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Foreign Aid as Prize:
Incentives for a Pro-Poor Policy

By

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Abstract

We develop a theoretical model of foreign aid to analyze a method of disbursement of aid which induces the recipient government to follow a more pro-poor policy than it otherwise would do. In our two-period model, aid is given in the second period and the volume of it depends on the level of wellbeing of the target group in the first period. We find that this way of designing aid does increase the welfare of the poor. We also consider the situations where the donor and the recipient governments act simultaneously as well as sequentially, and find that by moving first in a sequential game, the donor country can, under certain conditions, increase the welfare of the poor and its own compared to the case of simultaneous moves.

1   Introduction

The basic purpose of foreign aid is to assist countries in promoting economic development including improving the wellbeing of the poor. Although foreign aid in the form of Marshall Aid after World War II was hugely successful in promoting economic development in the war-torn Europe, its effect in the developing world in the last forty years or so has been questionable (see, for example, Mosley et al. (1987), Boon (1996)). In the literature there are many explanations for the latter, i.e., the ineffectiveness of aid. For example, it has been said that aid promotes rent seeking behavior in the recipient countries (Svensson, 2000; Alesina and Weder, 2002; Easterly, 2003). Burnside and Dollar (2000) and Collier and Dollar (2002) suggested that aid is effective only in countries with good policies implying that the ineffectiveness of aid is primarily due to bad policies followed by the recipient governments.[1] In Dalgaard et al. (2004) geography seems to matter in the effectiveness of aid. Mavrotas (2005) considers aid heterogeneity and finds variations in aid effectiveness according to the type of aid.[2]

Conditional aid can in principle discipline the recipient government, and conditionality can include policy changes. Adam and O'Connell (1999) and Lahiri and Raimondos-Møller (1997a) examine the effects of aid that is tied to the reduction of distortionary taxes. Lahiri and Raimondos-Møller (1997) and Svensson (2003) suggest that conditional or unconditional aid can be made more effective if recipient countries compete for aid.

One of the problems however is that donors seem to have very little control on how the recipients use aid. There are many empirical studies which suggest that for all intents and purpose foreign aid is fungible: see , for example, Pack and Pack (1993), Khilji and Zampelli, (1994), Boone (1996), Feyzioglu et al. (1998), and Swaroop (2000). Thus, conditionalities are unlikely to work. In fact, many donor countries and institutions have tried giving aid

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[1]Hansen and Tarp (2001) and Easterly (2003) show that the Burnside-Collier-Dollar results are very sensitive to model specifications and sample selection. Hansen and Tarp (2001) also find that aid is effective without any qualification.

[2]See also various articles in Lahiri (2007) for all the issues involved in aid effectiveness.

on a selective basis or with conditions such as good policies and aid-effectiveness remains as illusive as ever.

The above discussions suggest the need for innovations in the way aid is disbursed. In this paper we propose one particular way of doing so, and this puts no conditionality on the recipient.[3] We develop a two-period model with two groups of people in the recipient country. Aid is meant for one of the groups (the target group), but due to corruption a proportion of aid may find its way to the non-target group. In our proposed design, aid is given in period 2 but the amount of aid is dependent the level of wellbeing of the target group in period 1. The recipient government can affect the wellbeing of the target group in period 1 by the use of fiscal policy. In this sense, aid can be viewed as a prize to the recipient government for reducing poverty through fiscal policy.[4]

We consider two scenarios. In the first, the donor and the recipient act simultaneously. In the second scenario, the donor country can credibly commit on its aid policy in the sense that it moves first in a sequential decision making.

The paper is organized in the following manner. The model is described in section 2. In section 3 the case of passive donor, the amount if aid is fixed, is analyzed. Section 4 discusses a situation where the donor is active. This section is divided into two subsections. In subsection 4.1 decision-making by the donor and that by the recipient are simultaneous. Sequential decision making where the donor acts as a leader is described in subsection 4.2. Concluding remarks are presented in section 5.

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[3]Collier and Dollar (2002) propose an aid allocation rule that is likely to have significant impact on poverty reduction under limited information on the part of the donors.

[4]As Collier and Dollar (2004) note poverty reduction is the central goal of most aid programs.

2　Aid as Prize: a Formal Model

In our model we consider two countries; the donor and the recipient. In the recipient country there are two groups of people, rich and poor, labeled as r and p, respectively.[5] The size of population for the rich is same in both the periods, $\overline{L}^r$ and for poor it is, $\overline{L}_1^p$ in period 1 and $\overline{L}_2^p$ in period 2.

The citizens of the donor country are altruistic and hence derive some utility by helping the poor in the recipient country. At the beginning of period 1 the donor country makes a promise to give aid in period 2, and the amount of aid is θu_1^p where (u_1^p) is the utility level of the poor in period 1, and θ is a policy parameter for the donor.

In period 1, the recipient government levies a lump-sum tax on the rich and transfers it to the poor.[6] In period 2, a proportion of foreign aid is transfered to the poor, the remaining goes to the rich.

