

# Conditional Aid, Sovereign Debt, and Debt Relief\*

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## Abstract

Is debt relief the best instrument to increase the consumption of the poor in HIPCs? To answer this question, we present a model of conditional aid as an implicit contract between altruistic donors (concerned about the consumption of the poor), and recipient government representing the interests of the well-offs. This contract is played out over an infinite horizon, and is supported by punishment threats for deviation. In a constrained optimal conditional aid relationship, we show that debt relief can reduce the welfare of the poor. Our framework also provides a new explanation of why aid flows can be procyclic, and why donors who are also debt-holders keep providing aid without granting debt relief.

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# 1 Introduction

Many of the poorest countries in the world are also among the most indebted.<sup>1</sup> This fact and the stunning plight of the poor in these countries has captured the imagination of many and created a consensus for relieving a substantial part of the highly indebted poor countries' (HIPCs) debt burden. The debt relief campaign arose from a concern for the welfare of the poor and a perception that the "debt overhang" inhibits poverty reduction. However, the emphasis on indebtedness as the main cause of the poor economic and social performance of the HIPCs has probably been exaggerated. The HIPC debt crisis is very different from the emerging market debt crises of the 1980s and lessons from that experience (see Sachs [1989]) are not directly applicable. In the 1980s debtor countries were transferring resources to the developed world, but the HIPCs continue to receive net transfers from their primary creditors, who are bilateral and multilateral donors, as their debts are continuously rescheduled. It is interesting to ask why the debt of the HIPCs is largely held by the primary donors of foreign aid and why these donors continue to reschedule rather than forgive the debt.

The reason we underscore these stylized facts is that we wonder whether regaining access to private credit markets can promote the poverty alleviation objectives of altruistic donors. One possibility is that official creditor-donors cannot coordinate. We explore another possibility that donors can direct more aid towards poverty reduction and social welfare spending when the government cannot borrow and does not need to service its external debt. Debt relief is one way of delivering aid, one that relaxes a constraint for the government. By regaining access to credit, the government, however, also regains repayment obligations. These resources might be better used, from a donor's perspective, for social welfare expenditures that can improve the lot of the poor.

A problem facing foreign aid donors is that recipient governments can use foreign aid funds for purposes contrary to the intentions of the donors. When the alleviation of poverty is the objective for donor countries, poor country governments often use aid to fund military procurement, public sector payrolls, urban services and lower taxes for affluent households. Once the recipient government is in possession of the funds, the government has an incentive to meet the needs of its constituency. Those with a voice are often those with means. Aid funds are both fungible and hostage to the domestic political status quo. The theoretical literature on the effectiveness of aid when the objectives of donors and recipients differ is

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<sup>1</sup>Berlage et al. [2000] report that 84 percent of the countries with a human development indicator lower than 0.5 belong to the list of high indebted poor countries (HIPCs).

limited.<sup>2</sup> Exceptions are Murshed and Sen [1995], Svensson and [2000], Azam and Laffont [2001], Federico [2001] and Cordella and Dell’Ariccia [2002]. The main lesson of this relatively new literature is that incentives matter (Easterly [2002]) and thus properly designed conditionality may enhance the effectiveness of aid programs. This point is gaining increasing support. For instance, whereas in the past NGOs often voiced a strong disagreement with the very principle of conditionality, they now acknowledge that some form of conditionality is needed for the debt relief project to be conducive to poverty reduction.<sup>3</sup>

One resolution to the conflict between spending on the projects donors desire and spending on those favored by the government’s key constituencies is for donors to condition current aid transfers on past expenditures. Foreign aid donors seeking to reduce poverty can refuse further aid if the government fails to meet threshold levels of social welfare spending. Donors may simply find that scarce funds can go to other needy countries with more cooperative governments. However, abandoning the poor may not be time consistent behavior for donors when their objectives are altruistic. A permanent cutoff of aid to a government may not be a credible threat, and donors may need to find strategies that include positive aid flows in punishment.

In this paper, we first model conditional aid as an implicit contract between donors and governments that specifies how a government allocates aid funds between what donors desire and what influential constituents desire. This contract is played out over an infinite horizon and is supported by punishment threats for deviation. The contract can only require the government to allocate funds in ways that it actually will when faced by the threat of aid sanctions. We find, in turn, the requirements for constrained efficient conditional aid contracts under the threat of aid cutoffs and under aid sanctions that are proof to renegotiation. Renegotiation-proof equilibria are shown to exist so that conditional aid can survive when donors are altruistic, but this is a binding constraint on aid levels.

We next allow government access to international credit markets. Sovereign borrowing and conditional aid are modeled in a common framework in which debt serves to smooth the government’s objective and is continuously renegotiated. The coalition-proof equilibria for sovereign borrowing from Kletzer and Wright [2000] are adapted to our model of aid and debt. We show that when a government does not have a debt overhang, aid flows and

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<sup>2</sup>See Drazen [2000]. There is however substantial empirical evidence suggesting that aid alone cannot buy a successful social program (e.g., Boone [1996], Burnside and Dollar [2000])

<sup>3</sup>According to CISDE-Caritas International [1999]: “Because not all governments can be counted on to use resources freed through debt relief to invest in the poor and marginalized sectors of society, there is a case for making a strong link between investment in human development and debt cancellation.” Oxfam International also points out possible incentive compatibility problems in the debt relief and poverty reduction strategy, and stresses that the “the focus should be on the development of incentives for converting debt relief into poverty reduction investments.”

government transfers to the poor are more restricted than when the government only has access to conditional aid flows. The government can default on the aid contract and borrow to raise its utility when it has not already borrowed up to its equilibrium credit limit. The donor's welfare is lower. When the government has a debt overhang, payments are continuously renegotiated but donors can only extract some of the remaining surplus of the government. Aid and donor welfare are again lower than in the case that the government has access only to aid. Lastly, we show that donors generally benefit from becoming creditors, by locking the government out of private credit market access. In this case, donors will not seek repayments, but, instead, direct the government to spend the same amounts as it would pay in debt service as aid. If donors desire that the government use its resources for social welfare-enhancing projects rather than for debt repayment, then at the margin debt service will be divided between the donor's projects and the government's exactly as in the constrained optimal conditional aid contract.

To represent a conflict between the donor's objectives and the government's in a simple way, we assume that the donors only care about the utility of an disenfranchised class (called the poor) and not the enfranchised (called the rich), in the recipient country. The government seeks to maximize the utility of the enfranchised class. These assumptions are shared by recent theoretical literature on aid which assumes fully altruistic donors. However, foreign aid is often motivated by political and strategic considerations, and donor governments differ substantially in their degree of altruism (see Alesina and Dollar [2000]) so that the actual allocation of aid is not efficient from a poverty-reduction point of view (Collier and Dollar [2002]). We abstract from this important political-economy issue to focus on the normative question of how donors should design conditional (incentive compatible) aid policies to induce recipient governments to make transfers to the poor above and beyond what they would like to do.

Finally, there is substantial empirical evidence showing that aid flows are positively correlated with recipient country growth (see Pallage and Robe [2001]), but the theoretical literature has not explained this phenomenon easily. Svensson [2000] shows that when the donor cannot commit, it can face the Samaritan's dilemma which results in procyclic aid. We use a consumption-smoothing model over an infinite horizon and show the counterintuitive result that aid flows are generally procyclical. Incentives for the government in the conditional aid relationship lead to procyclic aid even if the donor can commit to permanent aid cutoffs.

