

DOES FOREIGN AID DISTORT INCENTIVES AND HURT GROWTH?

Theory and evidence from 75 aid-recipient countries

by

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First draft: August 17, 2005. This version: September 6, 2007.

Forthcoming in Public Choice

Abstract: Foreign aid transfers can distort individual incentives, and hence hurt growth, by encouraging rent seeking as opposed to productive activities. We construct a model of a growing small open economy that distinguishes two effects from foreign transfers: (i) a direct positive effect, as higher transfers allow the financing of infrastructure; (ii) an indirect negative effect, as higher transfers induce rent-seeking competition by self-interested individuals. In this framework, the growth impact of aid is examined jointly with the determination of rent-seeking behavior. We test the main predictions of the model for a cross-section of 75 aid-recipient countries. There is evidence that aid has a direct positive effect on growth, which is however significantly mitigated by the adverse indirect effects of associated rent-seeking activities. This is especially the case in recipient countries with relatively large public sectors.

Keywords: Foreign aid, Incentives, Growth

JEL classification numbers: F35, D7, D9, H2

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Acknowledgements: We are grateful to four anonymous referees and the editors for constructive criticisms. We are also grateful to Konstantinos Angelopoulos and Vangelis Vassilatos for discussions. We have benefited from comments by Panos Hatzipanayotou, Thomas Moutos, Nikitas Pittis, Albrecht Ritschl and Elias Tzavalis, as well as by seminar participants at the CESifo-Delphi Conference “Designing the new EU” in Munich, the 2004 Royal Economic Society Conference in Swansea, the 8th International Conference on Macroeconomic Analysis and International Finance in Crete, the University of Macedonia in Thessaloniki, the University of Cyprus in Nicosia, and the Institute for International Integration Studies in Dublin. Any remaining errors are ours.

1. Introduction

The effects of foreign aid on recipient countries' macroeconomic performance, and especially growth, are ambiguous.¹ In many cases, despite earlier optimistic expectations, aid has failed to boost growth. A prevalent explanation seems to be that foreign aid is often misused and misappropriated (see, e.g., Drazen, 2000, chapter 12). For instance, it can foster rent seeking and corruption in recipient countries. If we refer to rent seeking as "the socially costly pursuit of winning a contestable prize",² the idea is that foreign aid transfers increase the size of the prize that interest groups fight over (see Svensson, 2000). Actually, there is some evidence that increases in aid are associated with worse institutions (see, e.g., Alesina and Weder, 2002), although this is not without criticism (see, e.g., Tavares, 2003). The interest in the association between institutions and aid is not surprising given the robust evidence that institutions and economic performance (like growth) are positively associated (see, e.g., Mauro, 1995, and Knack and Keefer, 1995, 1997).

In this paper, we study both theoretically and econometrically the joint determination of economic growth and rent-seeking activities when the driving force is foreign aid transfers. The emphasis will be on the distorting effects of aid on private incentives.

To this end, we construct a small open economy in which domestic taxes and foreign transfer payments co-finance public infrastructure. The latter is the engine of long-term growth, as in the model introduced by Barro (1990). We show that under certain conditions (depending on the relation between the magnitude of foreign transfers and the size of the recipient country's public sector), the possibility of extraction from foreign transfers pushes self-interested individuals away from productive work to rent-seeking in an attempt to

¹ There is a rich empirical literature on the growth impact of aid surveyed by, e.g., Clemens et al. (2004) and Jensen and Paldam (2006). Empirical studies on the growth impact of aid include Mosley et al. (1987), Boone (1996), World Bank (1998), Svensson (1999), Easterly (2001), Mosley et al. (2004) and Dalgaard et al. (2004). Moreira (2003) provides a summary of evidence from cross-country regression studies: out of seventy-two regressions, the estimated effect is positive in forty regressions, non-significant in thirty-one and negative in one regression. See below for further details.

² See Drazen (2000, p. 335). Influential papers with rent seeking include Tullock (1980), Krueger (1974), Baumol (1990) and Murphy et al. (1991). Bhagwati (1982) provides a synthesis of the welfare analysis of rent-seeking activities. More recently, Conlon and Pecorino (2004) study policy reforms in a model with rent seeking.

extract resources for their own personal benefit. There is therefore an indirect negative effect, which can counterbalance the manna-from-heaven direct effect that aid may have on growth. The larger the amount of aid and the size of the recipient country's public sector, the higher is the rent seeking effect.

We test these predictions by using data for a pooled cross-section of 75 aid-recipient countries for which proxies of rent-seeking behavior are available. Following most of the related literature, we use the Knack and Keefer (1995, 1997) indices as measures of rent-seeking behavior. Our econometric results indicate that, when economic growth and rent seeking are examined jointly with aid transfers, a rise in the latter exerts *ceteris paribus* a direct positive effect on economic growth. However, this effect is mitigated by an endogenous increase in rent-seeking activities triggered by the very same rise in aid. Eventually, the net growth effect of aid is substantially smaller compared to the direct positive effect. When we partition recipient countries according to the sizes of their public sectors, and in accordance with our theory, there is evidence that the deleterious effect of aid upon incentives, and in turn growth, is significant only in recipient countries with relatively large public sectors. This confirms the popular belief that rent seeking and corruption take place mainly through government activities, as corrupt government officials have some effective property rights over the aid transfers they are allocating (see, e.g., Tanzi, 2002).

Therefore, our finding is that aid can generate both growth winners and growth losers depending on whether it triggers rent seeking, where the latter also depends on the size of the public sector in aid-recipient countries. This finding may help to explain why past studies were frequently unsuccessful in establishing a substantial positive impact of aid on growth, as aid-induced rent-seeking activities typically were ignored. Our paper also offers support to those who argue for conditional aid, where conditionality has to do with the size and the role of the government sector in recipient countries.

The rest of the paper is as follows. Section 2 presents a theoretical model. Section 3 specifies the econometric model and describes the data. Section 4 presents empirical results. Section 5 reviews the literature and explains how our work differs. Section 6 concludes.

2. A model of growth, incentives and aid

We incorporate foreign transfers, as well as rent-seeking competition for a fraction of them, into a model of growth. In particular, we will build on the model introduced by Barro (1990), which is well known and algebraically tractable.

It should be said that the focus is on rent seeking and aid. Thus, many other interesting issues related to aid are left out. For instance, Svensson (2000) studies reputational equilibria as well as the donor's behavior (but he uses a setup with exogenous output in which rich countries are more prone to rent seeking). Chatterjee et al. (2003) study how aid affects the transitional dynamics of a small open economy (but they abstract from incentives). Morrison (2007) studies how natural resources and aid affect democracy and income distribution.

2.1 Informal description of the model

The key features of the theoretical model are as follows: (a) The government uses domestic tax revenues and foreign transfers to finance public productive services. The latter provide a positive production externality to private firms. (b) Only a fraction of foreign transfers is actually used to finance public services. The rest can be extracted by self-interested individuals. Specifically, we assume that households can extract from total foreign transfers the means to increase their own total wealth.³ In doing so, each household competes with

³ We can assume that households also extract from collected tax revenue; this does not change our main results (see below for details). We can also assume that firms, like households, rent seek; again this is not important since households are also firm-owners in this class of models. Policymakers could also rent seek; this would complicate the model algebraically, but adding more types of self-interested individuals is not expected to affect our main results.

other households. (c) Extraction comes at a private cost.⁴ Specifically, it requires time and effort. Thus, each household chooses optimally (in addition to consumption and saving) the allocation of its time and effort between productive work and rent-seeking activities.⁵ (d) The fraction of foreign transfers appropriated by each individual is proportional to the effort and time that he, or she, allocates to rent-seeking competition relative to the total effort and time allocated to rent-seeking competition by all individuals. Then, in equilibrium, the aggregate rent-seeking effort will deplete the flow of foreign transfers earmarked for the finance of public services. (e) The economy is small so that it takes the rest of the world as given. For simplicity, we assume that there is only one link with the rest of the world and this is via foreign transfers.

There are $i = 1, 2, \dots, I$ identical households and $j = 1, 2, \dots, J$ identical firms, where $I = J$ for simplicity. Concerning quantities, we will distinguish individual variables from their aggregate counterparts by using lower-case and upper-case letters respectively.

2.2 Firms' behavior

Each firm j maximizes profits, π^j :

$$\pi^j = (1 - \theta)y^j - rk^j - wl^j \quad (1)$$

where $0 < \theta < 1$ is a common proportional output tax rate; y^j , k^j and l^j are j 's output, capital input and labor input; and r and w are the interest rate and wage rate.