The production side of the recipient economy in the two periods are represented by the revenue functions $R^1(\overline{L}^1, \overline{K})$ and $R^2(\overline{L}^2, \overline{K} + I)$, where K is the capital stock in period 1 and I is the level of investment in period 1 which add to the capital stock in period 2.[7]

On the consumption side, the inter-temporal expenditure of a rich person is given by the expenditure function $E^r(P_1, \overline{\rho} P_2, u^r)$ where u^r is its inter-temporal utility level and $\overline{\rho} = 1/(1 + i)$ where i is the exogenous interest rate at which a rich person can borrow as much as it wants in period 1, and P_i $(i = 1, 2)$ is the vector of prices in period i. We take the recipient country to be a small open economy so that P_1 and P_2 are exogenously given. The poor are assumed not be able to borrow at all. Each poor persons expenditure function in

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[5]This classification is for convenience only. There can be other classifications based on ethnicity or caste, for example.

[6]For simplicity we use this simple policy instrument. One can consider a more complicated way of transferring income from the rich to the poor; for example through the provision of public good such as health and education services.

[7]Since prices do not vary in our analysis, for brevity, these are left out of the arguments of the revenue function. See Dixit and Norman (1980) for properties of revenue function. It is well known that the partial derivative of the revenue function with respect to the ith endowment gives the supply function for the ith good.

the two periods are given by $E^{p1}(P_1, u_1^p)$ and $E^{p2}(P_2, u_2^p)$ respectively where u_2^p is the utility level of a poor person in period 2.[8]

Assuming, for simplicity, that the rental on capital accrues completely to the rich and wage income goes exclusively to the poor, the income-expenditure balance equations in the recipient country can be written as:

$$\overline{L}^r E^r(P_1, \overline{\rho}P_2, u^r) + I = \overline{K}R_k^1 + \overline{\rho}(\overline{K} + I)R_k^2 + \overline{\rho}(1 - \alpha)\theta u_1^p - T, \tag{1}$$

$$\overline{L}^{p1} E^{p1}(P_1, u_1^p) = \overline{L}_1^p R_L^1 + T, \tag{2}$$

$$\overline{L}^{p2} E^{p2}(P_2, u_2^p) = \overline{L}_2^p R_L^2 + \alpha\theta u_1^p. \tag{3}$$

$$\overline{\rho}R_K^2 = 1. \tag{4}$$

The left hand side of (1) is the total discounted expenditure (consumption and investment) by the rich. The first and the second terms on the right hand side of (1) are respectively rental income from capital in period 1 and the discounted rental income in period 2. The third term is the discounted value of the part of foreign aid in period 2 that is given to the rich, and finally last term is the lump-sum tax that is taken away from the rich in period 1. Equations (2) and (3) are the income-expenditure balance equations for the poor in periods 1 and 2 respectively. The first term is the factor (wage) income and the second term is the transfer income. T is the lump-sum transfer from the rich to the poor in period 1, and $\alpha\theta u_1^p$ is the proportion of aid in period 2 that is given to the poor. Equation (4) represents the optimality of investment I. It is obtained by setting $\partial u^r/\partial I = 0$.

Having described the overall scenario above, we now discuss the behavior of the recipient and the donor governments. In the following section, we shall assume that the donor is passive in the sense that the parameter θ is exogenous. In section 4, we endogenize this parameter by considering an active donor.

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[8]For properties of the expenditure function see Dixit and Norman (1980). It is well known that E_u^{pi} is the reciprocal of the marginal utility of income for the poor in period i.

4

3 Passive Donor

In this section we shall take θ to be exogenous and consider the recipient governments decision making on the two instruments at its disposal, viz., the lump-sum tax T and the allocation parameter α

The objective function of the recipient is:

$$\max_{\alpha, T} G = \lambda \overline{L}^r u^r + \overline{L}_1^p u_1^p + \delta^p \overline{L}_2^p u_2^p, \tag{5}$$

where $\lambda > 1$, is the extra weight placed on the welfare of the rich by the recipient government. That is, the government cares for welfare of the rich more than that they do for the poor. This is often called a political support function (see, for example, Van Long and Vousden (1991)). This formulation can have many interpretations including a situation where the rich lobbies the government with the help of campaign contributions *a la* Grossman and Helpman (1994). δ^p is the rate of time preference for the poor. This formulation of the government's objective function is somewhat similar to Lahiri and Raimondos-Møller (2004) who analyzed the issue of fungibility of aid in a single-period model and how the donor government can affect it.

In the above framework, when the recipient decides on the lump-sum tax, it is aware of the penalties that the donor country can impose by lowering the amount of aid which would adversely affect both the rich and the poor.