## 2 Debt and Aid: Some Stylized Facts

Here we describe some of the key features of the financial relations between a large set of HIPCs and the donor community that motivate our theoretical questions. Our data covers 30 recipient countries<sup>4</sup> and 26 donor countries, plus a number of multilateral donors, for the period 1996-2000. Table 1 of the Appendix lists these countries. We complement this data<sup>5</sup> with information about the foreign debt position of recipient countries.<sup>6</sup> Both the aid and the debt data are on a bilateral basis, so that one observation corresponds to a recipient-donor or borrower-lender pair. Furthermore, development assistance flows are available on a gross basis. It is then possible to observe the magnitude of new assistance flows from donor countries to recipient countries, and that of “negative” flows, generally in the form of debt repayments, in the opposite direction.

The examination of this dataset reveals three important stylized facts revealed in Table 2. First, no recipient country has actually experienced aggregate negative net assistance flows over the period considered. On average, net flows have been non-negligible: the countries in our sample received on average net development assistance of about 18 percent of GDP. It is also true that at the bilateral level there have been a few donor-recipient pairs that exhibited negative net flows. These, however, represent only about 5 percent of our sample. Overall, we can claim that there have been substantial net assistance flows towards the countries in the dataset.

The second important finding is that substantial flows from “recipient” countries to “donor” countries exist. These “negative” flows generally represent debt repayment and coexist with the positive flows generated by new assistance programs. We construct an index that takes value 0 when flows are purely unilateral, and value 1 when there are zero net flows and all the new assistance funds are matched by repayment flows. Our index is given by

$$I = \frac{POS + NEG - |NET|}{POS + NEG},$$

where  $POS$  indicates inflows and  $NEG$  outflows.

About a third of the observations in our sample exhibit nonzero negative flows, that is  $I > 0$ . Furthermore, within that group, such flows appear to be important in magnitude. Indeed,

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<sup>4</sup>These are the 26 HIPCs with debt relief approved at decision point, plus four countries (Comoros, Democratic Republic of Congo, Cote d’Ivoire) who have not yet reached decision point or whose debt sustainability has yet to be assessed (Yemen).

<sup>5</sup>The source of our aid flows data is the OECD DAC database. The series we consider are total official net and gross flows (series number 966 and 967, respectively)

<sup>6</sup>The source for these data are the IMF/World Bank “Decision point documents for the Enhanced HIPC initiative” and for countries that have not reached decision point the “Preliminary Documents.” These documents are available on the web at <http://www.worldbank.org/hipc/>

for the average recipient country in that group  $I$  is about 0.3 for bilateral donors and 0.4 for multilateral donors. This suggests that the simultaneous existence of new positive gross aid flows and negative gross flows is a widespread and economically relevant phenomenon. Furthermore, the index  $I$  is negatively correlated with gross positive flows.

The simultaneous existence of opposing gross flows is consistent with our third finding that the main donors of a recipient country are also its primary creditors. For each recipient country (in each year), we consider the share of total aid provided by each donor, and the share of outstanding debt (in net present value) held by each debt-holder, and find that these are positively correlated (the rank correlation is about 0.4). This correlation is clearly observable in Table 3 which reports the ranking of debt-holders and donors for Cameroon in 2000.

These stylized facts confirm the notion that it has not necessarily been the case that debt overhang significantly reduces the magnitude of assistance flows to developing countries. We also note that most of the aid flows to the HIPCs have been procyclic.<sup>7</sup>

### 3 Self-enforcing foreign aid

A conditional aid relationship can be portrayed in a simple stylized model. Differences between the objectives of a foreign donor and a domestic government concern the distribution of the benefits of government spending across two different income classes within the country. For simplicity, one class is enfranchised so that its preferences are represented by the government while the other is disenfranchised. Within classes, all individuals are identical and care only about their own consumption over time. To represent a conflict between the donor's objectives and the government's in a simple way, the donor is assumed to only care about the utility of the unrepresented class. Assuming that donor preferences do not depend positively on the utility of both classes does not change the qualitative results and simplifies the algebra. For short-hand, we refer to the enfranchised as the rich and the disenfranchised as the poor.

Although the motivation for donors includes social welfare spending on public goods that benefit the poor, we make the simplifying assumption that there are no public goods and a single private good. The government can make lump-sum transfers to residents using donor funds, and the government and donor have conflicting views on which class should benefit from such transfers. An agency problem arises because the donor cannot make direct transfers to the poor. The sovereign government can demand that it intermediates all aid

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<sup>7</sup>In a recent study, Pallage and Robe [2001] find that for almost all HIPCs aid flows were procyclical between 1969 and 1995.

inflows. Any aid, therefore, can be used by the government to make transfers to the rich.

The donor will want to choose an aid policy (a strategy) that induces the government to cooperate in making transfers to the poor in exchange for using some of the aid to increase the utility of the rich. To sustain such a relationship, the donor needs to be able to punish the government if it diverts more of the aid to the rich than it should under an agreement with the donor. The aid policy is a contract enforced by the donor and the government on each side. At each date, aid intended for the poor is first given to the government, and the government then chooses how to distribute it. Sovereign immunity implies that the government can always quit a relationship with the donor. The sanctions available to the donor for punishing the government are limited to refusals to provide aid transfers. At any time, the government can choose to give all current aid to the rich and accept no more conditional aid. Since the donor is either a sovereign or represents the interests of sovereign governments, it can also choose to not provide aid at any time. Neither party can commit its future actions.

This self-enforcing relationship is modeled using an infinitely-repeated game. The game is a bit more complicated than necessary for demonstrating a conditional aid policy because the income of the rich and poor is assumed to be stochastic. This done for two reasons. It first allows comparisons between the theoretical dynamics of aid flows and spending on the poor to empirical observations that aid flows to developing countries are procyclic. It also provides a simple consumption-smoothing model that motivates government foreign borrowing so that we can consider the interaction between aid and debt.<sup>8</sup> The nature of the punishments that support cooperation in the repeated game is important for the analysis. In particular, we begin with simple trigger strategy punishments but recognize that these will not be renegotiation proof in the self-enforcing relationship. In the consumption-smoothing debt model of Kletzer and Wright [2000], renegotiation-proof punishments exist that support the same equilibrium behaviors as trigger strategy punishments. However, this is not true in the conditional aid model in which renegotiation-proofness reduces the set of equilibria that can be achieved. Renegotiation is discussed after the basic equilibrium is characterized using trigger strategies.

There is a single consumption good that is non-storable and there is no production. The income of the poor is denoted by  $w_t$  (for period  $t$ ) which is independently drawn from an identical distribution each period over a finite support given by

$$0 < w^1 < w^2 < \dots < w^N.$$

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<sup>8</sup>The simple consumption-smoothing model draws on Kletzer and Wright [2000], and we rely on the results on renegotiation-proof and coalition-proof debt equilibria from that paper in our analysis of aid and debt.

Superscripts denote states of nature and subscripts dates. The utility of the poor is given by

$$U_t^p = E_t \sum_{s=t}^{\infty} \beta^{s-t} u(c_s^p),$$

where  $c_s^p$  denotes the consumption of the poor in period  $s$ . The income of the rich is denoted by  $y_t$  and is i.i.d. with support

$$0 < y^1 < y^2 < \dots < y^N.$$

It is assumed here that the income of rich and poor are positively related. This is discussed later. The utility of the rich is given by

$$U_t^r = E_t \sum_{s=t}^{\infty} \beta^{s-t} v(c_s^r),$$

where  $c_s^r$  denotes the consumption of the rich at time  $s$ . The functions,  $u(c)$  and  $v(c)$ , are both increasing, strictly concave and display unbounded marginal utility as consumption goes to zero. The discount factor,  $\beta$ , is in the open interval,  $(0, 1)$ . The government's objective function is  $U_t^r$ . The donor's objective function is given by

$$U_t^d = E_t \sum_{s=t}^{\infty} \beta^{s-t} [u(c_s^p) - \tau_s],$$

where  $\tau_s$  is the total aid transfer made by the donor at time  $s$ . The donor cares about the utility achieved by the poor and the opportunity cost of donor funds. The current incomes of the poor and rich are in the information sets of both the government and the donor when actions are taken. The discount rate is the same for all agents for simplicity, although allowing for different discount rates will change the dynamics of transfers.