At the firm's level, the production function is:

$$y^j = A(k^j)^\alpha (l^j)^{1-\alpha} \left(\frac{G}{I} \right)^{1-\alpha} \quad (2)$$

where $A > 0$ and $0 < \alpha < 1$ are parameters, and G is aggregate public production services.

⁴ Breaking the law, bribing, lobbying, extracting favors from the government, etc, are costly activities. Of course, there are social costs too.

⁵ The idea is as in, e.g., Baumol (1990), Murphy et al. (1991) and many others, where individuals decide how to allocate their activities between "productive" ones (such as work, innovation and entrepreneurship) and "unproductive" ones (such as rent seeking and violation of property rights).

Each firm j acts competitively by taking prices, policy variables and aggregate outcomes as given. The first-order conditions for k^j and l^j are simply:

$$r = (1 - \theta)\alpha \frac{y^j}{k^j} \quad (3a)$$

$$w = (1 - \theta)(1 - \alpha) \frac{y^j}{l^j} \quad (3b)$$

so that, with constant returns to scale at the firm's level, profits are zero in equilibrium.

2.3 Households' behavior

Each household i maximizes inter-temporal utility:

$$\int_0^{\infty} \log(c^i) e^{-\rho t} dt \quad (4)$$

where c^i is i 's consumption and $\rho > 0$ is a time discount factor.

At each instant, household i consumes, c^i , saves in the form of an asset, a^i , and allocates one unit of effort time⁶ between productive work and rent-seeking activities. Specifically, let $0 < \eta^i \leq 1$ denote the fraction of i 's time allocated to productive work and $0 \leq (1 - \eta^i) < 1$ the fraction allocated to rent seeking. The budget constraint is (a dot over a variable denotes a time derivative):

$$\dot{a}^i + c^i = ra^i + w\eta^i + \frac{(1 - \eta^i)}{\sum_i (1 - \eta^i)} \Delta T \quad (5)$$

where $\sum_i (1 - \eta^i)$ is aggregate rent seeking activities, T is total aid transfers and $0 \leq \Delta < 1$ is the aggregate degree of extraction (see below for its determination). The idea is that there is a

⁶ For simplicity, we assume that each household has one unit of effort time available. Exogeneity of total labor time/effort justifies why leisure is not included as an argument in (4).

perceived pie ΔT , and each individual tries to extract a fraction of it by competing with all other individuals.⁷

Each household i acts competitively by taking prices, policy variables and aggregate outcomes as given. Combining the first-order conditions for consumption, saving and extraction (c^i, a^i, η^i) , we get:

$$\dot{c}^i = c^i(r - \rho) \quad (6a)$$

$$w = \frac{\Delta T}{\sum_i (1 - \eta^i)} \quad (6b)$$

where (6a) is an Euler equation and (6b) implies that net returns from work and appropriative competition are equal in equilibrium.

2.4 Government budget constraint

Assuming a balanced budget, the government budget constraint is:

$$G = \theta Y + (1 - \Delta)T \quad (7)$$

so that public services, G , are financed by domestic taxes, θY , where $Y \equiv \sum_j y^j$, and the fraction of foreign aid that is not taken away by rent seekers, $(1 - \Delta)T$.

2.5 Decentralized competitive equilibrium

We can now solve for a Decentralized Competitive Equilibrium (DCE) in a growing small open economy. This is for any foreign transfer policy and any feasible domestic policy. In a DCE: (i) each individual firm and household maximize their own profit and utility respectively by taking prices, policy and aggregate outcomes as given; (ii) all markets clear;⁸

⁷ For a similar way of modeling rent seeking competition, see, e.g., Murphy et al. (1991), Svensson (2000), Grossman and Mendoza (2003), Park et al. (2005) and many others. This goes back to Tullock (1980).

⁸ That is, $\sum_{j=1}^J l^j = \sum_{i=1}^I \eta^i$ in the labor market and $\sum_{j=1}^J k^j = \sum_{i=1}^I a^i$ in the capital market, where recall that $I = J$. As said above, for simplicity, we have assumed away cross-country factor (labor and capital) mobility.

(iii) individual decisions are consistent with aggregate decisions;⁹ (iv) all constraints, including the economy's resource constraint, are satisfied. We focus on a symmetric DCE (thus, from now on, superscripts i and j are omitted).

To get a closed-form solution for the DCE, we choose - without loss of generality - a convenient specification for foreign aid transfers, T . In particular, we assume:

$$T = \mu(\bar{Y} - Y) \quad (8a)$$

where $\mu > 0$ is a redistribution parameter. According to the redistribution rule in (8a), foreign transfers, T , given to a country are a fraction of the deviation of that country's income, Y , from worldwide average income, \bar{Y} . Thus, if $\bar{Y} > Y$, the country is a recipient; if $\bar{Y} < Y$, the country is a donor (our analysis will be in terms of a recipient country).¹⁰ Since the rest of the world is taken as given, we assume $\bar{Y} = \lambda Y$, where $\lambda > 1$ is a measure of inequality between the domestic economy and the rest of the world.¹¹ Obviously, λ can depend on a number of socio-economic factors, whose specification is an empirical matter (see, e.g., Aghion and Williamson, 1998); we will return to this issue in the empirical section below. In this section, we will solve for a DCE for given λ . Thus, the foreign aid-to-output ratio becomes:

$$\frac{T}{Y} = \mu(\lambda - 1) \equiv \tau \quad (8b)$$

where $\tau \geq 0$ is an "effective redistribution" parameter.

⁹ In equilibrium, the aggregate degree of extraction, Δ , equals the per capita time spent in rent-seeking activities.

Thus, $\Delta = \frac{\sum_i (1 - \eta^i)}{I}$, which is in the spirit of most general equilibrium models with externalities. Note that we

use the average time, rather than the total time, to avoid scale effects. Also note that Δ may also depend on other factors (exogenous and endogenous) in addition to rent seeking activities.

¹⁰ See, e.g., Park and Philippopoulos (2003) and the references cited therein for similar state-contingent redistributive rules. The rule in (8a) is consistent with several institutional arrangements on foreign transfers.

¹¹ We set $\lambda > 1$ because the analysis is in terms of a recipient country. Note that the functional specification in (8a)-(8b) does not violate the linear structure of the model, and hence allows us to get a closed-form analytical solution for the competitive equilibrium. This is a Barro-type growth model.

We now solve for a DCE. It is straightforward to show that (1)-(8) give:¹²

$$\dot{c} = c \left[(1-\theta)\alpha A^\alpha \eta^{\frac{1}{\alpha}} \frac{1-\alpha}{\alpha} (\theta + \eta\tau)^{\frac{1-\alpha}{\alpha}} - \rho \right] \quad (9a)$$

$$\dot{k} = [1 + \tau - (\theta + \eta\tau)] A^\alpha \eta^{\frac{1}{\alpha}} \frac{1-\alpha}{\alpha} (\theta + \eta\tau)^{\frac{1-\alpha}{\alpha}} k - c \quad (9b)$$

$$\eta = \frac{(1-\alpha)(1-\theta)}{\tau} \quad (9c)$$

Equations (9a)-(9c) give the paths of (c, k, η) for any domestic policy as summarized by the tax rate $0 < \theta < 1$, and any foreign transfer policy as summarized by the redistribution parameter $\tau \geq 0$.

An advantage of the model is its simplicity. Equation (9c) gives the value of η . If $\tau \leq (1-\alpha)(1-\theta)$, then $\eta = 1$ so that all effort is allocated to work, while if $\tau > (1-\alpha)(1-\theta)$, then $0 < \eta < 1$ so that only a fraction of effort is allocated to work (see below for details). In

turn, having solved for η , (9a) gives the so-called balanced growth rate, $\gamma \equiv \frac{\dot{c}}{c} = \frac{\dot{k}}{k}$, and (9b)

gives the consumption-to-capital ratio, $\frac{c}{k}$. Inspection of (9a) and (9b) reveals that equilibria

with rent seeking ($0 < \eta < 1$) are associated with a lower growth rate and a lower consumption-to-capital ratio than equilibria without rent seeking ($\eta = 1$).

We focus on the equilibrium effects of the foreign aid-to-output ratio (τ).¹³ We consider first the benchmark non-interesting case without rent seeking, namely $\tau \leq (1-\alpha)(1-\theta)$ and hence $\eta = 1$. In this case, η is obviously independent of τ , so that (9a) implies that there is only a direct positive effect from τ on the growth rate, γ , denoted as

¹² Equation (9a) comes from the Euler equation (6a). Equation (9b) is the economy's resource constraint, $\dot{k} = y + T - G - c$, and arises from the budget constraints (1), (5) and (7). Equation (9c) follows by equating (3b) and (6b) and using the market-clearing conditions.

