On Foreign Aid Effectiveness: When Conditionality met Ownership

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Abstract

In this paper we propose a game theoretic approach to deal with the problem of implementing the efficient allocation of aid and reform through policy conditionality. We show that optimality can only be attained by a conditional scheme that takes into account the characteristics of both donor and recipient. Moreover, the levels of aid and reform induced by such a mechanism are, under certain conditions, compatible with the goals of the recipient government. This result reconciles ownership with a specific form of conditionality.

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1. Introduction

An important challenge in foreign aid policy is the improvement of government ownership of structural reform programs designed by International Financial Institutions (IFIs). The emphasis placed on ownership since the end of the nineties is part of the IFI’s strategies for poverty reduction, and comes as a result of the questionable success achieved in this respect by the so-called policy conditionality. The current debate on ownership vs. conditionality can be placed in the broader context of the debate on institutions as centrally designed devices (the “top down” vision) vs. institutions as a result of the evolution of customs and traditions in a society (the “bottom up” vision). Whereas policy conditionality is a top down institution, country ownership of policy reform draws on a bottom up approach. There is a general consensus that the principles of top-down changes should be combined with context-specific

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2 For an overview of the new approaches undertaken by the IFIs to revisit conditionality, see Koeberle et al. (2005).
3 See Easterly (2008).
knowledge to create feasible reforms. In this line, Branson and Hanna (2000) suggest several ways to improve government ownership of policies by proposing “a broader view of conditionality as an evolving process in support of a policy compact based on mutual commitment”. Although reasonable, their proposals are somewhat vague and lack analytical support. This paper provides a theoretical toolkit to better understand the problem of consistency between conditionality and ownership.

Our paper relates to Marchesi et al. (2011) and Dreher et al. (2017), who identify the conditions under which it is optimal for the donor to delegate policy control to the recipient. They stress the importance of context-specific knowledge in the design of sensible reform programs. In the same line, Khan and Sharma (2005) analyze proposals aimed at enhancing the degree of ownership of structural programs financed by the IMF. Unlike the mentioned papers, we use the tools of mechanism design to ascertain an explicit relationship between conditionality and ownership. Our main contribution is the characterization of an optimal conditional aid scheme that is somehow compatible with the policy preferences of the government in the recipient country.

The unconditional aid policy of the 60's and 70's depicted a voluntary contributions scenario in which both donors and recipients faced a Prisoner Dilemma's situation. The equilibrium of a voluntary contributions game like this implies an inefficiently low level of provision of the public good, which, in this case is “poverty reduction”. The inefficiency of unconditional aid policy prompted a major shift in development cooperation at the beginning of the 80s. The donors became increasingly concerned with the institutional framework of recipients. Thanks to the promotion of the Bretton Woods institutions and most donor countries, the so-called policy conditionality appeared on the scene. The main feature of structural adjustment programs was that aid donations were made conditional on the recipient’s fulfillment of a series of conditions, which were mostly related to structural reform and macroeconomic policy.⁴

However, the current practice of policy conditionality has been seriously questioned as an effective tool to promote development.⁵ In particular, the dynamic structure of conditional

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⁴ Empirical studies of conditionality include Dreher (2009), Mosley et al. (1995), Killick (1995, 1997), and Devarajan, Dollar and Holmgren (2001a), among others.

⁵ Some reasons for the failure of conditionality are: (i) aid donations respond to commercial interests of donors (Alesina and Dollar 2000, Kanbur 2000); (ii) the low opportunity costs of committed funds due to the budget-pressure problem (Svensson 2003); (iii) aid donations are fungible and imperfectly monitored (Cordella and
aid programs entails problems of commitment and credibility on the part of the donors\(6\). The effectiveness of foreign aid policy is affected by the strategic incentives that shape the donor-recipient relationship. Thus, a game theoretic approach seems an appropriate framework of analysis. We consider two players: the donor country and the government of the recipient country. As in Azam and Laffont (2003), poverty reduction is considered a global public good, whose provision is subject to the voluntary contributions of the donor and recipient. The donor’s contribution to poverty reduction is foreign aid policy, and the recipients’ contribution is the implementation of sound domestic policies. Aid has a budgetary cost for the donor and, since domestic political issues are not necessarily aligned with good policies, recipients face the political cost of structural reform.

We undertake the task of designing an aid institution, based on policy conditionality, that is, to some extent, compatible with government ownership of aid policies on the part of recipient countries. However, as Drazen (2002, p.41) points out, “it is basically impossible to justify conditionality in the absence of a conflict of interests of some sort”. This conflict is present in our model since donors and recipients’ preferences over policy outcomes are partially misaligned. Although both benefit from poverty reduction, aid is costly for the donors and reform is (politically) costly for recipients.

Our analysis consists of two steps: First, we characterize an aid scheme that achieves implementing the efficient allocation of aid and reform. Second, we identify a condition under which the efficient policy outcome, obtained from the proposed scheme, entails higher degree of government ownership than the time consistent policy outcome expected from a traditional conditional aid scheme. In order to carry out the second step, we propose a theoretical way to measure the degree of government ownership of every structural reform program.

We start our analysis by investigating the characteristics of the strategic interaction between donor and recipient in a scenario of policy conditionality. We focus our attention in the time inconsistency of conditional aid policy. The (altruistic) donors are said to fall in a

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Samaritan’s Dilemma (Buchanan, 1975) as long as they face incentives to disburse aid, even when the conditions related to structural reform have not been met. Recipients anticipate the donors’ incentives and backtrack on structural reform. The donors’ lack of credibility implies that the equilibrium aid policy is inefficient. Based on this analysis, we study which incentives would induce recipients to carry out the efficient reform level.

For this purpose, we use the tools of mechanism design. An external, independent, and possibly supranational aid agency is in charge of implementing the mechanism (we may think of this “social planner” as the World Bank or the IMF). The goal of the agency is to maximize social welfare, defined as the sum the utilities of donor and recipient. This institution is at the same time the enforcement authority and a social planner concerned with social welfare. In our first result (Proposition 1) we identify the conditions that characterize an optimal conditional scheme, i.e., a scheme that induces as its equilibrium outcome the socially optimal allocation of aid and reform. We find that the rule that associates aid to reform depends on the donor and recipient’s preferences over policy outcomes (hence, it is context-specific). Moreover, this rule must be gradual and flexible. This implies, for instance, that aid should not be completely withdrawn if recipients fail to comply with the conditions. Instead, the amount of aid should be tailored to the degree of fulfillment of structural adjustment.

