 (0.685)	0.002 (0.822)	-0.000 (0.760)	0.006 (0.518)	-0.000 (0.722)
UNGA Distance (t-1)					-0.001 (0.975)	-0.002* (0.059)
Number of Observations	46378	46378	46014	46014	43944	43944
Number of Country Pairs	3126	3126	3126	3126	3039	3039
Number of Recipients	112	112	112	112	109	109

Notes: OLS fixed effects at the donor-recipient-year-level. Donor-recipient-fixed- and year-fixed effects are included. Standard errors are in parentheses (clustered at the donor-recipient-level; significance levels: * 0.10, ** 0.05, *** 0.01).

Table 2: Interaction effects

	(1)	(2)	(3)	(4)
	Project Aid	Budget Aid	Project Aid	Budget Aid
(log) GDP per capita (t-1)	-0.030 (0.477)	0.009*** (0.003)	-0.027 (0.514)	0.008*** (0.005)
(log) Population (t-1)	-0.076* (0.091)	0.006 (0.100)	-0.087* (0.058)	0.007** (0.049)
Transparency (t-1)	0.514** (0.040)	-0.030* (0.071)	0.187 (0.140)	0.015* (0.055)
Telephone Lines (t-1)	0.005*** (0.000)	-0.000 (0.199)	0.006** (0.013)	-0.000*** (0.002)
Donor experience (t-1)	0.002*** (0.000)	0.000 (0.933)	0.002*** (0.000)	-0.000 (0.982)
Bureaucratic Quality (t-1)	-0.003 (0.756)	-0.000 (0.611)	-0.004 (0.727)	-0.000 (0.699)
Bilateral Experience (t-1)	0.016*** (0.000)	0.000 (0.434)	0.015*** (0.000)	0.000 (0.292)
(log) Bilateral Trade (t-1)	-0.001 (0.549)	-0.000*** (0.005)	-0.001 (0.517)	-0.000*** (0.007)
Government Capability (t-1)	0.003 (0.595)	0.000 (0.374)	0.002 (0.654)	0.000 (0.275)
Ethnic Tensions (t-1)	0.006 (0.510)	-0.000 (0.694)	0.006 (0.504)	-0.000 (0.662)
UNGA Distance (t-1)	0.124** (0.014)	-0.019*** (0.003)	0.002 (0.966)	-0.004** (0.015)
UNGA*Transparency (t-1)	-0.197* (0.073)	0.027*** (0.008)		
UNGA*Telephone Lines (t-1)			-0.000 (0.755)	0.000*** (0.006)
Number of Observations	43944	43944	43944	43944
Number of Country Pairs	3039	3039	3039	3039
Number of Recipients	109	109	109	109

Notes: OLS fixed effects at the donor-recipient-year-level. Donor-recipient-fixed- and year-fixed effects are included. Standard errors are in parentheses (clustered at the donor-recipient-level; significance levels: * 0.10, ** 0.05, *** 0.01).

