Reprinted from

JOURNAL OF PUBLIC ECONOMICS

Journal of Public Economics 87 (2003) 445–466

Democracy, rent seeking, public spending and growth

Hamid Mohtadi[a,b,*], Terry L. Roe[a]

[a]*Department of Applied Economics, University of Minnesota, St. Paul, MN 55439, USA*
[b]*Department of Economics, University of Wisconsin, Milwaukee, WI 53201, USA*

Received 5 June 2000; received in revised form 16 May 2001; accepted 24 May 2001

ELSEVIER

JOURNAL OF PUBLIC ECONOMICS

Editorial Policy:
The aim of the *Journal of Public Economics* is to encourage original scientific contributions on the problems of public economics, with particular emphasis on the application of modern economic theory and methods of quantitative analysis. It provides a forum for discussion of issues of public policy of interest to an international readership.

Publication information: *Journal of Public Economics* (ISSN 0047-2727). For 2003, volumes 83–86 are scheduled for publication. Subscription prices are available upon request from the Publisher or from the Regional Sales Office nearest you or from this journal's website (http://www.elsevier.nl/locate/jpubeco). Further information is available on this journal and other Elsevier Science products through Elsevier's website: (http://www.elsevier.nl). Subscriptions are accepted on a prepaid basis only and are entered on a calendar year basis. Issues are sent by standard mail (surface within Europe, air delivery outside Europe). Priority rates are available upon request. Claims for missing issues should be made within six months of the date of dispatch.
Personal Subscription: Private subscribers are entitled to a subscription at a reduced rate, details available on request. The following rules apply: (1) subscription must be prepaid; (2) the order must be sent direct to the publisher; (3) the copies should not be made available to institutions.

Orders, claims, and product enquiries: please contact the Customer Support Department at the Regional Sales Office nearest you:
New York: Elsevier Science, P.O. Box 945, New York, NY 10159-0945, USA; phone: (+1) 212 633 3730 [toll free number for North American customers: 1-888-4ES-INFO (437-4636)]; fax: (+1) 212 633 3680; e-mail: usinfo-f@elsevier.com
Amsterdam: Elsevier Science, P.O. Box 211, 1000 AE Amsterdam, The Netherlands; phone: (+31)20 4853757; fax: (+31)20 4853432; e-mail: nlinfo-f@elsevier.nl
Tokyo: Elsevier Science K.K., 9-15 Higashi-Azabu 1-chome, Minato-ku, Tokyo 106-0044, Japan; phone: (+81)3 5561 5033; fax: (+81)3 5561 5047; e-mail: info@elsevier.co.jp
Singapore: Elsevier Science, No. 1 Temasek Avenue, #17-01 Millenia Tower, Singapore 039192; phone: (+65)434 3727; fax: (+65)337 2230; e-mail: asiainfo@elsevier.com.sg
Rio de Janeiro: Elsevier Science, Rua Sete de Setembro 111/16 Andar, 20050-002 Centro, Rio de Janeiro – RJ, Brazil; phone: (+55) (21) 509 5340; fax: (+55) (21) 507 1991; e-mail: elsevier@campus.com.br [Note (Latin America): for orders, claims and help desk information, please contact the Regional Sales Office in New York as listed above]

Claims for issues not received will be honoured free of charge if made within six months of the publication date.

USA mailing notice: *Journal of Public Economics* (ISSN 0047-2727) is published monthly by Elsevier Science S.A., (P.O. Box 211, 1000 AE, Amsterdam). Annual subscription price in the USA US$1647 (valid in North, Central and South America only), including air speed delivery. Periodical postage rate is paid at Jamaica, NY 11431.

USA POSTMASTERS: Send address changes to *Journal of Public Economics*, Publications Expediting Inc., 200 Meacham Avenue, Elmont, NY 11003.
AIRFREIGHT AND MAILING in the USA by Publications Expediting Inc., 200 Meacham Avenue, Elmont, NY 11003.

Printed in The Netherlands

ELSEVIER

Journal of Public Economics 87 (2003) 445–466

JOURNAL OF PUBLIC ECONOMICS

www.elsevier.com/locate/econbase

Democracy, rent seeking, public spending and growth

Hamid Mohtadi[a,b,*], Terry L. Roe[a]

[a]Department of Applied Economics, University of Minnesota, St. Paul, MN 55439, USA

[b]Department of Economics, University of Wisconsin, Milwaukee, WI 53201, USA

Received 5 June 2000; received in revised form 16 May 2001; accepted 24 May 2001

Abstract

Does democratization imply faster growth, less corruption and less inefficiency? Past studies yield ambiguous results on the effects of democracy on economic performance and growth. We develop a simple two-sector endogenous growth model that shows both very young and mature democracies grow faster than countries in mid stages of democratization, producing a 'U' effect. This effect results from the pattern of rent seeking as it diverts from the provision of public goods. Rent-seekers act as monopolistic competitors. Initially, more democracy increases their number, raising aggregate rents. However, rents per rent-seeker fall with the number of rent seekers. Due to this crowding effect and the increased competition among rent seekers, aggregate rents fall in mature democracies. Thus, rents show an 'inverted-U' effect in relation to democracy. We find fairly robust supportive evidence for the latter.

JEL classification: H41; P16; P16

1. Introduction

The trend toward decentralization of political authority along with the democratic experiment of the past two decades in many parts of the world seems to have accompanied a rise in the reported incidence of corruption, as indicated by evidence from Russia, Turkey, Latin America and elsewhere. This seems puzzling since democracy is about transparency and checks and balances and since mature

*Corresponding author. Tel.: +1-612-625-8241; fax: +1-612-625-2729.

0047-2727/01/$ – see front matter
doi:10.1016/S0047-2727(01)00135-9

democracies are known to experience relatively less corruption. Is it perhaps that democracy helps reveal what would otherwise be hidden forms of corruption? If not, what accounts for the seemingly higher reporting of corruption and what does this imply for the future of democratization in other parts of the world? Finally, since corruption has been found to be growth inhibiting (e.g., Mauro, 1995) what does this imply for the growth potentials of democratic reforms? An attempt to answer this puzzle and the accompanying questions that it raises is the motivation for this paper. While several recent studies have sought to view democracy as endogenous, either empirically (e.g., Barro, 1999), or as a choice made by the elites (e.g., Acemoglu and Robinson, 2000), the motivating question behind this paper leads us the other way, i.e. in the direction of examining the *impact* of democracy.