Next, we approach the issue of government ownership of aid policy. The concept of ownership has been handled in a multitude of papers and reports on foreign aid policy. However, to our knowledge, there are few approaches that assess analytically the extent of government ownership of an aid policy program (exceptions of this are Marchesi et al. (2011) and Dreher et al. (2017)). The problematic issue here is to find a measure that captures how closely coupled are a given aid policy package and the government’s preferences about reform. For this purpose, we derive an analytical expression for ownership and call it the virtual ownership function. This virtual ownership function is shown to depend positively on both the aid received and the government’s concern with poverty reduction, and negatively on the level of structural reform specified in the aid package.

Finally, we compare, in terms of government ownership, the aid policy implemented by means of our mechanism with the one that emerges in equilibrium from a conditional aid scheme in which the donor lacks enforcement power. The mechanism proves to be superior to the traditional conditional scheme if and only if a specific condition holds. This condition is more likely to hold the higher the recipient’s concern with poverty reduction. Thus, the
success of conditionality is linked to the selection of countries that exhibit a stronger commitment to development policies.

The paper is organized as follows. In Section 2 we describe the model. Section 3 shows the lack of effectiveness of policy conditionality caused by time inconsistency. In Section 4 we characterize an aid scheme that achieves the efficient aid policy outcome. Section 5 presents the virtual ownership function and obtains a condition that characterizes situations where the efficient aid policy exhibits a higher degree of government ownership than the time-consistent policy. Section 6 summarizes the main conclusions of the paper. The proofs of the main results are in Appendix A. Appendix B includes an example of the computation of an optimal aid mechanism and its degree of ownership.

2. Model

We propose a game theoretical model with two players: the donor country and the government in the recipient country. Poverty reduction is considered a global public good. The donor is concerned with poverty reduction and also cares about the amount of aid donations (aid helps to reduce poverty, but it also entails budgetary costs). The recipient benefits from poverty reduction, but also faces the political costs of undertaking structural reform. Both aid and reforms contribute to reduce poverty. Let \( y \geq 0 \) denote aid and let \( z \geq 0 \) represent a measure of the effort exerted by the recipient government in structural reform. For instance, we can think of \( z \) as the World Bank’s Country Policy and Institutional Assessment (CPIA)\(^7\).

Domestic consumption in the recipient country (or poverty reduction) is given by function \( c(y,z) \). We interpret this function as a technology that relates aid and reform (inputs) to poverty reduction (outcome). Collier and Dollar (2001) estimate positive values for both the marginal impact of aid on growth and the marginal impact of reform on growth (a proxy for poverty reduction). Besides, in their paper aid is shown to exhibit diminishing returns. Consistent with these empirical findings, we assume that\(^8\) \( c_y > 0, c_z > 0 \) and \( c_{yy} \leq 0 \).

\(^7\) “The World Bank's Country Policy and Institutional Assessment (CPIA) assess the conduciveness of a country's policy and institutional framework to poverty reduction, sustainable growth, and the effective use of development assistance” (World Bank, 2009).

\(^8\) Subscripts denote partial derivatives.
For technical reasons, we further assume that $c_{zz} \leq 0$, $c_{yy}c_{zz} \geq c_{yz}^2$, and that $c$ has continuous second partial derivatives at any point\(^9\) $(y, z)$.

The utility functions of both donor and recipient are defined as:

$$u^D(y, z) = \theta^D c(y, z) - y, \quad (1)$$

and

$$u^R(y, z) = \theta^R c(y, z) - e(z). \quad (2)$$

Parameters $\theta^D > 0$ and $\theta^R > 0$ represent, respectively, the donor's and the recipient's concern with poverty reduction. The monetary costs of disbursing aid level $y$ enter linearly in the donor's utility function in Eq. (1). Structural reform costs are represented by function $e(z)$, with $e'(.) > 0$ and $e''(.) > 0$. The convex shape of this function indicates that reform is proportionally more costly the higher the level of reform pursued is. Reform costs for the government include, for instance, engaging in democratization processes, or liberalizing sectors that provide financial support to the current regime\(^10\).

Parameter $\theta^D > 0$ represents the donor's concern with poverty reduction. A positive value of parameter $\theta^D$ may mean that the donor is altruistic\(^11\). However, the donor's valuation of $c(y, z)$ may also depend on the donor's commercial interests in the recipient country (Younas, 2008), the recipient's colonial past (Alesina and Dollar, 2002), or UN Security Council membership (Kuziemko and Werker, 2006; Dreher et al, 2009). It may also be that aid donations help alleviate terrorism-related threats (Bandyopadhyay et. al, 2011), or make the occurrence of undesirable events less likely, like a revolution, a civil war, or a coup d'état that might change the geopolitical balance of power in the area in detriment to the donor's interests. In any case, whether the motives for donating are humanitarian or strategic is irrelevant for our analysis.

Parameter $\theta^R > 0$ measures the relative weight the recipient puts on domestic consumption with respect to the political cost of reform. This parameter reflects the government’s degree of commitment with development outcomes, which is positively related

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\(^9\) This implies, by Schwarz' theorem, the symmetry of second derivatives, i.e., $c_{yz} = c_{zy}$.

\(^10\) Our modeling of the government’s preferences follows a similar rationale as in Casamatta and Vellutini (2008), who consider a politician partly concerned with social welfare and partly concerned with holding office.

\(^11\) The altruism of the donor is present in the theoretical literature about the strategic donor-recipient relationship. For instance, see Svensson (2000, 2003) or Azam and Laffont (2003).
to the country’s level of democracy. The value taken by $\theta^R$ determines the level of reform that is most preferred by the recipient government.

In this paper, we consider foreign aid as complementary to policy reform. As stated in Collier and Dollar (2001), foreign aid enhances the poverty reduction effect of good policy and good policy increases the impact of aid on poverty reduction. In their estimations, these authors find a positive and significant coefficient that account for the interaction of aid and policy (measured through the CPIA). That is, the impact of policy change on growth depends on how much aid a country is getting. In the terms of our model, the players’ actions $(y$ and $z)$ are strategic complements\(^{12}\), i.e., $c_{yz} \geq 0$ and $c_{zy} \geq 0$.