¹³ The effects of the tax rate (θ) are similar to those of the foreign aid-to-output ratio (τ). See Mohtadi and Roe (1998, 2003), Mauro (2002) and Park et al. (2005) for the effects of tax-spending policies in similar models.

$\frac{\partial \gamma}{\partial \tau}^{(+)} \text{ direct}$. This effect arises because foreign aid finances public infrastructure. Consider now

the case with rent seeking, namely $\tau > (1-\alpha)(1-\theta)$ and hence $0 < \eta < 1$. Equation (9c)

implies $\frac{\partial \eta}{\partial \tau} < 0$, i.e. a higher foreign aid-to-output ratio leads to a lower fraction of effort

allocated to work relative to rent seeking. In turn, (9a) implies $\frac{\partial \gamma^{total}}{\partial \tau} = \frac{\partial \gamma}{\partial \tau}^{(+)} \text{ direct} + \frac{\partial \gamma}{\partial \eta} \frac{\partial \eta}{\partial \tau}^{(-)}$. This

implies that now an increase in τ exerts two effects on growth, γ : (i) the above direct positive effect; (ii) an indirect negative effect through smaller effort allocated to work,

$\frac{\partial \gamma}{\partial \eta} \frac{\partial \eta}{\partial \tau} < 0$. The indirect negative effect arises because aid transfers distort the incentives of

self-interested individuals by pushing them away from productive work to appropriative competition. As the amount of aid increases, individuals (who do not internalize the adverse effect of their rent-seeking activities on aggregate outcomes) become more aggressive. This is at the society's expense for two reasons: first, it reduces the resources available for public infrastructure (i.e., it increases Δ); second, it reduces effective labor supply (η).

It is important to point out two features of our DCE. First, there is a rent-seeking equilibrium ($0 < \eta < 1$), if $\tau > (1-\alpha)(1-\theta)$, that is, if the foreign aid-to-output ratio (τ) and/or the domestic tax rate (θ) are high enough. Conditions like this are quite common in the literature.¹⁴ Note that while different model specifications imply different thresholds for a rent-seeking equilibrium to arise, the main message is the same across models. For instance, if we had assumed that the contestable prize is not only foreign aid transfers but also domestic tax revenues, $G=(1-\Delta)(\theta Y+T)$, then the threshold becomes $\tau+(2-\alpha)\theta > (1-\alpha)$, where a sufficient condition for the latter to hold for any value of τ is

¹⁴ For instance, in models of social conflict, it is optimal to follow appropriative, non-cooperative behavior when assets to be appropriated are relatively high (for a survey, see Drazen, 2000, chapter 10.7).

$\theta > (1 - \alpha)/(2 - \alpha)$.¹⁵ While one could argue that some thresholds/conditions are more plausible to hold than others, the qualitative results are the same. Namely, (i) high values of aid (τ) and high values of the tax rate (θ) put the good equilibrium to a test (ii) although it is possible to get a rent-seeking equilibrium by either a sufficiently high τ only, or a sufficiently high θ only, we prefer to read the thresholds in a combined way in the sense that both τ and θ work in the same direction by making the rent-seeking equilibrium more likely to exist.

Second, our model predicts that after a turning point, $\tau = (1 - \alpha)(1 - \theta)$, not only further increases in aid and/or fiscal size trigger rent-seeking, but also that these rent-seeking activities are strong enough to more than offset the positive direct effects that aid may have on growth ($\frac{\partial \gamma^{total}}{\partial \tau} < 0$). We thus get a non-linear effect, or a type of an “Aid Laffer curve” similar to that in, e.g., Dalgaard and Hansen (2001), Lensink and White (2001) and Jensen and Paldam (2006), although here the adverse effect works via the endogenous distortion of private incentives.¹⁶ In other words, below this critical point, there is zero rent seeking, so that only the direct positive effect exists and hence aid is good for growth ($\eta = 1$ and $\frac{\partial \gamma^{total}}{\partial \tau} > 0$); for an aid level above this critical point, it is straightforward to show that rent seeking activities more than offset the positive direct effect so that the net effect is negative ($\eta < 1$ and $\frac{\partial \gamma^{total}}{\partial \tau} < 0$). It is worth reporting that in more complicated models, one could get rent seeking ($0 < \eta < 1$) even along the positively sloped part of the curve. This could be the case in our setup if, for instance, we also allow for some exogenous degree of rent seeking in the sense that economy-wide rent seeking is not only a function of per capita rent seeking efforts as assumed here, but also of an exogenous part that reflects social norms

¹⁵ We are grateful to an anonymous referee for pointing out this implication to us.

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and is independent of rent seeking efforts.¹⁷ In more general setups like this, one could get rent seeking also along the positively sloped part of the Aid Laffer curve (along the positively sloped part, the adverse effect would reduce the effectiveness of aid but would not be strong enough to offset the positive direct effects of aid). However, irrespectively of modeling details, the main point remains the same: there is a non-monotonic effect from aid to growth, in the sense that - if aid is high enough - the adverse effects of incentives can even offset the direct positive effects that aid typically has on growth.

3. Econometric specification and description of data

This section develops an empirical framework that is suitable for testing the predictions of the theoretical model given by (9a)-(9c). The key prediction is that a rise in foreign aid transfers has a direct positive effect on growth by enhancing public infrastructure, but it can also trigger an indirect negative effect by pushing individuals to rent-seeking activities. By using a cross-country dataset (see subsection 3.2 below for data description), we will search for these two opposite effects.

As Svensson (2000) has pointed out, any test of this form is bound to be only suggestive for several reasons. For instance, long-term time series observations are not available for aid and rent seeking, and thus the analysis can only be confined to the medium-term impact of these variables on growth. In addition, rent-seeking activities are hard, if possible at all, to measure. Hence, any empirical methodology can only utilize proxy variables, which can hopefully provide adequate description of this type of activities.

3.1 *From theory to testing*

Following the theoretical model, we consider linear regressions of the form:¹⁸

¹⁷ Thus, in comparison to footnote 9 above, Δ also depends on a constant term, say $\delta_0 \geq 0$. Results are available upon request. Here we prefer to use a relatively simple model that delivers an analytical solution.

¹⁸ Equations (10a) and (10b) follow from (9a) and (9c) respectively. We omit (9b), which gives the consumption-to-capital ratio, because data for capital stocks are not available for most aid-recipient economies.

$$\text{growth rate} = G(\text{rent seeking, aid, tax rate; control variables}) \quad (10a)$$

$$\text{rent seeking} = R(\text{aid, tax rate; control variables}) \quad (10b)$$

According to (9a)-(9c), we have the following testable hypotheses:

Hypothesis 1: Growth is positively affected by aid and negatively affected by rent seeking in (10a).¹⁹

At the same time, rent seeking increases with aid in (10b).

Hypothesis 2: Rent seeking increases with the tax rate in (10b).

These hypotheses hold when there is rent seeking. Thus, they are complemented by:

Hypothesis 3: Rent seeking is affected by aid and the tax rate, only when aid and/or the tax rate are high enough.

To close the econometric specification, note that equation (8b) suggests that aid transfers (specifically, the foreign aid-to-output ratio) to a particular country increase with its inequality vis-à-vis the rest of the world. Several authors have already pointed out the potential pitfalls associated with the simultaneity bias when aid is treated as an exogenous variable in growth regressions; this accords with the approach adopted by Burnside and Dollar (2000).²⁰ We therefore assume that aid is jointly determined with growth and rent

¹⁹ The effect of the tax rate on the growth rate is ambiguous in (10a) exhibiting a Laffer curve as in Barro (1990).

²⁰ For a survey of the empirical literature, see Hansen and Tarp (2001) who stress that, with a 5-year average data sample (as the one utilized here), treating aid as endogenous, but predetermined, implies that any decisions on the allocation of aid are made on the basis of a 5 to 6 year planning horizon. We maintain this assumption here but we will also report - for comparison purposes - some results when aid is exogenous. Notice that, in accordance with the theoretical model and in particular (8b), aid depends upon the income difference of the recipient country from the rest of the world. Also notice that aid (and its determinants) drives growth. Some studies have investigated the joint determination of aid and growth (rather than income). For instance, Svensson (1999) has studied the simultaneous determination of growth, aid and a democracy index, whereas Dalgaard et al. (2004) have examined the simultaneous determination of growth, aid and policy, and Mosley et al. (2004) have studied the joint determination of poverty, aid and policy.

seeking. In particular, we use a linear regression of the following form (where a measure of inequality will be defined in subsection 3.2 below):

$$aid = A(\text{inequality}; \text{control variables}) \quad (10c)$$

Therefore, the econometric model consists of (10a)-(10c).