Before deriving the optimality conditions, it is useful to differentiate equations (1)-(3) and using (4) write:

$$L^r E_u^r du^r = -\overline{\rho} \theta u_1^p d\alpha + \overline{\rho} (1 - \alpha) \theta du_1^p + \overline{\rho} (1 - \alpha) u_1^p d\theta - dT, \tag{6}$$

$$L_1^p E_u^{p1} du_1^p = dT, \tag{7}$$

$$L_2^p E_u^{p2} du_2^p = \theta u_1^p d\alpha + \alpha \theta du_1^p + \alpha u_1^p d\theta. \tag{8}$$

Using equations (6)-(8), the first order condition for the optimizing problem of the recipient government in (5) can be derived as:

$$G_\alpha = -\frac{\lambda\bar{\rho}\theta u_1^p}{E_u^r} + \frac{\delta^p \theta u_1^p}{E_u^{p2}} = 0,$$ (9)

$$G_T = \lambda\left[-\frac{1}{E_u^r} + \frac{\bar{\rho}\theta(1-\alpha)}{\bar{L}_1^p E_u^{p1} E_u^r}\right] + \frac{1}{E_u^{p1}} + \frac{\delta^p \alpha\theta}{\bar{L}_1^p E_u^{p1} E_u^{p2}} = 0.$$ (10)

An increase in α for a given level of T, increases the utility of the poor in period 2. This is the marginal benefit of increasing α. However, an increase in α reduces the income of the rich in period 2 This is the marginal cost of increasing α. Equation (9) equates the marginal benefits and marginal costs. Similarly, an increase in T reduces (increases) the income of the rich (poor) in period 1 and increases the income of both the rich and and the poor in period 2 by increasing the volume of aid. In equation (10) optimal T is determined at a point where the marginal cost is equal to the marginal benefit of increasing T. Note that whereas equation (9) gives a relationship between the marginal utilities of income of the rich and that of the poor in period 2, equation (10) provides a relationship between the marginal utilities of income of the rich and that of the poor in period 1.[9]

Having derived the optimality conditions, we shall now examine the effects of changes in θ on optimal levels α and T. For this, we totally differentiate (9) and (10) to obtain:

$$\frac{d\alpha}{d\theta} = \frac{-G_{\alpha\theta}G_{TT} + G_{T\theta}G_{\alpha T}}{\Delta},$$ (11)

$$\frac{dT}{d\theta} = \frac{G_{\alpha\theta}G_{T\alpha} - G_{T\theta}G_{\alpha\alpha}}{\Delta},$$ (12)

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[9]The second order conditions, evaluated at the optimal levels of T and α, are:

$$G_{\alpha\alpha} = -\frac{\lambda\bar{\rho}^2\left(\theta u_1^p\right)^2 E_{uu}^r}{L^r \left(E_u^r\right)^3} - \frac{\delta^p\left(\theta u_1^p\right)^2 E_{uu}^{p2}}{L_2^p \left(E_u^{p2}\right)^3} < 0,$$

$$G_{TT} = -\frac{E_{uu}^r}{L^r E_u^r \left(E_u^{p1}\right)^2 \lambda} - \frac{\lambda E_{uu}^{p1}}{L_1^p \left(E_u^{p1}\right)^2 E_u^r} - \frac{\bar{\rho}\alpha\theta E_{uu}^r}{L^r \left(E_u^r E_u^{p1}\right)^2 L_1^p} - \frac{\bar{\rho}\alpha\theta u_1^p E_{uu}^r}{L^r \left(E_u^{p1} E_u^r\right)^2} + \frac{\alpha^2 G_{\alpha\alpha}}{\left(L_1^p u_1^p E_u^{p1}\right)^2} < 0,$$

$$\Delta = G_{\alpha\alpha}G_{TT} - \left(G_{\alpha T}\right)^2 > 0, \quad \text{where}$$

$$G_{T\alpha} = -\frac{\bar{\rho}\theta u_1^p E_{uu}^r}{L^r \left(E_u^r\right)^2 E_u^{p1}} - \frac{\lambda\bar{\rho}^2\alpha\theta^2 u_1^p E_{uu}^r}{L^r \left(E_u^r\right)^3 L_1^p E_u^{p1}} - \frac{\delta^p\alpha\theta^2 u_1^p E_{uu}^{p2}}{L_2^p \left(E_u^{p2}\right)^3 L_1^p E_u^{p1}} < 0.$$

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where $G_{\alpha\alpha} < 0$, $G_{TT} < 0$, and $\Delta > 0$ from the second order conditions, $G_{\alpha T} < 0$ (see footnote 9), and

$$G_{\alpha\theta} = \frac{\lambda\bar{\rho}^2\theta\,(u_1^p)^2\,(1-\alpha)\,E_{uu}^r}{L^r\,(E_u^r)^3} - \frac{\delta^p\alpha\theta\,(u_1^p)^2\,E_{uu}^{p2}}{L_2^p\,(E_u^{p2})^3}, \tag{13}$$

$$G_{T\theta} = \frac{\bar{\rho}\,(1-\alpha)\,u_1^p E_{uu}^r}{L^r\,(E_u^r)^2\,E_u^{p1}} + \frac{\lambda\bar{\rho}}{\overline{L}_1^p E_u^{p1}E_u^r} + \frac{\lambda\bar{\rho}^2\theta u_1^p\alpha\,(1-\alpha)\,E_{uu}^r}{L^r\,(E_u^r)^3\,\overline{L}_1^p E_u^{p1}} - \frac{\delta^p\alpha\theta u_1^p E_{uu}^{p2}}{L_2^p\,(E_u^{p2})^3\,\overline{L}_1^p E_u^{p1}}. \tag{14}$$