The (weak) complementarity between aid and reforms allows for two alternative interpretations: either the marginal impact of reform (aid) increases with higher levels of aid reform, i.e. $c_{yz} = c_{zy} > 0$, or the marginal impact of reform (aid) is independent of the level of aid (reform), i.e., $c_{yz} = c_{zy} = 0$. The first scenario accounts for a Burnside and Dollar (2000) type benchmark, where higher levels of reform improve the effectiveness of foreign aid. The second scenario is related to other studies where no clear evidence of a positive relationship between aid and reform is found (see, for instance, Easterly et. al, 2004). On the other hand, the empirical evidence in Jones and Tarp (2016) shows that there is no systematic negative effect of foreign aid on institutions of the recipient countries. Hence, we shall not cover here the case where $c_{yz} = c_{zy} < 0$.

Our first concern is to derive the efficient levels of aid and reform. We use the term “efficient” for an allocation of aid and reform that maximizes the sum of the countries’ utilities. We define social welfare as $w(y, z) = u^R(y, z) + u^D(y, z)$. Note that social welfare does not only consist of poverty reduction. In our definition of social welfare are also included both the budgetary costs of the resources devoted to foreign aid and the recipient’s costs from structural reform programs. The assumptions made on functions $c(.)$ and $e(.)$ imply that function $w(y, z)$ is strictly concave and $w_{yy}w_{zz} > (w_{yz})^2$.

In order to derive the efficient aid policy, we solve the problem of maximizing social welfare $w(y, z)$ subject to $y \geq 0$ and $z \geq 0$. The first order conditions of this problem are

$$c_y = \frac{1}{\theta^D + \theta^R}$$

and

\(^{12}\) See Bulow, Geanakoplos, and Klemperer (1985).
\[
\frac{c_z}{e'(z)} = \frac{1}{\theta^d + \theta^r}
\]

(4)

We call \((y^*, z^*)\) the *efficient aid policy* pair, implicitly defined by equations (3) and (4) above. The pair \((y^*, z^*)\) is a socially desirable outcome, as it has been derived taking into account all the social benefits and costs that both aid and structural reform produce.

3. The Samaritan’s Dilemma in aid policy

In this section we describe a sequential setting in which the recipient first sets up a reform level and then the donor decides on aid disbursement. We consider the extreme case where the donor’s commitment power is null, in order to show the problem of time inconsistency in all its seriousness\(^{13}\). Authorities in the recipient country are aware that, in the event of nonperformance, the program will, at worst, be renegotiated. In the absence of a credible threat on the part of the donor, the recipient takes strategic advantage of its position as a Stackelberg leader. As a consequence, the equilibrium aid policy proves inefficient.

Formally, we consider a stylized version of the current practice of policy conditionality. The donor makes the disbursement of an amount \(y\) of foreign aid contingent upon the implementation by the recipient of policy reform at level \(z\). If the recipient fails to comply with the conditions, the tranche of aid is not released. This simplified description of a conditional aid scheme necessarily abstracts from the complexities of actual programs. However, it proves useful for our purpose to illustrate time inconsistency.

The time inconsistency problem arises because a donor, whose interest is to alleviate poverty in the recipient country, faces incentives to disburse positive amounts of aid even if reforms are below level \(z\). In the language of game theory, aid denial is a non-credible threat since it goes against the donor’s interests. Thus, the conditions to release the tranche of aid are not taken by recipients as a hard constraint. In this respect, Kanbur (2000) describes various situations where the conditions have not been met and aid has been disbursed nonetheless. The process follows the logic of a *Samaritan’s Dilemma*: The recipient is aware of the donor’s altruistic motivation and manipulates the donor’s best response to its own benefit. As a result, the conditional scheme suffers from time inconsistency.

\(^{13}\) The limited commitment power of the donor is a characteristic of the donor-recipient relationship typically assumed in the aid literature. See, for instance, Federico (2004), Hagen (2006), or Svensson (2000, 2003).
Next we analyze formally how the non-enforceability of a conditional aid scheme leads to inefficiently low reform level and aid disbursement. To see this, consider that an aid program consists of a set of conditions on structural reform \((\gamma)\), required to qualify for a given amount of aid funds \((\mathcal{Y})\). The recipient first undertakes a certain level of reform \(z\). Then, after observing \(z\), the donor makes a disbursement decision \(y\). With this sequence of events, regardless of the amount of aid initially committed \(\mathcal{Y}\), the donor’s best response is to disburse aid level \(y(z) = \arg\max_{y} u^{D}(y, z)\). The recipient anticipates the donor’s best response function \(y(z)\) and then sets up \(z\) so as to maximize \(u^{R}(y(z), z)\).

Let the policy pair \((y^{tc}, z^{tc})\) be the Subgame Perfect Equilibrium (SPE) of the sequential game induced by the conditional scheme described above. The equilibrium disbursement is \(y^{tc} = y(z^{tc})\). The pair \((y^{tc}, z^{tc})\) is the solution of the equations system:

\[
c_{y} = \frac{1}{\theta^{\delta'}}
\]

\[
c_{z} + \frac{c_{y} y'(z)}{e'(z)} = \frac{1}{\theta^{R'}}
\]

where \(y'(z)\) represents the donor’s responsiveness to reform. Implicit derivation in Eq. (5) allows us to write \(y'(z) = -\frac{c_{yz}}{c_{yy}} \geq 0\). Note that the responsiveness of aid to reform is affected by the degree of complementarity between aid and reform.

We establish in the next proposition that the SPE (time-consistent) policy package \((y^{tc}, z^{tc})\) is, in general, inefficient.

**Proposition 1:** In the absence of donor’s commitment power, the time-consistent conditional aid policy scheme \((y^{tc}, z^{tc})\) is such that: (i) \(z^{tc} < z^{*}\) if \(\frac{y'(z)}{e'(z)}\) is small enough; and (ii) \(y^{tc} < y^{*}\).

**Proof:** See Appendix A.

The above result tells us that the optimal aid policy \((y^{*}, z^{*})\) cannot be achieved through a conditional scheme in which the donor lacks credibility. The empirical evidence regarding the recipient’s compliance rates confirms our theoretical prediction (see, for instance, Mosley et al. 1995, or Killick et al. 1998).
The equilibrium (time-consistent) level of reform turns out to be inefficiently low as long as the quotient $\frac{y_r(x)}{e_r(x)}$ is not too high. That is, if the response of aid donations to reform (per unit of marginal cost of reform) is low enough, the equilibrium level of reform proves suboptimal. The factors underlying the low reform level can then be identified as: (i) domestic political constraints (in the form of high marginal cost of reform); and (ii) low degree of complementarity between aid and reform (i.e., low value of the derivative $c_{yx}$).