Figure 1: Choice among centralization and delegation as a function of D and G

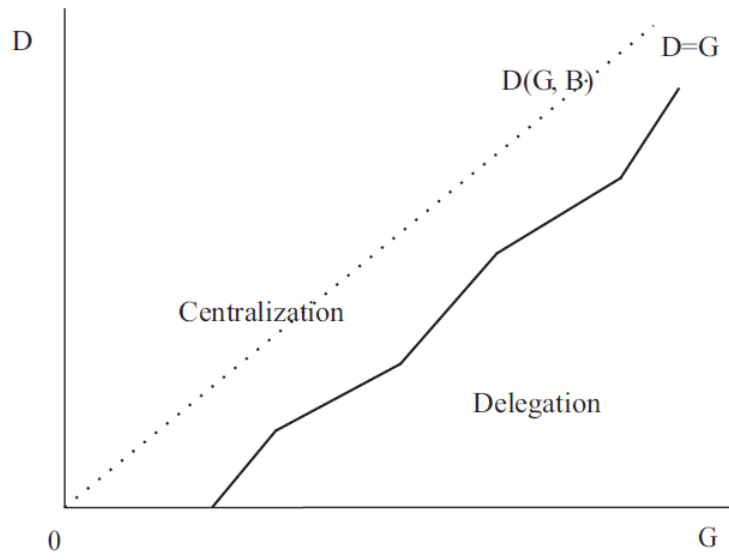
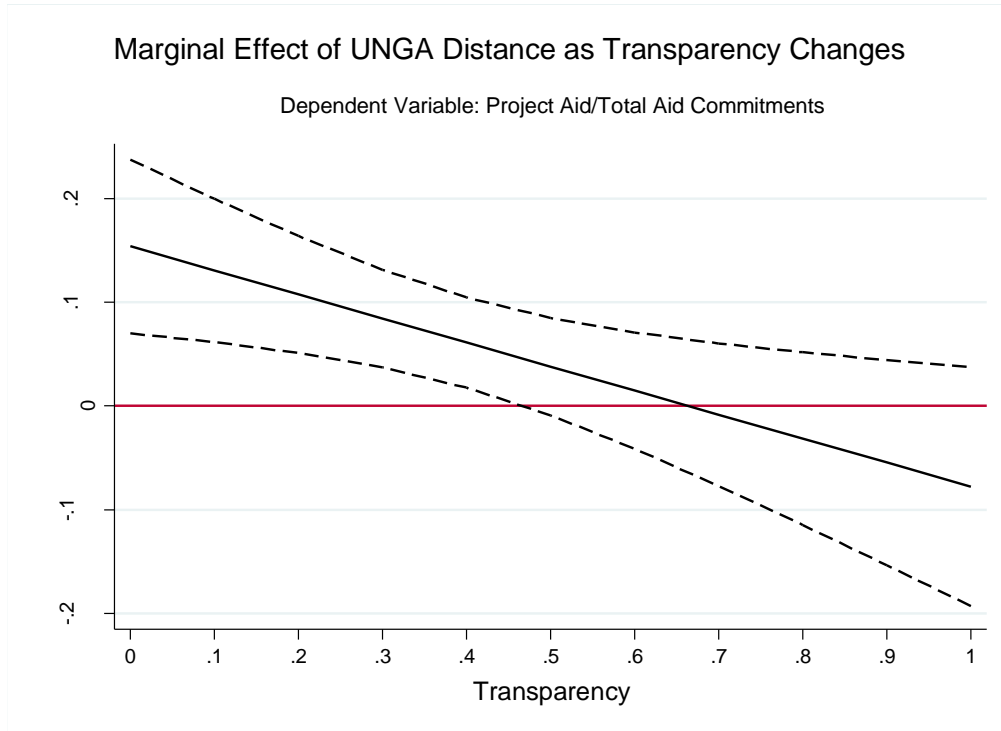
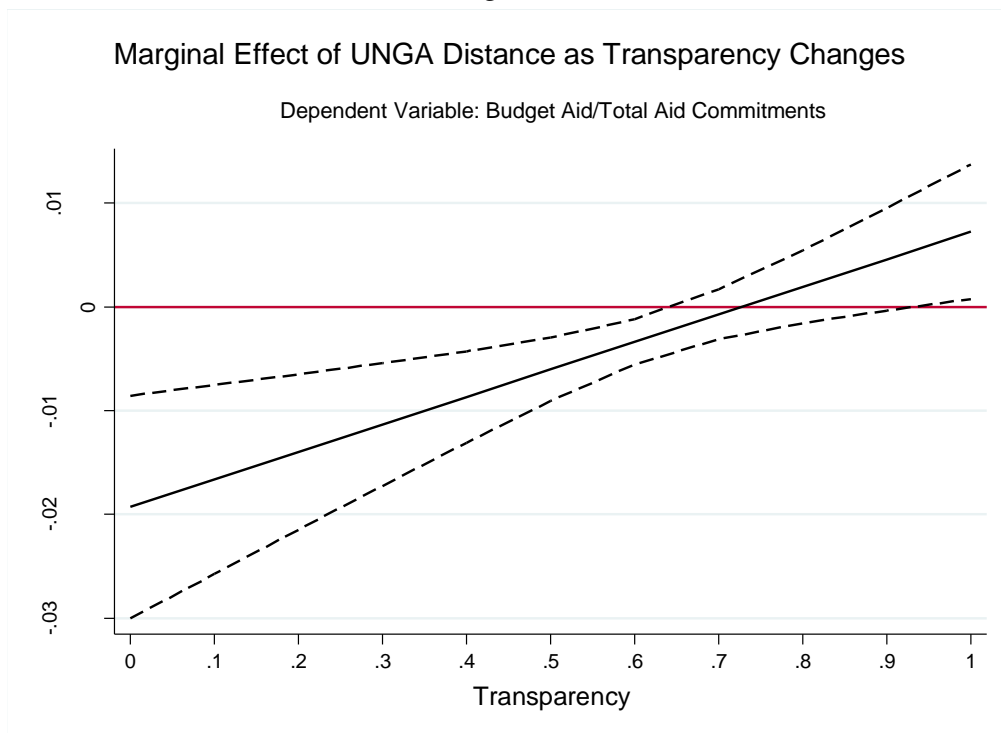