The formal empirical evidence on the impact of democracy on growth is quite mixed and does not help with the answer to our puzzle. An overview of this evidence suggests that democracies may grow more rapidly (e.g., Kormendi and Meguire, 1985; Pourgerami, 1988; Scully, 1988; Barro, 1989; Grier and Tullock, 1989 — in the case of Latin America and Africa), that authoritarian regimes may grow faster instead (Weede, 1983; Landau, 1986), or that statistically significant conclusions cannot be reached (Helliwell, 1994; Barro, 1996)[1]. Barro (1996) suggests that autocracy (lack of democracy) may in fact be growth promoting if it expands economic freedoms and private property regimes, or growth inhibiting if it involves dictators that divert nation's wealth into nonproductive investments, a point also brought up by Przeworski and Limongi (1993). The private property-growth nexus has been verified in an empirical study by Knack and Keefer (1995), but this says little about whether democracy is a necessary prerequisite for private property protection. The rapid economic growth of many countries, such as those in Asia, suggests there may not be a logically necessary link between democracy and the growth-promoting aspects of private property regimes. Distributive issues also yield conflicting results. Traditional redistributive forces that direct resources away from productive capital (e.g., in the form of union strikes, etc.) suggest a slowing of growth. Since these forces gain strength with democratization, this line of analysis implies that democracies experience slower growth. From another perspective, however, redistributive forces that direct resources away from rents and toward productive capital should lead to faster growth. Given that rents play a dominant role in non-democracies, distributions away from rents would imply that democracies should grow faster. Understanding these forces is critical to understanding the transition from non-democracies to democracies.

This paper provides an explanation for the relationship between democracy, rent seeking (corruption), the allocation of public goods, and economic growth. This explanation helps shed some light on the puzzle of why early democracies may

---

[1]For an earlier survey of this literature see Przeworski and Limongi (1993).

experience more corruption, *and* the accompanying questions that it raises, notably the impact of democracy on economic growth. We focus on how the allocation of public goods depends on the pattern of rent seeking and how this pattern depends on the strength of democracy.[2] The paper therefore also clarifies the role of public spending in growth (via the link to both democracy and rent seeking behavior), as the empirical evidence is also mixed in this regard[3].

The model views rent seeking as a monopolistically competitive behavior, where a part of public spending is distributed among rent seekers as a 'differentiated rent'. This mechanism is incorporated into a simple two sector endogenous growth model. In a young democracy with insufficient checks and balances, more openness means more political access but also more access to the dispensation of public funds. This invites more individuals to seek rent, and more overall rent in the aggregate, but only to some point: Because of the free entry into the monopolistically competitive rent-seeking field, further competition among a larger number of rent seekers reduces returns per rent seeker. Simultaneously, the higher transparency of mature democracies raises costs to rent seekers. Both forces act to reduce aggregate rents in mature democracies even as the number of rent-seekers is larger. Consequently, rents follow an inverted-U pattern with democratization. Transformation in the pattern of rent seeking in turn impacts the productivity and efficiency of the public sector, thereby influencing long-run growth in a curvilinear form. Thus, economic growth follows an opposite pattern to rent seeking, i.e., a U pattern, where it is highest in young and mature democracies and lowest in countries at a mid point of democratization. This explains both the higher incidence of corruption and the lower growth rate that transitional democracies seem to experience (see also the evidence).

Our paper is related to past important studies in different ways: For example, it is both related to but distinct from a study by Alesina and Rodrik (1994). That paper, which was on the political economy of endogenous growth, focused on already mature democracies, thus allowing the authors to rely on the median voter theory to arrive at their results. This paper can be also viewed in relation to the allocation of talent argument by Murphy et al. (1991). In an autocracy, the

[2]Rent seeking here is assumed to be 'pure' i.e., to benefit only the rent seeker with no spillover to others. This is closest to the definition of corruption. The possibility that rent seeking for public goods may entail a spillover effect to others is studied in Mohtadi and Roe (1998).

[3]The link between public spending and growth is analytically studied in a seminal paper by Barro (1990). Empirical evidence on this impact ranges from no significance (e.g., Kormendi and Meguire, 1985), to negative (e.g., Landau, 1986; Grier and Tullock, 1989; Barth and Bradley, 1987), to positive (e.g., Ram, 1986). Barro shows that when public spending enters production (i.e. public goods) with positive externalities, growth shows a inverted U pattern, implying an optimum level of public goods. His empirical test shows a significant negative effect on growth, coming from government consumption, and an *insignificant* effect, coming from government investment. The latter is as likely to reflect the optimality of government investments, as Barro points out, as the possibility that public investment have no significant long-run growth impact.

asymmetric distribution of power and privilege tends to insulate policy makers from public accountability, rewarding rent seeking activities and thus attracting talented individuals away from productive entrepreneurial activities, which adversely affects growth. Democracy tends to ease the entry to influence public choice, accentuating the problem at first. However, the increased competition among a larger number of rent seekers actually reduces overall rents, thereby improving growth prospects. Additionally, in a democracy, legal and institutional reforms in response to demands for redistribution lead to greater sanctions on rent seeking activities, curbing these activities further. A recent paper by Ehrlich and Lui (1999) incorporates a variant of the allocation of talent argument above to show costly investments in political capital (rents) affect the incentive to invest in productive human capital, leading to adverse output effects. In our framework, democracy eases entry into rent seeking which eventually causes such rents to be bid away, and reduced, overall.

The reported rise of 'corrupt' activities that have accompanied the openness of some recently democratizing economies[4] provide anecdotal support for the first part of this argument. One thorny issue is whether more political openness causes otherwise hidden corruption to be revealed, or whether corruption actually rises with more openness. The issue is discussed in Section 3, but the evidence presented there suggests that an increase in the observed incidence of corruption in young democracies may be a result of both *actual* corruption and the *revelation* of otherwise hidden corruption.

Finally, a number of recent studies imply that democracy may be endogenous. An analytical model by Acemoglu and Robinson (2000) views democracy as a choice by the society's elites, while an empirical study by Barro (1999) focuses on the determinants of democracy. What does this imply for our view of the *impact* of democracy on growth? In relation to the Acemoglu and Robinson model, democracy remains exogenous to our model, even if endogenous to the elites, since we do not model the behavior of the elites here. In the case of Barro, his determinants of democracy fall outside the variables of our model, and hence, *with respect to these variables,* democracy remains exogenous.

Some evidence is provided that suggests fairly robust support in favor of the inverted U hypothesis on the relation between democracy and rent seeking activities. Section 2 develops the model, Section 3 considers some empirical evidence, and Section 4 draws concluding remarks.

---

[4]Some examples are, the recent events in Russia related to alleged 'money laundering' practices, the financial practices of several Asian economies that are alleged to have been a factor behind the financial collapse of 1997, the corrupt practices of the former Indonesian leadership and the alleged misuse of public funds for personal use by a former Turkish Prime Minister.

