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Foreign Aid and Rent-Seeking

Jakob Svensson

Why has foreign aid had so seemingly poor a macroeconomic impact in many developing countries? Is there a relationship between concessional assistance, widespread corruption, and other types of rent-seeking?

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Summary findings

To address the relationship between concessional assistance, corruption, and other types of rent-seeking activities, Svensson provides a simple game-theoretic rent-seeking model. Insights with interesting implications emerge from the analysis:

• An increase in government revenue (from windfalls, for example, or from increased foreign aid) does not necessarily lead to the provision of more public goods and in certain circumstances may reduce it.

• The mere expectation of aid may suffice to increase rent-dissipation and reduce productive public spending. But if the donor community can enter into a binding policy commitment, this result may be reversed.

Svensson provides some preliminary empirical evidence in support of the hypothesis that windfalls and foreign aid, in countries suffering from a divided policy process, are on average associated with more extensive corruption.

He finds no evidence that donors systematically allocate aid to countries with less corruption.

The results accord with recent empirical findings that aid is more effective, the greater the effort to direct it to good performers. But such a regime shift may involve an aid policy that in the short run provides more assistance to countries in less need and less aid to those in most need. Enforcing such a regime shift might be difficult.

This paper — a product of the Development Research Group — is part of a larger effort in the group to study the effectiveness of foreign aid. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Rebecca Martin, room MC3-354, telephone 202-473-9065, fax 202-522-3518, Internet address rmartin1@worldbank.org. February 1998. (28 pages)

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It is so easy to give. So wonderfully satisfactory. To receive, on the other hand, demands a balance of self-control and generosity [John Steinbeck (1954), "Cannery Row"]

1. Introduction

Empirical evidence indicates that rent-seeking is a serious problem in the third world. This type of discretionary redistribution also tend to be particularly severe in "good" times. For instance, Ahmad Khan (1994) emphasizes the pervasiveness of corruption and other side-interests as a result of the oil boom in Nigeria and Gelb (1988) and Little et al. (1994) attributed low post-boom growth rates following positive terms of trade shocks to the fact that windfalls were either consumed or invested in (low return) projects benefiting special interests. A country-specific example illustrates the point. "Public spending in Nigeria during the oil boom in the early 1990s increased by more than 50 percent, yet over the same period school enrollment shrunk due to tight education funding. The Nigerian Nobel Prize winner and dissident writer Wole Soyinka (1996) notes that a government-appointed commission of inquiry was unable to account for what happened to much of the 1990s government oil windfall" [Easterly & Levine (1996)].

Causal empiricism suggest that the dramatic increase in foreign aid over the past three decades has had a similar effect in many countries. For instance, the World Bank reports that the rapid increase in foreign exchange resources, mainly due to large concessional flows, has greatly expanded the opportunities of malfeasance [World Bank (1989) p.27,61], and Klitgaard (1990) gives a vivid description of aid-related corruption in Africa. In many developing countries foreign assistance is an important source of revenue, constituting more than 50 percent of total government revenues (excluding grants) for the 30 most aid-dependent countries in 1970-90. Despite this vast resource transfer, a number of empirical studies, dating back at least to the study by Griffin (1970), have shown that the macroeconomic effects of aid are, at best, ambiguous. This holds true not only for traditional macroeconomic variables such as investment and growth, but also with respect to measures of social and human development [Boone (1996)].

To explain this puzzle we develop a game-theoretic rent-seeking model in which (social) groups compete over common-pool resources. The common resources can either be invested in public goods, or be appropriated for private consumption. The latter either by means of direct appropriation (seizure of power) or manipulations of bureaucrats and politicians to implement favorable transfers, regulations and other redistributive policies. In a static setting it is not hard to see how this setup can lead to a Pareto-inefficient Nash equilibrium: each group will be strictly better off if all reduced their costly appropriation efforts, but an unilateral decrease is not rational for the individual social group. However, since the social groups interact repeatedly, this may provide a mechanism which can reduce the conflict of interest.[1] At the same time, these forces may not suffice to deliver the first-best outcome since full cooperation among the groups maximizes the reward for behaving opportunistically. Hence, it is possible to envision an economy where the degree of cooperation among social groups is, at the margin, balancing the benefit of cooperative behavior with the cost of sustaining the equilibrium. This idea has been applied in the industrial organization context by Rotemberg & Saloner (1986), who analyzed the way tacit coordination among producers with market power varies throughout the business cycle.

This paper employs a similar mechanism in a political economy context. We show that an increase in government revenues, under certain circumstances, lowers the provision of public goods. This provides an explanation for why large disbursements of aid, or windfalls, do not necessarily lead to increased welfare. Second, we show that the mere expectation of aid according to the recipients' future needs may increase rent dissipation and reduce the expected number of periods in which efficient policies can be sustained. This may be an important observation because a positive correlation between recipient's needs and aid flows has been noted in the literature.

These results have three novel implications. First, since concessional assistance may influence policy in the recipient country even without any resources actually being disbursed, evaluations of project and sector assistance may overestimate the total impact of foreign aid. Second, the effects of development aid critically depend on the political equilibrium in the recipient country. An empirical investigation of the macroeconomic impact of aid that does not take this into account may yield biased results. Finally, if the donor community can enter into a binding policy commitment, aid may mitigate the incentives for social groups to engage in rent-seeking activities.

The empirical prediction of the model is that discretionary aid, and windfalls, in countries with divided policy control, will on average be associated with higher rent-seeking activities. Motivated by the theory, we specify a simultaneous equation system to test this implication. To this end, we try to identify characteristics of the political and socio-political structure of a country which are plausibly correlated with the existence of influential social groups and, consequently, a divided policy process. As the dependent variable we employ an index of corruption. Although the results are only preliminary, we are encouraged by the fact that we cannot reject that the model's prediction is consistent with the data. In particularly, we find that foreign aid and windfalls, in countries suffering from a divided policy process, are on average associated with higher corruption. We find no evidence that the donors systematically allocate aid to countries with less corruption, which is what the model of donor assistance under discretion predicts.

There is only limited work on foreign aid and endogenous macroeconomic policy. Casella & Eichengreen (1994) show, in line with our results, using the Alesina & Drazen (1991) model, that the prospect of aid can actually exacerbate the delay in stabilization, by inducing the social groups to postpone making sacrifices until aid

[1] See Benhabib & Rustichini (1996) for a dynamic model with this ingredient.

actually materializes. In our model, the adverse impact of aid may hold irrespective of specific timing assumptions. Further, Ranis & Mahmood (1992) argue that the availability of external resources tends to promote irresponsible policies. Boycko et al. (1996) discuss the impact of foreign assistance in countries characterized by a divided government, arguing that aid may be counterproductive if based on the wrong premise of government. This is an argument which accords well with our model's prediction. The papers closest in spirit to ours are Lane & Tornell (1995, 1996). They show that in a growth model with several powerful interest groups, a change in productivity (or terms of trade) may lead to a reduction in the growth rate. They also provide some empirical evidence in support of their model. Our analysis, by studying a repeated rather than a dynamic game should be regarded as complementing their work. However, our model differ from that of Lane & Tornell in a number of ways. First, the chocks in our model are stochastic, rather than a one-time change in a perfect-foresight model as in Lane & Tornell. More important, in Lane & Tornell, the voracity effect whereby an increase in the raw return to aggregate capital leads to a more than proportional increase in redistributive transfers, is due to a coordination failure across the interest groups. Our results, on the contrary, arise from Pareto constrained responses by the social groups to changing incentives to deviate. However, the main difference is that we focus primarily on foreign aid. Foreign aid differs from the other sources of windfalls in that the outcome depends on the donors actions. Taking this explicitly into account we find that foreign aid also affects the equilibrium through a less tangible mechanism, namely the mechanism that enforces the control of rent dissipation in the economy.