Probably, the central concern with regard to conditionality is the credibility issue. Credibility has two dimensions. The first one refers to the degree of commitment of the donors when it comes to imposing threats against their own will. The second refers to the particular way in which aid and reform are related in a conditional aid scheme.

If the donor is altruistic, or is somehow interested in reducing poverty, the effectiveness of conditional aid policy should benefit from improvements in the donor’s commitment power. One possible way to enhance the donor’s credibility is delegation of aid policy to a third party with the ability and the will to enforce the conditions (possibly because this third party has less aversion to poverty than the donor herself). While international aid agencies (like the World Bank or the IMF) are not free from credibility problems, there are reasons to believe that their enforcement power is stronger than that of bilateral donors. In this regard, we focus our attention on the role of supranational aid agencies (like the IFI’s) in the implementation of cross conditionality. As argued by Rodrik (1995), the interaction of recipient governments with multilateral agencies can remain less politicized than with bilateral donors.

On the other hand, the sequence of actions implicit in conditional aid policy is misaligned with the incentives of the donors: If the recipient backtracks on reform, even if the rule prescribes aid withdrawal, the donor is not interested in carrying out the threat. A flexible rule in which non-compliance of the conditions involves a proportional penalization would be more credible as long as this rule is closer to the donor’s true intentions than a traditional conditional scheme. Faced with a proportional rule, the recipient is more prone to

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15 Svensson (2000) shows that time inconsistency of conditional aid policy can be mitigated by delegating aid budget to an agency with less aversion to poverty.
believe that, in case of underperformance, and even if the donor is altruistic, the rule will be implemented.

Let us now move to a scenario where the rules of a mechanism in which donor and recipient participate are enforced by an external aid agency. Our goal is to find out the incentives that induce as an equilibrium outcome the efficient aid policy.

4. Designing an efficient conditional aid policy scheme

In this section we propose a conditional scheme that manages to implement the efficient policy characterized in Eqs. (3) and (4). Specifically, we analyze which incentives would induce recipients to undertake the socially optimal reform level.

A “social planner” devises the rule that links aid donations to reform level. The players subject to the mechanism’s rules are the donor and the recipient country. The conditional aid rule, together with the order in which the participants make decisions, defines a sequential game. From a theoretical point of view, we are looking for a mechanism whose equilibrium outcome is the efficient aid policy.

One practical aspect of our analysis concerns the real world implementation of a mechanism of this kind. As pointed out in Svensson (2003), the low opportunity costs of already committed funds (caused by allocation and disbursements of aid being done separately) is a source of inefficiency since it harms the credibility of a conditional scheme. To mitigate this problem, this author proposes a mechanism where recipients compete for aid.

Our proposal to enhance the credibility of the disbursement rule is based on delegation of the disbursement decision to a third party. In particular, we draw on the concept of cross-conditionality, whereby donors condition their aid on a country meeting the conditions established by the IMF or World Bank programs (Dijkstra, 2002; Koeberle et al, 2005). Consider, for instance, the Norwegian-Tanzanian aid relationship reported in Selbervik (1999). Norway (the donor) applies “cross-conditionality” towards Tanzania (the recipient), “which means that Norwegian bilateral aid has been conditional on Tanzania reaching agreements with the IMF and the World Bank”. There are many other examples of the use of cross conditionality16. The role of the WB or the IMF as a social planner is to enforce and

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16 See Griffith-Jones and Rodriguez (2016), for a description of the characteristics of cross conditionality in Argentina, Chile, Costa Rica, Jamaica, Mexico and Tanzania.
implement the rules of the conditional aid mechanism\textsuperscript{17}. If the scheme is credible to donors and recipients, the agents’ equilibrium play will lead to the efficient aid policy characterized in Eqs. (3) and (4).

We define a conditional aid rule as a function \( y^C: \mathbb{R}^+ \rightarrow \mathbb{R}^+ \) that associates each level of reform with exactly one value for aid donation. Recipients take into account that aid disbursements are determined by function \( y^C(z) \). The conditional aid rule is complete, as every level of structural reform is associated with a certain amount of aid, and it is also a flexible rule, since aid disbursements are adapted to the achieved degree of structural reform.

The players’ order of moves is:

Stage 1: The aid agency (the planner) sets up the policy scheme \( y^C(z) \).

Stage 2: The recipient country, aware of the policy scheme \( y^C(z) \), makes a decision on \( z \).

Stage 3: The donor country disburses aid according to the rule \( y = y^C(z) \).

Our approach implicitly entails ex-post conditionality, provided that the transfer in Stage 3 is made in exchange for completed reform actions or reform outcomes\textsuperscript{18}. We now look for a Subgame Perfect Equilibrium (SPE) of the game jointly defined by the utilities in Eqs. (1) and (2), the timing of events just described, and the conditional aid policy rule \( y^C(z) \). The third stage of the game is trivial, since the amount of aid finally disbursed follows simply from applying rule \( y^C(\cdot) \) to each level of reform undertaken. We solve the game by backwards induction. In Stage 2, the recipient sets \( z \) so as to maximize \( u^R(y, z) \) subject to \( y = y^C(z) \). We write this problem as

\[
\text{Max}_{(\theta^R)} \theta^R_c(y^C(z), z) - e(z).
\] (7)

The first order condition of this problem is given by

\textsuperscript{17} The assumption of a benevolent multilateral organization has been questioned in Thacker (1999), Barro and Lee (2005), Dreher and Jensen (2007), Stone (2008), Dreher et al. (2009), Kaja and Werker (2010), Kilby (2009), or Moser and Sturm (2011). Note that our social planner is not only interested in poverty reduction, since social welfare in our modeling also includes the budget costs of aid disbursements and the political cost of reform. Thus, it does not seem unreasonable to think of a multilateral organization as a planner seeking to maximize social welfare.

\textsuperscript{18} We do not distinguish between disbursements made conditional on reforms itself or conditional on the achievement of outcomes emerging from such reforms.
\[ \theta^R [c_y y^C (z) + c_z] = e'(z). \]  

(8)

The left hand side of condition (8) is the marginal benefit of increasing z. This marginal benefit includes both the direct effect of z on poverty reduction and the indirect effect of z on the amount of aid disbursed according to the conditional rule. The right hand side of condition (8) is the marginal cost of increasing z. Condition (8) implicitly defines a value for z (let us call it \( z^{max}(\theta^D, \theta^R) \)) that maximizes the recipient’s utility given the conditional rule \( y^C(z) \). In Stage 1, the donor takes into account condition (8) in order to devise the optimal scheme \( y^C(z) \), i.e., the scheme such that \( z^{max}(\theta^D, \theta^R) = z^* \) and \( y^C(z^*) = y^* \). The next proposition characterizes the rule \( y^C(z) \) that succeeds in implementing the optimal policy \( (y^*, z^*) \).