The signs of $G_{\alpha\theta}$ and $G_{T\theta}$ are in general ambiguous since an increase in θ has conflicting effects on the marginal benefits and marginal costs of α and T. For example, an increase in θ, *ceteris paribus*, increases incomes of both the rich and the poor in the second period by raising the volume of aid. This reduces the marginal utilities of income of both groups, and thus reduces both the marginal cost and the marginal benefit of increasing α.

Defining $\eta^r = E_{uu}^r u_r / E_u^r$, $\eta^{p1} = E_{uu}^{p1} u_1^p / E_u^{p1}$ and $\eta^{p2} = E_{uu}^{p2} u_2^p / E_u^{p2}$, and making the reasonable assumption that the preferences of the poor are same in both the periods — i.e., $\eta^{p1} = \eta^{p2}$ —, from equations (11) and (12) after substitutions we get

$$\Delta\frac{dT}{d\theta} = \frac{\bar{\rho}\delta^p\theta^2\,(u_1^p)^3\,\eta^r\eta^{p2}}{L^r E_u^r L_2^p\,(E_u^{p2})^2\,E_u^{p1}u_2^p u^r} + \frac{\lambda^2\bar{\rho}^3\,(\theta u_1^p)^2\,\eta^r}{L^r\,(E_u^r)^3\,L_1^p E_u^{p1}u^r} + \frac{(\delta^p)^2\,(\theta u_1^p)^2\,\eta^{p2}}{L_2^p\,(E_u^{p2})^3\,L_1^p E_u^{p1}u_2^p} > 0,$$

$$\Delta\frac{d\alpha}{d\theta} = -\frac{\lambda\bar{\rho}u_1^p\,(\eta)^2}{L^r\,(E_u^r)^2\,(E_u^{p1})^2\,u^r}\left\{\frac{\alpha\theta u_1^p}{L_2^p E_u^{p2}u_2^p} + \frac{\bar{\rho}-\sigma}{\bar{\rho}}\right\} - \frac{\lambda^2\bar{\rho}^2\alpha\theta u_1^p\eta^{p1}\eta^r}{L^r\,(E_u^r)^3\,L_1^p E_u^{p1}u^r}$$

$$-\frac{\lambda\delta^p\alpha\theta u_1^p\eta^{p1}\eta^{p2}}{L_2^p\,(E_u^{p2})^2\,E_u^r L_1^p E_u^{p1}u_2^p} - \frac{\lambda\bar{\rho}^2\theta u_1^p\eta^r}{L^r\,(E_u^r)^3\,L_1^p\,(E_u^{p1})^2\,u^r} - \frac{\lambda^2\bar{\rho}^3\alpha\theta^2 u_1^p\eta^r}{L^r\,(E_u^r)^3\,(L_1^p E_u^{p1})^2\,u^r}$$

$$-\frac{\lambda\bar{\rho}\delta^p\alpha\theta^2 u_1^p\eta^r}{L^r\,(E_u^r)^3\,(L_1^p E_u^{p1})^2\,u^r} < 0.$$

where $\sigma\;(=\delta^p E_u^{p1}/E_u^{p2})$ is the implicit discount factor — one over one plus the implicit interest rate — for the poor (see Djajić et al. (1999)). Since the interest rate faced by the poor is likely to be much larger than that faced by the rich, we make the natural assumption that $\sigma \leq \bar{\rho}$.

From the above two equation we find that

$$\frac{d\alpha}{d\theta} < 0, \quad \frac{dT}{d\theta} > 0.$$

That is, an increase in θ increases the optimal level of T, but reduces that of α. Formally,

Proposition 1 *A stronger linkage between the volume of aid in period 2 and the level of welfare of the poor in period 1 leads to a higher transfer of income to the poor in period 1 and a bigger share of aid going to the poor in period 2.*

Intuitively, a stronger linkage between the volume of aid in period 2 and the level of welfare of the poor in period 1 acts as a carrot for the recipient government in period 1: it raises the level of rich-to-poor transfer in order to receive a higher volume of aid in period 2. However, having received a higher volume of aid, it then compensates the rich for extracting from it a higher level of transfer in period 1 by giving the latter a higher proportion of the aid received. We now analyze how an increase in θ affects the welfare of the poor.