2. Model

2.1. Basics

Let $N = \{1, 2, \dots, n\}$ denote the set of n infinitely lived agents in the economy. The agents choose whether to engage in rent-seeking or in production. This generates a partition of the set of agents into two mutually exclusive subsets: $N = R \cup P$ (with $R \cap P = \emptyset$), where R is the set of rent seekers $R = \{1, \dots, m\}$, and P is the subset of producers, $P = \{m + 1, \dots, n\}$.[5] The crucial aspect of the analysis is that m and thus the partitioning of set N is determined *endogenously*. The return to each producer is her value of output which is a function of both private capital and public investment as per Barro (1990). But, the public investments that enter production are *net* of any amounts diverted to rent-seekers. The return to rent-seeking is some fraction of public investments that a rent-seeker is able to appropriate. In equilibrium, a non-arbitrage condition equalizes the flows of income between producers and rent seekers, leading to the determination of the partition, m. The role that democracy plays in this framework is that returns to rent-seeking are subject to both the positive effect of 'increased political access' that democratization makes possible, and the negative effect of (i) crowding of rent seekers and (ii) increased 'costs' of rent seeking that the greater transparency of democracy requires. Thus the equilibrium size of the rent-seeking sector will depend on the state of democracy. As a result, the overall level of rent seeking and long run growth both depend on the state of democracy.

Each agent, indexed i, chooses between production and rent seeking. She maximizes the discounted utility stream $\int_0^\infty U(c_i)\, \mathrm{e}^{-\rho t}\, \mathrm{d}t$ subject to the budget constraint,

$$c_i = (1 - \bar{\tau})y_i - \dot{k}_i \quad \forall i \in N \tag{1}$$

where $\bar{\tau}$ is the tax rate given to agents (hence the bar), $\dot{k}_i$ is investments by agent i and $y_i \in Y$ ($i \in N$) is the higher of the two income streams that the agent can choose from, production income y_i^p (for $i \in P$), or rent seeking income y_i^r (for $i \in R$). Thus y_i can be expressed as:

[5]The functional separation between rent seeking and production that is represented by the mutually exclusive sets R and P abstracts from a more complex reality where producers engage in rent-seeking and rent-seekers in production. However, it is reasonable to imagine that rent seeking responds to institutional structures and incentives in the same way, whether it is carried out by different agents or it is a sub-function of a one agent, occurring jointly with other functions. Therefore, the separation does not deter from the general nature of the findings. Yet by simplifying the algebra, it helps to crystallize the key arguments more sharply.

$$y_i = \text{Max}(y_i^p, y_i^r) \Rightarrow y_i \in Y^P = \{y_i^p | y_i^p \geq y_i^r\}; \quad \text{or}$$
$$y_i \in Y^R = \{y_i^r | y_i^p \leq y_i^r\} \tag{2}$$

Given (2), agents' movement from one sector to another generates an arbitrage activity. In equilibrium, no further movement of agents occurs and the two income streams are equal. This non-arbitrage condition will lead to the endogenous determination of the number of rent seeking agents. Before deriving this equilibrium, we first specify each sector's source of income.

If an agent pursues production, gross income (before taxes) is:

$$y_i^p = k_i^\alpha \bar{G}^{1-\alpha} \quad \alpha \in (0, 1), i \in P \tag{3}$$

where k_i is the private production capital and $\bar{G}$ is public investments. As usual, the bar indicates that G is viewed as fixed by individuals, but is in fact variable in the aggregate (to be determined later). The entry of G into the production function is similar to Barro (1990)[6], but with the distinction that it is net of funds diverted to rent seekers. Thus, total government spending X on public goods is *less* than realized expenditures G entering production. The difference between X and G accounts for 'leakages' due to rent seeking activities. The explicit relation between G and X will be developed later.

2.2. Structure of rent seeking and relation to democracy

The rent seeking process depends on three factors, the behavior of government functionaries, the behavior of rent seekers and the role of democracy in the process. These concepts are developed below.

2.2.1. Measuring democracy

First, the role of democracy needs to be clarified. Democracy is about the flow of information and access to the government. In an attempt to quantify this aspect of democracy, let ι_{il} represent the information signal about a single rent-seeking event i that reaches citizen l; let a_{il} represent the ability of citizen l to access authorities, based on this information. Thus $\delta_{il} = h(\iota_{il}, a_{il})$ describes the 'production function' of democratic 'freedoms' for citizen l regarding event i. Suppose there are p citizens with such democratic freedoms. Then $l \in \boldsymbol{P} = \{1, 2, \ldots, p\}$ and $\boldsymbol{P} \in N$ so that $p \leq n$. Aggregating over all p citizens, $I_i(p) \equiv \Sigma_{l=1}^{p} \delta_{il}$ defines society's aggregate information and 'access' parameters on event i which we take to represent the state of democracy regarding event i. Normalizing to n, the

[6]Utility enhancing, but otherwise unproductive government spending is ignored. Adding this effect is simple but dilutes the focus. Also, many utility enhancing public expenditures are indirectly productive. For example, improving the quality of the environment, water supply, or social security entails productivity gains via improved employee health and morale.

measure $D_i(p/n) \equiv I_i(p)/n$ represents aggregate state of 'democracy' for event i. Suppose democracy is 'event symmetric,' i.e., to any citizen l, the information and access parameters ι_{il} and a_{il} on any event i are the same as any other event j. Then $D_i(p/n) = D_j(p/n) \equiv D$, $\forall$ i and j. Since $p/n \in (0, 1)$, without loss of generality, we define measure D over the unit interval, $D \in (0, 1)$.

2.2.2. Government functionaries

Suppose that there are numerous (thus atomistic) government functionaries that are appointed for life, independent of the political processes that might lead to changes among top policy makers.[7] Rent seeking transactions are assumed to take place between the private rent seeking agents and these government functionaries. A functionary provides benefits to the rent seeker i which is a fraction $g_i \in (0, 1)$ of total public funds, X. The fraction g_i depends, in part, on how close the rent seeker i's demand for a particular service (or favor) is to the functionary's duties. Since a more democratic state allows for better flow of information, this yields a closer match between the rent seeker and the functionary. Moreover, democracy also allows greater access to the bureaucracy as we have seen. Both factors raise the effectiveness of rent seeking and therefore the size of g_i. Thus, let $g_i = w(D)\gamma_i$ where $w(D)$ is a weight $[w(D) \in (0, 1)]$, increasing with D. In return for providing g_i, the rent seeker receives a proportional bribe, $\beta_i g_i X$ where $\beta_i \in (0, 1)$. The 'supply' function g_i is the solution to the utility maximization problem of the government functionary from this rent seeking transaction, given β_i. This is the value of the bribe, less the expected cost of being caught. Assume that the functionary's utility is *separable* in each transaction he is engaged in. Thus the utility for the transaction with rent seeker i is:

$$u_i^G = \beta_i g_i X - c^G \pi^G(g_i) X \quad (\partial \pi^G / \partial g_i > 0) \tag{4a}$$

where,

$$g_i = w(D)\gamma_i \quad (w' > 0), \tag{4b}$$

as indicated earlier. Here c^G is the cost to the bureaucrat in the event he is caught; $\pi^G(g_i)$ is the probability of being caught, which depends on the fraction of funds diverted. The assumption here is that sanctions on bureaucrats must dissuade further activity and thus be proportional to the fraction of funds diverted. Given a value of β_i, the bureaucrat's optimal supply of services g_i^* to rent seeker i solves the utility maximization problem $\beta_i - c^G \partial \pi^G / \partial g_i = 0$, yielding, $g_i^* = w(D)\gamma_i^*(\beta_i) \equiv g^i(D, \beta_i)$. The second order condition on utility maximization guarantees that $\partial^2 \pi^G / \partial (g_i)^2 > 0$, i.e., higher g_i^* is likely to be discovered at a faster rate. Differentiating the first order condition, we find that,

---

[7] We assume that entering the government is not a choice to citizens, as an implied rationing of government posts is associated with barriers to entry into such posts.

$$\partial g_i^* / \partial \beta_i = 1/[c^G \partial^2 \pi^G / \partial (g_i)^2] > 0 \tag{5}$$

In addition, g_i 'shifts' down with an increase in *overall* rent seeking activity, as resources needed to distribute to rent seekers become more scarce. Thus, we can write:

$$g_i^* = g^i\left(\beta_i | D, \sum_{j=1, j\neq i}^{j=m} \beta_j\right) \quad \text{with} \quad \partial g^i / \partial \left(\sum_{j=1, j\neq i}^{j=m} \beta_j\right) < 0 \text{ and}$$
$$\partial g^i / \partial \beta_i > 0 \tag{6}$$

where the vertical bar indicates that the aggregate effect of rent seeking by others (and of course the state of democracy) is *external* and therefore *given* to any single government functionary.

2.2.3. Rent seeking agents

We now develop the structure motivating rent seeking by the individual agent. Rent seekers act *strategically* vis-à-vis the government functionaries in the sense of *observing* the positive effect of their own effort on the benefit they receive from the government functionaries. Otherwise, no rent seeking would take place. Consistent with this, the rent seeking agent i diverts a fraction g_i of total public funds X where g_i is given by (6), i.e. she incorporates the government functionaries' optimum supply function in her rent seeking behavior. Thus her gross income is $g_i X$.

The cost of rent-seeking consists of two factors: The first is the actual cost of rent seeking, e.g., bribing public officials. We saw in Section 2.2.2 that this is some $\beta_i(0, 1)$ fraction of the rent seeker's gross income $g_i X$, paid to the government functionary. Thus, β_i enters both the cost of rent seeking and also, via (6), the benefits from it. Rent seekers will *choose* β_i to maximize rent seeking income. This will be derived in the next subsection.

The second cost is the cost of being 'caught' (e.g., fines, foregone profits, reputation costs), since rent seeking is presumed illegal[8]. This cost is assumed to be uniform across agents and to increase with democratization due to the greater transparency of democracies. Let c reflect such costs per dollar of rents and $\pi \in (0, 1)$ the probability of being caught. This probability depends on (i) the flow of *information* and (ii) the ability to *access* political authorities to pressure the government to punish the rent seeker which, given the discussion in Section 2.2.1, can be summarized by the democracy index $\pi[D(p/n)]$.

With this background, the rent seeker's net expected income is:

[8]Later, we use 'corruption' data that involves illegal activities such as bribery.

$$y_i^r = [(1-\beta_i) - c\pi(D)]g^i\left(\beta_i|D, \sum_{j=1,j\neq i}^{j=m} \beta_j\right)X \qquad (7)$$

$$i, j \in R; \quad c\pi(D) < (1-\beta_i);$$

$$\frac{\partial g^i}{\partial \beta_i} > 0; \quad \frac{\partial g^i}{\partial D} > 0; \quad \frac{\partial g^i}{\partial m} < 0; \quad \frac{\partial g^i}{\partial \sum_{j=1,j\neq i}^{j=m} \beta_j} < 0 \qquad (8a)$$

It must be emphasized, as was previously mentioned, that besides D and m, the last term $\Sigma_{j=1,j\neq i}^{j=m} \beta_j$ appears fixed to the individual rent seeker, but varies in the aggregate with the action of all rent seekers taken together.

2.2.4. Rent seekers' optimizing behavior

The optimizing behavior of agents involves an intertemporal and an intratemporal decision. The latter is the decision of whether to engage in rent-seeking or production. The former is to choose the optimum path of consumption/accumulation, given the intratemporal decision. Consider first the intratemporal decision. With m and G as exogenous to the atomistic agents, the optimizing behavior of an agent who rent-seeks is to choose the optimum intensity β_i, *if* this optimization yields rents at least as high as the income she would have gained from production. Otherwise this agent will not be a rent seeker. This means that β_i maximizing y_i in (2) is positive, *if* it is also arg-max of y_i^r whenever $y_i^r(\beta_i^*) \geq y_i^p$, and zero, otherwise. That is:

$$\begin{aligned} &\forall i \in N: \\ &i \in R \quad \text{and} \quad \beta_i^* > 0 \text{ if } \max_{\{\beta_i\}} (y_i^r) \geq y_i^p \\ &i \in P \quad \text{and} \quad \beta_i^* = 0 \text{ if } \max_{\{\beta_i\}} (y_i^r) < y_i^p \end{aligned} \qquad (9)$$

Note that in (9) agents view y_i^p as independent of β_i. This is because y_i^p depends on rent seekers' behavior only at the *aggregate*, working via the adverse effect of rent seeking on public spending G, as we will see shortly.

When $i \in R$, the first order condition, for strictly positive β_i^* leads to the following:

$$[1 - \beta_i^* - c\pi(D)]\frac{\partial g^i\left(D, \beta_i, \sum_{j=1,j\neq i}^{j=m} \beta_j\right)}{\partial \beta_i^*} = g^i\left(D, \beta_i^*, \sum_{j=1,j\neq i}^{j=m} \beta_j\right) i, j \in R \qquad (10)$$

As expected, Eq. (10) shows that an optimum β_i^* occurs where the expected marginal cost of rent seeking equals its marginal benefit. The second order condition is locally satisfied if g_i is locally concave in β_i.[9] Note that the implicit solution to (10) is agent i's 'reaction function' to all other agents, taken together.