Recently a number of studies have empirically investigated the macroeconomic impact of foreign aid. Boone (1996) concludes that aid primarily goes to consumption and that there is no relationship between aid and growth, nor does it benefit the poor as measured by improvements in human development indicators, while Burnside & Dollar (1997) find that aid has a positive impact on growth in countries with "good" fiscal, monetary and trade policies. The empirical section of the paper provides additional evidence on the aggregate impact of foreign aid, but rather than studying the relationship between aid and growth, we study the relationship between aid and corruption. Contrary to existing literature on foreign aid, we explicitly take into account that the impact of aid is likely to depend on the political equilibrium in the recipient country.

This paper is organized as follows. In section 2 the model is presented. In section 3, the noncooperative- and the fully cooperative equilibrium in the stage game are derived. The second best equilibrium is studied in section 4. In section 5 the model is extended by explicitly model the donor's behavior. Section 6 provides some empirical results and section 7, finally, concludes.

2. A political model of public spending and rent-dissipation

2.1. The model

Consider an economy consisting of n powerful social groups. All groups have "common access" to the government's budget constraint. More precisely, at the beginning of each time period the government receives income (revenue) y_t. Income can be used either on local public goods, or appropriated by each individual social group. Appropriation of common resources is costly. Hence, rent-seeking outlays by group i, denoted by z_i, result in total appropriation equal to $d_i = y\frac{z_{it}}{\sum_{j=1}^{n} z_{jt}}$ for $z_{it} > 0$, and $d_i = 0$ for $z_{it} = 0$.[2] Thus, private consumption is

$$c_{it} = \begin{cases} y_i & \text{for } z_{it} = 0 \\ y(\theta_t)\frac{z_{it}}{\sum_{j=1}^{n} z_{jt}} - z_{it} + y_i & \text{for } z_{it} > 0 \end{cases} \tag{2.1}$$

where $y(\theta_t)$ is government revenue, c_{it} denotes consumption of the i^{th} group, and z_{it} denotes rent-seeking outlays by social group i, all expressed in time period t. The last term in (2.1), y_i, denotes the exogenously given income received by group i at the beginning of each time period. We think of this as income derived from the informal sector or from capital held abroad. It is assumed that y_i is secure from appropriation from others. Equation (2.1) warrants two remarks. First, income for private consumption is derived from two sources: appropriation of government revenue, the first two terms in (2.1), and from the secure stock of capital (y_i). Second, the appropriation technology is exogenously given. It can be interpreted as a reduced form of a more structural model, in which organized social groups can capture a large share of government income either by means of direct appropriation, or by manipulating the political system to implement favorable transfers, regulations, and other redistributive policies.[3] This implies that z_{it} is a composite variable of both direct cost for redistribution; such as bribes, and indirect cost of political competition; such as protection costs, and resources employed to seize, or attempt to seize, power and restrict opponents political activities.

We assume that $y(\theta_t)$ is stochastic, where θ_t is the realization at t of the observable shock to revenues. Income is assumed to be strictly increasing in θ_t and we postulate that θ_t has domain $[\underline{\theta}, \bar{\theta}]$, and a distribution function $F(\theta_t)$. Furthermore, we assume that the shocks are independently and identically distributed over time.

[2]This setup builds on the seminal contribution by Tullock (1980). See Nitzan (1994) for a survey on alternative ways of modelling rent-seeking contests.

[3]See e.g. Becker & Stigler (1974), Rose-Ackerman (1975, 1978), Klitgaard (1988) and Acemoglu & Verdier (1995) for principal-agent models of corruption and rent-seeking and Shleifer & Vishny (1993) for an industrial organization perspective on corruption. References to the earlier rent-seeking literature includes, among others, Tullock (1967) and Krueger (1974).

Each social group has a population of size 1. There is no heterogeneity within groups.[4] The citizens get utility from consumption and public projects. The per period utility of the i^{th} social group (or individual) is given by $u_{it} = b_{it} + c_{it}$, where $b_i = \left[y(\theta_t) - \sum_{j=1}^{n} d_i\right]/n$ is the amount of local public goods benefiting group i.

The social groups interact strategically, each maximizing the following expected utility function

$$E\sum_{t=0}^{\infty}\delta^t u_{it} \tag{2.2}$$

subject to the per period budget constraint $y_c \leq z_{it}$.

This model defines a repeated game among the n social groups. At the beginning of each period, θ_t becomes common knowledge. The social groups then simultaneously choose rent seeking outlays $z_i \in [0, y_c]$. Resources not appropriated by the social groups are thereafter spent on local public goods in a symmetric fashion.

A strategy for the individual social group is a policy function $z_i(\theta_t)$ that specifies the amount of rent-seeking outlays for each realization of θ_t.

3. The Stage Game

To solve the problem we start by calculating the symmetric Nash- and cooperative equilibrium in the stage game.

3.1. Nash equilibrium

Each social group determines the optimal level of rent-seeking outlays, z_{it}, taking z_{jt} for $j \neq i$ as given. The first-order condition for this problem can be written as

$$\frac{y(\theta_t)}{\sum_{j=1}^{n} z_{jt}}\left[1 - \frac{z_{it}}{\sum_{j=1}^{n} z_{jt}}\right] - 1 = 0 \tag{3.1}$$

Hence, in equilibrium the marginal gain of rent-seeking, taking the form of an higher share of total net income, should be equal to the marginal cost, unity. Solving for z_{it} and summing over i gives us the aggregate level of rent dissipation in the economy

$$Z^n(\theta_t) = \frac{(n-1)}{n} y(\theta_t) \tag{3.2}$$

where superscript n denotes the symmetric Nash equilibrium. Clearly, rent dissipation is an increasing function of the number of social groups and the aggregate level of income.

In the Nash equilibrium, all common resources will be appropriated from the budget. Hence, $b_i^n(\theta) = 0$ and $\sum_i^n d_i^n(\theta_t) = y(\theta_t)$. However, as appropriation is costly, only a fraction of the appropriated resources will actually benefit the social groups through higher private consumption.

[4] Hence, we abstract from collective choices within the interest groups.

3.2. Cooperation among the social groups

Now consider instead the fully cooperative equilibrium in which the n social groups cooperate with each other. The symmetric cooperative equilibrium is a vector of feasible policy functions $[z_i(\theta_t), ..z_n(\theta_t)]$ such that all social groups exert the same level of rent-seeking activities and $z_i(\theta_t) = \arg\max\ E\sum_{i=1}^{n} u_{it}$.

Clearly since rent-seeking is a zero-sum game in influence, but a negative-sum game in total resources, the cooperative equilibrium has $z_i^c(\theta_t) = 0\ \forall\ i$. Hence, in the fully cooperative equilibrium all resources will be spent on public projects, $b_i^c(\theta) = y(\theta_t)/n$. Moreover, since rent-seeking is costly, there will be no rent-dissipation in equilibrium. Consequently, utility is strictly higher than in the Nash equilibrium.

4. The Repeated Game

4.1. Second best equilibrium (SBE)

The game described in section 3 is a repeated game. Hence, one equilibrium is the Nash equilibrium in the stage game repeated infinitely. However, infinitely played games of the type described above are usually able to sustain an equilibrium that strictly dominates the outcome in the corresponding static Nash equilibrium played repeatedly, even if the groups cannot sign binding contracts. The extreme case would be if the social groups could sustain the fully cooperative outcome in all states. In reality the actual outcome may lie between the extreme regimes of either full cooperation and non-cooperative behavior. This is so because, on the one hand, repeated interaction provides a mechanism which can sustain a subgame perfect equilibrium (SPE) with higher payoffs for all groups with trigger strategies. On the other hand, these forces may not suffice to deliver the fully cooperative outcome in all states, since full cooperation maximizes the reward for behaving opportunistically. Hence, it is possible to envision an economy where the degree of cooperation among the social groups is, at the margin, balancing the benefit of cooperative behavior with the cost of sustaining the equilibrium.

To deter groups from deviating, the equilibrium must involve a mechanism that punishes deviations. One such mechanism would be the use of punishment against defecting groups in periods following the defection [see Friedman (1971)]. A simple, but not the only, way to ensure sequential rationality is for the punishment to involve playing of the static Nash-equilibrium for the reminder of the game after the first defection is detected. We restrict attention to these kind of strategies.