Figure 2



Notes: 90-percent confidence interval shown. Corresponds to regression of column 1 in Table 2.

Figure 3



Notes: 90-percent confidence interval shown. Corresponds to regression of column 2 in Table 2.

Appendices

Appendix A: Definition and properties of the communication game

This Appendix provides the definition of the communication game and the properties of the equilibrium outlined in Section 3.

Let $t \in [0, D]$ denote the *message* that the donor sends to the recipient, when asked to offer its advice. Let $q(t|d)$ denote the density function that the donor sends message t when it has observed d . $q(t|d)$ is the *reporting rule* chosen by the donor. Let $p(g, t)$ be the *action rule* (i.e., the policy) chosen by the recipient, given the donor has sent message t to the recipient. We then have that:

Definition 1 *A Perfect Bayesian Nash Equilibrium of the communication game consists of a reporting rule $q(t|d)$ and an action rule for the recipient $p(g, t)$ such that*

i) for each $d \in [0, D]$, $\int_{\mathcal{R}} q(t|d) dt = 1$. If t^ is in the support of $q(t|d)$, t^* is such that*

$$t^* = \arg \min L^D = \int_0^G [p(g, t) - p_D^*]^2 f_G(g) dg, \quad (\text{A.1})$$

and

ii) for each t , $p(g, t)$ solves

$$p(g, t) = \arg \min L^G = \int_0^G [p(g, t) - p_G^*]^2 g(d|t) dd, \quad (\text{A.2})$$

where $g(d|t) = \frac{q(t|d)f_D(d)}{\int_0^D q(t|\theta)f_D(\theta)d\theta}$.

According to condition (i), the reporting rule $q(t|d)$ chosen by the donor minimizes the donor's expected loss, given the recipient's action rule $p(g, t)$. In other words, the equilibrium reporting rule $q(t|d)$ induces the recipient to choose policies $p(g, t)$ which minimize the expected loss of the donor. Condition (ii) simply says that the recipient responds optimally to each donor report t . Namely, the recipient uses Bayes' rule to update its prior on d , given the donor's reporting strategy and the signal received. Then, given the donor's report t and the posterior density function of d given t —that is, $g(d|t)$ — $p(g, t)$ minimizes the recipient's expected loss. Crawford and Sobel (1982) show that this communication game does not have a full revelation equilibrium, but that there are multiple equilibria which are all partition equilibria. More specifically, the state space $[0, D]$ is partitioned into intervals and the donor only reveals which interval the true value of d belongs to. The following characterizes the relevant equilibria of the communication game.