An increase in θ, by increasing the amount of rich-to-poor transfer T in period 1, unambiguously increases the welfare of the poor in period 1. However, it has conflicting effect on the welfare of the poor in period 2. First, since the total amount of aid θu_1^p increases with θ, the income of the poor in period 2 increases for a given value of α. But since α decreases with θ, an increase in θ reduces the income of the poor in period 2, for a given level of aid. Combining these two conflicting effects, we find that

$$\Delta \frac{d\left(\alpha\theta u_1^p\right)}{d\theta} = \frac{\lambda\left(\overline{\rho}\theta u_1^p\right)^2 E_{uu}^r}{L^r \left(E_u^r\right)^2 L_1^p \left(E_u^{p1}\right)^2} \cdot \left[\frac{\sigma\eta^{p1}}{\overline{\rho}} - 1\right] \tag{15}$$

That is, $\quad \dfrac{d\left(\alpha\theta u_1^p\right)}{d\theta} > 0 \iff \eta^{p1} > \dfrac{\overline{\rho}}{\sigma}$

The effect on total inter-temporal welfare of the poor, W^p which is equal to $\overline{L}_1^p u_1^p +$

$\delta^p \overline{L}_2^p u_2^p$, can be derived as

$$\frac{\Delta}{\theta (u_1^p)^2} \cdot \frac{dW^p}{d\theta} = \frac{\overline{\rho} \delta^p (1 - \alpha) \theta u_1^p \eta^r \eta^{p2}}{L^r E_u^r L_2^p (E_u^{p2})^2 (E_u^{p1})^2 u_2^p u^r} + \frac{\lambda \overline{\rho} \delta^p \theta \eta^{p2}}{L_2^p E_u^{p2} L_1^p (E_u^{p1})^2 E_u^r u_2^p} \qquad (16)$$

$$+ \frac{\lambda^2 \overline{\rho}^3 \delta^p \theta \eta^{p1} \eta^r}{L^r (E_u^r)^3 L_1^p (E_u^{p1})^2 E_u^{p2} u^r} + \frac{\overline{\rho} \delta^p \theta u_1^p \eta^r \eta^{p2}}{L^r E_u^r L_2^p (E_u^{p1} E_u^{p2})^2 u_2^p u^r} + \frac{\lambda \overline{\rho} \delta^p \theta \eta^{p1} \eta^r}{L^r (E_u^r)^3 L_1^p (E_u^{p1})^2 E_u^{p2} u^r} > 0.$$

That is, an increase in θ unambiguously increases the inter-temporal utility of the poor. Formally,

Proposition 2 *A stronger linkage between the volume of aid in period 2 and the level of welfare of the poor in period 1 unambiguously increases period-1 utility and inter-temporal utility of the poor. It also increases period-2 utility of the poor if and only if $\sigma \eta^{p1} > \overline{\rho}$.*

The possibility that an increase in θ can in fact increase period-two utility is an interesting one, as in our two-period model, the recipient government has no direct incentive to be particularly kind to the poor in period 2. This happens partly via an increase in the total amount of aid. Note that when σ is sufficiently high or, in other words, the implicit interest rate for the poor is sufficiently low, the poor's welfare in period 2 will in fact increase with θ. This is because a lower value of the interest in some sense would allow the poor to effectively transfer some of the benefits from period 1 to period 2.

4   Active Donor

In this section we endogenize the parameter θ by assuming that the donor government chooses it optimally. We consider two situations based on the timing of the decision making process of the donor and the recipient. In the first case we will consider the case of simultaneous decision making, i.e., where both the governments act at the same time. This is done in subsection 4.1. In subsection 4.2, we will analyze a sequential decision making game where the donor moves first and recipient acts as a follower. Later, the two equilibria will be compared.

4.1 Simultaneous Decisions

The donor and the recipient move at the same time taking each ones actions as given, i.e. the recipient chooses α and T considering θ as a constant and donor chooses θ taking α and T as given.

The optimality conditions for the recipient country are the same as in (9) and (10). As for the donor country, it maximizes the following objective function:

$$\max_{\theta} U^D = V\left(Y - \frac{\theta u_1^p}{1 + \gamma}\right) + \beta \left[\overline{L}_1^p u_1^p + \delta^p \overline{L}_2^p u_2^p\right], \tag{17}$$

where $V(.)$ is the indirect utility function (with $V' > 0$ and $V'' < 0$), γ is the discount rate in the donor country, β is the altruism parameter, and the expression inside the square brackets is the total discounted welfare of the poor people in the recipient country.

The first order condition for θ is:

$$U_\theta^D = -\frac{u_1^p V'}{(1 + \gamma)} + \frac{\beta \delta^p \alpha u_1^p}{E_u^{p2}} = 0,$$

which can be simplified as

$$\frac{\beta \delta^p \alpha}{E_u^{p2}} = \frac{V'}{(1 + \gamma)}. \tag{18}$$

An increase in θ increases aid and therefore reduces income in the donor country. This is the marginal cost of increasing θ, and is given by the right hand side of (18). However, providing aid increases welfare of the poor in the recipient country this increases the utility of the donor country via the altruism factor. This effect is captured by the left hand side of (18).

Equations (9), (10) and (18) simultaneously determine the optimal values of α, T and θ. Having described the simultaneous game, we shall now carry out a few comparative static exercises. For simplicity, for these exercises we shall first treat T as exogenous so that we

shall only consider equations (9) and (18). Having done this, we shall then consider T to be endogenous and α as exogenous, focusing on equations (10) and (18).