One important observation about this setup is in order. As shown by Abreu (1988), the highest equilibrium payoff is achieved by threatening to respond to a deviation by infinitely playing the SPE which gives the player that deviates the lowest possible SPE payoff. In general, switching forever to the stage-game Nash equilibrium is not the strongest credible punishment. Thus, a higher expected payoff could be achieved by threatening to respond with a harsher punishment. However, provided that the number of social groups are sufficiently high, it is obvious from equation (3.2) that the stage-game Nash equilibrium repeated infinitely approximately yields the lowest possible SPE payoff, since all common resources are dissipated. In this case the stage-game Nash equilibrium is indeed the optimal punishment. This implies that we focus on the equilibrium that lies on the constrained Pareto frontier (second best equilibrium, i.e. the SPE which yields the highest expected present discounted utility of each group along the equilibrium path. Due to institutional arrangements, social norms and evolution we believe it is conceivable that this is the "focal equilibrium" the social groups will coordinate on.

Definition 4.1. *The second best equilibrium (SBE) is a sequence of feasible policy functions* $[z_i(\theta_t), ..z_n(\theta_t)]$ *such that: (i) all social groups exert the same level of rent-seeking activities; (ii) the rent-seeking configuration is sustainable in equilibrium; (iii) the expected present discounted utility of each group along the equilibrium path is not Pareto dominated by other equilibrium payoffs.*

The equilibrium is solved in two steps. First, the highest sustainable level of income is determined for a given punishment. Second, the optimal punishment as a function of the highest sustainable level of income is derived. This defines a mapping from the set of possible punishments into itself. The fixed point of this mapping, then, defines a threshold value for θ_t.

We start by exploring the options of the pressure groups for each value of θ_t. Let $v^c(\theta_t) = y(\theta_t)/n$ be the equilibrium level of "net" utility (i.e. net of own income y_i) for each social group under full cooperation. Since $y(\theta_t)$ is increasing in θ_t, "net-utility" is increasing in θ_t.

Along the cooperative equilibrium path, an increase in the level of rent-seeking with an arbitrary small amount raises net-utility for the group that deviates to almost $y(\theta_t)$. Thus, group i would deviate from the joint utility-maximizing strategy if

$$y(\theta_t) > \frac{n}{n-1}P \tag{4.1}$$

where P is the punishment inflicted on group i in the future if it deviates at time t. Note that the higher θ_t, the higher is $y(\theta_t)$, and the greater are the incentives to deviate for a given P. Since $y'(\theta_t) > 0$, there exist some $\hat{\theta}_t$, for which $y(\hat{\theta}_t) = (n/(n-1))P$. Thus, if $v(\theta_t)$ denotes the highest level of net-utility each group can sustain in the SBE,

$$v(\theta_t) = \begin{cases} v^c(\theta_t) & \text{for } \theta_t \leq \hat{\theta}_t \\ v^c(\hat{\theta}_t) = \dfrac{1}{n-1}P & \text{for } \theta_t > \hat{\theta}_t \end{cases} \tag{4.2}$$

Clearly, the higher the punishment, P, the higher the equilibrium level of net-utility, $v(\theta_t)$. The future loss from deviation at some date, discounted at the same date, can be stated as[5]

$$P(\hat{\theta}_t) = \frac{\delta}{(1-\delta)} \int_{\underline{\theta}}^{\bar{\theta}} \left[v(\hat{\theta}_t, \theta_t) - v^n(\theta_t) \right] dF(\theta_t) \tag{4.3}$$

That is, P is the difference between the expected discounted value of utility from time $t+1$ to ∞, between the SBE, given in equation (4.2), and the repeated Nash equilibrium. Clearly, P does not depend on the realization of θ_t at the time of deviation. That is, total revenue at the time of deviation does not affect the punishment.

Equation (4.3) gives a mapping from the set of possible punishments into itself: a given P implies a cutoff value $\hat{\theta}_t$ from (4.2), which in turn defines a punishment level from (4.3). The equilibrium of the model is the fixed point of this mapping with the highest value of P, and hence, the highest level of utility for the social groups.

In appendix A.2. we show that sufficient conditions for the existence of a fixed point are

(i) $\frac{1}{(1-\delta)} > n$

(ii) $y(\underline{\theta})\Gamma > (\beta/n^2)E[y(\theta_t)]$

(iii) $y(\bar{\theta}_t)/E[y(\theta_t)] > \frac{\delta}{(1-\delta)n^2}$

where $\beta \equiv \delta/(1-\delta)$, $\Gamma \equiv (\beta/(n-1)-1)$ and E is the expectation operator.

Condition (i) and (ii) state that the discount factor must be sufficiently high. Otherwise the social groups discount the future too much, implying that the punishment become less important and it will no longer be possible to sustain the fully cooperative equilibrium. Condition (iii) ensures that full cooperation is not the only solution in every state. This condition is satisfied provided that there is sufficient dispersion in the distribution of revenues.

Lemma 4.2. *If conditions (i)-(iii) are satisfied, there exists a fixed point $\hat{\theta}_t$ such that (4.2) holds with P defined as in equation (4.3).*

Proposition 4.3. *An increase in revenue above the threshold value, $\hat{\theta}$, lowers the provision of public projects, leaving total utility unchanged. The equilibrium configuration for the endogenous variables are*

$$b_i(\theta_t) = y(\theta_t)/n, \;\; c_i(\theta_t) = y_c, \;\; z_i(\theta_t) = 0 \text{ for } \theta_t \leq \hat{\theta}_t$$

$$b_i(\theta_t) = 0, \;\; c_i(\theta_t) = y(\hat{\theta}_t)/n + y_c, \;\; z_i(\theta_t) = \left[y(\theta_t) - y(\hat{\theta}_t) \right]/n \text{ for } \theta_t > \hat{\theta}_t$$

Proof. Follows from Lemma 4.2 and the first-order condition (3.1). ■

The higher the income the higher the incentive to deviate from the cooperative conduct. To counter-balance this, the social groups must increase their appropriation rate so as to reduce the aggregate net level of resources for redistribution. In equilibrium, all income gains above $y(\hat{\theta}_t)$ are dissipated, leaving welfare unchanged.

[5]Note that $v^c(\theta_t) - v^n(\theta_t) = u^c(\theta_t) - u^n(\theta_t)$.

Note that in the SBE aggregate appropriation must increase by more that the rise in income, implying that the provision of public projects actually falls with an increase in income above $y(\hat{\theta}_t)$.

This finding has one important implication. If the political game described in the paper is relevant, and provided that θ_t is near $\hat{\theta}_t$, we should observe surprisingly small or in fact even contractible effects on welfare and public project provision following increased inflows of foreign aid, or windfall gains in revenue. Hence, proposition 4.3 provides one explanation for the poor macroeconomic impact of aid in many developing countries, as well as for the puzzling fact that windfalls may result in reduced public investment and a disproportionate increase in rent-seeking activities.

Corollary 4.4. *An increase in the number of social groups as an ambiguous effect on $\hat{\theta}_t$ starting from $n = 1$, but lowers the threshold value $\hat{\theta}_t$ starting from a sufficiently high n.*

Proof. See appendix A.3.

The intuition for this result is that the number of social groups affects both the gain and the punishment of a deviation. The gain in private consumption for the group that deviates is $((n-1)/n))\, y(\theta_t)$, which is clearly increasing in n. However, at the same time a larger n implies that the punishment initially becomes more severe, since the difference in welfare between non-cooperative and cooperative behaviour rises.

This non-monotonic response stands in contrast with both the standard result from the common-pool and rent-seeking literature, as well as the result reported in Lane & Tornell (1995). They show that an increase in the number of interest groups (starting from $n = 2$) leads to a higher growth rate, while the standard finding is that the free-rider problem is exacerbated by an increase in n.