3.2 Control variables

To control for other possible determinants of the endogenous variables in (10a)-(10c), we follow standard practice and include a number of control variables; their choice is mainly dictated by the empirical literature on the determinants of growth (see, for instance, Barro and Sala-i-Martin, 2004, chapter 12) and the studies by Burnside and Dollar (2000), Svensson (2000), Alesina and Weder (2002) and Persson and Tabellini (2003, chapter 3). These control variables include country characteristics like the initial level of per capita GDP, regional dummies, population size, as well as measures of ethnic conflict and political instability.

Although the inclusion of these control variables is standard, it is useful to provide some brief explanations. First, the initial GDP per capita is used to control for convergence arguments, as well as for recipient countries' needs (see also Svensson, 2000). Second, regional dummies typically capture geographical and historical characteristics of the countries examined; following Burnside and Dollar (2000), dummies for Sub-Saharan countries and East-Asian countries are included in the growth equation.²¹ The same regional dummies are used in the rent-seeking equation along with a dummy for Central American countries as in Svensson (2000). In a similar vein, following Burnside and Dollar (2000), the aid equation includes a dummy for Central American countries (which are closely linked to the US), as well as two additional dummies, one for Egypt (an important ally of the US) and

²¹ We have also experimented with other explanatory variables in the growth equation, like measures of human capital (years of primary and secondary schooling years), life expectancy, and initial government consumption, which often appear in the list of potential growth determinants in empirical studies. However, none of these variables was found to be statistically significant. We therefore opted for the more parsimonious specifications presented in Table 1 and we check the robustness of our results to various plausible modifications in subsection 4.2.

one for the Franc zone countries (which are closely linked to France).²² Third, the log of the population size is included in the aid equation to capture possible scale effects, as countries with smaller populations are more likely to receive relatively large aid transfers due to donors' strategic interests like voting in international organizations.

Finally, measures of ethnic diversity and political instability are included in all three equations. Ethnic diversity aims at capturing the ethno-linguistic fractionalization of groups within a country, which is correlated with bad policies and low growth (see Easterly and Levine, 1997), and also takes into account the finding by Svensson (2000) that aid in countries suffering from competing social groups is associated with rent seeking. In turn, political turmoil will be used to capture civil unrest, which is also believed to affect growth (Drazen, 2000). Another variable, usually related to economic conditions and policies, is openness. Measures of all these variables will be defined in subsection 3.3 below.

As far as the estimation method is concerned, most of the literature relies on Instrumental Variable techniques or Panel methods with fixed effects. Taking into account the data availability and the nature of variables utilized, which are largely time-invariant, we will report 2SLS estimations in the pooled cross-section with a core set of exogenous instruments nearly identical to those used by Burnside and Dollar (2000).²³ These instruments include various regional dummies (to account for donors' interests), initial GDP and population (to account for recipients' needs), as well as measures of ethnic diversity, political instability and openness in extended specifications. In general, however, we will rely on 3SLS results, since the simultaneous estimation of the system (compared to an equation-by-equation estimation method like 2SLS) has the advantage of not imposing any restrictions on the correlation between the error terms, which may improve the estimates on

²² See also Svensson (1999, p. 284) on the effect of these variables on growth through aid flows. Persson and Tabellini (2003) use similar regional dummies to capture the effects of colonial history.

²³ Estimating the system (10a)-(10c) via fixed effects yielded implausible estimates and large standard errors due to time-invariance of our measure of rent seeking for many countries. On the other hand, we did not utilize a random effects approach because in our setup the explanatory variables are not likely to be orthogonal to the fixed country effect. See Collier and Hoeffler (2005) for an alternative approach to dealing with fixed effects.

grounds of efficiency in the case of non-zero elements in the variance-covariance matrix. This can be important in the current setup (where, for instance, an unexpected shock in aid can be correlated with the disturbance in the growth equation).

3.3 Data description

The data come mainly from the Penn World Tables, version 6.1 (Heston et al., 2002); the IRIS data set (*countrydata.com*); and the World Bank database on aid (Chang et al., 1998).

The Penn World Tables provide a number of variables. The GDP per capita in constant prices is used to obtain five-year average growth rates (denoted as *growth rate* in the Tables), the log of initial GDP per capita (denoted as *lgdp*) and the log of population (denoted as *lpop*). Following most of the empirical growth literature, instead of the tax rate, we will use government spending (which is mostly domestically financed and does not include outlays financed by foreign aid) as a share of output.²⁴ This is a common measure of government size and the distortions associated with it (see, e.g., Angelopoulos and Philippopoulos, 2007, section 3, who discuss in some detail the various measures of government size). This will give us a five-year average of a variable denoted as *government size*. To get a measure of inequality in the aid regression (10c), we will use the recipient country's log of initial per capita income, *lgdp*, and the log of initial per capita income in high-income OECD countries (following the World Bank classification), denoted as *ldon*. Aid transfers are expected to decrease with the former and increase with the latter, reflecting the idea that as the donors' income increases, aid increases. Finally, we define a country's *openness* as the sum of exports plus imports over GDP to obtain five-year averages.

The source for aid data is the World Bank database on foreign aid. The files included in this database contain the conventional and the adjusted measures of official development

²⁴ Data on tax revenues are limited. Persson and Tabellini (2003) find that tax revenue is more sensitive than government expenditure to the state of the economy implying a smaller reaction when both measures are scaled to GDP. Tanzi and Schuknecht (2000) use government expenditure as a percentage of GDP, which includes interest payments. Since this is not available for all non-OECD countries, here we use government spending.

assistance to a set of 133 countries between 1975 and 1995. The principal component of this dataset is Effective Development Assistance (EDA), an aggregate measure of aid flows combining total grants and the grant equivalents of all official loans. EDA is computed on a loan-by-loan basis to reflect the financial cost the creditor incurs in making loans on concessional terms. Details on this variable are in Chang et al. (1998). By use of this dataset, we construct five-year averages of the ratio of EDA (in current units relative to current GDP) denoted as *aid*.

Out of these 133 aid-recipient countries, we can obtain a measure of rent seeking for 75 countries (listed in the Data Appendix) for which the IRIS dataset, version IRIS-3, contains indicators of quality of governance, corruption and violation of property rights, as constructed by Stephen Knack and the IRIS Center, University of Maryland, from monthly ICRG data provided by Political Risk Services.²⁵ This dataset has been used by, among others, Knack and Keefer (1995), Svensson (2000), Alesina and Weder (2002), Fredriksson and Svensson (2003), Tavares (2003) and Barro and Sala-i-Martin (2004). Following most of the literature, we take the sum of five subjective indices available by the IRIS dataset: namely, “corruption in government”, “rule of law”, “risk of repudiation of government contracts”, “risk of expropriation” and “quality of bureaucracy”. From these indices, “corruption in government”, “rule of law”, and “quality of bureaucracy” range in value from 0 to 6, whereas “risk of repudiation of government contracts” and “risk of expropriation” are scaled from 0 to 10 with higher values indicating better ratings, i.e., less corruption and less rent seeking. We then construct a new variable (measured at a 50-point scale) by converting “corruption in government”, “rule of law”, and “quality of bureaucracy” to a 10-point scale, and then adding them to the other two indices. The resulting sum is finally averaged for each

²⁵ Obviously, rent seeking can take a variety of forms other than corruption, bureaucracy or property risks. This type of data, however, is not available at any form. Apart from data non-availability, our choice is also motivated by Svensson’s (2000) point that in practice there is no discrimination between the various forms of rent seeking, as presumably the competing groups equalize marginal costs and benefits between these forms.

country for each 5-year period and multiplied by (-1) to give a measure of rent-seeking activities (denoted as *rent seeking*) in the society at large.

From the same dataset, we also use an index of ethnic diversity (denoted as *ethnic*) which assesses the degree of tension within a country attributable to racial, nationality, or language divisions. Lower ratings are given to countries where tensions are high because opposing groups are intolerant and unwilling to compromise, whereas higher ratings are given to countries where tensions are minimal, even though such differences may still exist. Finally, following related studies (see, e.g., Knack and Keefer, 1995), we also utilize a measure of political instability measured by the average number of political assassinations per million people per year (denoted as *assassinations*). The general idea is that tensions and conflicts are associated with anti-social behavior, and evidently rent seeking is a form of such behavior.