The strongest punishment that can be imposed on the government or the donor in the repeated game is permanent aid autarky.. The government's payoff under autarky is given by

$$\bar{U}^r(y_t) = v(y_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} v(y_s), \quad (1)$$

but if the government defects at time  $t$  its utility is

$$v(y_t + \tau_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} v(y_s) = \bar{U}^r(y_t) + v(y_t + \tau_t) - v(y_t), \quad (2)$$

because aid flows are made before the government decides how to distribute them. In defection to permanent autarky, the government maximizes its utility by giving all current aid to

the rich. The autarky utility for the donor is

$$\bar{U}_t^d = u(w_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} u(w_s). \quad (3)$$

Following the practice in other papers on self-enforcing equilibria, we express the payoffs as surpluses over autarky utilities.<sup>9</sup> The surplus for the donor is given by

$$U_t \equiv u(c_t^p) - \tau_t - u(w_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} (u(c_s^p) - \tau_s - u(w_s)), \quad (4)$$

and the surplus for the government is

$$V_t \equiv v(c_t^r) - v(y_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} (v(c_s^r) - v(y_s)). \quad (5)$$

These surpluses can be rewritten in the form

$$U_t = u(c_t^p) - \tau_t - u(w_t) + \beta E_t U_{t+1}^q$$

and

$$V_t \equiv v(c_t^r) - v(y_t) + \beta E_t V_{t+1}^q.$$

The superscript  $q$  indicates the state of nature for period  $t + 1$ . The self-enforcement constraints for the donor are given by

$$U_{t+1}^q \geq 0 \quad \text{for all states } q = 1, \dots, N.$$

and

$$V_{t+1}^q \geq 0 \quad \text{for all states } q = 1, \dots, N.$$

In defection, the government can ensure itself surplus equal to  $v(y_t + \tau_t) - v(y_t)$ .

An efficient conditional aid scheme is found as the solution to a constrained dynamic programming problem. The problem is to maximize the donor's surplus with respect to the aid transfer,  $\tau_t$ , and state-contingent surplus promises for the recipient government,  $V_{t+1}^q$ , subject to the self-enforcement constraints plus the defection constraint for the government. The donor's surplus is written as a function of the surplus for the government, for example,  $U_{t+1}^q(V_{t+1}^q)$ , following the slight convenient abuse of notation in Thomas and Worrall [1988]. The problem is find the maximum of

$$U_t(V_t) = u(c_t^p) - \tau_t - u(w_t) + \beta E_t U_{t+1}^q(V_{t+1}^q) \quad (6)$$

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<sup>9</sup>For example, Thomas and Worrall [1988], Kocherlakota [1996], Kletzer and Wright [2000] and Kehoe and Perri [2002].

with respect to  $\tau_t$ ,  $c_t^p$ ,  $c_t^r$  and  $\{V_{t+1}^q\}$  for  $q = 1, \dots, N$ , subject to the constraints,

$$v(c_t^r) - v(y_t) + \beta E_t V_{t+1}^q \geq V_t, \quad (7)$$

$$V_t \geq v(y_t + \tau_t) - v(y_t), \quad (8)$$

$$c_t^p + c_t^r \leq y_t + w_t + \tau_t \quad (9)$$

and

$$U_{t+1}^q (V_{t+1}^q) \geq 0 \quad \text{and} \quad V_{t+1}^q \geq 0 \quad \text{for all states } q = 1, \dots, N. \quad (10)$$

An additional constraint that transfers cannot be negative,  $\tau_t \geq 0$ , is included to represent an aid relationship rather than a borrowing and repayment relationship. As written,  $V_t$  is the surplus promised by the donor to the government in equilibrium in date  $t$ . The constraint, condition (7), assures that the government's utility surplus is at least as great as that promised the previous period for the current state of nature. The constraint, condition (8), is a restriction on the transfer,  $\tau_t$ , made in period  $t$  so that the government does not defect, giving all the current aid to the rich. At the start, the donor's surplus  $U_t$  will be maximized with respect to  $V_t$ . The resource constraint (9) and self-enforcement constraints (10) for period  $t + 1$  complete the specification of the opportunity set.

This is solved by setting up a Lagrangian given that the programming problem is convex. The convexity of the program is not obvious, but follows directly from the proofs given in Thomas and Worrall [1988] or Kletzer and Wright [2000]. The proof is not included here as it is redundant. However, the frontier for solutions to this problem is not necessarily downward sloping in  $U$  for all  $V \geq 0$  because of the transfer passes through the hands of the government increasing the government's utility from defecting. This means that the donor may be able increase its surplus by increasing the transfer and the surplus to the government together for low levels of aid.

The necessary conditions for an optimum are given by

$$u'(c_t^p) = \lambda_t v'(c_t^r), \quad (11)$$

$$u'(c_t^p) = 1 + \gamma_t v'(y_t + \tau_t), \quad (12)$$

$$\lambda_t + (1 + \varphi_{t+1}^q) U_{t+1}^{q'} (V_{t+1}^q) + \psi_{t+1}^q = 0 \quad (13)$$

and the envelope condition,

$$U_t'(V_t) = -\lambda_t, \quad (14)$$

where  $\lambda_t$  is the Lagrange multiplier for (7),  $\gamma_t$  for (8), and  $\beta\pi^q\varphi_{t+1}^q$  and  $\beta\pi^q\psi_{t+1}^q$  for the constraints,  $U_{t+1}^q (V_{t+1}^q) \geq 0$  and  $V_{t+1}^q \geq 0$ , respectively, where  $\pi^q$  is the probability state  $q$

occurs. We have that  $\varphi_{t+1}^q \geq 0$  and  $\psi_{t+1}^q \geq 0$  with the complementary slackness conditions  $\varphi_{t+1}^q U_{t+1}^q (V_{t+1}^q) = 0$  and  $\psi_{t+1}^q V_{t+1}^q = 0$ .

$U(V)$  is maximized when the donor provides aid until  $\gamma_t = \lambda_t$  which implies that

$$u'(c_t^p) \left( 1 - \frac{v'(y_t + \tau_t)}{v'(c_t^r)} \right) = 1. \quad (15)$$

The equilibrium condition (15) means that the donor seeks to achieve equality between the marginal utility of the poor times the marginal transfer by the government to the poor for each unit of aid on the left-hand side and the marginal cost of aid on the right-hand side. The Euler condition (13) implies that the donor seeks to smooth the ratio of marginal utilities between the poor and the government,  $\lambda_t = u'(c_t^p) / v'(c_t^r)$ , as much as possible up to the self-enforcement constraints. It can be rewritten as

$$\lambda_t = (1 + \varphi_{t+1}^q) \lambda_{t+1}^q - \psi_{t+1}^q$$

which requires that  $\lambda_{t+1}^q = \lambda_{t+1}^k$  for states,  $q$  and  $k$ , such that both donor and government surpluses are positive. If the donor's surplus is zero in state  $k$  but not in state  $q$ , then  $\lambda_{t+1}^q \geq \lambda_{t+1}^k$  and conversely if the government's surplus is zero in state  $k$  but not in state  $q$ . This Euler condition is the same as in Thomas and Worrall [1988] or Kocherlakota [1996].