Case 1: Exogenous T

We start by considering a comparative static effect of the corruption parameter λ. Totally differentiating (9) and (18) we obtain the following results:

$$\frac{d\alpha}{d\lambda} = -\frac{(G_{\alpha\lambda})\left(U_{\theta\theta}^D\right)}{\left(G_{\alpha\alpha}U_{\theta\theta}^D - G_{\alpha\theta}U_{\theta\alpha}^D\right)} < 0,$$

$$\frac{d\theta}{d\lambda} = \frac{(G_{\alpha\lambda})\left(U_{\theta\alpha}^D\right)}{\left(G_{\alpha\alpha}U_{\theta\theta}^D - G_{\alpha\theta}U_{\theta\alpha}^D\right)},$$

where

$$G_{\alpha\lambda} = -\frac{\overline{\rho}\theta u_1^p}{E_u^r} < 0, \qquad U_{\theta\alpha}^D = \frac{\beta\delta^p u_1^p}{E_u^{p2}}\left[1 - \frac{\alpha\theta u_1^p \eta^{p2}}{L_2^p E_u^{p2} u_2^p}\right].$$

Note that the second order condition for the donor's optimization problem requires that $U_{\theta\theta}^D < 0$, and the stability of the Nash equilibrium implies $\left(G_{\alpha\alpha}U_{\theta\theta}^D - G_{\alpha\theta}U_{\theta\alpha}^D\right) > 0$.

It follows from the above that an increase λ unambiguously reduces the allocation of aid to the poor. This is because an increase in the corruption parameter increases the marginal cost of increasing α (the first term in (9)). The effect of an increase in λ on θ is however ambiguous. This is because an increase in λ on one hand reduces the marginal benefit of increasing θ by reducing α. On the other hand, the induced reduction in α reduces the second-period income of the poor and thus increases the marginal utility of income in that period. This increases the marginal benefit of increasing θ. The net effect on θ is therefore ambiguous. However, noting that $\alpha\theta u_1^p/(L_2^p E_u^{p2} u_2^p)$ is less than the share of aid in period 2 income of the poor, when the magnitude of η^{p2} is less than unity then an increase in λ will decrease θ.

Proposition 3 *When the donor and the recipient countries move simultaneously, an increase in corruption in the recipient country, unambiguously reduces the proportion of aid going to the poor. In such a situation, the donor will reduce θ provided η^{p2} is not very large.*

Turning to the comparative static effects of the altruism parameter, β, and the income level Y in the donor country, we find:

$$\frac{d\alpha}{d\beta} = \frac{(U_{\theta\beta})(G_{\alpha\theta})}{(G_{\alpha\alpha}U_{\theta\theta}^D - G_{\alpha\theta}U_{\theta\alpha}^D)}, \quad \frac{d\theta}{d\beta} = \frac{-(G_{\alpha\alpha})(U_{\theta\beta}^D)}{(G_{\alpha\alpha}U_{\theta\theta}^D - G_{\alpha\theta}U_{\theta\alpha}^D)} > 0,$$

$$\frac{d\alpha}{dY} = \frac{(U_{\theta Y})(G_{\alpha\theta})}{(G_{\alpha\alpha}U_{\theta\theta}^D - G_{\alpha\theta}U_{\theta\alpha}^D)}, \quad \frac{d\theta}{dY} = \frac{-(U_{\theta Y})(G_{\alpha\alpha})}{(G_{\alpha\alpha}U_{\theta\theta}^D - G_{\alpha\theta}U_{\theta\alpha}^D)} > 0,$$

where

$$G_{\alpha\theta} = \frac{\lambda\bar{\rho}^2\theta\,(u_1^p)^2\,(1-\alpha)\,E_{uu}^r}{L^r\,(E_u^r)^3} - \frac{\delta^p\alpha\theta\,(u_1^p)^2\,E_{uu}^{p2}}{L_2^p\,(E_u^{p2})^3},$$

$$U_{\theta\beta} = \frac{\delta^p\alpha u_1^p}{(1+\gamma)} > 0, \quad U_{\theta Y} = -\frac{V''u_1^p}{(1+\gamma)} > 0.$$

An increase in income in the donor country reduces the marginal cost of increasing θ (and thus increasing aid) by reducing the marginal utility of income there (see (18). This increases the optimal value of θ. An increase in β also increases the optimal value of θ by increasing the marginal benefit of increasing θ. This increase in the optimal value of θ (because of an increase in either Y or β) has two opposite effects on the optimal level of α. First, it reduces the marginal utility of the rich and therefore the marginal cost of increasing α. Second, it also reduces the marginal utility of the poor in period 2 and therefore the marginal benefit of increasing α. If the poor have very low time preferences, i.e. δ^p is very low then the first effect will dominate and the optimal value of α will increase with both Y and β. Formally,