**Proposition 2:** The conditional aid rule \( y^C(z) \) that induces the pair \( (y^*, z^*) \) as an equilibrium outcome of conditional aid policy is such that:

\[
y^C(z) = \left( \frac{\theta^D}{\theta^R} \right)^{\frac{c_y(y^C(z),z)}{c_y(y^C(z),z)}} \]  

(9)

and

\[
y^C(z^*) = y^* \]  

(10)

**Proof:** See Appendix A.

What is the rationale behind conditions (9) and (10)? First, note that the planner is aware of the characteristics of the optimal policy, implicit in Eqs. (3) and (4), and can also infer the recipient’s optimal response in Eq. (8). The planner must then find a rule \( y^C(z) \) such that Eq. (8) becomes equivalent to Eq. (4). A rule that meets Condition (9) achieves this goal. However, the solution to the differential equation in Condition (9) is a family of functions \( y^C(z) \). In order to reduce this family to a single function, the planner imposes Condition (10), e.g., the requisite that the value taken by the conditional rule in the optimal reform level must be the optimal aid level. Conditions (9) and (10) together imply that the optimal choice of the recipient government is \( z^* \) and that the amount of aid disbursed is \( y^* \).

The rule \( y^C(z) \), implicit in Equations (9) and (10), provides the right incentives for recipients to carry out reform. What are the main features of this rule? First, observe that Condition (9) implies positive responsiveness of function \( y^C(z) \) to changes in \( z \), provided that
$c_z > 0$ and $c_y > 0$. Function $y^C(z)$ is substantially different from function $y(z)$, whose slope is only determined by the shape of the poverty reduction function $(y'(z) = -\frac{c_{yzz}}{c_{yy}} \geq 0)$.

Moreover, the degree of responsiveness of the rule (its slope) depends on the quotient $\theta^B/\theta^R$. Therefore, an optimal conditional aid rule must be necessarily tailored to the preferences of both donor and recipient. From a theoretical viewpoint, the one-size-fits-all approach to conditionality proves not valid for achieving optimality.

The proposed mechanism provides certain flexibility that allows the recipient to adapt to specific situations and thus make conditionality more credible. In particular, the mechanism includes a continuous response to reform. This means that, if the conditions required to qualify for aid are not fully met, some amount of aid will still be disbursed. This principle is in line with Branson and Hanna (2000), who claim that “conditionality could support floating tranches, as in Higher Impact Adjustment Lending (HIAL), with the government choosing the sequence and timing of sector reforms as external support is calibrated to the quality of the program”. Imagine, in contrast, a mechanism in which the agency established aid donation by amount $y = y^*$ if and only if structural reform were set at level $z = z^*$. This would mean that if $z \neq z^*$, then $y = 0$. It is highly unlikely that an aid agency goes ahead with the imposition of harsh conditionality by carrying out such an extreme, Doomsday Machine, penalty scheme. A disproportionate threat to non-compliance, although theoretically possible, is not realistic, especially considering the historical behavior of the IFIs at this respect. The conditional scheme proposed here provides the right incentives and at the same time allows the recipient to adjust to a gradual pace of reform. However, the strongest argument in favor of our scheme is that, under certain circumstances, the outcome induced by the mechanism at equilibrium entails a higher degree of ownership than the outcome from a traditional conditional aid scheme. We investigate this issue in the next section.

5. Ownership and its relationship with conditionality

In this section we establish a relationship between the recipient’s ownership of aid policy and the optimal conditional scheme of the previous section. In order to define “ownership”, we first talk about the use of the term in the development economics literature. Then, we derive an analytically tractable expression in order to capture the main features of the concept.
As stated in Koeberle et al (2005), ownership is an elusive concept. Drazen (2002) defines it as “the extent to which a country is interested in pursuing reforms independently of any incentives provided by multilateral lenders”. According to Koeberle et al (2005) ownership is the “commitment to aid-supported reforms by country authorities and a majority of domestic stakeholders”, and Khan and Sharma (2001) refer to ownership as “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”. We think about the degree of ownership of reform package \((\mathcal{Y}, z)\) as the extent to which the recipient considers that the policy pair \((\mathcal{Y}, z)\) is coincident with its own objectives. Therefore, if the package establishes aid level \(\mathcal{Y}\) contingent upon reform at level \(z\), the degree of ownership of this policy depends on the government’s preferences with respect to the pair \((\mathcal{Y}, z)\).

At this point, we clarify the difference between country ownership and government ownership. Country ownership refers to the preferences of society (or a representative citizen) with respect to a particular aid policy scheme. In this case, poverty reduction would be the main social concern, although society might also be concerned with possible distortions from structural reform. In contrast, government ownership of a particular policy depends also on the domestic political consequences for the government of implementing this policy\(^{19}\). For instance, the recipient government may be reluctant to implement a certain reform package that includes regulations detrimental to organized lobbies from which it receives political support. As long as the relevant decision unit that negotiates the conditions on structural issues is the government, hereinafter we talk about ownership in the restricted sense of government ownership\(^{20}\).

We do not address here the issue of whether aid can help or not to build country ownership. This question would require a model in which financial assistance from donors has the power to change the recipient government’s preferences regarding development

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\(^{19}\) Unlike Drazen (2002), we do not consider that the country authorities “own” the reforms program, and that there is an internal conflict with interest groups concerned with rent seeking. In our view, the authorities within the country face domestic political costs of changing the privileged situation of interest groups (the “status quo”). Part of these costs is caused by a relationship of clientelism between the government and the interest groups. From a practical point of view, it is as if the government opposed reform.

\(^{20}\) The degree of government ownership is measured by the World Bank Operations Evaluation Department (OED) through a rating that includes several objective and subjective indicators (see Khan and Sharma, 2001).
goals. Instead, we consider the recipient’s preferences as given, and evaluate the degree of ownership of different structural policy packages.

Next we seek to measure the degree of government ownership of the equilibrium outcome from the mechanism studied in the previous section. For this purpose, the first step is to provide an accurate measure of the degree of ownership of any given policy pair \((y, z)\). We employ a useful fiction. Let us define function:

\[
u_\gamma^R (y, z) = \Theta^R c(y, z) - \gamma e(z),
\]

with \(0 \leq \gamma \leq 1\). This instrumental function generalizes the recipient government’s utility function in Eq. (2). Parameter \(\gamma\) can be interpreted as the relative weight assigned to domestic political issues with respect to poverty reduction. If parameter \(\gamma\) is close to zero, function \(u_\gamma^R\) may well describe society’s preferences in the recipient country.