Corollary 4.5. *A decrease in the discount factor lowers the threshold value $\hat{\theta}_t$.*

Proof. δ only affect Ω through the composite parameter β. As

$$\frac{d\beta}{d\delta} > 0 \quad \forall\, \delta \in (0, 1]$$

a fall in δ raises Ω. Again, as Ω is increasing in θ_t, this must be counter-balanced by a reduction in $\hat{\theta}$ in order to restore the equilibrium. ■

The intuition for this result is straightforward. The relative gain from deviating rises since the punishment is discounted more. To counter-balance this the social groups must content themselves with fewer states in which the fully cooperative outcome is sustained.

5. Aid and rent-dissipation: the indirect linkage

The main point highlighted in this section is that foreign aid may affect the equilibrium outcome not only though the direct effect explored in previous section, but also through a less tangible mechanism, namely the mechanism that enforces the control of rent dissipation in the economy.

5.1. A modified model

Consider the following extension of the model described in section 2. Besides the n social groups there is also now an external actor, a donor. We assume that the donor's preferences are partly defined over total welfare of the agents in the recipient country. Hence, the donor's problem is to maximize

$$E\sum_{t=1}^{\infty}\delta^t\left[\varphi f_t + w(s_t)\right] \tag{5.1}$$

subject to the budget constraint $f_t + a_t \leq r$. In (5.1) f_t denotes the domestic activity of the donor at time t, $s_t \equiv \sum_i^n u_{it}$, a_t is the level of aid disbursed at time t, r is the income received at the beginning of each period and $w(\cdot)$ is a concave, increasing function. Alternatively, f_t captures the welfare of giving aid to other recipient countries or to activities not valued by the recipient. Assuming that the donor's utility is linear in its domestic activity simplifies the analysis. However, the qualitative results do not hinge on this specification [see appendix A.5.]. The parameter φ is the constant marginal utility of the domestic activity.

We believe that (5.1) is a realistic and rather general characterization of the donor's preferences. The empirical literature on the determinants of foreign aid have found that aid is driven both by the donor's own interests (captured by f) and by recipients' needs (captured by s).[6]

We assume initially that aid is given in the form of public project provision. Assuming that aid is disbursed as untied program support does not alter the qualitative result. In fact we consider the alternative in section 5.1.2.

5.1.1. Foreign aid with discretion

Consider first a discretionary aid regime where it is impossible to commit policy in advance. Thus, the sequencing of events are as described in section 2.1 with the exception that the donor now determines the level of aid disbursed simultaneously with the choices of the n social groups, taking $[z_i(\theta), ...z_n(\theta)]$ as given.

The equilibrium in the stage game is characterized by two conditions. The first condition defines the amount of rent-seeking outlays and is described in section 3. The second concerns the disbursement of foreign aid, and is given by the first-order condition of the donor's maximization program

$$w'\left(\sum_{i=1}^{n}\left[c_i(\theta_t\,|a_t) + b_i(\theta_t\,|a_t)\right]\right) = \varphi \tag{5.2}$$

[6]For a recent contribution, see Burnside & Dollar (1997) who also provide references to the earlier literature.

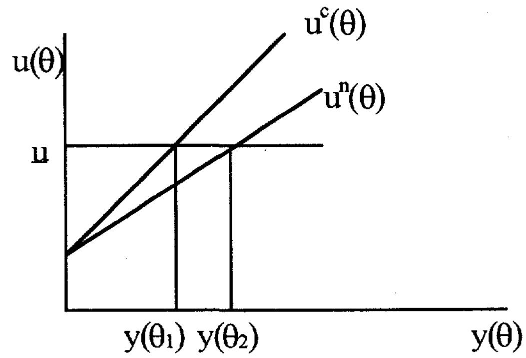

Figure 5.1: Utility in the cooperative- & Nash equilibrium with foreign aid.

where r is assumed to be sufficiently large to guarantee an interior solution and $c_i(\theta_t\,|a_t)$ is defined in (2.1), and

$$b_i(\theta_t\,|a_t) = \frac{1}{n}\left[y(\theta_t) + a_t\right] - \frac{1}{n}\sum_{i=1}^{n}\left[y(\theta_t)\frac{z_i(\theta_t)}{\sum_{j=1}^{n} z_j(\theta_t)}\right] \tag{5.3}$$

when the social groups interact non-cooperatively, and $c_i = y_c$ and $b_i = \frac{1}{n}\left[y(\theta_t) + a_t\right]$ when they act cooperatively. Thus, aid will be provided to the point where the marginal utility of aid is equal to the opportunity cost of foreign assistance, φ. In other words, the inclusion of a donor in the model sets a lower bound on the welfare of the agents.[7]

Figure 5.1 compares utility in the static Nash- and cooperative equilibrium with foreign aid for different values of θ, where $\underline{u} = w_c^{-1}(\varphi)/n$ is the lower bound on welfare. Clearly, since the payoff in the Nash equilibrium is strictly smaller than the payoff in the cooperative equilibrium for all θ, foreign aid will affect the two scenarios differently. More precisely, more aid will be given in the former setting. Thus, the presence of a donor will increase expected welfare in the Nash- relative the cooperative equilibrium. As the punishment is the expected discounted difference between utility in the second best- and Nash equilibrium, foreign aid will undermine the enforcement mechanism available for the social groups.

Proposition 5.1. *A discretionary aid policy will make cooperative behaviour more difficult to sustain thereby lowering the threshold value $\hat{\theta}_t$.*

Proof. See appendix A.4. ■

A discretionary aid policy of higher aid disbursements when income is low will undermine the enforcement mechanism available for the social groups. Since harsh

[7] We assume that $w_c^{-1}(\varphi) < \sum_{i=1}^{n} u_i^c(\bar{\theta})$ so that consumption is not constant in the fully cooperative equilibrium.

punishment facilitates cooperation, foreign aid makes cooperation more difficult to sustain. As a result, the social groups must content themselves with fewer periods in which the fully cooperative outcome can be sustained. Consequently, the expected level of rent dissipation will increase.

This result warrants four remarks. First, it is not the actual increased disbursement of aid in bad states that drives the result, but the expectation that this will happen. Hence, the fact that the donor acts according to recipient's needs may by itself increase rent dissipation in the recipient country, and reduce the number of periods in which efficient policies can be sustained. Note that this result differs from the time-consistency and Samaritan's dilemma problem explored in the literature on altruism and transfers [see e.g. Lindbeck & Weibull (1988), Coate (1995) and Svensson (1997)]. In these papers, the recipient strategically try to free-ride on the donor's concern; the recipient knows that the donor will bail him out in the future and therefore exerts lower effort today. Here, on the contrary, the linkage is more subtle: expectation of aid undermines the mechanism that enforces the control of rent dissipation.

Second, in this setup, aid is effective at the micro-level while having adverse macroeconomic consequences. Since all aid disbursed is used for project implementation, evaluation of the impact of aid from a micro-perspective would not pick up these potentially adverse effects. Hence, the model provides a possible explanation for the so called macro-micro paradox that has been discussed in the aid-literature [see e.g. Mosley (1987) and White (1992)].[8]

Third, even though the aid relationship causes corruption, the social groups are better of (in expected terms) with aid than without.

Finally, taking the model literally, rent-seeking and aid cannot coexist in the SBE. The reason for this is that for all $y(\theta) < y(\theta_1)$, welfare is constant along the equilibrium path. Thus, if it is profitable to deviate at some $y(\theta) < y(\theta_1)$, i.e. if $y(\hat{\theta}) < y(\theta_1)$, it must be profitable to deviate for all $y(\theta)$. In this case, of course, there exist no equilibrium. Hence, $\hat{\theta} > \theta_1$. It is straightforward to generalize the model so that rent-seeking and aid can co-exist in the SBE. As shown in appendix A.5., a sufficient condition for this is that the donor's utility-function over the domestic activity is concave rather than linear.