Proposition 4 *Suppose that the donor and the recipient country move simultaneously. Then an increase in altruism or income in the donor country unambiguously induces the donor government to impose a stronger relationship between the volume of aid and the wellbeing of the poor in period 1. This induced stronger relationship increases the optimal value of the proportion of aid going to the poor if the time preference of the poor is sufficiently low.*

Case 2: Exogenous α

Now we will consider α to be exogenous and examine comparative static effects on T and θ. Totally differentiating (10)) and (18) we get:

$$\frac{dT}{d\lambda} = -\frac{-\left(G_{T\lambda}\right)\left(U_{\theta\theta}^D\right)}{\left(G_{TT}U_{\theta\theta}^D - G_{T\theta}U_{\theta T}^D\right)} < 0,$$

$$\frac{d\theta}{d\lambda} = \frac{\left(G_{T\lambda}\right)\left(U_{\theta T}^D\right)}{\left(G_{TT}U_{\theta\theta}^D - G_{T\theta}U_{\theta T}^D\right)} > 0,$$

where

$$G_{T\lambda} = -\frac{1}{E_u^r} + \frac{\overline{\rho}\theta\left(1 - \alpha\right)}{L_1^p E_u^{p1} E_u^r} < 0, \qquad \text{(because of (10)),}$$

$$U_{\theta T}^D = \frac{\theta u_1^p}{L_1^p E_u^{p1}}\left[\frac{V''}{\left(1 + \gamma\right)^2} - \frac{\beta\delta^p\alpha^2 E_{uu}^{p2}}{L_2^p\left(E_u^{p2}\right)^3}\right] < 0.$$

Note that from the stability of Nash equilibrium we must have $\left(G_{TT}U_{\theta\theta}^D - G_{T\theta}U_{\theta T}^D\right) > 0$.

An increase in corruption in the recipient country will increase the marginal cost of increasing T, and thus the optimal value of T will fall. However, in this case the effect of an increase in λ on θ is unambiguously positive. An increase in corruption, by reducing T, lowers the volume of aid. This increases the marginal utility of income for the poor in period 2 (which in turn increases the marginal benefit of increasing θ), but it also reduces the marginal utility of income in the donor country (which in turn reduces the marginal cost of increasing θ). These two effects reinforce each other and the optimal value of θ increases with λ. This result is formally stated in the following proposition.

Proposition 5 *When donor and recipient move simultaneously, then an increase in corruption in the recipient country will reduce the level of rich-to-poor transfer in period 1 and donor will strengthen link between aid and the wellbeing of the poor in period 1.*

As for the comparative static effects of the donor's income and the altruism parameter

on T and θ, we get:

$$\frac{dT}{d\beta} = \frac{(U_{\theta\beta})(G_{T\theta})}{(G_{TT}U_{\theta\theta}^D - G_{T\theta}U_{\theta T}^D)}, \quad \frac{d\theta}{d\beta} = \frac{-(G_{TT})(U_{\theta\beta}^D)}{(G_{TT}U_{\theta\theta}^D - G_{T\theta}U_{\theta T}^D)} > 0,$$

$$\frac{dT}{dY} = \frac{(U_{\theta Y})(G_{T\theta})}{(G_{TT}U_{\theta\theta}^D - G_{T\theta}U_{\theta T}^D)}, \quad \frac{d\theta}{dY} = \frac{-(U_{\theta Y})(G_{TT})}{(G_{TT}U_{\theta\theta}^D - G_{T\theta}U_{\theta T}^D)} > 0,$$

where

$$G_{T\theta} = \frac{\bar{\rho}u_1^p(1-\alpha)E_{uu}^r}{L^r(E_u^r)^2 E_u^{p1}} + \frac{\lambda\bar{\rho}}{L_1^p E_u^{p1} E_u^r} + \frac{\lambda\bar{\rho}^2\theta u_1^p\alpha(1-\alpha)E_{uu}^r}{L^r(E_u^r)^3 L_1^p E_u^{p1}} - \frac{\delta^p\alpha^2\theta u_1^p E_{uu}^{p2}}{L_2^p(E_u^{p2})^3 L_1^p E_u^{p1}},$$

$$U_{\theta\beta} = \frac{\delta^p\alpha u_1^p}{(1+\gamma)} > 0, \quad U_{\theta Y} = -\frac{V''u_1^p}{(1+\gamma)} > 0.$$

Any increase in the altruism parameter (or, income in the donor country) will increase the marginal benefit of increasing θ ((or, reduce the marginal cost of increasing θ by reducing the marginal utility of income in the donor country). Thus the effects on θ are unambiguously positive. This induced increase in the value of θ has conflicting effects on the marginal effects of T. However, if the rate of time preference for the poor is sufficiently low, the optimal level of T will increase. Formally,

Proposition 6 *If the donor and recipient move simultaneously then an increase in the altruism parameter or the income of the donor will increase θ. This will induce the recipient to increase T if the the time preference of the poor is not very high.*