Suppose now that the incumbent government has preferences represented by \(u_\gamma^R (y, z)\). We pose the question: Which level of reform would be preferred by this “\(\gamma\)-government” if aid were set up at level \(\hat{y}\)? We define \(z^{ow}(\hat{y}, \gamma)\) as the value of \(z\) that would be fully owned by a virtual government with preferences parameterized by \(\gamma\) if the amount of aid belonging to the conditional policy package were \(\hat{y}\). This fully owned reform level is given by \(z^{ow}(\hat{y}, \gamma) = \arg\max_z u_\gamma^R (\hat{y}, z)\). By implicit derivation of the first order condition that defines \(z^{ow}\) we find that \(\frac{d z^{ow}(\hat{y}, \gamma)}{d \hat{y}} \geq 0\) and \(\frac{d z^{ow}(\hat{y}, \gamma)}{d \gamma} < 0\). That is, the amount of reform a recipient \(\gamma\)-government wishes to undertake depends positively on the aid received (because of the strategic complementarity between aid and reform) and negatively on the weight \(\gamma\) placed on reform cost.

Observe that the government’s utility in Eq. (2) is equal to \(u_\gamma^R (y, z)\) only when \(\gamma = 1\). Then, there is full ownership of policy pair \((\hat{y}, \hat{z})\) if \(\hat{z} = z^{ow}(\hat{y}, 1)\). In general, though, recipient governments prefer to undertake structural reform below the level specified in the conditional aid program, that is, \(z^{ow}(\hat{y}, 1) < \hat{z}\). The question is: How can we measure the distance between the government’s reform goals \(z^{ow}\) and reform level \(\hat{z}\)?

For this purpose we focus our attention on the value of parameter \(\gamma\) for which \(\hat{z} = z^{ow}(\gamma, \gamma)\) holds. Since \(z^{ow}(\gamma, 1) < \hat{z}\), and provided that \(\frac{d z^{ow}(\gamma, \gamma)}{d \gamma} < 0\), such a value for \(\gamma\) exists and is less than 1. We call it \(\gamma\). Solving \(\hat{z} = z^{ow}(\gamma, \gamma)\) for \(\gamma\) yields \(\gamma = \gamma(\gamma, \hat{z})\). By definition, then, the policy pair \((\gamma, \hat{z})\) is fully owned by a “\(\gamma\)-government”. What is, then, the
degree of ownership of this policy on the part of the government (a "1-government")? Observe that, as $γ(\hat{y}, \hat{z})$ goes to one, the preferences of a "$γ$-government" with respect to reform approach the government’s preferences. Therefore, function $γ(\hat{y}, \hat{z})$ can be used as a sensible approximation to the degree of ownership of policy $(\hat{y}, \hat{z})$. This function provides a measure of the distance between the government’s preferences and the preferences of a virtual government with full ownership of policy $(\hat{y}, \hat{z})$. Let us call $γ(\hat{y}, \hat{z})$ a virtual ownership function. Then, according to our definition, we can express the virtual ownership function as:

$$γ(\hat{y}, \hat{z}) = \theta^R \frac{c_{xy}(\hat{y}, \hat{z})}{e(\hat{z})},$$

(12)

The concept of virtual ownership nicely encapsulates the recipient’s preferences with regard to reform and aid. To see this, observe that, from Eq. (12), we can compute the derivatives

$$\frac{dy(\hat{y}, \hat{z})}{d\hat{z}} = \theta^R \frac{c_{xy}(\hat{y}, \hat{z}) - e(\hat{z})c_{xz}}{(e(\hat{z}))^2} < 0$$

and

$$\frac{dy(\hat{y}, \hat{z})}{d\hat{y}} = \theta^R \frac{c_{xy}}{e(\hat{z})} \geq 0.$$  

That is, the virtual ownership of package $(\hat{y}, \hat{z})$ is decreasing in $\hat{z}$ and increasing in $\hat{y}$. Moreover, the virtual ownership function also depends positively on the recipient’s concern with poverty reduction, represented by parameter $\theta^R$.

Next we show that, in certain circumstances, the efficient mechanism leading to $(y^*, z^*)$ dominates in terms of government ownership the conditional policy that yields the policy pair $(y^{tc}, z^{tc})$. This result is not particularly intuitive. In principle, recipient governments enjoy a higher degree of discretion (and thus more flexibility) in the choice of reform levels when conditionality is not fully enforceable. This would lead us to believe that a scenario in which the punishment in case of non-compliance of the conditions is not credible favors the emergence of policy outcomes that entail higher degree of government ownership. However, we claim that there exist reasonably general circumstances under which this is not the case.

In order to introduce the main result of this section, let us first define the marginal rate of substitution between aid and reform at pair $(y, z)$ as the quotient $MRS_{z,y} = \frac{c_y}{c_z}$. The next proposition identifies a condition that is both necessary and sufficient for the inequality $γ(y^*, z^*) > γ(y^{tc}, z^{tc})$ to hold.

**Proposition 3:** The virtual ownership of the aid policy pair $(y^*, z^*)$, achieved through an optimal conditional scheme is higher than the virtual ownership associated to the policy pair $(y^{tc}, z^{tc})$ if and only if...
\[
\frac{\theta^b}{\theta^R} < MRS_{z^{tc},y^{tc}}y'(z^{tc}).
\]

**Proof:** See Appendix A.

We can rewrite Condition (13), by using the definition of \(MRS_{z^{tc},y^{tc}}\), as \(\theta^b c_y(y^{tc}, z^{tc}) < \theta^R c_y(y^{tc}, z^{tc})y'(z^{tc})\). At the pair \((y^{tc}, z^{tc})\), if the (induced) marginal impact of reform on poverty reduction for the recipient is stronger than the (direct) marginal impact of reform on poverty reduction for the donor, then the optimal aid policy has a higher degree of government ownership than the time-consistent conditional policy.