### The dynamics of aid flows and consumption

A simple case helps to demonstrate the dynamics of aid flows in an efficient perfect equilibrium. Consider the case in which the incomes of the poor and the rich are perfectly correlated. This is consistent with empirical results that per capita income for the poor grow one for one with aggregate per capita income in developing countries (see Dollar and Kraay [2000]). If the preferences of the rich and poor display equal constant elasticities of substitution, then there are no gains from domestic risk-sharing schemes before aid. In an autarchic equilibrium, the ratio of marginal utilities,  $u'(w_t) / v'(y_t)$ , is constant. Compare this to an aid equilibrium in which the self-enforcement constraints do not bind (just assume this for the experiment, it may not be true). The efficient aid solution then satisfies the three conditions,

$$1 - \left( \frac{c_t^r}{y_t + \tau_t} \right)^\sigma = (c_t^p)^\sigma, \quad (16)$$

$$\left( \frac{c_t^r}{c_t^p} \right)^\sigma = \lambda, \quad (17)$$

for  $\lambda$  constant, and

$$c_t^p + c_t^r = y_t + w_t + \tau_t, \quad (18)$$

where  $w_t = \theta y_t$  for some constant  $\theta$ .

Because the ratio of marginal utilities is constant, the marginal utility of the poor,  $u'(c^p)$ , decreases as total resources,  $y_t + w_t + \tau_t$ , increase. Equation (16) then implies that

$$\frac{d}{d(y_t + \tau_t)} \left( \frac{c_t^r}{y_t + \tau_t} \right) < 0,$$

which says that the consumption of the rich rises more slowly than the total resources they can potentially consume,  $y_t + \tau_t$ . This suggests that the share of the poor's consumption in national income may rise with national income unless aid completely smooths income fluctuations. Total differentiation of the three conditions with respect to national income leads to the following result.

**Proposition 1.** Under the assumed utilities and income correlation, if  $\lambda$  is constant, then the transfer to the poor,

$$c_t^p - w_t = y_t + \tau_t - c_t^r$$

rises with national income plus aid,  $w_t + y_t + \tau_t$ , and the volume of aid,  $\tau_t$ , rises with national income,

$$\frac{d\tau_t}{d(w_t + y_t)} > 0 \quad \text{for } \tau_t > 0.$$

Proof: Follows from total differentiation of the three conditions with  $\lambda$  constant. The differentiation shows that the derivative is zero for  $\tau_t = 0$  and positive for  $\tau_t$  positive. The details tedious.

This is somewhat surprising because it is natural to think that the risk-neutral donor would seek to smooth the consumption of the poor against income fluctuations. We might also expect the donor to use consumption smoothing of the rich to induce cooperation in transferring more resources to the poor. Some smoothing of the consumption of the rich does occur, but this is relative to the resources they command in each period which includes grants to the government from abroad. The binding constraint that matters is given by equation (16), the efficient choice of aid inflows given that the rich control the distribution of the transfer between themselves and the poor within each period.

This simple case shows how the ability of the government to hold aid hostage to its own distributional goals when these differ from those of the donor can lead to procyclic aid inflows and transfers to (or social welfare spending to benefit) the risk-averse poor. The empirical observation made by Pallage and Robe [2000] that aid flows to developing countries are procyclic has received widespread attention. One reason for this attention is the expectation that aid inflows should smooth the consumption of the poor or provide more social welfare spending during periods of distress. Suggestions for rationalizing the empirical finding involve arguments that aid is more productive in periods of high growth because, for example, the

productivity of capital rises with income growth or policies that benefit the objectives of donors are also conducive to income growth. Our model shows that positive correlations between income and aid inflows can result from different distributional objectives between donors and sovereign governments in pure endowment economy.

The result does not require perfect correlation of rich and poor incomes, nor does it require identical degrees of risk aversion. In particular, the result may be a surprise for identical elasticities of substitution because there are no gains from risk-sharing between rich and poor. If the poor are more risk-averse than the government, then it may be possible for the donor to induce the government to make larger transfers to the poor in low income states in exchange for higher consumption of the rich in high income states. The procyclicality of aid is at least robust to modest differences in rates of risk aversion. Empirical evidence does not provide an unambiguous guide to whether poorer residents of developing countries are more risk averse than those most likely to be represented by the government, so we choose not to pursue this further.

Returning to the general case, some observations are useful. In the solution for the optimum when either self-enforcement constraint binds in some income state, the ratio of marginal utilities,  $\lambda_t$ , will not be fully smoothed over dates and states. The Euler condition (13) shows that  $\lambda_{t+1}$  will follow a Markov chain even though income is i.i.d. so that  $\lambda_{t+1}(\lambda_t, (w_{t+1}, y_{t+1}))$  in general. This is a result demonstrated in the simpler models of Kocherlakota [1996] for two-risk averse agents or Thomas and Worrall [1988] for a risk-averse and a risk-neutral agent.

A second observation is that the consumption of the rich may be lower in some income states with aid inflows than under autarky.. That is, the transfer from the government to the poor may be larger than the aid inflow in high income states and smaller in low income states. In this case, the rich smooth their consumption by making transfers from their income to the poor in high income states and receiving aid to raise their consumption in low income states. The contract between the government and the donor can use the motive of the government to smooth the consumption of the rich to increase the utility of the poor.

This is necessarily true if the self-enforcement constraint for the government binds at some time in a non-autarchic equilibrium. In this case,

$$V_t = v(c_t^r) - v(y_t) + \beta E_t V_{t+1}^q = 0.$$

The continuation surplus of the government,  $\beta E_t V_{t+1}^q$ , must be positive so that the current surplus,  $v(c_t^r) - v(y_t)$ , must be negative.

An inefficient perfect equilibrium demonstrates how consumption smoothing can be used to support transfers to the poor that increase the donor objective. Kletzer and Wright [2000]

solve for efficient perfect equilibrium for sovereign debt in the endowment model with a risk-neutral lender and risk-averse sovereign borrower. This is simply the current model with the utility of the poor removed from the donor's objective function. In a simple two-state case, the lender provides a payment to the government in the low state and receives a repayment in the high state. The payments are i.i.d. in the two-state case (but not in the general case). If smoothing in equilibrium is incomplete, we have

$$c^{r1} - y^1 + \frac{\beta}{1 - \beta} E(c_t^r - y_t) = 0$$

in the low state,  $y^1$ , because the lender is just willing to make the positive payment  $(c^{r1} - y^1)$  where  $c^{r1}$  is the government's consumption in state  $y^1$ . In the high state,  $y^2$ ,

$$v(c^{r2}) - v(y^2) + \frac{\beta}{1 - \beta} E(v(c_t^r) - v(y_t)) = 0$$

because the borrower is just will to repay  $(y^2 - c^{r2})$  in this state.

Suppose that the donor makes the following contract with the government. It pays  $(c^{r1} - y^1)$  in the low state which is used to raise the consumption of the rich as in the debt equilibrium. But, rather than repay the donor in the high state, the government agrees to make transfer payments in the amount  $(y^2 - c^{r2})$  to the poor. As long as the marginal utility of consumption of the poor exceeds one after the transfer,

$$u'(w^2 + y^2 - c^{r2}) > 1,$$

the donor's objective is higher under this agreement than under autarky. This is an example of conditional aid. The grant is conditional upon the government paying to the poor what it would have paid in debt service to foreign creditors. In the low income state, the self-enforcement constraint of the donor is relaxed because the marginal utility of the risk-averse poor exceeds the marginal utility of the risk-neutral lender. This is why we noted that this is an inefficient equilibrium. The donor's utility if it makes a larger transfers in the low income state for additional payments to the poor in the high income state. The optimal contract should involve more smoothing of the consumption of the poor, however, as suggested by the first example in this section. We return to the comparison between debt and aid later.