4.2 Sequential Decisions

Having analyzed the case where both countries act simultaneously, in this section we shall examine if credible commitment on the part of the donor country can influence the equilibrium my inducing the recipient government to follow a more pro-poor policy. To be more specific, in this section we assume that the donor country acts as a leader and the recipient country as the follower. In order to achieve a sub-game perfect equilibrium, we work with backward induction, starting with stage two of the game. In stage two of the game, the

recipient country optimally chooses the values of α and T for a given value of θ. The recipient's reaction functions $\alpha(\theta)$ and $T(\theta)$ are derived from (9) and (10). Hence in the stage I of the game the donor country optimally chooses its instruments by taking into consideration the recipient's reaction functions, $\alpha(\theta)$ and $T(\theta)$. In the first stage of the game the donor government optimally chooses its instruments by taking into consideration the recipient's reaction functions, $\alpha(\theta)$ and $T(\theta)$. That is, the donor government maximizes (17) subject to (9) and (10) (the recipient's reaction functions).

The first order condition for θ in the sequential game is:

$$\frac{dU^D}{d\theta} \equiv \widetilde{U_\theta^D} = -\frac{V' u_1^p}{1+\gamma} + \frac{\beta\delta^p \alpha u_1^p}{E_u^{p2}} + \frac{\beta}{E_u^{p1}}\frac{dT}{d\theta} + \frac{\beta\delta^p \theta u_1^p}{E_u^{p2}}\frac{d\alpha}{d\theta} \qquad (19)$$

The last two terms were absent in the simultaneous game and appear here because of the sequential nature of the present game. From Proposition 1, $dT/d\theta > 0$ and $d\alpha/d\theta < 0$. Hence, since the sum of the first two terms on the right hand side of (19) is zero when it is evaluated at the simultaneous equilibrium, using (18) we obtain from (19):

$$\left.\widetilde{U_\theta^D}\right|_{\theta=\theta_{sim}} = \frac{\beta}{E_u^{p1}}\frac{dT}{d\theta} + \frac{\beta\delta^p \theta u_1^p}{E_u^{p2}}\frac{d\alpha}{d\theta}, \qquad (20)$$

where θ_{sim} is the equilibrium value of θ in the simultaneous game. If the time preference of the poor is sufficiently low, then the positive effect of T will dominate and $\theta_{seq} > \theta_{sim}$ where θ_{seq} is the equilibrium value of θ in the sequential game. A higher θ in the sequential game also implies a higher value of T and lower value of α in that game (compared to the simultaneous game). However, this will mean a higher welfare for the poor and the donor country. This result is formally stated in the following proposition.

Proposition 7 *The welfare of the poor and the donor will higher in a sequential game where the donor moves first as compared to a simultaneous game, provided the the rate of time preference for the poor is sufficiently low.*

By committing credibly to a stronger relationship between aid in period 2 and good governance in period 1 (in the sense of a better pro-poor policy in period 1), the donor country is able to induce the recipient country to follow a more pro-poor policy as compared to the situation where prior commitment is not possible.

5   Conclusion

Foreign aid is often given for the benefit of the poor in a recipient country. However, more often than not, a significant proportion of this aid is diverted away from the target group. In the literature this is known as fungibility of foreign aid. Fungibility is often blamed for the ineffectiveness of aid which in turn causes aid fatigue among donors.

In this paper we have tried to develop a method of disbursement of aid that would induce recipient countries to follow, without any conditionality on the use of aid, a more pro-poor policies than they would otherwise do. Our method would also imply a higher flow of aid than there would be in its absence.

The method involves linking the volume of aid in a period to the wellbeing of the target group in the previous period. The recipient country is assumed to maximize its political support function (which attached a higher weight to the welfare of the non-target group than to that of the target group) by optimally choosing a level of transfer from the rich to the poor in the first period and the allocation aid between the two groups in the second period.

We analyze the donor's and the recipient's behavior under three scenarios : (1) the donor is passive in the sense that its policy instrument (the link between aid and pro-poor policy) is treated as exogenous, (2) the donor is active and chooses it policy at the same as the recipient government chooses its instruments, (3) the donor behaves as a leader.

When the donor is passive, an increase in the aid determining parameter of the donor,

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or the link between aid in the second period and good governance (a more pro-poor policy) in the first period, raises the level of transfer from the rich to the poor, but lowers the poor's share in aid. However, the total welfare of the poor increases.

When the donor is active and chooses the aid determining parameter simultaneously as the recipient government chooses its instruments, the deterioration of governance in the recipient country in the sense of a higher weight for the non-target group in the recipient country's objective function, leads to lower proportion of aid going to the poor and lower transfer from the rich to the poor. However, an increase in either altruism or income in the donor country increases the aid determining parameter.

We compare the equilibrium between the cases when the two countries act simultaneously and when the donor acts before the recipient country in a sequential-move game. We find that the volume of aid is higher and the recipient government follows a more pro-poor policy in the sequential game as compared to the simultaneous game, provided the rate of time preference for the poor is sufficiently low.

Our simple theoretical study points out that the mode of disbursement of aid in a dynamic context can be a move forward for the benefit of all the parties concerned.

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