The variables utilized in the empirical section of the paper along with the relevant sources are also summarized in the Data Appendix.

4. Empirical evidence from pooled cross-section data

We have collected 283 observations for 75 aid-recipient countries for which *rent seeking* is available with each country having at most four observations. We will present results by treating all 75 countries as one group (in subsections 4.1. and 4.2) and then partition them into subgroups (in subsection 4.3).

4.1 Empirical results

Table 1 presents results from the estimation of (10a)-(10c). Although this is a system of equations, OLS estimates - displayed in the first column for each specification - are also reported to provide results comparable to those of the literature. Regarding Hypothesis 1, the OLS estimates pinpoint a positive sign for *aid* and a negative sign for *rent seeking* in the

growth equation; however, the effect of *aid* on *rent seeking* is insignificant in the rent seeking equation. Some other effects should also be noticed. The coefficients of *ldon* and *lpop* in the aid equation have the right signs and are significant at the 5% level. In fact, the hypothesis that the coefficients on *lgdp* and *ldon* are equal and have opposite signs, as predicted by (8a), cannot be rejected by a standard F-test at the 1% significance level. Thus, the redistribution rule assumed in (8a) is not inconsistent with the data. The coefficient on the *government size* is significantly negative in the growth equation, and positive (though insignificant) in the *rent seeking* equation. Concerning control variables, their coefficients have the expected signs and are significant in most cases. For instance, *ethnic tensions* and *assassinations* are significant in the *rent seeking* equation with positive signs. Also, *lgdp* enters with a significant negative sign in all equations. The dummies for Sub-Saharan and East-Asian countries are also significant with expected signs in both the growth and rent seeking equations.

Since coefficients from OLS regressions may suffer from an endogeneity bias, 2SLS estimations are reported in the second column next to each specification. Observe that now, as predicted by Hypothesis 1, *aid* exerts a positive and significant effect on *rent seeking*.²⁶ Also, the coefficients on *aid* and *rent seeking* in the growth equation have the expected signs and are significant. Combining estimation results, the coefficient on *aid* implies that a rise of aid transfers as a percentage of GDP by one point would raise the *growth rate* by around 0.5 points in the absence of rent-seeking activities. However, rent-seeking activities also rise as a result of higher aid, so that the net effect of aid on the growth rate is eventually smaller: a rise of aid-to-GDP ratio by one percentage point raises the growth rate by 0.3 percentage points only,²⁷ when the adverse effect of rent seeking is also taken into account.

²⁶ See also Alesina and Weder (2002, p. 1135) who argue that "...an increase in aid is associated with an increase in corruption and vice versa...". Moreover, the lack of statistical significance of *rent seeking* in the aid equation confirms the finding by the same authors and Svensson (2000) that there is no evidence that aid is allocated to countries with less corruption. The combined evidence reinforces the view that the causation runs from aid transfers to rent-seeking activities, which is further strengthened by the insignificance of *aid* in the rent seeking equation when aid enters as an exogenous variable (see the results from the OLS specification).

²⁷ The net effect is obtained by subtracting the product of the coefficients on *rent seeking* (in the growth equation) and *aid* (in the rent seeking equation) from the coefficient on *aid* in the growth equation.

Therefore, the message is that aid causes rent seeking and this makes aid less effective. Note that the theoretical model predicted something stronger: once foreign aid and/or large public sectors trigger rent seeking, the net effect of aid on growth should be negative. The data do not seem to validate this prediction. This is not surprising for several reasons. In the context of our model, a main reason is that the sample may also contain countries without severe rent seeking problems and this affects the final effect in a cross-section or pooled estimation.

Regarding the size of the government and its impact on growth and rent-seeking, *government size* enters with a statistically significant negative sign in the *growth* equation. By contrast, the coefficient on *government size* in the rent seeking equation is significantly negative. Although this coefficient turns insignificant in all subsequent specifications, this is somewhat against our theoretical predictions and so we further examine the impact of *government size* in subsections 4.2 and 4.3. At the current stage, a possible explanation for the insignificance of *government size* in the rent seeking equation could be the inclusion of *lgdp* in the estimated specification; for instance, Mauro (1998) has shown that when one controls for initial GDP, the significance of public spending (with the exception of education expenditures) in explaining corruption is reduced. Finally, observe that, relative to the OLS estimates, the estimated coefficients on control variables and regional dummies retain their signs and significance levels, with the exception of the dummy for East-Asian countries in the *growth* equation, which is now insignificant (see also Burnside and Dollar, 2000).

It is to be noted that the identifying assumptions often raise a number of controversies. We have attempted to cope with this issue in several ways. As a first step, we tested for over-identifying restrictions in all equations using the standard Sargan's statistic. The results are reported in the last row of Table 1 and indicate that the null hypothesis on the validity of the exclusion restrictions cannot be rejected. Second, we conducted several experiments (not reported here) with the variables involving the identifying restrictions. For

instance, we included variables like the *Central America*, *Egypt* and the *Franc Zone* dummies, which are assumed to drive aid, but not directly growth, in the *growth* equation, and we tested their joint significance. In all cases examined, the hypothesis that the corresponding coefficients equal zero was soundly accepted.

The system (10a)-(10c) is also estimated by 3SLS to account for non-zero correlations in the unexplained parts of the regressions (results with the common set of instruments are reported in the column under 3SLS next to each specification). All coefficients remain roughly unchanged, with the exception of the coefficient on *government size* in the rent seeking equation, which becomes insignificant. The tests for the over-identifying restrictions again suggest that the null on the validity of these restrictions cannot be rejected.²⁸

Regarding the coefficients of main interest, a rise in *aid* again leads to an increase in *rent seeking* (with a somewhat larger coefficient now), whereas *aid* and *rent seeking* appear with similar (though slightly larger) coefficients in the *growth* equation. The net effect, however, of a rise in the aid-to-GDP ratio by one percentage point on the growth rate remains remarkably close to the one found with 2SLS, indicating that the overall picture is confirmed when the equations are estimated jointly, as long as aid and rent-seeking activities are being treated endogenously.

Before we move on, it is worth noting the following regarding our econometric methodology. By estimating equations (10a)-(10c) jointly, we have taken account of the indirect effect that aid may exert on growth via rent seeking. As an alternative specification, we can add a multiplicative term (*aid* X *rent seeking*) in the *growth* equation (10a) to capture the indirect effect that aid possibly has on rent seeking. Results (reported in the third column in the left panel of Table 1) show that the interaction term is insignificant and that the coefficient on *aid* also becomes insignificant, whereas the negative impact of *rent seeking*

²⁸ The test statistics are 4.54, 2.46 and 13.62 for the three equations respectively. The corresponding critical value (5%) for the χ^2 distribution is 21.02.

on *growth* remains. These findings are largely due to the high correlation of the interaction term with *aid* (amounting to 0.97).

4.2 *Robustness and extensions*

We have conducted several robustness tests, all of which confirm the above multivariate relationship between *growth rate*, *rent seeking* and *aid*, as summarized by Hypothesis 1. Apart from the robustness checks reported in the next paragraphs, the tests also involved the use of alternative definitions for the variables measuring *aid* and *rent seeking*. For instance, we experimented with the two other measures of aid available by the World Bank, namely Bilateral EDA and Multilateral EDA (see Chang et al., 1998, for the description of these variables) without any significant changes in the results. We also used the property rights index (available from ICRG), which is the sum of rule of law and expropriation risk, as suggested by Knack and Keefer (1995), and the results remained similar. Finally, we tested the robustness of our results for the possible effect of outliers by dropping separately one suspected country at a time. None of the resulting regressions for each equation is significantly different from the regressions presented in the paper after the exclusion of the following list of countries (observations), which had the highest residuals: Jordan (1975, 1980), Zaire (all observations), Philippines (all observations), Botswana (1975), Uganda (1980), Gabon (1975, 1980) and Guinea-Bissau (1975).