## 4 Renegotiation proofness and equilibrium

In the conditional aid relationship, the government continued to receive grants from the donor as long as it allocated the grants between transfers to rich and poor according to the (implicit) contract. It has been assumed that deviation by either the government or the

donor from the contract results in permanent reversion to autarky. However, such trigger strategy punishment threats are prone to renegotiation because the mutual gains from aid that motivated the original agreement still exist. The punishments may not be credible because the donor and the government can both gain by abandoning such punishments.

In a solution to the conditional aid problem (given as maximizing (6) subject to (7), (8), (9) and (10)), the donor realizes a positive surplus over autarky. The government can also realize positive initial surplus and necessarily does if the grant,  $\tau$ , is positive. The punishments used cannot be renegotiation proof if there are gains from aid in this economy. To show that renegotiation-proof equilibria exist and characterize these, we follow the approach taken by Kletzer and Wright [2000] for a debtor-creditor relationship, but with an important complication.

In the consumption-smoothing debt model, Kletzer and Wright [2000] prove that efficient perfect equilibrium payment and repayment paths can be supported by renegotiation-proof punishments.<sup>10</sup> These punishments work because they give the party that defects from equilibrium behavior the same utility as under permanent autarky. They are renegotiation-proof because the other party gets all of the gains from the efficient equilibrium. In that game, the surplus possibility frontier for efficient perfect equilibria is downward sloping so that the creditor's surplus is maximized when the debtor's surplus is minimized in an efficient equilibrium path.

The parallel to this reasoning is that if the government deviates from the equilibrium of an agreement in period  $t - 1$ , it can pay an amount that just exhausts the future surplus that it receives from starting a new aid agreement at time  $t$ . This payment would be made as a transfer from the rich to the poor. The government gains future surplus from starting a new aid contract in the amount of its discounted continuation surplus,  $\beta E_t V_{t+1}^q$ , but gives up exactly this much surplus as  $v(y_t) - v(c_t^r)$  by paying  $y_t - c_t^r$  as a transfer to the poor.

Renegotiation in the conditional aid economy can reduce the set of sustainable equilibrium aid and transfer schemes. This will be true if the donor can increase its utility by financing additional transfers to the poor (above the amount,  $y_t - c_t^r$ , that the government is just willing to pay in the absence of aid in period  $t$ ). Aid, however, raises the reservation utility of the government in date  $t$  by  $v(y_t + \tau_t) - v(y_t)$  so that the consumption of the rich,  $c_t^r$ , and the government's surplus in punishment rise with  $\tau_t$ . Providing a grant can increase the donor's utility even though it also raises the government's surplus in punishment if

$$u'(c_t^p) \left( 1 - \frac{v'(y_t)}{v'(c_t^r)} \right) > 1,$$

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<sup>10</sup>In Kletzer and Wright [2000], the equilibria demonstrated are renegotiation proof by any definition of renegotiation proofness in the game theory literature. The definition adopted here will be that of Farrell and Maskin [1989].

for  $c_t^r$  as defined and  $c_t^p = w_t + y_t - c_t^r$ . We take this to be the general case for our model economy. Refusing to provide aid after the government deviates is not a time consistent plan for the donor.

A renegotiation-proof equilibrium requires the specification of aid inflows in punishment that leave the government at least as well off cooperating in a return to a constrained efficient equilibrium as continuing to deviate. In this economy, the donor will make state-contingent grants in punishment that are smaller than those it makes in equilibrium. The government can always transfer all such aid to the rich. If, instead, it makes a sufficiently large transfer to the poor, then the donor will return to a cooperative plan under which aid is divided between poor and rich.

A two-state example illustrates. We let the incomes of the rich and poor be perfectly correlated. Consider a possible equilibrium in which the donor makes positive payments,  $\tau^q$ , in each state  $q$ , and consumption of the rich in the high income state,  $c^{r2}$ , is less than  $y^2$ . The government cooperates because  $c^{r1}$  is sufficiently larger than  $y^1$  in the low income state. The transfers to the poor equal  $y^2 + \tau^2 - c^{r2} > \tau^2$  and  $y^1 + \tau^1 - c^{r1} < \tau^1$ , in the high and low income states, respectively. Consider candidate transfers in punishment as follows. In the high income state, the donor makes the positive grant,  $\hat{\tau}^2 \leq \tau^2$ , and the government makes the transfer  $y^2 + \hat{\tau}^2 - \hat{c}^{r2} = y^2 + \tau^2 - c^{r2}$ . Similarly, in the low income state the new grant,  $\hat{\tau}^1$ , is chosen so that  $y^1 + \hat{\tau}^1 - \hat{c}^{r1} = y^1 + \tau^1 - c^{r1}$ . The transfers to the poor are the same as in the equilibrium policy.

The surplus for the government in punishment needs to satisfy the constraints,

$$v(\hat{c}^{r1}) - v(y^1) + \beta(\pi_1 V^1 + \pi_2 V^2) \geq v(y^1 + \hat{\tau}^1) - v(y^1) + \beta(\pi_1 \hat{V}^1 + \pi_2 \hat{V}^2) \quad (19)$$

and

$$v(\hat{c}^{r2}) - v(y^2) + \beta(\pi_1 V^1 + \pi_2 V^2) \geq v(y^2 + \hat{\tau}^2) - v(y^2) + \beta(\pi_1 \hat{V}^1 + \pi_2 \hat{V}^2), \quad (20)$$

where the expected future surplus from cooperating is

$$\pi_1 V^1 + \pi_2 V^2 = \frac{1}{1-\beta} [\pi_1 (v(c^{r1}) - v(y^1)) + \pi_2 (v(c^{r2}) - v(y^2))],$$

and the expected future surplus from continuing in punishment is

$$\pi_1 \hat{V}^1 + \pi_2 \hat{V}^2 = \frac{1}{1-\beta} [\pi_1 (v(\hat{c}^{r1}) - v(y^1)) + \pi_2 (v(\hat{c}^{r2}) - v(y^2))].$$

If the constraints (19) and (20) are satisfied, then the government will be just as well off cooperating in punishment by making the transfers to poor in either state and returning to higher consumption levels than by taking the aid grants,  $\hat{\tau}^1$  and  $\hat{\tau}^2$ , respectively, for every

period into the future. The constraints are added because the donor has the same incentive looking forward to make the state-contingent, punishment, grant,  $\widehat{\tau}^q$ , in period  $t + 1$  if the government deviates in period  $t$  by giving all of the grant to the rich. The constraints assure that the government realizes no gain by not returning to the cooperative relationship.