5.1.2. Foreign aid with commitments

Now consider instead an environment in which the donor can enter into a binding policy commitment before the social groups choose rent-seeking outlays. That is, suppose the timing is such that the donor first chooses aid as a function of θ and $z_i ... z_n$. Then, observing $a(\theta_t, \mathbf{z}(\theta_t))$, the social groups choose $z_i(\theta),...z_n(\theta)$. We assume now instead that aid is given as untied program support. Consequently, aggregate

[8]The paradox is that whilst micro-level evaluations have been, by and large, positive, those of the macro evidence have, at best, been ambiguous.

government income in each period is $y(\theta_t) + a(\theta_t, \mathbf{z}(\theta_t))$, where $\mathbf{z}(\theta_t)$ is the vector of rent-seeking outlays.

The equilibrium can be computed by backward induction. From the discussion at the end of previous section it follows that we only need to consider aid disbursement under two different institutional settings, namely when the social groups cooperate and when they interact non-cooperatively. In both cases, the last stage of the game is identical to that described in section 3, with $y(\theta_t)$ replaced by $y(\theta_t) + a(\theta_t, \mathbf{z}(\theta_t))$. These conditions will act as incentive constraints on the donor's maximization program in the first stage of the game. The first-order conditions for the donor are

$$w'\left(a(\theta_t, \mathbf{z}(\theta_t)) + \sum_{i=1}^{n} u_i^c(\theta_t)\right) = \varphi \tag{5.4}$$

when the social groups cooperate, and

$$w'\left(\frac{1}{n}a(\theta_t, \mathbf{z}(\theta_t)) + \sum_{i=1}^{n} u_i^n(\theta_t)\right)\frac{1}{n} = \varphi \tag{5.5}$$

when they interact non-cooperatively. As evident, the donor now internalizes the cost of rent-dissipation. The political competition over the common resources (including aid) creates a wedge, $1/n$, between the marginal utility of the recipients' consumption and the opportunity cost of foreign aid. In other words, the rent-seeking contest results in a "tax" on foreign aid. If the tax effect dominates, more aid will be given in the cooperative setting for each θ, implying that the mechanism that enforces cooperation becomes stronger. Thus,

Proposition 5.2. *A donor with access to binding policy commitment generally strengthen the mechanism that enforces cooperation, thereby increasing the threshold value* $\hat{\theta}_t$.
Proof. See appendix A.6. ■

6. Some preliminary evidence

6.1. Empirical prediction

In this section we take a first step to empirically test the predictions of the model. The test, however, is bound to be only suggestive. There are at least three reasons for this. First, time series observations for sufficiently long periods and of decent quality are only available for a small subset of the relevant variables, implying that we are constrained to analyze the medium term implications of the model. Second, since manipulations of the political system are seldom done in open and are almost never recorded, we cannot directly measure the degree of policy division. As an alternative, we try to identify characteristics of the political and socio-political structure of a country which are plausibly correlated with the existence of influential social groups and, consequently, a divided policy process. Finally, since we cannot a priori determine the cutoff value $\hat{\theta}$ and as actual disbursements of aid are likely to be (highly) correlated with expectations of future assistance, we are not able to distinguish between the two mechanisms summarized in propositions 4.3 and 5.1.

With these limitations in mind, the model's main prediction can be stated as, *discretionary aid (or expectations thereof) and windfalls, in countries suffering from a divided fiscal process, will on average increase the level of rent-seeking activities.*

To test this implication, we specify the following equation

$$z_{it} = \beta^z \mathbf{x}_{it} + \gamma^z d_{it} + \zeta^z \mathbf{w}_{it} + \theta^z (\mathbf{w}_{it} d_{it}) + \varepsilon_{it}^{\tau} \tag{6.1}$$

where z_{it} is a measure of the average level of rent-seeking activities in period t for country i, d_{it} is a proxy of a divided policy process, $\mathbf{w}_{it}$ is a vector of windfalls proxies including the level of aid disbursed to country i, denoted by a_{it}, and $\mathbf{x}_{it}$ is a vector of other variables that affect the level of rent dissipation. The model suggests that a is an endogenous variable. In fact, the equilibrium under commitment implies that a will be lower when z is higher. For this reason we also specify an aid-determinants equation,

$$a_{it} = \beta^a \mathbf{v}_{it} + \phi^a z_{it} + \varepsilon_{it}^a \tag{6.2}$$

where $\mathbf{v}_{it}$ is a vector of other variables that affect the amount of aid disbursed to country i. Once we properly instrument for aid, we can test our null hypothesis that the marginal impact of aid and windfalls on z depends on the political equilibrium, i.e. we test $\mathrm{H_O}$: $\zeta^z + \theta^z d > 0$ against $\mathrm{H_A}$: $\zeta^z + \theta^z d \leq 0$.

6.2. Data and base specification

Following Easterly & Levine (1997), we choose a measure of ethnic diversity (ETH) as proxy for the likelihood of competing social groups in a country. A vast political science literature links ethnic groups with redistributive policies in developing countries, particularly in Africa.[9] ETH measures the probability that two randomly selected individuals in a country will belong to different ethnolinguistic groups. The raw data for ETH refers to 1960. ETH increases with the number of ethnolinguistic groups and the more equal is the size of the groups. Obviously, ethnic fractionalization is not a necessary, and much less a sufficient, condition for a divided policy process, since coalitions with power to extract transfers from the rest of society may be formed along many other lines. Consequently, we do not claim that ETH is a valid measure for all countries, nor that other measures cannot be employed to capture the existence of influential interest groups. However, we think that given our focus on powerful social groups, on average our proxy is correlated with the occurrence of a divided policy process.

[9] Easterly & Levine (1997) discuss the concept in more detail. See also Mauro (1995) who employ ETH as an instrument for bureaucratic efficiency.

To proxy for the dependent variable rent-dissipation, we employ an index of corruption drawn from ICRG [see Knack & Keefer, 1995]. The index is on a scale from 0 to 6. We reverse the scale so that 0 indicates least corrupt and 6 most corrupt (COR). Obviously, rent dissipation can take many other forms than corruption, e.g. indirect costs of latent social conflicts; such as protection costs, resources employed to seize, or attempt to seize, power and restrict opponents political activities. However, this type of data is not readily available. Moreover, it is hard to see why increased pressure for redistribution would manifest itself only through certain channels (e.g. costs of political competition) and not through all different types available for the social groups (e.g. corruption). Presumably the social groups are equalizing the marginal costs and benefits along the different dimensions of rent-seeking activities.

Previous studies of foreign aid have used a measure of aid that lumps together grants and concessional loans. The World Bank has developed a new data base on foreign aid, where the grant component of each concessional loan has been calculated and added to outright grants to provide a more accurate measure of foreign assistance. The raw aid data is in current U.S. dollars. Following Burnside & Dollar (1997), we convert the data into constant dollars to real GDP. This provides a real measure of aid (denoted by AID) that is constant in terms of its purchasing power over a representative bundle of world imports.

We also employ two additional proxies of windfalls; term of trade shocks (TT), the average growth rate of dollar export prices times initial share of exports in GDP minus the average growth rate of import prices times initial share of imports to GDP; and the share of exports of primary products in GDP (SXP). The latter measure is meant to capture discoveries of natural (mineral) resources which are important sources of windfall gains in many developing countries.[10]

The level of rent-seeking is also a function of the discount factor δ. A lower δ leads to a higher expected z. To proxy for δ we employ regional-specific dummy variables for Sub-Saharan Africa ($AFRICA$), Central America (CAM), and East Asia ($ASIA$). In the base specification we also include time dummies to control for time-specific effects.

Motivated by the theory we assume that aid is driven both by donors' interest and recipients' needs. In the base specification we include the log of population ($LPOP$) to proxy for donors' interests, and initial log of real GDP per capita ($LGDP$) to control for recipients' needs motives. We also include TT. According to the model, a negative income shock will result in increased aid flows.

We are able to collect data for 66 aid recipient countries starting from 1980. To increase the size of the sample, but also to explore the time dimension in the data, we divide the cross-country data into three 5-year periods. Thus, each country has three observations, data permitting. The system of equations is estimated by 2SLS, allowing for country-specific random effects.[11]

[10] Sachs and Warner (1995) argue that resource-rich economies are more likely to be subject to extreme rent-seeking behavior than resources-poor economies.