Table 2 reports the estimated coefficients of interest for some plausible robustness tests (estimated by 3SLS). These tests involve first the inclusion of *assassinations* and *ethnic* in the growth equation (rows 1 and 3), the inclusion of *openness* in all three equations (rows 2 and 3), and an interaction term (*aid* X *ethnic*) in the growth equation (row 4). More specifically, the first modification stems from Burnside and Dollar (2000) and aims at capturing long-term characteristics affecting growth, civil status and policies. Both *assassinations* and *ethnic* are found to be insignificant in the growth equation, in line with the

findings by Burnside and Dollar (2000). The second modification allows for the widely established positive correlation between various measures of openness and economic growth. These variables are often included in empirical growth and aid equations. The coefficient on *openness* is significant in the growth equation, but insignificant in the rent seeking equation. Results do not change when *assassinations*, *ethnic* and *openness* are all included in the growth equation. Interestingly, the estimates of the coefficient on *aid* in the growth equation become less significant when *openness* is included, whereas the coefficient on *aid* in the rent seeking equation becomes larger in magnitude (and is always significant at the 5% level). Consequently, the net effect of *aid* upon *growth* is now close to zero. A more detailed analysis of this result is beyond the scope of the paper, but a potential explanation offered by Neeman et al. (2003) is that, in today's open economies, agents can transfer stolen money outside of the country depleting their country's capital stock. When the (*aid X ethnic*) interaction term is included in the growth equation the coefficient on *aid* becomes insignificant, whereas the coefficient on *rent seeking* increases in absolute terms (see row 4).²⁹

Another modification is motivated by the often-cited existence of diminishing returns of aid flows on growth. Hansen and Tarp (2001) have shown that entering the square of aid drives out the Burnside and Dollar (2000) "good policy" effect and renders the linear aid effect significant. However, when an aid-squared term is included in the growth equation, it turns out to be insignificant and drives out the significance of the simple aid effect (see row 5 of Table 2). The adverse effect of *rent seeking* on growth remains negative and statistically significant, whereas the rest of the coefficients remain virtually unaltered.

To examine the potential impact of scale effects on growth when the negative effect of *aid* on *rent seeking* is taken into account, we include the size of the country, as proxied by the log of population, *lpop*, in the growth equation (see row 6). The estimated coefficient of *lpop* is

²⁹ We have also experimented with (*aid X openness*) in the growth equation but the results were insignificant. Another candidate is the Burnside and Dollar (2000) "good policy" index as an additional variable in the growth and aid equations. However, two of the three determinants of the policy index (openness and the budget surplus) are captured by the existing variables leaving only the less significant component of the index (inflation) out.

found to be insignificant and the coefficient of *aid* in the growth equation becomes now insignificant, whereas the negative effect of *rent seeking* increases, thus rendering the aggregate effect of aid on growth negative.

Finally, we allow for the potential endogeneity of *government size*, as public spending is likely to be affected by both growth and aid. The evidence from the estimates shows that the coefficient of *government size* remains negative, although its significance is marginally rejected. The results for the coefficients of interest are presented in row 7 of Table 2. As can be seen, the magnitude of the estimates is not substantially affected and their statistical significance is preserved. We can thus conclude that the potential endogeneity of public spending does not affect substantially our results regarding Hypothesis 1.

We close this subsection by saying that we are aware that there might be structural breaks in the estimated parameters. Nevertheless, since the focus of our work is on how private incentives or behavior are influenced by aid, and since it is widely recognized that “institutions” (established norms of behavior) change very slowly (see, e.g., Tanzi, 2002), we feel that the assumption of constant parameters is not a serious weakness. We have run cross-section regressions that, by construction, do not suffer from this problem (not reported here). Most estimated coefficients become insignificant, mainly because our sample size falls to less than 75 observations. Future work, with larger country samples covering longer time periods, could investigate for structural breaks.

4.3 *Do aid-recipient countries differ?*

So far we have treated all 75 aid-recipient countries as a single group. Recall however that the theoretical model distinguishes countries that receive relatively large aid transfers and/or have large public sectors from countries that receive relatively small aid transfers and/or have small public sectors. Only in the former case, *aid* and *government size* can trigger rent-seeking activities. In the latter case, rent-seeking activities (if any) are expected to be

independent of *aid* and *government size*, so that only the direct positive effect from aid upon growth should be present.

To test for such differences across countries, we have to partition them on the grounds of the amount of aid they receive, or the size of their public sector, or a combination of both. We have experimented with various definitions of “small” and “large” aid transfers in the data (namely, with different critical values of *aid* below which it would be possible that *rent seeking* is not affected by *aid*) but the data do not distinguish different groups. Given also that the interaction term of *aid* and *rent seeking* in the growth equation turned out insignificant (see subsection 4.1), we conclude that the distinction in “small” and “large” aid-recipients does not provide any useful insights. We believe that this can be justified by the nature of the countries included in the dataset, all of which are “large” aid recipients and, therefore, we do not attempt to partition countries into groups based on the amount of aid received. We finally report that we have also attempted to distinguish between high-income and low-income aid recipients within our dataset but the results do not indicate any substantial differences between subgroups. This is mainly due to the fact that the countries included are mainly low-income economies.

The empirical analysis becomes more interesting when we partition aid-recipient countries according to the size of their public sector. Apart from the theoretical prediction as summarized by Hypothesis 2, this classification can be motivated by the literature initiated by Burnside and Dollar (2000) and the recent studies of, e.g., Collier and Dollar (2004) and Mosley et al. (2004), who point out that aid appears to have a positive impact only in countries with ‘sound’ policies, which to a large extent reflect small public deficits. Table 3 checks the suggested hypothesis, where - for comparison purposes - we adopt both the core specification of Table 1 (specifications 2a and 2c) and the extended specification of Table 2 that includes *assassinations*, *ethnic* and *openness*. There are now two subgroups with “large” and “small” government size respectively, where 121 observations belong to the former and

162 observations to the latter with the average government size of the sample taken as the breaking point. In line with the theoretical predictions, the empirical results indicate that, in countries with “large” public sectors, *aid* affects *rent seeking* positively; the coefficients of *aid* are significant in both specifications, although somewhat lower in magnitude compared to the ones reported for the full sample. In contrast, this effect evaporates in countries with “small” public sectors, where the coefficients are insignificant. This implies that countries with larger-than-average public sectors mainly drive the above-established adverse effect of foreign aid on incentives.³⁰

Turning to the growth equation, *rent seeking* affects *growth* negatively irrespectively of the government size. In line with the findings in Tables 1 and 2, the estimated coefficients on *rent seeking* are significant, with those in the core specifications (2a) and (2c) being smaller in magnitude than those in the extended specification (2b) and (2d) for both groups of countries respectively. The evidence is less strong concerning the growth effect of *aid*: the estimated coefficients of the *aid* effect are found to be larger in countries with “small” public sectors, but are only significant in the core specifications (2a) and (2c) at the 10% level. A potential interpretation of these results may be associated with the finding of, e.g., Rodrik (1998) that a rise in openness is associated with an increase in the size of government. An explanation put forward by Rodrik was that in countries, which are more vulnerable to external shocks, the government sector can mitigate the risk by taking command of a larger share of the economy’s resources. Along these lines, the evidence presented in Table 3 may bear a complementary explanation, namely that high aid flows increase openness and hence provide more scope for government activities, thus rendering the adverse effect on rent-seeking (and growth) stronger.

³⁰ Another testing procedure is to investigate the statistical significance of the difference in the estimated coefficients. In our case, however, this test would have low power as the variance of the estimate for the countries with “small” public sectors is large and leads the test to accept the null hypothesis too often. We therefore opt for the direct comparison of the individual estimates for the two groups of countries.

To sum up, the data support the theoretical prediction that countries with large public sectors differ from countries with small public sectors. In countries with large public sectors, foreign aid triggers rent seeking competition. Although our findings should be interpreted with some caution given the uncertainty surrounding the estimates of the capital share, α , in the production function, they seem to confirm the common belief that rent seeking triggered by aid transfers takes place via state coffers, and this process is facilitated when the size of public sector is relatively large. We believe that the link among aid, fiscal management and incentives merits further research.

5. Related literature and how our work differs

Our point of departure, as in the whole literature on the effects of aid, has been the disappointing results that aid transfers have had in promoting growth and reducing poverty in poor countries. As said above, a popular explanation has been the misuse and misappropriation of aid by recipient countries. This can in turn reflect (among other things) social conflicts. Rent seeking is a form of social conflict. See Drazen (2000, chapter 12) for a survey of the relatively early literature along these lines.