Since rent seekers seek public funds for own purposes (e.g., a sidewalk in front of his/her dwelling), the ith rent seeker's reward $g_i X$ is a *differentiated* product. Essentially, this means that each agent seeks a slightly different goal from others, thus an imperfect substitute for the goals of any other agent. As under monopolistic competition, product differentiation then implies agent i's ability to influence policy in her favor exceeds all other agents' ability to counter agent i's efforts. Otherwise, i would not engage in rent seeking. Thus,

$$\partial g^i/\beta_i > \left| \sum_{j=1, j\neq i}^{j=m} \partial g^i/\partial\beta_j \right| \quad i, j \in R \tag{8b}$$

Assumptions (8a) and (8b) reflect the stylized facts to be utilized in the propositions developed below.

Under symmetric equilibrium, $\beta_i^* = \beta_j^*$. Then, Eq. (10) is solved to yield the equilibrium level of β_i^*. It is seen that β_i^* only depends on D and $m-1$, or simply on D and m:

$$\beta_i^* \equiv \beta^*(D, m) \quad i \in R = \{1, \ldots, m\} \tag{11}$$

To proceed further we need to understand how the function $\beta^*(D, m)$ behaves. This is important because it affects the discussion of the impact of democracy on the size of the rent seeking sector (m). The following two propositions establish the properties of the partial derivatives of $\beta^*(.)$.

Proposition 1. *For any D, if the rent seeking return function $g^i(.)$ is additive in β_i and β_j, then in symmetric equilibrium, a more crowded playing field (larger m) means a more intense rent-seeking effort, β^*, i.e., $\partial\beta^*/\partial m|_{\bar{D}} > 0$.*

Proof. See Appendix A.

The intuition behind this result is that agents find themselves forced to engage in rent seeking more intensely in order to counter the effects of a more competitive playing field. Next, we consider how rent-seeking responds to changes in democracy, D, holding m constant.

Proposition 2. *For any m, more democracy means less rent seeking intensity ($\partial\beta^*/\partial D < 0$).*

[9] The second order condition is: $-\partial g^i(.)/\partial\beta_i + [1 - \beta_i^* - c\pi(D)]\ \partial^2 g^i(.)/\partial\beta_i^2 < \partial g^i(.)/\partial\beta_i$ Substituting for the brackets from (7) this reduces to the following local condition, $g^i(.)\ \partial^2 g^i(.)/\partial\beta_i^2 < 2(\partial g^i(.)/\partial\beta_i)^2$, which is satisfied if, $\partial^2 g^i(.)/\partial\beta_i^2 < 0$.

Proof. See Appendix B.

The condition in this proposition is consistent with the notion that democratization entails greater transparency (see Section 1). Greater transparency reduces returns to (or marginal productivity of) rent seeking, as information on rent seeking activities is better publicized.

In addition, we need to understand the equilibrium properties of the g^i function in (6). With symmetry among m agents this function becomes:

$$g^i(D, \beta_i, \sum_{j=1, j\neq i}^{j=m} \beta_j) = g^*(D, \beta_i^*, (m-1)\beta_i^*) \quad i \in R \tag{12}$$

Substituting for β_i^*, from (11):

$$\begin{aligned} g^*(D, \beta_i^*, (m-1)\beta_i^*) &= g^*(D, \beta^*(D,m), (m-1)\beta^*(D,m)) \\ &\equiv \tilde{g}(D,m), \end{aligned} \tag{13}$$

showing that $\tilde{g}$ also depends only on the state of democracy and the size of the rent seeking sector. Moreover, from the derivatives of the $g^i(.)$ function in m and D (Eq. (8a)), it follows:

$$\frac{\partial \tilde{g}}{\partial D} > 0; \quad \frac{\partial \tilde{g}}{\partial m} < 0 \tag{14}$$

Maximum rent seeking income is found by substituting from (11) and (13) into (7), yielding,

$$y^{r*} = [1 - \beta^*(D,m) - c\pi(D)]\tilde{g}(D,m)X \tag{15}$$

Observe that as m increases y^{r*} falls both because rewards to rent seeking $\tilde{g}$ fall (more crowded field); and because rent seeking intensity β^* rises.

By Eq. (9), rent seekers also need to know the alternative income stream available from production. To find y^p we need the value of G, the part of spending entering production. This value is,

$$G = X - \left(\sum_{i=1}^{m} g_i\right) X = [1 - m\tilde{g}(.)]X \tag{16}$$

Production income is then found from,

$$y^p = k^\alpha G^{1-\alpha} = k^\alpha[\{1 - m\tilde{g}(.)\}X]^{1-\alpha} \tag{17}$$

Eqs. (15) and (17) are used in the non-arbitrage condition below.

2.2.5. Non-arbitrage condition — determining m

Although agents view m as exogenous, each agent's decision of whether to choose rent seeking or production does affect m in the aggregate. When two income streams, y^p and $y^{r}*$, are equal, agents will be indifferent between them. This non-arbitrage condition leads to the endogenous determination of m in equilibrium (say m_e). This is an intratemporal equilibrium condition, taking place at given time, t. Later, it will be seen that dynamic considerations also enter the determination of m. The integer m is found as the nearest integer to a real number that satisfies the following equilibrium condition[10]:

$$y_e^p = y_e^{r}* \Rightarrow k^{\alpha}[\{1 - m_e\tilde{g}(.)\}X]^{1-\alpha} = (1 - \beta^*(.,m_e) - c\pi(D))\tilde{g}(., m_e)X, \quad (18)$$

which simplifies to:

$$(k/X)^{\alpha}[1 - m_e\tilde{g}(D, m_e)]^{1-\alpha} = [1 - \beta^*(D, m_e) - c\pi(D)]\tilde{g}(D, m_e) \quad (19)$$

The size of rent seeking sector m_e is the implicit solution to (19). Note that m_e depends on D and k/X ratio:

$$m_e = m^e(D, k/X) \quad (20)$$

Thus a key to the existence of m_e and its properties is determining k/X. This requires analyzing growth first. It will then be shown that for an economy in steady-state, an equilibrium value of m_e *exists*, under mild conditions, and is *unique*.