[11] Because we use 2SLS we must also specify an equation for the interaction term a^*d. See the

6.3. Results

As a benchmark, the simple regression of corruption on ETH is highly significant, with a t-statistic of 3.71. If we add the vector of windfalls proxies and AID to this regression we obtain the equation system (1a)-(1b) shown in table 1. As evident, if we do not control for the political equilibrium, there is no significant correlation between COR and the regressors AID, SXP and TT. In the aid regression, both initial income, proxying for recipients' needs motives, and the log of population, are highly significant. COR and TT enter with negative signs in (1b), but are insignificant. If the donor could credibly commit to a policy rule, we would expect the coefficient on COR to be significantly different from zero. However, in the model in which aid is determined under discretion, a is constant for all z if $\theta > \hat{\theta}$ (see appendix A.5). Hence, the data suggest that the donor community acts under discretion and do not systematically allocate aid to countries with less corruption. Overall, our instruments for aid are rather powerful. The R^2 in the first-stage regression of AID increases from 0.10 to 0.60 when $LGDP$ and $LPOP$ are included.

Adding the regional dummies and the interaction terms yields the base specification reported in columns (1c)-(1d). We instrument for AID^*ETH by including ETH interacted with several of the regressors in (6.2). In the base specification ETH is interacted with the time and regional dummies.[12] In column (1c), AID^*ETH and SXP^*ETH are positive and highly significant, while TT^*ETH enters with the predicted sign, but is not significantly different from zero. However, the joint hypothesis that the coefficients on all interaction terms are zeros is rejected by a wide margin [F-statistic 4.12]. In accordance with the prediction of the model, the partial derivatives of corruption with respect to AID and SXP are positive for high levels of ETH. In particular, the marginal impact of AID [SXP] on COR is positive for $ETH > 0.18$ [$ETH > 0.64$] implying that for 47 [27] out of 66 countries in the sample, increased aid [discovery of exploitable resources] is associated with higher corruption. The magnitude of the correlation between aid and corruption is considerable. For the most fractionalized country ($ETH = 0.93$), a one-standard deviation increase in predicted aid (2.0 percentage points) is associated with a 0.8 standard deviation increase in the corruption index (0.8 points).

As reported above, there is no significant relationship between the level of aid and TT. However, a closer look at the data reveals the change in aid during the subperiods, ΔAID, is responsive to terms of trade shocks, particularly in fractionalized countries.

discussion in the text below.

[12] These interaction terms are highly correlated with ETH^*AID (F-statistic on the joint hypothesis that the coefficients on the interaction variables are zero in the first-stage regression is 5.95), but uncorrelated with AID (F-statistic in the first-stage regression is 0.70). They are also uncorrelated with shocks to AID and COR which make them good candidates for instruments. ETH interacted with the additional regressors in (6.2), i.e. $LPOP$ and $LGDP$, are less suitable as instruments for ETH^*AID since they are highly correlated with the endogenous variable AID (F-statistic in the first-stage regression is 12.21).

The simple correlation between TT and ΔAID for the most fractionalized countries (top 20 %) is 0.27.[13] If terms of trade shocks are (partly) counterbalanced by aid flows, it is not surprising that $TT*ELF$ is insignificantly different from zero. In columns (1e)-(1f) we try circumvent the multicollinearity problem by including the sum of AID and TT as a regressor. Note that both variables are measured as a share of GDP. Taking as a reference point a situation without aid, $(AID + TT)$ provides a measure of the change of "exogenous" resources flowing into the country. As shown in column (1e), the results improve with this specification. Both the coefficients and the t-statistics on the interaction terms are higher. Using the sum of AID and TT as regressor, the cutoff point for the derivative of COR with respect to $(AID + TT)$ is $ETH = 0.39$, implying that for 62 percent of the countries in the sample, an increase in adjusted aid, or a positive terms of trade shock not counterbalanced by lower aid, are associated with higher corruption. Note also that the "own-effect", is significantly negative. In countries less likely to suffer from competing social groups, i.e. countries with low ETH, higher aid is associated with lower corruption.

It is reasonable to assume that the mechanism described in the model is more relevant for countries with a sufficiently high level of aid. Thus, we estimate the effect of aid on corruption for countries with a share of aid to GDP above 0.1 percent.[14] The results of this exercise are shown in table 2. Compared to table 1, AID and $AID + TT$ are no longer significantly different from zero, while the interaction terms remain highly significant.

Summarizing the preliminary findings, when properly instrumenting for aid, the interaction term neatly separates the effects of aid on corruption. On average, foreign aid in countries more likely to suffer from a divided policy process is positively associated with corruption. This partitioning fits the prediction of the model and underlies the general idea that the effects of aid critically depend on the political equilibrium in the recipient country. Additional proxies of windfalls show a similar pattern. We find a weakly robust negative relationship between aid and corruption in countries less likely to suffer from a divided policy process, while there is no evidence that the donors systematically allocate aid to countries with less corruption.

6.4. Sensitivity analyses

We conducted several robustness checks. We have already shown that the results are robust to the sample of countries. Another important question is whether the findings are robust to alternative specifications. To check this we first included additional controls in the aid regression, namely the most commonly used explanatory variables in the literature on the determinants of aid, apart from $LGDP$ and $LPOP$, the infant mortality rate at the start of the period $(INFM)$, and arms imports as a share of

[13] If Nigeria is excluded, the correlation jumps to 0.36.

[14] There are all together 12 countries with a share of aid to GDP below 0.1 percent in at least one of the three subperiods.

total imports lagged one period (ARM). Equation (6.1) was also augmented with a battery of variables that might plausibly control for other factors which affect the level of corruption. For instance, a measure of (trade) distortions in the economy; black-market premium (BMP), and a proxy for openness; share of trade to GDP ($TRADE$). As an alternative, we also use the composite measure openness from Sachs & Warner ($OPEN$). The original rent-seeking literature emphasized trade restrictions as the primary source of (government induced) rents [Krueger (1974)]. More generally, protection from international competition generates rents that business may be willing to pay for.

Table 3 summarizes the results of this exercise.[15] Overall, once we control for ETH none of the additional controls have any significant effect on COR, and the results of the other regressors, in particular AID^*ETH, remain qualitatively unaffected.[16] The t-statistic on SXP^*TT is reduced. However, the joint hypothesis that the coefficients on all interaction terms are zeros can be rejected at the 5-percent level [F-statistic 3.46]. We find no evidence that the level of aid is significantly correlated with ARM or $INFM$, even though ARM enters with the predicted sign and a p value of around 0.15.

Finally, we did a Hausman test of the over-identifying restrictions on the base specification reported in columns (1c)-(1d). We cannot reject the over-identifying restrictions; i.e., we find no evidence that the instruments for AID [COR] belong in the corruption [aid] regression.[17]

7. Concluding remarks

The present model has abstracted from a number of issues influencing public policy in developing countries. The analysis may therefore be biased and it would be inappropriate to draw any definite conclusions. Nevertheless, some important qualitative insights emerge from the analysis. First, we have shown that the provision of public goods does not need to increase with higher government revenue, thus providing a political-economy rationale for why large windfall gains in revenue, or large inflows of foreign aid, do not necessarily result in general welfare gains. Second, we have shown that expectations of aid in the future may suffice to increase rent dissipation and reduce the expected level of public goods provision.

From a policy perspective, there are three main implications of these findings. First, at a general level, the model points to the importance of studying the inter-

[15]To conserve space some of the controls are added simultaneously. Inserting the controls individually does not lead to significantly different results.

[16]This result may be partly due to the fact that policy variables such as BMP and $TRADE$ might be endogenous to ETH. In fact, Easterly & Levine (1997) show that ETH and BMP is significantly correlated.