At the heart of the problem of rent seeking, there is a common-pool problem. That is, there is a possibility of common access to a social resource (here, foreign aid), which opens the door to anti-social behavior among self-interested individuals and hurts growth.³¹ A theoretical model close to ours is Svensson's (2000), who has developed a game-theoretic model in which rent seekers compete for a fraction of an exogenously given output and has shown how a cooperative solution, namely one without rent seeking, can be achieved if the game is repeated over time; foreign aid makes such a cooperative solution more difficult to

³¹ Different papers differ in what the common-pool resource is. For surveys, see Persson and Tabellini (2000, chapters 7 and 14) and Drazen (2000, chapter 10.7). Some recent related papers, not included in Persson and Tabellini (2000) and Drazen (2000), are: Svensson (2000) where the common-pool is aid transfers; Leite and Weidmann (2002) and Grossman and Mendoza (2003) and Mehlum et al. (2006) where the common-pool is natural resources; Mohtadi and Roe (1998, 2003), Mauro (2002) and Park et al. (2005) where the common-pool is government tax revenue.

sustain. Our paper differs mainly because we used a standard model of growth, in which public infrastructure is co-financed by domestic taxes and foreign transfers, where the latter redistribute from above-average to below-average income countries. We also managed to get an analytic and testable solution that distinguished the direct and indirect effects of aid upon private incentives and economic growth.

Other recent theoretical models with aid include Lensink and White (2001), Dalgaard and Hansen (2001), Svensson (2003), Chatterjee et al. (2003), Torsvik (2005) and Morrison (2007). However, these models do not study how aid fosters rent seeking and how this affects growth.

What is the related empirical literature? Most of the existing studies have focused on bivariate relations between aid and corruption (see, e.g., Knack, 2001, Alesina and Weder, 2002, Tavares, 2003), growth and aid (see, e.g., the references in footnote 1 above) and growth and corruption (see, e.g., Mauro, 1995, Knack and Keefer, 1995). Our paper bridges a gap between these empirical relations by estimating the joint determination of rent seeking, growth and aid. To our knowledge, there has been no attempt so far to examine this link. Svensson (1999) has studied the simultaneous determination of growth, aid and a democracy index, while Svensson (2000) has focused on the simultaneous determination of rent seeking and aid without including growth and in particular the direct and indirect effects that aid may have on growth. More recent studies by, e.g., Dalgaard and Hansen (2001), Lensink and White (2001), Jensen and Paldam (2006) and Dalgaard et al. (2004), who have examined the relationship and/or joint determination of growth, aid and policy, and Mosley et al. (2004), who have examined the joint determination of poverty, aid and policy, have also recognized the possibility that aid may have indirect effects on growth or poverty via the channel of policy. However, they have not considered the distortion of private incentives, and, in particular, how foreign aid affects growth and incentives in a theory-consistent setup.

6. Conclusions and extensions

This paper has investigated the interrelationship between growth, rent seeking and foreign aid. The primary aim was to explain the recorded poor performance of aid flows in terms of economic growth. To this end, we constructed a tractable general equilibrium model of endogenous growth in which foreign aid distorts individuals' incentives by pushing them towards socially destructive activities. This hypothesis was tested for a cross-section of aid-recipient countries where measures of rent seeking are available. The main finding is that aid does cause rent seeking and this in turn mitigates the net growth effect of aid. We also found that the deleterious effect of aid upon incentives, and in turn growth, is significant only in recipient countries with relatively large public sectors. In other words, more manna from heaven in the form of aid requires smaller fiscal sizes to avoid rent seeking and low growth.

We are aware that we have not formally tested for an aid Laffer curve (see, e.g., Lensink and White, 2001, and Jensen and Paldam, 2006, for tests of an aid Laffer curve in the context of single-equation models). Nevertheless, to the extent that aid triggers rent seeking and this in turn reduces - or, in some countries/periods, more than offsets - the positive direct effect of aid on growth, our findings can provide some indirect evidence that there is a non-linear effect from aid to growth, where the implied non-linearity is related (among other things) to the distortion of individual incentives. Besides, our evidence implies that it is aid-recipient countries with relatively large public sectors that are more possible to be along the negatively-sloped part of a Laffer curve.

In our study, we have focused on social conflicts. Other possible explanations for the poor results of aid transfers have been ignored. These can include domestic government goals and incentives on the part of donors (see, e.g., Drazen, 2000, chapter 12), as well as adverse effects on democracy and equality (see, e.g., Morrison, 2007). It would be interesting to add these explanations/factors to our study. A problem might be that different factors do not provide different qualitative predictions for growth, so it would be difficult to identify

which factor is more important. If this is the case, more accurate conclusions would require the test and estimation of the various models subject to their full cross-equation theoretical restrictions. What we have found here is that the data do not reject the hypothesis that aid induces social conflicts in the form of rent seeking, and this in turn hurts growth.

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DATA APPENDIX

List of countries:

Algeria, Angola, Argentina, Burkina Faso, Bangladesh, Bolivia, Brazil, Botswana, Chile, China, Cote d'Ivoire, Cameroon, Colombia, Costa Rica, Czech Republic, Dominican Republic, Ecuador, Egypt, Ethiopia, Gabon, Ghana, Guinea, The Gambia, Guinea-Bissau, Guatemala, Guyana, Honduras, Haiti, Hungary, Indonesia, India, Iran, Jamaica, Jordan, Kenya, Republic of Korea, Lebanon, Sri Lanka, Morocco, Madagascar, Mexico, Mali, Mozambique, Malawi, Malaysia, Niger, Nigeria, Nicaragua, Pakistan, Panama, Peru, Philippines, Papua New Guinea, Poland, Paraguay, Romania, Senegal, Sierra Leone, El Salvador, Slovak Republic, Syria, Togo, Thailand, Trinidad and Tobago, Tunisia, Turkey, Tanzania, Uganda, Uruguay, Venezuela, Vietnam, Yemen, Zaire, Zambia, Zimbabwe.

Variables (in alphabetical order) and sources; see section 3.2 in the text for a detailed description:

aid: Effective Development Assistance in current units as a share of GDP in current units (source: Chang et al., 1998)

ethnic: index of ethnic diversity (source: countrydata.com)

assassinations: political assassinations per million people (source: countrydata.com)

government size: average of government spending over GDP (source: Penn World Tables, version 6.1; Heston et al., 2002)

growth rate: average growth rate of GDP per capita in constant prices (source: Penn World Tables, version 6.1; Heston et al., 2002)

ldon: log of initial per capita income in high-income OECD countries, World Bank classification (source: Penn World Tables, version 6.1; Heston et al., 2002)

lgdp: log of initial GDP per capita (source: Penn World Tables, version 6.1; Heston et al., 2002)

lpop: log of population (source: Penn World Tables, version 6.1; Heston et al., 2002)

openness: sum of exports plus imports over GDP (source: Penn World Tables, version 6.1; Heston et al., 2002)

rent seeking: measure of rent-seeking activities (source: countrydata.com)

TABLE 1. Estimates of the aid impact on growth and rent seeking: core model (1975-1995, 283 observations)

Dep. variable: <i>growth rate</i>	<i>OLS</i>	<i>2SLS</i>	<i>2SLS</i>	<i>3SLS</i>	Dep. variable: <i>rent-seeking</i>	<i>OLS</i>	<i>2SLS</i>	<i>3SLS</i>	Dep. variable: <i>aid</i>	<i>OLS</i>	<i>2SLS</i>	<i>3SLS</i>
<i>aid</i>	0.275** (2.85)	0.493** (2.43)	-0.717 (0.51)	0.549** (2.75)	<i>Aid</i>	-0.003 (-0.03)	0.785** (2.84)	0.876** (3.29)				
<i>rent-seeking</i>	-0.148** (-3.44)	-0.229** (-2.25)	-0.193 (-1.68)	-0.257** (-2.57)					<i>rent-seeking</i>	-0.037 (-1.52)	-0.014 (-0.28)	-0.006 (-0.14)
<i>aid X rent seeking</i>			-0.057 (-0.87)									
<i>lgdp</i>	-1.508** (-3.51)	-1.742** (-2.67)	-1.897** (-2.68)	-1.863** (-2.90)	<i>lgdp</i>	-4.676** (-9.48)	-3.767** (-6.30)	-3.863** (-6.64)	<i>lgdp</i>	-1.799** (-9.28)	-1.695** (-6.19)	-1.649** (-6.16)
<i>Sub-Saharan</i>	-3.499** (-5.82)	-4.020** (-5.19)	-4.441** (-4.70)	-4.369** (-5.76)	<i>Sub-Saharan</i>	-3.536** (-4.63)	-4.102** (-4.91)	-4.763** (-5.98)	<i>lpop</i>	-0.818** (-9.08)	-0.808** (-8.77)	-0.797** (-8.96)
<i>East Asia</i>	1.894** (2.58)	1.568* (1.72)	1.410 (1.45)	1.452 (1.63)	<i>East Asia</i>	-5.123** (-5.61)	-4.668** (-4.73)	-4.549** (-4.90)	<i>Franc Zone</i>	-0.114 (-0.31)	-0.088 (-0.24)	-0.020 (-0.06)
					<i>Central America</i>	2.378** (2.91)	2.440** (2.79)	2.337** (2.77)	<i>Central America</i>	-0.641* (-1.74)	-0.736* (-1.80)	-0.797** (-2.00)
					<i>Assassinations</i>	7.650** (3.99)	7.470** (3.64)	7.084** (3.72)	<i>Egypt</i>	1.036 (1.03)	1.016 (1.00)	0.794 (0.85)
					<i>Ethnic</i>	1.009** (4.28)	1.209** (4.65)	1.046** (4.30)	<i>ldon</i>	1.892** (2.03)	1.867** (2.00)	1.748** (2.03)
<i>government size</i>	-0.086** (-3.93)	-0.108** (-3.85)	-0.129** (-3.39)	-0.098** (-3.58)	<i>government size</i>	-0.013 (-0.49)	-0.085** (-2.30)	-0.045 (-1.29)				
<i>constant</i>	11.540** (3.61)	11.673** (3.08)	14.226** (2.88)	11.740** (3.14)	<i>Constant</i>	16.489** (4.14)	10.464** (2.25)	9.890** (2.18)	<i>constant</i>	9.879 (1.10)	9.730 (1.08)	10.541 (1.27)
R ²	0.19	0.20	0.15	0.19		0.47	0.41	0.40		0.40	0.41	0.42
D-W	2.11	2.06	1.89	2.01		0.59	0.61	0.61		0.92	0.92	0.92
Sargan OR test	-	Yes**	Yes**	Yes**		-	Yes**	Yes**		-	Yes**	Yes**