The characterizing condition (13) tells us that the recipient would prefer to follow rule \(y^c(z)\) rather than being the leader in an aid game where the donor is moving last the higher the following: (i) the recipient's relative concern with poverty reduction, \(\frac{\theta^R}{\theta^D}\), and/or (ii) the marginal impact of aid on poverty reduction, \(c_y\) (relative to \(c_z\)), and/or (iii) the degree of responsiveness of aid to reform, \(y'\). Note that Condition (ii) is more likely to hold the lower the aid level of the time-consistent solution, \(y^{fc}\). Also, provided that \(y'(z) = -\frac{c_{yz}}{c_{yy}}\), the degree of responsiveness in Condition (iii) depends positively on the degree of complementarity between aid and reform (at the pair \((y^{tc}, z^{tc})\)). To sum up, optimal conditionality has a higher chance of success in a context where the government has a strong commitment to development outcomes, and where both the marginal impact of aid on poverty reduction and the degree of complementarity between aid and reform are relatively high.

In Appendix B we include an illustrative example of the design of an optimal conditional scheme and analyze its degree of ownership. In the example, we consider a poverty reduction function with a Cobb-Douglas functional form \(c(y, z) = y^{1-\alpha}z^\alpha\) with \(\alpha \in (0,1)\). We find that the optimal rule for aid donations is given by power function \(y^c(z) = \phi z^\delta\) (with the value of \(\delta\) being \(\delta = \left(\frac{\alpha}{1-\alpha}\right)\frac{\theta^D}{\theta^R}\)). On the other hand, the virtual ownership of policies \((y^*, z^*)\) and \((y^{fc}, z^{tc})\) is given by: \(\gamma(y^*, z^*) = \frac{\theta^R}{\theta^R + \theta^D}\) and \(\gamma(y^{fc}, z^{tc}) = \alpha\).

In this example we can visualize neatly the relationship between the shape of the aid rule \(y^c(z)\) and the degree of ownership it induces in the recipient. In particular, it turns out that \(\gamma(y^*, z^*) > \gamma(y^{fc}, z^{tc})\) if and only if \(\delta = \left(\frac{\alpha}{1-\alpha}\right)\frac{\theta^D}{\theta^R} < 1\). Then, in this case, success of the efficient
policy in terms of ownership is associated with a rule that exhibits higher responsiveness of aid donations to reform at lower levels of reform (i.e., function $y^C(z)$ must be concave).

The proposed optimal mechanism implicitly invokes some general principles that have been put forward to enhance country ownership of policies with the purpose of streamlining conditionality. By Condition (13) we know that it is more likely that recipients accept conditionality the higher is $\theta^R$. Our approach then provides support for the idea of selectivity in favor of countries with good policy environments and commitment to a viable development strategy (Koeberle et al. 2005; OECD, 2005; Khan and Sharma, 2001; Svensson, 2003, among others). This result is also in line with Montinola (2010), who argues that the efficacy of conditional aid depends on recipient countries’ level of democracy (which can be seen as a proxy for $\theta^R$). Similarly, the empirical study by Dollar and Svensson (2000) shows that the probability of success of conditionality is higher in democracies.

Second, the design of an optimal program must be worked out cooperatively between the recipient country, the donor and the aid agency. Formally, the shape of the optimal aid rule $y^C(z)$ depends on the preferences of both donor and recipient. Therefore, some partnership between countries is required in the design of conditionality. In this sense, our analysis shares the view of the Monterrey Consensus (2002) and the Doha Declaration (2008) that the World Bank and the IMF should “continue to enhance participation of all developing countries and countries with economies in transition (DTC) in their decision making21 [...]”

Third, in our mechanism, countries are offered some sort of policy options menu, since the optimal rule associates each level of reform with a certain amount of aid. This idea is present in the World Bank’s assessment of conditionality (Koeberle et al., 2005): “The tension between conditionality and ownership can be addressed in part by expecting borrowing countries to follow some minimum standards on fundamental policies to gain access to financing from donors, leaving space for any additional country-grown policies beyond those minimum standards”. As stated in Khan and Sharma (2001): “Ownership is achieved through the country being able to make specific choices, rather than accepting a single option prepared by the IMF”. The IMF’s Flexible Credit Lines, which allow countries with sound economic policies to borrow from the Fund with no ex post conditions, are an example of the kind of gradualism our mechanism advocates.

8. Conclusions

This paper aims to contribute to the debate on the reform of conditionality. We use a highly stylized model to account for the basic incentive issues regarding the donor-recipient relationship. Within this framework, we discuss the Samaritan’s Dilemma incentives inherent in any non-enforceable conditional aid scheme. After that, we propose a conditional aid rule that successfully implements the socially optimal allocation of aid and reform. The specific shape of this rule is shown to depend on the preferences of both donor and recipient. Next, we ask whether the outcome from this rule is aligned with the policy goals of the recipient government. For this purpose, we measure the degree of ownership of the optimal aid policy and compare it to the degree of ownership of a traditional, non-enforceable, conditional aid scheme. We find that, under certain circumstances, the former proves higher than the latter.

Our contribution provides theoretical support to some of the general principles that underlie the reform of conditionality, like selectivity of countries with favorable policy environment, partnership in the design of aid policy, or gradual implementation of conditionality. This article proposes a specific form of conditionality that is compatible with government ownership of reform programs. We bring the two visions on aid policy together and prove through mathematical arguments that an appropriate design of conditionality can alleviate the alleged tension between them.

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**Appendix A**

**Proof of Proposition 1:**

We compare Eqs. (3) and (4) (those characterizing the optimal policy) with equations (5) and (6) (the ones characterizing the time consistent solution of a conditional scheme). Provided that $\theta^D > 0$ and $\theta^R > 0$, we have that $\frac{1}{\theta^D + \theta^R} < \frac{1}{\theta^D}$ and $\frac{1}{\theta^D + \theta^R} < \frac{1}{\theta^R}$. On the other hand, the term $\frac{c_y y'(z)}{e'(z)}$ appearing in Eq. (6) is non negative since $y'(z) \geq 0$. Consider the expressions $c_y(y, z) = A$ and $\frac{c_y(y, z)}{e'(z)} + C = B$, where $A$, $B$ and $C$ represent arbitrary non negative variables. We totally differentiate these expressions to obtain: (a) $c_{yy} dy + c_{yz} dz = dA$, and (b)
\[
c_{zy} \frac{1}{e'(z)} \, dy + \frac{c_{xy}}{e'(z)} \, dz + dC = dB.
\]
In order to show that \( y^{tc} < y^* \) and \( z^{tc} < z^* \), we just need to prove that \( dA > 0 \), \( dB > 0 \) and \( dC \geq 0 \) imply \( dy < 0 \) and \( dz < 0 \). We proceed by contradiction. Suppose that \( dA > 0 \), \( dB > 0 \) and \( dC \geq 0 \), and either (i) \( dy > 0 \) and \( dz < 0 \), or (ii) \( dy < 0 \) and \( dz > 0 \), or (iii) \( dy > 0 \) and \( dz > 0 \). Given our assumptions that \( c_{yy} \leq 0, c_{zz} \leq 0, c_{zy} = c_{yz} \geq 0 \) and \( c_{yy}c_{zz} \geq (c_{zy})^2 \), in case (i), there is a contradiction with expression (a).