2.2.6. Growth

As stated earlier, the income of *all* agents (producers and rent-seekers), is taxed at the rate τ to finance public spending X. Each agent's budget constraint is $(1 - \bar{\tau})y_i = c_i + \dot{k}_i$ per Eq. (1), where $y_i = \max(y_i^p, y_i^r)$, by Eq. (2), and y_i^p and y_i^r are given by Eqs. (3) and (7). Agents maximize the discounted utility streams $\int_0^{\infty} U(c_i)\, e^{-\rho t}\, dt$ subject to their budget constraint (ρ = discount factor), with both τ and G perceived as fixed. In equilibrium, m_e agents rent-seek and $n - m^e$ produce. But the non-arbitrage constraint implies that in intratemporal equilibrium, $y_i^p = y_i^{r}* \equiv y_i^*$. This simplifies the analysis greatly, since the budget constraint can be expressed in terms of producers income only: $(1 - \bar{\tau})k_i^{\alpha}[\{1 - m_e\tilde{g}(.)\}X]^{1-\alpha} = c_i + \dot{k}_i$ even though it applies to *all* n agents. Using Eq. (3) for y_i^p and the utility function $U(c_i) = \ln(c_i)$, the decentralized growth path for agents i is given by:

$$\lambda_i = \left[\alpha(1 - \bar{\tau})\left(\frac{\bar{G}}{k_i}\right)^{1-\alpha} - \rho \right] \quad i \in N \quad (21)$$

[10] Given that m is a large number, the difference between it and the real number will be exceedingly insignificant.

2.2.7. Aggregation and the steady-state

In the aggregate both τ and G are endogenous. In particular, taxes are paid to finance the total funds X earmarked for public spending. Thus, the government budget constraint is:

$$\tau\left[\sum_{i=1}^{m} y_i^r + \sum_{i=m+1}^{n} y_i^p\right] = X \tag{22}$$

Since $y_i^p = y_i^r{}^*$ in equilibrium, (22) simplifies to:

$$\tau = \frac{X}{ny_e^p} \tag{23}$$

where the subscript i is dropped.

Now consider several equilibrium ratios. The equilibrium ratio of G/X, say G_e/X, is found from Eq. (16) as,

$$\frac{G_e}{X} = 1 - m_e\tilde{g}(D, m_e), \tag{24}$$

the ratio G_e/k appearing in (21) is found from the production function,

$$\frac{y_e^p}{k} = \left(\frac{G_e}{k}\right)^{1-\alpha}, \tag{25}$$

and the ratio k/X is found from the non-arbitrage condition (19). Eqs. (19) and (23)–(25) then determine the steady-state ratios involving variables, k, X, G_e, and y^p. Specifically, from (23)–(25):

$$\frac{G_e}{k} = (\tau n)^{1/\alpha}[1 - m_e\tilde{g}(D, m_e)]^{1/\alpha} \tag{26}$$

and

$$\frac{k_e}{X} = \left(\frac{1}{\tau n}\right)^{1/\alpha}\left(\frac{1}{1 - m_e\tilde{g}(D, m_e)}\right)^{(1-\alpha)/\alpha} \tag{27}$$

The G_e/k ratio in (26) is used to simplify the steady-state growth rate (shortly below) and the k_e/X ratio in (27) is used in (19) to provide the final expression for the equilibrium value of m_e which is:

$$\frac{1}{\tau n} = (1 - \beta^*(D, m_e) - c\pi(D))\tilde{g}(D, m_e) \Rightarrow m_e^* \equiv m^{e*}(D) \tag{28}$$

where m_e^* denotes both the inter-sectoral (non-arbitrage) equilibrium *and* the steady-state. Proposition 3 (below) shows that m_e^* will exist and is unique under mild conditions.

Note that unlike m_e, m_e^* no longer depends on k/X ratio, but only on D.

Furthermore, unlike (19), the left-hand side of (28) is now *independent* of m. The explanation lies in Eqs. (19) and (27). Specifically, in (19) the term $[1 - m_e\tilde{g}(.)]$ represents the extent that rent-seeking diverts from public funds per unit of X. Eq. (27) shows that this diversion is *exactly* offset by an increase in the stock of private capital. The net result is that the left-hand side of (28) is unaffected. This observation implies that rent seeking behavior in the long run involves considerations only *within* the rent seeking sector, as expressed by the right-hand side of (27).

It is also important to observe that the ratio of total government spending to national output, X/ny_e^p, is *not* determined within the system of Eqs. (23)–(28), but remains *exogenous*. This implies that any level of this ratio is supported by the system. Let θ denote this exogenous ratio, i.e.,

$$\theta \equiv \frac{X}{ny_e^p}, \tag{29}$$

It follows that the tax rate (Eq. (23)) is determined by any exogenous value of θ:

$$\tau = \theta \tag{30}$$

Although a representative government may choose a socially optimum θ by maximizing growth (as for example in Barro, 1990), a government prone to rent seeking may not. Thus the assumption of a optimum choice of θ may be consistent only with highest values of D. Since the level of democracy is not uniform in our model, this assumption is not universally valid here.[11]

Rewriting (21), in light of the expression (26), the steady-state growth rate becomes:

$$\lambda^* = \left[\alpha(1-\theta)(n\theta)^{\frac{1-\alpha}{\alpha}}[1 - m^{e*}(D)\tilde{g}(D, m^{e*}(D))]^{\frac{1-\alpha}{\alpha}} - \rho\right] \tag{31}$$

2.2.8. Properties of $m^{e*}(D)$

A. Existence and uniqueness in steady state

Proposition 3. *A steady-state equilibrium value of m_e^* will exist and is unique only if incentives favor entry of the first seeker, i.e., when $y_r^*(m=1) > y_e^p$.*

Proof. m_e^* solves (28). The left-hand side of (28) is a constant since $\tau = \theta$. The right-hand side monotonically decreases in m (recall that β increases and $\tilde{g}$ decreases in m). Substituting for θ from (29), the left side of (28) becomes y_e^p/X.

[11] One appropriate course of action is to treat θ as exogenous in the model and then to empirically examine, in a growth regression context, the significance of its coefficient. An insignificant coefficient would be consistent with an underlying optimizing behavior because it would imply a near zero slope (see Barro, 1990); a significant coefficient would imply non-optimizing behavior. This approach is carried out in a separate working paper by the authors.

The right side is y_r^*/X. Thus *if* at the minimum value of $m = 1$ the condition $y_r^*(m = 1) > y_e^p$ holds, i.e., the vertical intercept of the right-hand side exceeds the left-hand side. It follows that the two sides intersect in R_+^2 leading to a positive and unique value of m_e^*. □

B. Effect of democracy on m:

To understand how the incentive structure of rent seekers depends on the state of democracy, an essential property of m needs to be derived. This property, described below, utilizes Propositions 1 and 2 (on the behavior of β) together with inequality (14).

Proposition 4. *If the sensitivity of the sanctions probability $\pi(D)$ to democracy index is 'small', then in steady-state, the equilibrium number of rent-seekers, m_e^* increases with the democracy index.*

Proof. See Appendix C.