Proposition 1 *There exists at least one equilibrium with the following properties: there is a positive integer N , such that one can define a set of $N + 1$ real numbers, with generic element denoted by d_i , such that $0 = d_0 < d_1 < \dots < d_{N-1} < d_N = 1$, and*

(a) $q(t|d)$ is uniform, supported on $[d_i, d_{i+1}]$, if $t \in (d_i, d_{i+1})$;

(b) $p(g, t) = g + \frac{d_i + d_{i+1}}{2} - b$, for all $t \in (d_i, d_{i+1})$.

Moreover

$$(i) \int_0^G \left[g + \left(\frac{d_i + d_{i+1}}{2} \right) - (g + d_i) - B \right]^2 f(g) dg = \int_0^G \left[(g + d_i) - \left[g + \left(\frac{d_{i-1} + d_i}{2} \right) \right] + B \right]^2 f(g) dg;$$

$$(ii) d_0 = 0; d_N = D.$$

Proof: The proof follows directly from Theorem 1 in Crawford and Sobel (1982). \square

Condition (i) is an ‘arbitrage’ condition which says that for states of nature that fall on the boundaries of two intervals the donor must be indifferent between the actions $(p(g, t))$ on these two intervals. Condition (i) defines a second order linear differential equation on d_i , while condition (ii) specifies its initial and terminal conditions. Since the donor is not informed on the true value of g , when choosing t , it will take the expected value of g , that is $G/2$. The arbitrage condition (i) then, for $i = 1, \dots, N - 1$, reduces to

$$\frac{G}{2} + \left(\frac{d_{i+1} + d_i}{2} \right) - \left(\frac{G}{2} + d_i \right) - B = \frac{G}{2} + d_i - \left[\frac{G}{2} + \left(\frac{d_{i-1} + d_i}{2} \right) \right] + B, \quad (\text{A.3})$$

from which it implies

$$d_{i+1} = 2d_i - d_{i-1} + 4B. \quad (\text{A.4})$$

This second order linear difference equation has a class of solutions parameterized by d_1 (given that $d_0 = 0$)

$$d_i = id_1 + 2i(i-1)B, \quad i = 1, \dots, N-1. \quad (\text{A.5})$$

Given that $d_N = D$ it is the case that

$$d_1 = \frac{D - 2N(N-1)B}{N}, \quad (\text{A.6})$$

which, using (A.4) and substituting for the value of d_1 , becomes

$$d_i = \frac{iD}{N} - 2i(N-i)B, \quad i = 1, \dots, N. \quad (\text{A.7})$$

From (A.7) it follows that

$$d_i - d_{i-1} = \frac{D}{N} + 2(2i - N - 1)B, \quad (\text{A.8})$$

where the width of the interval increases by $4B$ for each increase in i .

Note that the centralization game is entirely symmetric to the delegation game. As before, the recipient’s report r is determined by a partition $\{g_i\}$ of $[0, G]$. Again, it is possible to define a reporting rule $q(r|g)$ and a posterior belief

$$g(g|r) = \frac{q(r|g)f_g(g)}{\int_0^G q(r|\eta)f_G(\eta)d(\eta)}, \quad (\text{A.9})$$

such that, given the report $r \in [g_i, g_{i+1}]$, the donor's expected value of g is $(g_i + g_{i+1})/2$ (posterior mean of the random variable \tilde{g} , given r). Thus, the donor will implement the following policy

$$p(g, r) = \frac{g_i + g_{i+1}}{2} + d + e \quad \text{if } r \in [g_i, g_{i+1}], \quad i = 1, \dots, N - 1. \quad (\text{A.10})$$