[17]The test statistics are 9.08 and 12.56 respectively. The 5 [1] percent critical value from the χ^2-distribution are 11.07 [15.09] for regression (1c), and 12.59 [16.81] for regression (1d).

action between the political process shaping public policy and foreign aid. Second, concessional assistance may influence policy in the recipient country even without any resources actually being disbursed, implying that evaluations of project and sector assistance may overestimate the total impact of foreign aid. Finally, the analysis stresses the important issue of commitment in foreign aid policy. In particular we have shown that if the donor community can enter into a binding policy commitment, aid may mitigate the incentives for social groups to engage in rent-seeking activities. This result is in accordance with recent empirical findings that aid is more effective the greater effort is made to redirect it to good performers [Burnside & Dollar (1997)]. However, such a regime shift would involve an aid policy that in the short run provides more assistance to countries in less need, and less assistance to those in most need. Enforcing such a regime shift may be difficult [Svensson (1997)]. Clearly, more research should follow along these lines.

We provide some empirical evidence in support of the mechanism we propose. Employing a measure of ethnic and linguistic fractionalization to proxy for the likelihood that a country suffers from a divided policy control, we show that foreign aid and windfalls in countries characterized by a divided policy process are associated with increased corruption. We find a weakly robust negative relationship between aid and corruption in countries less likely to suffer from a divided policy process, while there is no evidence that the donors systematically allocate aid to countries with less corruption. These results are robust to an ample of statistical problems.

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A. Appendix

A.1. Data description and sources

$AFRICA$ = Dummy variable for Sub-Saharan African countries.
AID = Grants and grant equivalents of concessional loans [Fernandez-Ariaa & Serven (1997)] deflated by import unit value index (US$) 1985=100 [IFS] to real GDP (1985=base year) [Penn World Tables 5.6], averages over 1980-84, 85-89, 90-93.
ARM = Arm imports to total imports, averages, lagged one period [ACDA, World Military and Arms Transfers].
$ASIA$ = Dummy variable for East Asian countries.
BMP = Log of 1+black market premium (black-market xrate/official xrate - 1) [World Bank National Accounts, World's Currency Yearbook, average over 1980-84, 85-89, 90-92.
CAM = Dummy variable for Central American countries.
COR = Indices of corruption from ICRG, [Knack & Keefer (1995)], where 0 indicates least corrupt and 6 most corrupt, averages over 1982-84, 85-89, 90-94.
ETH = Index of ethnolinguistic fractionalization, 1960. Measures the probability that two randomly selected people in a country belong to different ethnolinguistic groups [Easterly & Levine (1997)].
$INFM$ = Infant mortality rate per 1000 live births at the start of the sample period (1980, 87, 92) [World Development Indicators,].
$LGDP$ = Log of initial real per capita GDP [Penn World Tables 5.6]
$LPOP$ = Log of total population in 100.000 units at the start of sample period [World Bank Development Indicators].
$OPEN$ = Openness dummy from Sachs & Warner (1995), 1 = open, 0 = not open at the start of the sample period.
SXP = Share of exports of primary products in GDP measured in nominal US$, units percentage points at the start of the sample period [World Bank Trade Statistics].
$TRADE$ = Sum of the initial shares of exports and imports in GDP times 0.5. [World Development Indicators].
TT = the average growth rate of dollar export prices times initial share of exports in GDP minus the average growth rate of import prices times initial share of imports to GDP [World Bank Development Indicators].

A.2. Sufficient conditions for the existence of a fixed point

Let θ_t' be a candidate for a fixed point and define

$$\Omega(\theta_t') = y(\theta_t') - \frac{n}{n-1} P(\theta_t') \tag{A.1}$$

Since $\Omega(\theta_t')$ is continuous, a sufficient condition is that $\Omega(\underline{\theta}) < 0$ and $\Omega(\bar{\theta}) > 0$. Using (3.2) and (4.2), equation (4.3) can be written as

$$P(\hat{\theta}_t) = \beta \left[\frac{(n-1)}{n^2} \int_{\underline{\theta}}^{\hat{\theta}} y(\theta_t) dF(\theta_t) + \left(1 - F(\hat{\theta}_t)\right) \frac{1}{n} y(\hat{\theta}_t) - \frac{1}{n^2} \int_{\hat{\theta}}^{\bar{\theta}} y(\theta_t) dF(\theta_t) \right] \tag{A.2}$$

where $\beta \equiv \delta/(1-\delta)$. By inserting (A.2) into (A.1) and simplifying we obtain

$$\Omega(\underline{\theta}) = y(\underline{\theta})\left[1 - \frac{\beta}{(n-1)}\right] + \frac{\beta}{n^2}\int_{\underline{\theta}}^{\bar{\theta}} y(\theta_t)dF(\theta_t) < 0 \tag{A.3}$$

The second term in (A.3) is positive. Hence, a necessary condition for $\Omega(\underline{\theta}) < 0$ is that the term in the bracket is negative. This holds provided that

$$n < \frac{1}{(1-\delta)} \tag{A.4}$$

In absolute terms the first term in (A.3) must also outweigh the second term. Hence

$$y(\underline{\theta})\Gamma > (\beta/n^2)E[y(\theta_t)] \tag{A.5}$$

The other necessary condition is given by the following equation

$$\Omega(\bar{\theta}) = y(\bar{\theta}_t) - \frac{\beta}{n^2}\int_{\underline{\theta}}^{\bar{\theta}} y(\theta_t)dF(\theta_t) > 0 \tag{A.6}$$

Hence, a sufficient condition is that

$$y(\bar{\theta}_t)/\int_{\underline{\theta}}^{\bar{\theta}} y(\theta_t)dF(\theta_t) > \frac{\delta}{(1-\delta)n^2} \tag{A.7}$$

in which case the difference between the first two terms is positive.

A.3. Proof of corollary 4.4

Lemma 4.2. states that there exist a $\hat{\theta}_t$ such that $\Omega(\hat{\theta}_t) = 0$. Moreover, since $\Omega(\bar{\theta}_t) > 0$, Ω must be increasing in θ at the largest value of θ for which $\Omega(\theta_t) = 0$. To explore the effect of a change in the number of social groups it is informative to rewrite (A.1) as

$$\Omega(\hat{\theta}_t) = v^c(\hat{\theta}_t) - \frac{1}{(n-1)}P(\hat{\theta}_t) \tag{A.8}$$

For fixed $\hat{\theta}_t$, $z_i(\theta_t)$ and $v^n(\theta_t)$, $v^c(\hat{\theta}_t)$ and $P(\hat{\theta}_t)$ are inversely proportional to n. Hence, an increase in n raises Ω since $v^c(\hat{\theta}_t)$ increases relative $P(\hat{\theta}_t)/(n-1)$. This effect tends to increase the incentives to deviate. To counter-balance this $\hat{\theta}$ must fall. However, an increase in n also affects the expected punishment. This effect, though, is non-monotonic. For a fixed $\hat{\theta}_t$,

$$\frac{\partial}{\partial n}\left[v(\hat{\theta}_t, \theta_t) - v^n(\theta_t)\right] = \begin{cases} [2-n]y(\theta_t)/n^3 & \text{for } \theta_t \leq \hat{\theta}_t \\ [2y(\theta_t) - ny(\hat{\theta}_t)]/n^3 & \text{for } \theta_t > \hat{\theta}_t \end{cases}$$

A.4. Proof of proposition 5.1

The equilibrium with aid is denoted by subscript a. For convenience time and group subscripts are dropped. Let $y(\theta_1)$ denote the cutoff value of $y(\theta)$ for which (5.2) no longer binds in the fully cooperative equilibrium, i.e. $y(\theta_1) = w_c^{-1}(\varphi) - ny_c$. Comparing with the equilibrium without aid we see that welfare of the social groups in the fully cooperative equilibrium is constant $\forall y(\theta_t) \in [y(\underline{\theta}), y(\theta_1)]$, implying that a deviation must occur when $y(\theta_t) > y(\theta_1)$. This is so because if it is profitable to deviate at some $y(\theta) < y(\theta_1)$, it must be profitable to deviate for all $y(\theta)$. In this case there exist no equilibrium. Moreover, $a^c(\theta_t) = 0 \; \forall y(\theta_t) \in [y(\theta_1), y(\bar{\theta})]$. Hence, the gain of a deviation is not affected by the inclusion of a donor. At the same time $P_a(\theta') \leq P(\theta')$ since

$$P_a(\theta') = \beta \left[\int_{\theta_1}^{\theta_2} [u^c(\theta_t) - u^c(\theta_1)] \, dF(\theta_t) + \int_{\theta_2}^{\bar{\theta}} [u^c(\theta', \theta_t) - u^n(\theta_1)] \, dF(\theta_t) \right] \tag{A.9}$$

is strictly smaller than $P(\theta')$ given in (4.3). Hence, $\Omega_a(\theta') > \Omega(\theta')$. Consequently $\hat{\theta}$ must fall.