In case (ii) there is a contradiction with expression (b) as long as \( dC \) is small enough. Provided that \( dC = \frac{c_{yy}'(z)}{e'(z)} \), we need to assume that either the responsiveness of aid to reform is low enough, or the marginal cost of reform is high enough. Let us focus our attention on case (iii).

Since \( dA > 0 \) and \( dB > 0 \) by hypothesis, we rewrite (a) and (b) as:

(a') \[ 0 < -c_{yy} dy < c_{yz} dz, \] and (b') \[ 0 < -\frac{c_{xy} e'(z) - e''(z) c_y}{e'(z)^2} \, dz < c_{zy} \frac{1}{e'(z)} \, dy. \]

Both inequalities imply that \( c_{yy}c_{zz} \leq (c_{zy})^2 + c_{yy} \frac{e''(z)}{e'(z)} c_y \), which is a contradiction with \( c_{yy}c_{zz} \geq (c_{zy})^2 \) provided that \( c_{yy} c_z \frac{e''(z)}{e'(z)} < 0. \)

**Proof of Proposition 2:**

We solve the game by backwards induction. In Stage 3, the aid agency plugs the value observed for \( z \) into function \( y^C(z) \). In Stage 2, the recipient government selects

\[
z^\text{max}(\theta^D, \theta^R) = \arg \max_{z} \theta^R c(y^C(z), z) - e(z).
\]

If \( y^C(z) \) is such that \( y^C(z) = \frac{\theta^D c^\ast(y^C(z), z)}{\theta^R c_{zy}(y^C(z), z)}, \) then, condition (9) becomes

\[
(\theta^D + \theta^R) c_z(y^C(z), z) = e'(z).
\]

Then, \( z^\text{max}(\theta^D, \theta^R) = z^\ast \), provided that \( y^C(z^\ast) = y^* \).

**Proof of Proposition 3:**

The virtual ownership attached to pair \((y^*, z^*)\) can be computed using Eq. (12) jointly with Eqs. (3) and (4). Its value is given by \( \gamma(y^*, z^*) = \frac{\theta^R}{\theta^R + \theta^D}. \) Again, using (12) we compute \( \gamma(y^{tc}, z^{tc}) \) as \( \gamma(y^{tc}, z^{tc}) = \theta^R c_z(y^{tc}, z^{tc}) \). Then, we have that \( \gamma(y^*, z^*) > \gamma(y^{tc}, z^{tc}) \Leftrightarrow \frac{(\theta^R + \theta^D) c_z(y^{tc}, z^{tc})}{e'(z^{tc})} < 1. \) On the other hand, by Eq. (6) we know that
\[ \frac{\theta R e_c(y^{tc},x^{tc}) + \theta R c_y(y^{tc},x^{tc})y'(z^{tc})}{e'(z^{tc})} = 1. \] Combining this equation with the inequality above we obtain that \( \gamma(y^*, z^*) > \gamma(y^{tc}, z^{tc}) \iff \frac{\theta D}{\theta R} < \frac{c_y(y^{tc}, x^{tc})}{c_x(y^{tc}, x^{tc})}y'(z^{tc}). \)

**Appendix B**

**Example:**

Let the poverty reduction function be \( c(y, z) = y^{1-\alpha}z^\alpha \) with \( \alpha \in (0,1) \) and the reform cost function \( e(z) = \frac{1}{2}z^2 \). By Eqs. (3) and (4), the efficient aid policy pair \((y^*, z^*)\) is given by

\[
    y^* = \frac{\alpha}{1 - \alpha} [(1 - \alpha)(\theta^D + \theta^R)]^{2/\alpha},
\]

\[
    z^* = \frac{\alpha}{1 - \alpha} [(1 - \alpha)(\theta^D + \theta^R)]^{1/\alpha}.
\]

We use Eqs. (5) and (6) to compute the time consistent equilibrium pair \((y^{tc}, z^{tc})\) as

\[
    y^{tc} = \theta R [(1 - \alpha)\theta^D]^{2-\alpha/\alpha}
\]

\[
    z^{tc} = \theta R [(1 - \alpha)\theta^D]^{1-\alpha/\alpha}.
\]

Solving the differential equations system of Eqs. (9) and (10) yields the following aid scheme:

\[
    y^C(z) = \varphi(\alpha, \theta^D, \theta^R)z^{\delta(\alpha, \theta^D, \theta^R)},
\]

with

\[
    \delta(\alpha, \ theta^D, \theta^R) = \left( \frac{\alpha}{1 - \alpha} \right) \frac{\theta^D}{\theta^R},
\]

and

\[
    \varphi(\alpha, \theta^D, \theta^R) = \left( \frac{\alpha}{1 - \alpha} \right)^{1 - \delta(\alpha, \theta^D, \theta^R)} [(1 - \alpha)(\theta^D + \theta^R)]^{2 - 2\delta(\alpha, \theta^D, \theta^R)} > 0.
\]

Faced with rule \( y^C(z) \) specified above, the recipient (see Eq. (8)) optimally selects \( z^{\max}(\theta^D, \theta^R) = z^* \). The level of aid disbursed according to the rule is \( y^C(z^*) = y^* \). Therefore, the conditional aid rule \( y^C(z) \) successfully implements the optimal policy.
By Eq. (12), the virtual ownership function in our example is given by

$$\gamma(y, z) = \theta^{R} \alpha \frac{\theta^{1-\alpha}}{\theta^{2}-\alpha}. $$

Evaluated at pairs \((y^*(z^*), \gamma(y^*, z^*) = \alpha). Therefore, \gamma(y^*, z^*) \gamma(y^{tc}, z^{tc}) \text{ if and only if } \delta(\alpha, \theta^{D}, \theta^{R}) < 1. The optimal policy has a higher degree of government ownership than the time consistent pair \((y^{tc}, z^{tc}) \text{ if and only if function } \gamma(y^{C}(z) \text{ is strictly concave, i.e., when aid disbursements are relatively more generous at the initial stages of reform.}

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