The proposed punishment aid grants and transfers to the poor are not necessarily the solutions. The inclusion of renegotiation-proof punishment surpluses for the government changes the constraint set for the dynamic programming problem that determined  $\tau^1$ ,  $\tau^2$ ,  $c^1$  and  $c^2$ . The definition of the government's surplus, equation (5) can be changed to

$$V_t \equiv v(c_t^r) - v(\widehat{y}_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} (v(c_s^r) - v(\widehat{y}_s)), \quad (21)$$

where  $\widehat{y}^q \equiv y^q + \widehat{\tau}^q$  for state  $q$  and  $\widehat{y}_t$  is  $\widehat{y}^q$  for the state  $q$  realized at date  $t$ . The dynamic program for finding the efficient equilibrium policies becomes

$$\max U_t(V_t) = u(c_t^p) - \tau_t - u(w_t) + \beta E_t U_{t+1}^q(V_{t+1}^q) \quad (22)$$

with respect to  $\tau_t$ ,  $c_t^p$ ,  $c_t^r$  and  $\{V_{t+1}^q\}$  for  $q = 1, \dots, N$ , subject to the constraints,

$$v(c_t^r) - v(\widehat{y}_t) + \beta E_t V_{t+1}^q \geq V_t, \quad (23)$$

$$V_t \geq v(y_t + \tau_t) - v(\widehat{y}_t), \quad (24)$$

$$c_t^p + c_t^r \leq y_t + w_t + \tau_t \quad (25)$$

and

$$U_{t+1}^q(V_{t+1}^q) \geq 0 \quad \text{and} \quad V_{t+1}^q \geq 0 \quad \text{for all states } q = 1, \dots, N. \quad (26)$$

The necessary conditions for a constrained optimum are unchanged.

Taking the equilibrium in the example as the solution to this renormalized version of the problem, the proposed solution may not be an efficient punishment scheme. For example, if

$$u'(c^{pq}) \left( 1 - \frac{v'(y^q + \tau^q)}{v'(c^{rq})} \right) = 1,$$

in each state  $q = 1, 2$ , then for constant elasticity of substitution  $v(c^r)$ ,

$$u'(c^{pq}) \left( 1 - \frac{v'(y^q + \widehat{\tau}^q)}{v'(\widehat{c}^{rq})} \right) > 1.$$

The transfers to the poor can be adjusted to maximize the donor's utility in punishment of the government.

The example and proposed punishment support the following general statement.

**Proposition 2.** There exist renegotiation-proof equilibria for the conditional aid economy. Grants-in-aid can be made by the donor to the government in subgames reached by government deviation from an equilibrium policy. In this case, renegotiation proofness contracts the set of equilibrium policies that are sustainable.

## 5 Debt and aid

Access to foreign borrowing changes the equilibrium for this economy. The government's objective function displays risk aversion and has as its only arguments the consumption of the enfranchised (rich). In the presence of risk-neutral lenders, whose opportunity cost of funds is the same as for the donor, then the government can smooth the consumption of the rich without making any transfers to the poor. As noted before, this is the case analyzed by Kletzer and Wright [2000]. Self-enforcement constraints apply which represent sovereign immunity for the government and voluntary participation for lenders. Kletzer and Wright [2000] shows that at least partial consumption-smoothing for the debtor can be sustained using punishments that are renegotiation proof in the presence of potential lender entry. Equilibrium payments by the debtor and creditors are also interpreted in terms of continuously renegotiated simple debt contracts. An implication of Kletzer and Wright [2000] is that a debt overhang serves to lock parties into a self-enforcing long-term relationship implemented by short-term renegotiable, or state-contingent, contracts.

If the government does not already have a debt overhang, it may be able to increase its utility by borrowing from abroad in the midst of a conditional aid relationship with the donor. In some income states in equilibrium for the aid relationship, the government incentive constraint can bind and the government is indifferent between defecting and making the planned transfer to the poor. The utility for the government if it defects at time  $t - 1$  equals

$$V_{t-1}^r = v(y_{t-1} + \tau_{t-1}) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(y_s), \quad (27)$$

in the case of trigger strategies, or

$$V_{t-1}^r = v(y_{t-1} + \tau_{t-1}) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\hat{y}_s), \quad (28)$$

for renegotiation-proof strategies. There are no constraints that keep the payoff in a pure debt relationship from being higher than either of these.

In the sovereign debt equilibrium, the expected present value for a lender at any time in any state satisfies the self-enforcement constraint, so that

$$y_t - \tilde{c}_t^r + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} (y_s - \tilde{c}_s^r) \geq 0 \quad (29)$$

and the surplus for the government satisfies

$$v(\tilde{c}_t^r) - v(y_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} (v(\tilde{c}_s^r) - v(y_s)) \geq 0 \quad (30)$$

where tilde indicates consumption in the pure debt relationship.<sup>11</sup> If the government can borrow at all, the self-enforcement constraint for lenders requires that the government repays in some states. Therefore, in some state at some date,  $v(\tilde{c}_s^r) - v(y_s)$  will be negative. This implies that the expected surplus with debt is positive,

$$E_t \sum_{s=t+1}^{\infty} \beta^{s-t} (v(\tilde{c}_s^r) - v(y_s)) > 0. \quad (31)$$

When the government starts borrowing, it will get all of the surplus if there is lender free entry.<sup>12</sup> In the period that the government enters a pure debt relationship, its utility equals

$$v(\tilde{c}_t^r) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} v(\tilde{c}_s^r) > v(y_t) + E_t \sum_{s=t+1}^{\infty} \beta^{s-t} v(y_s) \quad (32)$$

where the initial consumption,  $\tilde{c}_t^r$ , depends on the state and is chosen so that the borrower gets all the surplus from the lender.

The government's utility if it defects from the aid contract and can borrow exceeds its utility it defects and cannot borrow. That is, the inequality,

$$v(y_{t-1} + \tau_{t-1}) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\tilde{c}_s^r) > v(y_{t-1} + \tau_{t-1}) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(y_s), \quad (33)$$

holds for the debt equilibrium if trigger strategy punishments support the pure conditional aid contract. For renegotiation-proof punishments in the aid relationship, the inequality,

$$v(y_{t-1} + \tau_{t-1}) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\tilde{c}_s^r) > v(y_{t-1} + \tau_{t-1}) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\hat{y}_s), \quad (34)$$

where  $\hat{y}_s \geq y_s$ , can hold. We can see that this should hold under broad conditions. The expected surplus on the right-hand side of the inequality,  $E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\tilde{c}_s^r)$ , equals the maximal expected utility from any self-enforcing consumption-smoothing equilibrium for the government transacting with a risk-neutral lender. The example of how debt repayment can be redirected into transfer payments to the poor in Section 3 implies that this surplus should be extracted by the donor in a renegotiation-proof punishment and not given to government. Reversing the order of the expected payoffs from

$$E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\tilde{c}_s^r) > E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\hat{y}_s) \quad (35)$$

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<sup>11</sup>In the debt equilibrium, renegotiation-proof punishments generate the same utility for the sovereign debtor as does permanent autarky, so these are the same for renegotiation-proof punishments or trigger strategy punishments.

<sup>12</sup>That lenders realize zero surplus from lending in the beginning is the definition of lender free entry in Kletzer and Wright [2000]. The same convention is used here.

would require very large total net gains to the donor from transfers to the poor in the solution for renegotiation-proof equilibria. A little thought leads us to conjecture that in such cases, the poor would no longer be poor relative to the enfranchised, at least for highly correlated incomes and similar rates of risk aversion.

This all implies that if the government can borrow on the international credit market, the opportunity set for the donor is a subset of what it is if the government cannot. The constraint (24) imposed on the solution for the constrained optimal aid contract becomes

$$V_t \geq v(y_{t-1} + \tau_{t-1}) - v(\hat{y}_t) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} (v(\bar{c}_s^r) - v(\hat{y}_s)). \quad (36)$$

If this is binding on the solution for the renegotiation-proof equilibrium, as necessarily is for trigger strategies, then the set of self-enforcing contracts shrinks and the constrained efficient equilibrium is worse for the donor. We summarize this as follows.