In particular, from the appendix we have,

$$m_D^{e*}(D) > 0, \text{ if } \pi_D(D) \leq \frac{(1 - \beta^*(.) - c\pi(D))\tilde{g}_D(.) - \beta_D^*(.).\tilde{g}(.)}{c\tilde{g}(.)} \tag{32}$$

Expression (32) says that if the probability of sanctions to curb rent seeking behavior does not rise too fast with more democracy, then more advanced democracies experience a rise in the number of rent seekers. This result obtains because increased access to polity that democracy affords, raises rewards to rent seeking for any m ($\tilde{g}_D|_{m=constant} > 0$). The result obtains, *despite* the fact that increased competition among rent seekers leads to a more intense rent seeking effort ($\beta_m > 0$), and to reduced rewards to rent seekers ($\tilde{g}_m|_{D=constant} < 0$). Yet as we will see in the following section, the latter two factors which accompany a more competitive playing field eventually force *aggregate* rents to fall when the D index is sufficiently large, creating an inverted U effect.

2.2.9. Aggregate rents

Define aggregate rents by R. Then $R = mgX$. Let r denote rent seeking per unit of government spending. Then, $r = mg$. In steady-state equilibrium the value of r is:

$$r^*(D) = m^{e*}(D)\tilde{g}[D, m^{e*}(D)] \tag{33}$$

The question is how r depends on D at any point in time. This is shown below:

Proposition 5. *If condition* (32) *holds, and if $\beta_m^*/|\beta_D^*| > |\tilde{g}_m|/\tilde{g}_D$ then r^* exhibits an inverted U pattern in D.*

Proof. See Appendix D.

The condition specified in Proposition (5) basically says that when both β and r are normalized by their respective responses to D, then as the rent-seeking field becomes more competitive (m rises) the rent seeking intensity (β) should rise by more than the reward from rent seeking (g) declines.

2.2.10. Growth and rent seeking

Expressing steady-state growth, Eq. (31), in terms of Eq. (33), we can explicitly see the adverse effect of rent seeking on growth:

$$\lambda^*(D) = \left[\alpha(1-\theta)(n\theta)^{\frac{1-\alpha}{\alpha}}(1-r^*(D))^{\frac{1-\alpha}{\alpha}} - \rho\right] \tag{34}$$

so that,

$$\frac{\partial \lambda^*}{\partial r^*} < 0 \tag{35}$$

But since r^* is a function of democracy, it follows that the inverted U effect of Proposition (5) is reversed:

Proposition 6. If rent seeking exhibits the 'inverted U' pattern with respect to democracy, as described in Proposition 5, then growth will exhibit a 'U' pattern with respect to democracy.

Proposition (6) is a natural extension of Proposition (5). It results from the logic that rent seeking, on the rise in early democracies, reduces the productive part of government spending, inhibiting growth. By contrast, in mature democracies, rent seeking effects are less important, with less harm to public coffers, and thus to growth.

3. Some supportive evidence

Support for the inverted U pattern on the relation between democracy and rent seeking, predicted by the theory, can be gleaned from Fig. 1, which is based on an

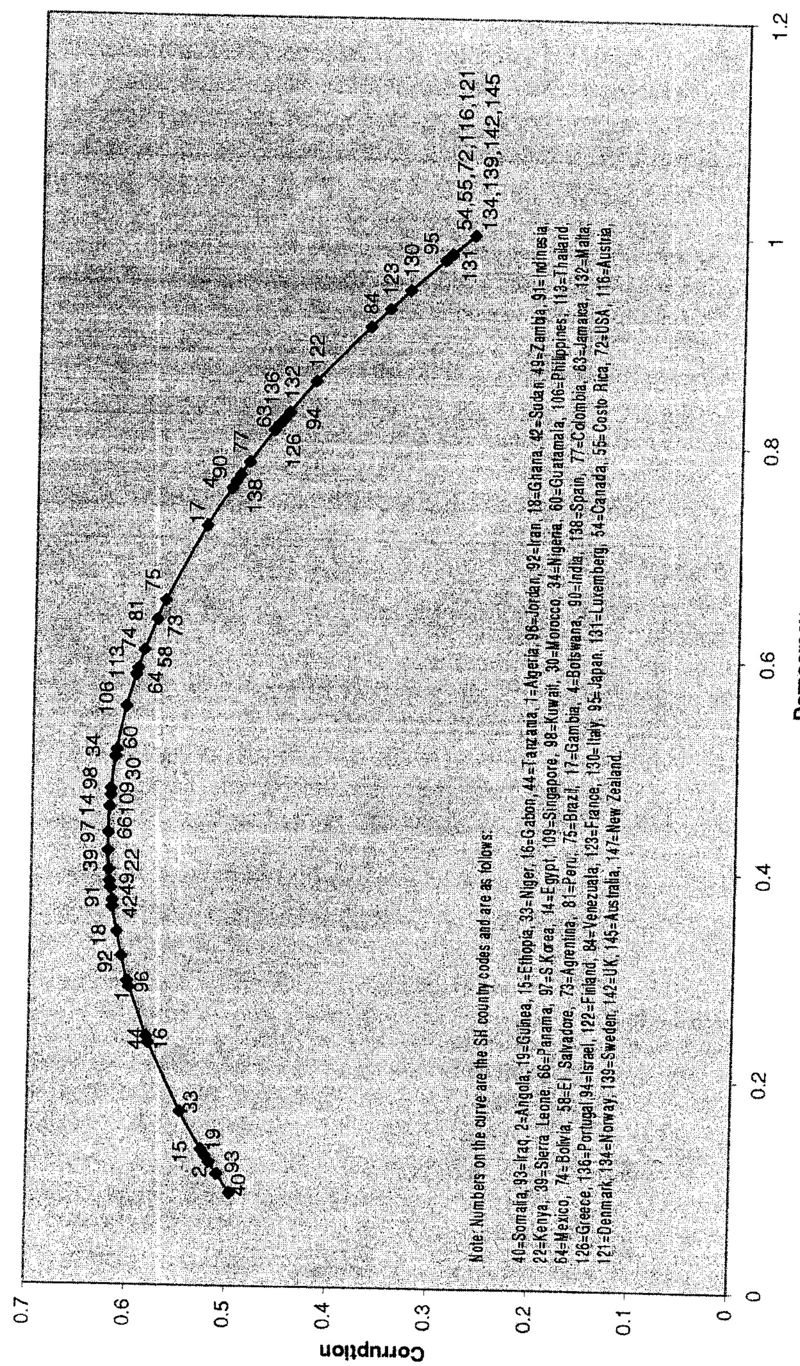

Fig. 1. Corruption index vs. democracy.

analysis of two major data series, a 'corruption' index and a democracy index[12]. The original scores, which are in the order of decreasing corruption and democracy, are linearly transformed to yield an index that increases in both.[13]

In Fig. 1, the country positions along the curve are from the Summers and Heston (1995) country codes and are defined in the figure. It is noteworthy that several of the young democracies of Asia, Latin America and the Middle East correspond to the mid point of the curve where the corruption index is near its high. Countries with low corruption index include, at the low end of the curve, several authoritarian societies of Africa and the Middle East, and at its high end, most of the developed industrialized countries.