The partition $\{g_i\}$ of $[0, G]$ is computed using the conditions (i) and (ii) in Proposition 1, in a similar way as above, that is

$$g_{N-i} - g_{N-(i-1)} = \frac{G}{N} - 2(2i - N - 1)B, \quad (\text{A.11})$$

where the width of the interval decreases by $4B$ for each increase in i . □

Appendix B: Derivation of donor and recipient government's ex ante expected losses

Under delegation, following Proposition 1 and using (A.8), the donor's ex ante expected loss for the equilibrium of size N is given by

$$\begin{aligned} L_D^D(N, B, D) &= \int_0^D (p(g, t) - p_D^*)^2 g(d|t) dd, \\ &= \int_0^D \left(g + \frac{d_i + d_{i+1}}{2} - b - g - d - e \right)^2 g(d|t) dd, \\ &= \frac{1}{D} \sum_{i=1}^N \int_{d_{i-1}}^{d_i} \left(\frac{d_{i-1} + d_i}{2} - d - B \right)^2 dd, \\ &= \frac{1}{D} \frac{1}{12} \sum_{i=1}^N (d_i - d_{i-1})^3 + \frac{1}{D} B^2 (d_0 - d_N), \\ &= \frac{1}{12} \sum_{i=1}^N \left[\frac{D}{N} + 2(2i - N - 1)B \right]^3 + \frac{1}{D} B^2 (d_0 - d_N), \\ &= \sigma_d^2 + B^2 \quad (d_0 = 0; d_N = C, \text{ see Proposition 1}). \end{aligned} \quad (\text{B.1})$$

Here, D stands for delegation and σ_d^2 is the ex ante residual variance of d , that is the uncertainty about d faced by the recipient before being reported by the donor the equilibrium signal t , which is given by

$$\sigma_d^2 \equiv \frac{D^2}{12N^2} + \frac{B^2(N^2 - 1)}{3}, \quad (\text{B.2})$$

and it is decreasing in N , the expected degree of informativeness of the donor's message.

Under centralization, following Proposition 1 and using (A.11), the donor's ex ante expected

loss for the equilibrium of size N is given by:

$$\begin{aligned}
L_C^D(N, B, D) &= \int_0^G [p(d, r) - p_D^*]^2 g(g|r) dg, \\
&= \frac{1}{G} \sum_{i=1}^N \int_{g_{i-1}}^{g_i} \left(\frac{g_i + g_{i+1}}{2} + d + e - d - g - e \right)^2 dd, \\
&= \frac{1}{G} \sum_{i=1}^N \int_{g_{i-1}}^{g_i} \left(\frac{g_{i-1} + g_i}{2} - g \right)^2 dd, \\
&= \frac{1}{G} \frac{1}{12} \sum_{i=1}^N (g_i - g_{i-1})^3 \\
&= \frac{1}{G} \frac{1}{12} \sum_{i=1}^N \left[\frac{G}{N} + 2(2i - N - 1)B \right]^3, \\
&= \sigma_g^2, \tag{B.3}
\end{aligned}$$

where σ_g^2 is the ex ante residual variance of g , that is the uncertainty about g faced by the donor before being reported by the government the equilibrium signal r , which is given by

$$\sigma_g^2 \equiv \frac{G^2}{12N^2} + \frac{B^2(N^2 - 1)}{3}. \tag{B.4}$$

□

Appendix C: Proof of statements in Section 3

The statement given in Section 3 follows directly from Proposition 2 below. By comparing its ex ante expected loss under delegation ($L_D^D(N, B, D)$) with the one it incurs under centralization ($L_C^D(N, B, D)$), the donor determines whether or not to retain its control rights over policies.