A.5. Sufficient conditions for the coexistence of rent-seeking and aid in equilibrium with discretion

Let the donor's preferences be

$$\sum_{t=1}^{\infty} \delta^t \left[l(f_t) + w(\sum_i^n u_{it}) \right] \tag{A.10}$$

where $l(\cdot)$ is an increasing and concave function. As in section 5.1.1. we assume that aid is given as project support. The first-order condition (5.2) is now given by:

$$w' \left(\sum_{i=1}^{n} [c_i(\theta_t \,|a_t) + b_i(\theta_t \,|a_t)] \right) - l'(f_t) \leq 0 \tag{A.11}$$

where $c_i(\theta_t \,|a_t)$ and $b_i(\theta_t \,|a_t)$ are defined in section 5.1.1.

The only difference from section 5.1.1 is that there is now no longer a constant lower bound on welfare. In this setup aid and rent-seeking can coexist. In fact, for all $\theta \geq \hat{\theta}$, aid will be constant, implicitly defined by the first-order condition (A.12).

$$w' \left(y(\hat{\theta}_t) + a^c(\hat{\theta}_t) + ny_c \right) - l' \left(r - a^c(\hat{\theta}_t) \right) = 0 \tag{A.12}$$

Since aid increases the potential amount of resources to be appropriated, foreign assistance increases the incentives to deviate. Hence, a sufficient condition for Proposition 5.1 to hold is that the punishment with aid will become less harsh. That is:

$$(v_A^c - v_A^n) \leq (v^c - v^n) \quad \forall \theta \in [\underline{\theta}, \bar{\theta}] \tag{A.13}$$

which is satisfied since more aid is given in the Nash- relative the cooperative equilibrium.

A.6. Proof of proposition 5.2

This can be seen by the following two part argument. First, as shown above, the gain of a deviation is not affected by the inclusion of a donor. Second, solving for the equilibrium aid flows in the two institutional settings we have

$$a^c(\theta_t) = w_c^{-1}(\varphi) - \sum_{i=1}^{n} u_i^c(\theta_t) \tag{A.14}$$

and

$$a^n(\theta_t) = n\left[w_c^{-1}(n\varphi) - \sum_{i=1}^{n} u_i^n(\theta_t)\right] \tag{A.15}$$

Evaluating equations (A.14)-(A.15) we see that there are two opposite forces determining the amount of aid disbursed in the two institutional settings. First, utility is lower in the Nash equilibrium which tends to increase aid flows in the non-cooperative setting. Second, a larger amount of aid will be wasted in rent-dissipation in the Nash equilibrium which tends to lower aid flows. Which effect that dominates depends on the parameters of the model. Using a CES-function with constant elasticity of substitution equal to $1/\sigma$ to solve explicitly for the equilibrium aid flows we can show that $a^c(\theta_t) \geq a^n(\theta_t)\ \forall y(\theta_t)$ provided that

$$y_i \geq \left[\frac{(n^{1-1/\sigma} - 1)}{n(n-1)}\right]\varphi^{-1/\sigma} \tag{A.16}$$

A sufficient condition for (A.16) is that $\sigma \leq 1$ in which case the term in bracket is negative and the difference in welfare between the cooperative- and Nash equilibrium increases.

Table 1

Expl.var.	*COR* (1a)	*AID* (1b)	*COR* (1c)	*AID* (1d)	*COR* (1e)	*AID* (1f)
ETH	.82		-.13		-.42	
	(3.02)		(-.24)		(-.71)	
AID	.04		-.09			
	(1.08)		(-.73)			
SXP	-.002		-.04		-.03	
	(-.25)		(-2.53)		(-2.17)	
TT	-.06	-.13	-.14	-.07		-.07
	(-1.00)	(-.71)	(-1.28)	(-.49)		(-.51)
COR		-.81		-.11		-.15
		(-.72)		(-.38)		(-.47)
LPOP		-.83		-.83		-.83
		(-4.81)		(-5.28)		(-5.26)
LGDP		-2.36		-2.17		-2.18
		(-5.36)		(-7.94)		(-7.93)
*AID*ETH*			.50			
			(2.43)			
*SXP*ETH*			.07		.07	
			(2.37)		(2.50)	
*TT*ETH*			.14			
			(.55)			
*(AID+TT)*ELF*					.71	
					(3.04)	
(AID+TT)					-.28	
					(-2.21)	
AFRICA			-1.22		-.98	
			(-5.00)		(-4.40)	
ASIA			-.27		-.19	
			(-1.04)		(-.22)	
CAM			-.25		-.07	
			(-.75)		(-.22)	
no.obs.	182	182	182	182	182	182

Note: 2SLS-estimation on pooled data (1980-84, 85-89, 90-94), with t-statistics adjusted for country-specific random effects. Each regression includes a constant and two time dummies not reported here.

Table 2

Expl.var.	*COR* (2a)	*AID* (2b)	*COR* (2c)	*AID* (2d)
ETH	-.29		-.73	
	(-.44)		(-1.13)	
AID	-.02			
	(-.09)			
SXP	-.07		-.05	
	(-2.87)		(-2.26)	
TT	-.08	-.10		-.11
	(-.69)	(-.74)		(-.75)
COR		-.01		-.02
		(-.02)		(-.06)
LPOP		-.97		-.97
		(-5.05)		(-5.04)
LGDP		-2.51		-2.52
		(-8.29)		(-8.27)
*AID*ETH*	.33			
	(2.27)			
*SXP*ETH*	.10		.09	
	(2.79)		(2.50)	
*TT*ETH*	.06			
	(.25)			
*(AID+TT)*ELF*			.62	
			(4.24)	
(AID+TT)			-.26	
			(-1.05)	
AFRICA	-1.27		-1.01	
	(-5.10)		(-4.46)	
ASIA	-.40		-.28	
	(-1.33)		(-.96)	
CAM	-.33		-.22	
	(-1.03)		(-.67)	
no.obs.	162	162	162	162

Note: 2SLS-estimation on pooled data (1980-84, 85-89, 90-94), with *t*-statistics adjusted for country-specific random effects. Each regression includes a constant and two time dummies not reported here.

Table 3

Expl.var.	*COR* (3a)	*AID* (3b)	*COR* (3c)	*AID* (3d)
ETH	-.35		-.50	
	(-.58)		(-.73)	
AID	-.16			
	(-1.50)			
SXP	-.03		-.03	
	(-1.53)		(-1.39)	
TT	-.15	-.01		-.09
	(-1.09)	(-.06)		(-.56)
COR		.06		-.07
		(.18)		(-.21)
LPOP		-.83		-.81
		(-4.69)		(-4.84)
LGDP		-2.13		-2.04
		(-5.46)		(-5.08)
*AID*ETH*	.65			
	(3.25)			
*SXP*ETH*	.05			
	(1.43)			
*TT*ETH*	.11			
	(.38)			
*(AID+TT)*ELF*			.87	
			(3.63)	
(AID+TT)				
BMP			-.06	
			(-.40)	
TRADE			-.01	
			(-.01)	
OPEN	-.45			
	(-1.82)			
ARM		.02		.02
		(1.43)		(1.35)
INFM		.001		.003
		(.04)		(.52)
no.obs.	166	166	165	165

Note: 2SLS-estimation on pooled data, with *t*-statistics adjusted for country-specific random effects. Each regression includes a constant and two time dummies, and the corruption regressions also include three regional dummies, not reported here.

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