**Proposition 3.** The equilibrium utility for the donor, and for the poor, is lower if the government can borrow on international credit markets subject to free lender entry than if it cannot, under the trigger strategy punishments. This holds for renegotiation-proof equilibria as well, except possibly for very high utility gains for the poor (compared to the opportunity cost of aid).

Our next concern is how the benefits of a conditional aid contract are affected by an existing debt overhang. In the model economy, a debt overhang locks the government into a long-term consumption-smoothing relationship with foreign creditors that satisfies the self-enforcing constraints (29) and (30). The example discussed in Section 3 implies that the donor can increase its objective by providing additional aid to the government. The donor faces the same opportunity cost of funds as do creditors, but cares about the utility of the risk-averse poor. In equilibrium, the government will use aid inflows to make transfers to both the poor and rich. By raising the consumption of the rich, the government will be implicitly reducing its opportunity cost of servicing the debt.

The government can defect from the aid relationship but continue to cooperate in the equilibrium with its creditors, or it can deviate from both simultaneously. The first case implies that the utility for the government when it defaults on the aid contract only in period  $t - 1$  is

$$v(y_{t-1} + \tau_{t-1}) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\bar{c}_s^r),$$

where  $\bar{c}_s^r$  denotes consumption in the debt relationship alone.  $\bar{c}_s^r$  and  $\tilde{c}_s^r$  can be different because they can denote the consumption paths of the rich when the surplus in the debt relationship in period  $t$  is divided between the government and foreign creditors differently.

When the government defaults on the aid contract and continues to service existing debt, the division of the surplus between creditors and the government in the debt relationship depends on the current and past states of nature. When the government defects from an aid only relationship to begin to borrow, it realizes all of the surplus from borrowing. The difference is simply that the government has outstanding debt in the first case and no prior debt in the second. Therefore,

$$E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\tilde{c}_s^r) \geq E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\bar{c}_s^r),$$

but the inequality,

$$v(y_{t-1} + \tau_{t-1}) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\bar{c}_s^r) > v(y_{t-1} + \tau_{t-1}) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(y_s),$$

holds as long as there are mutual gains from consumption smoothing between risk-neutral lenders and the risk-averse government. The incentive constraint for the government for the problem of finding a constrained efficient aid contract parallels that for no initial debt and is

$$V_t \geq v(y_{t-1} + \tau_{t-1}) - v(y_t) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} (v(\bar{c}_s^r) - v(y_s)). \quad (37)$$

With pre-existing debt, the transfer payment to the poor is also different. It is given by

$$c_t^p - w_t = y_t + \tau_t - c_t^r - (y_t - \bar{c}_t^r), \quad (38)$$

where  $(y_t - \bar{c}_t^r)$  is the debt payment made by the government. The opportunity set for the donor to maximize utility over is a subset of the opportunity set for the exclusive aid relationship characterized in Section 3 by the increase in the government's default payoff and by the restriction that a portion of what the government is willing to pay for consumption smoothing goes to creditors and not the poor. In the initial optimization problem for the donor (beginning with expression (6)), we need to replace constraint (8) with constraint (37) and the resource constraint (9) with the new constraint (38) to write the donor's optimization problem in the presence of outstanding debt. The maximized utility of the donor must be lower. The first-order condition for grants-in-aid changes to

$$u'(c^p) \left( 1 - \frac{v'(\bar{c}^r + \tau)}{v'(c^r)} \right) = 1,$$

which implies a larger marginal utility for the poor in equilibrium than for the original condition,

$$u'(c^p) \left( 1 - \frac{v'(y + \tau)}{v'(c^r)} \right) = 1,$$

and, consequently, lower consumption for the poor in each income state. Renegotiation proofness can also be imposed on the punishments. Renegotiation-proof punishments for deviation from the aid and not the debt relationship can be constructed in the same way as before, but are different punishment because the grants-in-aid and transfers to the poor are smaller.

Next, consider the possibility that the government deviates simultaneously from both the aid and debt equilibrium plans. The utility for the government in defection is the same as for the original exclusively aid contract, inequality (28) for renegotiation-proof equilibria,

$$V_{t-1}^r = v(y_{t-1} + \tau_{t-1}) + E_{t-1} \sum_{s=t}^{\infty} \beta^{s-t} v(\hat{y}_s).$$

Any efficient equilibrium derived imposing this condition on the economy with a debt overhang is not the same as the aid only contract of Sections 2 and 3. This is because the resource constraint is still given by equation (38).

The last possibility we consider is that the donor buys the debt. Once the donor holds the debt overhang, it can pursue the optimal aid policy which solves the problem for the most inclusive opportunity set, given in Section 3 (or Section 4 for renegotiation-proof equilibria). Because the opportunity set shrunk with either unexploited (no prior debt) or already exploited access to international credit markets, the equilibrium utility of the poor is maximal over all self-enforcing equilibria for this economy. The surplus for the poor is the same as when the government had no access to the credit market (the first case analyzed) because the donor increases its objective by directing any potential repayments on the debt to transfer payments to the poor. This is consequent to our assumption that the marginal utility of the poor always exceeds the opportunity cost of donor resources in the constrained equilibrium. Modifications for the possibility that fully efficient equilibria are possible are straightforward and would just imply that the donor will request some repayments in some income states.

A question is whether the donor is willing to buy the debt or does this leave the donor with negative initial surplus. Begin with the case that there is a debt overhang owed to non-donor creditors and that the supplementary aid contract is efficient for the donor. The donor does not want to redirect any repayments to transfer payments to the poor. In this case, after the donor buys the debt, the donor will follow exactly the equilibrium path of payments and repayments for the debt that the non-donor creditors would have. The debt has exactly the same value to the donor as it does to the old creditors, and in a competitive market, the debt price would exactly equal the donor's value so the donor would neither gain or lose. Next, suppose that the donor increases its objective by redirecting part or all of any potential repayments to transfer payments to the poor. Since the donor can choose to behave like any other creditor, by not doing so, it must realize a utility increase. The value of

the debt is higher for the donor than for the sellers of debt. In a competitive secondary debt market, the donor gets positive surplus from buying the debt and this surplus is revealed by the donor forgiving repayments if the government spends a sufficient share of the same resources on the poor. Forgiving debt payments on official bilateral or multilateral frequently occurs in the form of reschedulings and grants that cover debt service rather than outright *de jure* forgiveness for a variety of budgetary, legal or political reasons of concern to donors. Debt purchases may also not occur outright, but, rather, through a series of official loans from donors that eventually replace private debt.

The arguments of this section can be summarized as follows.

**Proposition 4.** The utility of the donor, and hence, of the poor, is lower in a self-enforcing equilibrium if the government can borrow on international financial markets than if it cannot, unless the marginal utility of consumption for the poor equals the opportunity cost of donor aid in each of these equilibria.

**Proposition 5.** The donor increases its utility by purchasing an outstanding debt overhang unless transfers to the poor are already unconstrained efficient. After purchasing the debt, the donor will forgive debt repayments conditional on the government spending the resources on transfers to the poor. Doing so raises the utility of the poor.

In the entirety of this paper, we have not addressed the possibility of domestic self-enforcing risk-sharing arrangements between the rich and poor. In particular, some readers may be concerned about expressions that imply that the rich repay foreign debt. A self-enforcing transfer scheme can be introduced by introducing the possibility that the poor pay state-contingent lump-sum taxes in exchange for state-contingent lump-sum transfers that give them at least as much utility in any state as autarky. Autarky in this case is tax evasion. Tax evasion could be made costly. Similarly, the government, representing the rich, makes transfer payments to the poor to the extent the surplus of the rich is no less than autarky. Autarky for the rich means getting no tax revenue from the poor and paying no taxes to provide transfer payments to the poor. In equilibrium, the rich do indeed pay the taxes to service the debt as implicitly assumed above.