Proposition 2 *The donor prefers delegation if and only if $G \geq D(G, B)$, where $D(G, B)$ is continuous and increasing in G and, for any B , $D(G, B) < G$.*

Proof: The proof follows Theorem 1 in Harris and Raviv (2005). □

Appendix D: Sources and definitions

Variable	Definition	Source
DEPENDENT VARIABLES		
Budget Aid	Aid committed as a share of a donor's total aid to the same recipient	OECD (2016)
Project Aid	Aid committed as a share of a donor's total aid to the same recipient	OECD (2016)
EXPLANATORY VARIABLES		
(log) Bilateral Trade	Sum of exports and imports between donor and recipient in log values (in constant US\$)	IMF DOTS (2015)
(log) GDP per capita	Log of GDP p.c., constant 2000 US\$	World Bank (2013)
(log) Population	Log of population	World Bank (2013)
Autonomous Regions	Are there autonomous regions? 1 yes, 0 no	DPI Beck et al. (2001)
Bilateral Experience	Number of years since a donor was giving first positive amount of aid to recipient	Own computation based on OECD (2016)
Bureaucratic Quality	Measures the bureaucracy's strength and expertise to govern, without the necessity for drastic changes in policy or interruptions in government services	ICRG (2013)
Combined Transparency CPIA	Composite global index of information transparency World Bank's Country Policy and Institutional Assessment	Williams (2015) CPIA, World Bank
Democratic Distance	1 if either one country of the pair is democratic while the other is non-democratic (measured by polity2)	Polity IV (2015)
Donor Experience	Number of recipients a donor gives aid to in a particular year	Own computation based on OECD (2016)
Ethnic Tensions	Measures the degree of tension within a country which can be attributable to racial, cultural and language division	ICRG (2013)
Government Capability	Measures the government's capability in carrying out its declared programs/policies and	ICRG (2013)

	its ability to stay in office	
Hollyer et al. Index	Share in all data series on “Economy & Growth” and “External Debt” for which data are reported	WDI (2016), constructed based on Hollyer et al. (2011)
HRV Index	HRV index of transparency	Hollyer et al. (2014)
Ideological Distance	Absolute distance of political spectrum between donor and recipient (measured by execrlc)	DPI Beck et al. (2001)
Internet Users	Internet users per 100 inhabitants	UN (2016)
KOF Index of Globalization	Globalization index ranging between 1-100, with higher values showing more globalization	Dreher (2006)
Newspapers	Total average circulation per 1,000 inhabitants	UNdata (2016)
Sub-national Exp./Tot. Exp.	Subnational expenditures (local and state level) / expenditure by general government (all levels)	IMF (2012), Dreher et al. (2013a)
Telephone Lines	Number of telephone lines per 100 people	WDI (2012)
Transparency	Share in all data series for which data are reported	World Bank (2013)
UNGA Distance	Dyadic distance between ideal points of voting behavior in the UNGA (United Nations General Assembly)	Bailey, Strezhnev, and Voeten (2015)

Appendix E: Descriptive statistics

Variable	N	Mean	SD	Min	Max
(log) Bilateral Trade	43888	17.37	3.98	0.00	32.01
(log) GDP per capita	43804	7.65	1.38	3.97	10.92
(log) Population	43944	16.25	1.61	12.54	21.01
Autonomous Regions	43834	0.11	0.31	0.00	1.00
Bilateral Experience	43944	14.89	14.04	0.00	40.00
Budget Aid/Overall Commitments	43944	0.01	0.07	0.00	4.11
Bureaucratic Quality	41029	1.89	0.89	0.00	4.00
Combined Transparency	42710	52.91	12.48	18.00	80.00
CPIA	28787	3.37	0.62	1.00	5.50
Democratic Distance	40322	0.52	0.50	0.00	1.00
Donor Experience	43944	78.78	46.36	0.00	148.00
Ethnic Tensions	41029	3.99	1.35	0.00	6.00
Government Capability	41029	8.77	1.66	2.92	12.00
Hollyer et al. Index	43944	0.82	0.22	0.07	0.98
HRV Index	36831	1.54	2.09	-2.95	9.98
Ideological Distance	42647	0.91	0.69	0.00	2.00
Internet Users	42748	11.21	16.57	0.00	83.70
KOF Index of Globalization	40948	52.97	13.06	22.87	89.18
Newspapers	10007	67.29	72.86	0.00	385.42
Project Aid/Overall Commitments	43944	0.32	1.19	0.00	197.24
Sub-national Exp./Tot. Exp.	7678	21.61	12.46	0.87	53.70
Telephone Lines	43916	12.87	13.07	0.01	58.91
Transparency	43944	0.65	0.12	0.22	0.87
UNGA Distance	43836	1.54	0.74	0.00	4.87