Notes: *t*-ratios (robust to heteroskedasticity) are in parentheses. An asterisk denotes significance at the 10% level and two asterisks at the 5% level. Sargan OR denotes the test of Sargan's statistic of overidentifying restrictions with * denoting acceptance of the null hypothesis at the 5% significance level.

**TABLE 2. Coefficient estimates of the aid impact on growth and rent seeking: robustness checks
(3SLS, 1975-1995, 283 observations)**

<i>Modifications</i>	growth equation		rent seeking equation
	<i>aid</i>	<i>rent seeking</i>	<i>aid</i>
1. <i>assassinations</i> and <i>ethnic</i> in <i>growth</i> equation	0.827** (2.73)	-0.532* (-1.95)	0.884** (3.32)
2. <i>openness</i> in all equations	0.283 (1.34)	-0.317** (-3.12)	1.028** (3.32)
3. <i>assassinations</i> and <i>ethnic</i> in <i>growth</i> equation, <i>openness</i> in all equations	0.585* (1.80)	-0.596** (-2.19)	1.033** (3.45)
4. <i>aid</i> X <i>ethnic</i> in <i>growth</i> equation	-0.598 (0.27)	-0.717** (-2.10)	1.035** (3.45)
5. <i>aid squared</i> in <i>growth</i> equation	0.218 (0.29)	-0.560** (-2.01)	1.033** (3.44)
6. <i>lpop</i> in <i>growth</i> equation	0.436 (1.01)	-0.760* (-1.74)	1.032** (3.44)
7. endogenous <i>government size</i>	0.606 (1.83)	-0.592** (-2.16)	1.075** (3.53)

Notes: *t*-ratios (robust to heteroskedasticity) are in parentheses. An asterisk denotes significance at the 10% level and two asterisks at the 5% level..

TABLE 3. Estimates of the aid impact on growth and rent seeking for ‘large’ (121 obs.) and ‘small’ (162 obs.) government size (3SLS, 1975-1995)

Dep. variable: <i>growth rate</i>	“large” government				“small” government				Dep. variable: <i>rent-seeking</i>	“large” government				“small” government					
Specification	(2a)	(2b)	(2c)	(2d)	Specification	(2a)	(2b)	(2c)	(2d)	Specification	(2a)	(2b)	(2c)	(2d)	Specification	(2a)	(2b)	(2c)	(2d)
<i>aid</i>	0.324* (1.76)	0.447 (1.54)	1.283* (1.85)	1.038 (1.24)	<i>aid</i>	0.571** (2.47)	0.490* (1.76)	1.301 (1.30)	1.513 (1.61)										
<i>rent seeking</i>	-0.266** (-2.25)	-0.762** (-2.31)	-0.321** (-2.24)	-0.460* (-1.93)						<i>rent-seeking</i>	-0.038 (-0.43)	-0.050 (-0.55)	-0.012 (-0.44)	-0.027 (-0.93)					
<i>lgdp</i>	-1.797** (-2.31)	-3.606** (-2.47)	-1.745 (-1.47)	-3.020** (-2.39)	<i>lgdp</i>	-3.588** (-4.35)	-3.637** (-3.75)	-4.184** (-3.28)	-3.652** (-3.01)	<i>lgdp</i>	-1.796** (-3.21)	-1.855** (-3.26)	-1.360** (-8.85)	-1.453** (-8.73)					
<i>Sub-Saharan</i>	-2.899** (-3.96)	-5.537** (-3.93)	-5.237** (-4.18)	-6.668** (-3.58)	<i>Sub-Saharan</i>	-2.957** (-2.58)	-6.171** (-4.38)	-5.876** (-4.54)	-5.315** (-3.84)	<i>lpop</i>	-1.044** (-5.93)	-0.970** (-4.42)	-0.373** (-6.41)	-0.429** (-6.69)					
<i>East Asia</i>	-0.016 (-0.01)	-3.611 (-1.37)	2.047 (1.78)	1.255 (0.98)	<i>East Asia</i>	-5.972** (-4.21)	-6.171** (-4.38)	-3.774** (-3.01)	-3.414** (-2.72)	<i>Franc Zone</i>	0.444 (0.51)	0.544 (0.61)	0.206 (1.16)	0.177 (0.99)					
<i>assassinations</i>	-	4.254 (1.07)	-	1.884 (0.65)	<i>assassinations</i>	8.827** (3.77)	8.820** (3.72)	5.584* (1.86)	4.885** (1.59)	<i>Egypt</i>	-	-	0.848** (2.20)	0.957** (2.43)					
<i>ethnic</i>	-	0.815 (1.45)	-	0.153 (0.43)	<i>ethnic</i>	1.582** (4.50)	1.569** (4.00)	0.749** (2.12)	0.872** (2.46)	<i>ldonor</i>	0.075 (0.04)	0.151 (0.08)	1.766** (3.75)	1.915** (4.02)					
					<i>Central America</i>	3.601** (2.82)	3.236** (2.63)	2.211* (1.92)	2.675** (2.29)	<i>Central America</i>	-1.425* (-1.79)	-1.227 (-1.45)	-0.116 (-0.50)	-0.056 (-0.24)					
<i>openness</i>	-	0.014 (1.03)	-	0.030** (2.91)	<i>openness</i>	-	0.005 (0.41)	-	-0.020 (-1.47)	<i>openness</i>	-	0.004 (0.53)	-	-0.005** (-2.09)					
<i>government size</i>	-0.085** (-2.03)	-0.082* (-1.66)	-0.114 (-1.43)	-0.197** (-2.14)	<i>government size</i>	0.057 (1.11)	0.0454 (0.89)	-0.083 (-0.80)	-0.039 (-0.35)										
<i>constant</i>	11.031** (2.20)	14.791** (2.14)	8.975 (1.15)	16.366** (2.17)	<i>constant</i>	5.602 (0.88)	6.144 (0.88)	12.369** (1.26)	8.585 (0.92)	<i>constant</i>	31.532 (1.64)	29.398 (1.50)	0.522 (0.12)	0.648 (0.15)					
R ²	0.22	0.15	0.15	0.18		0.44	0.46	0.46	0.46		0.38	0.39	0.65	0.66					
D-W	1.83	1.32	2.38	2.33		0.95	0.96	0.75	0.74		0.96	0.97	1.00	1.02					
Sargan OR test	Yes**	Yes**	Yes**	Yes**		Yes**	Yes**	Yes**	Yes**		Yes**	Yes**	Yes**	Yes**					

Notes: *t*-ratios (robust to heteroskedasticity) are in parentheses. An asterisk denotes significance at the 10% level and two asterisks at the 5% level. Sargan OR denotes the test of Sargan’s statistic of overidentifying restrictions with * denoting acceptance of the null hypothesis at the 5% significance level.