## 6 Conclusion

Our analysis addresses the question of whether debt relief is necessarily the best approach for achieving an increase in social welfare spending in highly-indebted impoverished countries. Observations that motivate this paper include the overlap between bilateral and multilateral donors and creditors and the tendency of these official creditors to *de facto* for-

give debt repayments but not debt overhangs. We also study the dynamics and enforcement of conditional aid relationships to illustrate the constraints that bind on mobilizing more aid for poverty alleviation in developing countries. In the presence of conflicting objectives between donors and recipient governments, debt relief can reduce the utility of an altruistic donor and the welfare of the poor in a constrained optimal conditional aid relationship. Our analysis implies that renewed access to private international credit for the governments of heavily-indebted countries may not be desirable for donors unless the government's priorities match those of donors. Our analysis does not address debt and growth, but it does address debt, aid and the allocation of fiscal resources in a way that could extend to growing economies.

## References

- [1] Alesina, A., and D. Dollar, (2000), “Who Gives Foreign Aid to Whom and Why?” *Journal of Economic Growth* 5, No. 1: pp. 33-63
- [2] Azam, J-P and J-J Laffont, (2001), “Contracting for Aid,” *Journal of Development Economics*, forthcoming.
- [3] Berlage, L., D. Cassimon, J. Drèze and P. Reding (2000), “Prospective Aid and Indebtedness Relief: A proposal,” *Core Discussion Paper* 2000/32.
- [4] Boone, P. (1996), “Politics and the Effectiveness of Foreign Aid,” *European Economic Review*, 40: pp. 289-329.
- [5] Burnside, C., and D. Dollar, 2000, “Aid, Policies, and Growth,” *American Economic Review*, Vol. 90, No. 4: pp 847-867.
- [6] CISDE-Caritas International (1999), *Putting Life Before Debt*, available on the web at: <http://www.cidse.org/pubs/finaldebteng.html>
- [7] Collier, P., and D. Dollar, (1999), “Aid Allocation and Poverty Reduction,” *European Economic Review*, Vol. 46, No. 8, pp. 1475-1500.
- [8] Cordella, T., and G. Dell’Ariccia (2002) “Limits of Conditionality in Poverty Reduction Programs,” *IMF Staff Papers*, Special Issue, Vol. 49, pp. 68-86.
- [9] Drazen, M. (2000), *Political Economy in Macroeconomics*, Princeton, Princeton University Press.
- [10] Easterly, W., (2001), *The Elusive Quest for Growth*, MIT Press, Cambridge, MA
- [11] Federico, G. (2001), “Samaritans, Rotten Kids and Policy Conditionality,” *Mimeo*, Nuffield College, Oxford.
- [12] Kletzer, K.M. , and B. D. Wright [2000], “Sovereign Debt as Intertemporal Barter,” *American Economic Review*, Vol 90, pp. 621-639.
- [13] Kocherlakota, Narayana R. [1996], “Implications of Efficient Risk Sharing without Commitment.” *Review of Economic Studies*, 63(4), October, pp. 595-609.
- [14] Murshed, M., and S. Sen, (1995), “Aid Conditionality and Military Expenditure Reduction in Developing Countries: Models of Asymmetric Information,” *Economic Journal*, Vol. 105: pp. 498-509.

- [15] Pallage, S., and M. Robe, (2001), "Foreign Aid and the Business Cycle," *Review of International Economics*, Vol. 9, pp. 641-672.
- [16] Sachs, J. (1989), "Conditionality, Debt Relief, and the Developing Country Debt Crisis," in J.Sachs (ed.) *Developing Countries Debt and Economic Performance Vol. 1, The International Financial System*, Chicago: University of Chicago Press.
- [17] Svensson, J. (2000), "When Is Foreign Aid Policy Credible? Aid Dependence and Conditionality," *Journal of Development Economics*, Vol 61: pp. 61-84.
- [18] Thomas, Jonathan and Timothy Worrall [1988], "Self-Enforcing Wage Contracts." *Review of Economic Studies*, 55(4), October, pp. 541-53.

Table 1. Our Dataset

Recipients	Donors	Years
Benin	Australia	1996
Bolivia	Austria	1997
Burkina Faso	Belgium	1998
Cameroon	Canada	1999
Chad	Czech Republic	2000
Comoros	Denmark	
Congo Democratic Rep. (Zaire)	Finland	
Cote d'Ivoire	France	
Ethiopia	Germany	
Gambia	Greece	
Ghana	Ireland	
Guinea	Italy	
Guinea-Bissau	Japan	
Guyana	Korea	
Honduras	Luxembourg	
Madagascar	Netherlands	
Malawi	New Zealand	
Mali	Norway	
Mauritania	Poland	
Mozambique	Portugal	
Nicaragua	Spain	
Niger	Sweden	
Rwanda	Switzerland	
Sao Tome & Principe	Turkey	
Senegal	United Kingdom	
Sierra Leone	United States	
Tanzania	AfDF/AfDB	
Uganda	Arab Agencies	
Yemen	CarDB	
Zambia	EC	
	GEF	
	IBRD/IDA	
	IDB Sp.Fund	
	IFAD	
	IFC	
	IMF	
	Nordic Dev.Fund	
	Other UN	
	SAF+ESAF(IMF)	
	UNDP	
	UNFPA	
	UNHCR	
	UNICEF	
	UNTA	
	WF	

Table 2: Net Official Flows (Annual Averages 1996-2000).

Country	Net Official Flows (\$mil.)	Net Official Flows/GDP	Net Official Flows (\$ per capita)
Benin	231.5	11%	39.0
Bolivia	593.3	8%	75.2
Burkina Faso	372.2	15%	34.7
Cameroon	444.6	5%	31.4
Chad	194.3	13%	26.9
Comoros	28.8	14%	54.8
Congo Dem.Rep. (Zaire)	154.2	3%	3.2
Cote d'Ivoire	480.7	5%	32.6
Ethiopia	678.5	11%	11.1
Gambia	37.5	9%	30.7
Ghana	608.3	9%	33.2
Guinea	257.9	7%	36.7
Guinea-Bissau	113.2	50%	99.0
Guyana	124.9	19%	153.2
Honduras	413.1	8%	66.8
Madagascar	479.1	13%	33.1
Malawi	423.3	22%	41.3
Mali	400.3	16%	38.6
Mauritania	226.6	23%	90.3
Mozambique	1075.2	32%	63.3
Nicaragua	723.5	46%	152.0
Niger	216.4	11%	21.5
Rwanda	365.7	21%	47.1
Sao Tome & Principe	34.0	84%	241.0
Senegal	477.7	11%	52.9
Sierra Leone	122.6	17%	25.4
Tanzania	973.7	13%	30.3
Uganda	678.8	11%	32.4
Yemen	316.2	5%	19.0
Zambia	541.7		-
Average		18%	

Table 3. Cameroon: Ranking of Debt Holders and Donors (year 2000)

Donor Countries	Ranking as debt holder (NPV of debt)	Ranking as Net donor
France	1	1
Germany	2	2
Italy	4	9
Japan	5	17
Austria	6	4
Belgium	7	8
United Kingdom	8	7
Netherlands	9	15
Canada	10	6
United States	11	13
Switzerland	12	16
Denmark	13	12
Sweden	14	11
Finland	15	19