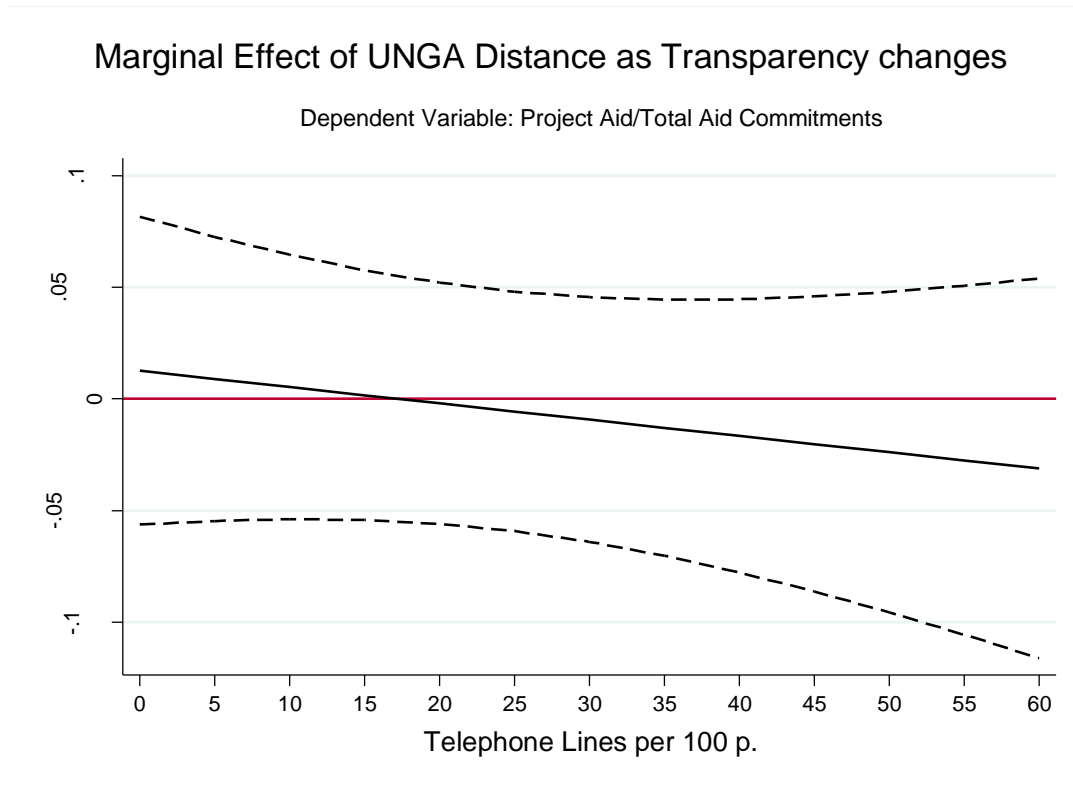
Notes: Corresponds to regression of column 5 (6) in Table 1.

Appendix F: Correlations

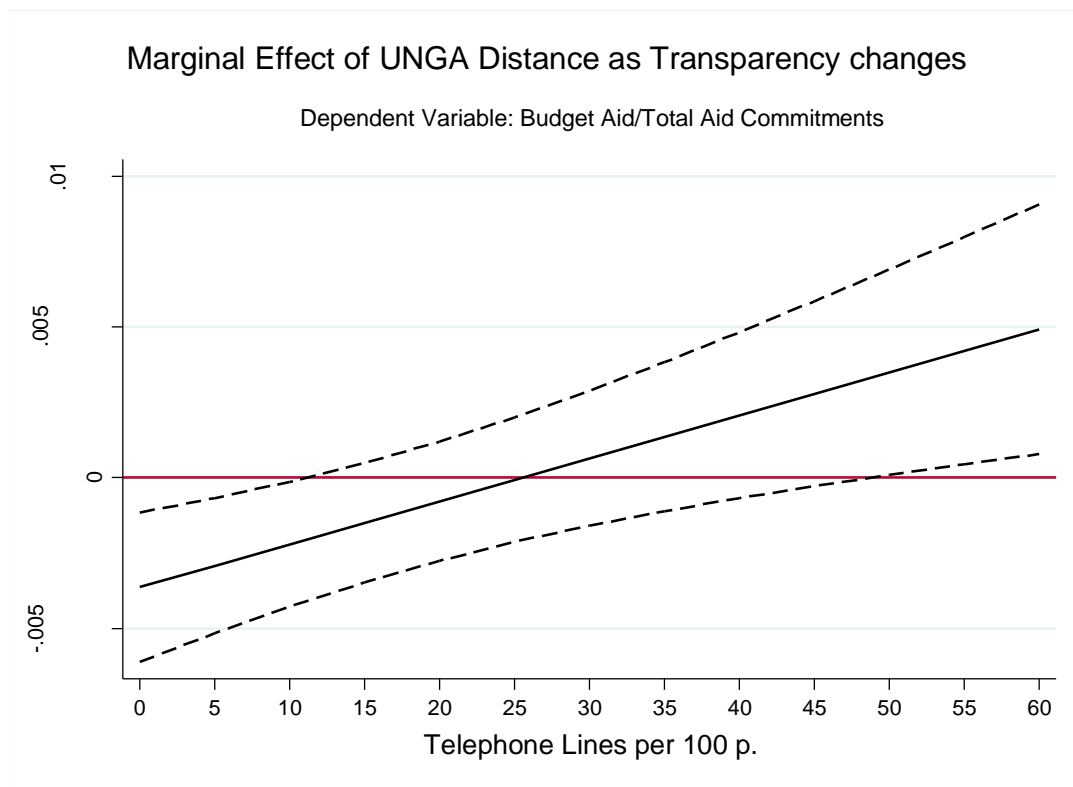
	(log) GDP per capita	(log) Population	Transparency	Telephone Lines	Donor Experience	Bureaucratic Quality	Bilateral History	(log) Bilateral Trade	Government Capability	Ethnic Tensions	UNGA Distance
(log) GDP per capita	1										
(log) Population	-0.351	1									
Transparency	-0.232	0.465	1								
Telephone Lines	0.785	-0.265	-0.107	1							
Donor Experience	-0.00415	0.0144	0.0390	0.00658	1						
Bureaucratic Quality	0.612	-0.106	-0.0770	0.585	-0.0175	1					
Bilateral Experience	-0.219	0.190	0.139	-0.208	0.584	-0.0826	1				
(log) Bilateral Trade	0.254	0.315	0.123	0.262	0.404	0.268	0.271	1			
Government Capability	0.133	-0.0874	-0.111	0.0714	0.0287	-0.0189	-0.0201	0.0396	1		
Ethnic Tensions	0.347	-0.206	-0.0435	0.248	-0.0185	0.183	-0.0934	0.0257	0.129	1	
UNGA Distance	-0.260	0.140	-0.209	-0.436	0.0915	-0.232	0.279	-0.00252	0.174	-0.0308	1

Notes: Corresponds to regression of column 5 (6) in Table 1.

Appendix G: Additional figures



Notes: 90-percent confidence interval shown. Corresponds to regression of column 3 in Table 2.



Notes: 90-percent confidence interval shown. Corresponds to regression of column 4 in Table 2.