One question is this: Can the rising portion of the curve in Fig. 1 be simply a consequence of better revelation and reporting of existing corruption, or is it due to an increase in *actual* corruption as the theory predicted? For example, in Mexico, Morris (1991) has argued that democratization and political openness may have changed the nature of corruption in the 1980s from one of traditional accommodation among the elite, hidden from public channels, to one of more open electoral corruption. Though not ruling out exogenous factors (e.g., 1980s debt crises), Morris attributes Mexico's 'crisis of corruption' in the 1980s also to the ability of newly emergent anti-corruption civic groups to expose existing corruption.

Thus, it is possible that the rising segment of curve in Fig. 1 could be due, at least in part, to increased revelation or exposure of corruption rather than to a rise in actual corruption. Empirically, the issue cannot be directly tested because the

[12]'Corruption' data are from the International Country Risk Guide (ICRG), provided by the private firm, PRS, and cover 1984–1994 (1982–92 for a few countries). They indicate the extent to which, 'high government officials are likely to demand special payments,' and 'illegal payments are expected in lower levels of government', in form of 'bribes connected with import and export licenses, exchange controls, tax assessments, policy protection, or loans' (Knack and Keefer, 1995). This definition particularly suits our theoretical concept of rents as extraction of resources from the government. (Corruption is of course an extreme form of rent seeking, but one that fits our definition, because it represents appropriating public funds for private goals. Less severe forms of rent seeking may entail spillovers to others — see Mohtadi and Roe, 1998). A different measure of rent seeking has been used by Rama (1993) who focused on laws and regulations regarding foreign trade restrictions. This measure is more suitable for rents as wasted resources than as extraction of public funds.
The index of democracy indicates 'political rights' and 'civil liberties' from the well known Gastil (1988–89) data for 1972–88. Although Gastil remains among the most consistent and widely used, Gastil's data happen to also closely correspond to our concept of democratization. For example, 'civil liberties' includes 'freedom of the press' which is a good proxy of information and 'political rights' signify political participation, a good proxy for 'political access.' By contrast, another data source by Jaggers and Gurr (1800–94) stresses the *'executive'* aspects of authority which is not a close proxy for our concept. Also, data from PRS (above), include a 'rule of law' indicator which is a better indicator of property rights regimes (see Knack and Keefer, 1995), than democracy. Stronger property rights need not imply more democracy (Barro, 1996).

[13]The values in Fig. 1 are calculated from the regression, $\tilde{r}_i = \hat{a}_1 + \hat{\mathbf{b}}_1.\bar{\mathbf{Z}} + \hat{c}_1.DMC_i + \hat{d}_1.DMC_i^2$,where $\tilde{r}_i$ is the 'fitted' democracy variable, and $\bar{\mathbf{Z}}$ is the mean value of per capita GDP from Summers and Heston (1995).

true incidence of corruption is unobservable. However, the 'increased revelation' hypothesis *cannot* account for the entire rise in the early portion of the curve, since in that case, the subsequent decline of the curve at higher democracy values cannot be explained. Moreover, even if the 'increased revelation' hypothesis were to be a feature of young democracies *only*, then the curve should turn down at a much *later* point than it does. (The declining segment of the curve begins roughly with Singapore but continues on for a very large number of young democracies before the more advanced industrial democracies show up.)

One attempt to empirically isolate the 'revelation' effect from the true effect is to construct an instrument for this effect in the regression equation. For this purpose we tried a combination of human capital and the democracy index as a proxy to control for informational openness, based on the notion that literacy and democracy are necessary to the information flow. Results reduced the 'upturn' and the 'downturn' somewhat but remained highly significant at 1 percent level.[14] Thus the inverted-U effect persisted.

4. Summary and conclusion

A simple two-sector endogenous growth model is developed in which some agents engage in illegal rent seeking activities to divert funds earmarked for public goods to private gains, while others engage in production. Agents switch between the two sectors, so that in equilibrium the size of production and rent seeking sectors are stable and only a function of the state of democracy. As societies democratize more openness and more equal distribution of information and privilege invites more rent seekers. As rent seeking is modeled in a simple monopolistically competitive model, this means less rents per agent but more rent seekers. Under mild conditions this mechanism produces an 'inverted-U' effect in which economic rents rise in young democracies but fall in mature democracies; simultaneously a 'U' pattern is also produced in which economic growth falls with early democratization but eventually rises. Our findings allow us to explain the conflicting evidence on the relationship between growth and democracy within a unified analytical framework.

We find a fairly strong evidence is support of the rent-democracy hypothesis.

Acknowledgements

We wish to thank Philip Lane, Philip Keefer, Caroline Vanrijckeghen, Jay Coggins, and Jeffrey Nugent and participants of an AEA workshop for helpful

[14]Empirical details on the results are available from the authors.

comments and discussions on an earlier version of this paper. Also thanks to the University of Minnesota workshop participants for comments on the present paper and to Sumit Agarwal for his hard work as our Research Assistant.

Appendix A. Proof of Proposition 1

Implicitly differentiate (10) in m. The resulting equation involves the term $[1-\beta_i^*-c\pi(D)]$. Use Eq. (10) again to eliminate this term. Invoking additivity in the resulting equation implies that $\partial^2 g^i/\partial\beta_i\partial\beta_j=\partial^2 g^i/\partial\beta_i\partial m=0$. Invoking symmetry in that equation implies that $\partial\beta_i/\partial m=\partial\beta_j/\partial m$. The final simplified equation is:

$$\left[g^i\frac{\partial^2 g^i}{\partial\beta_i^2}-\left(\frac{\partial g^i}{\partial\beta_i}\right)\left[2\frac{\partial g^i}{\partial\beta_i}+\sum_{j=1,j\neq i}^{j=m}\frac{\partial g^i}{\partial\beta_j}\right]\right]\frac{\partial\beta_i}{\partial m}=\frac{\partial g^i}{\partial m}\cdot\frac{\partial g^i}{\partial\beta_i} \qquad \text{(A.1)}$$

By (8b) the expression inside the small bracket on the left-hand side (which is inside the large bracket) is positive. So the expression inside the large bracket is negative. Since $\partial g^i/\partial m$ on the right side is negative by (8a), it follows that $\partial\beta_i/\partial m>0$. Thus, in equilibrium, given any level of D, we have:

$$\frac{\partial\beta^*}{\partial m}|_{\bar{D}}>0 \qquad \text{(A.2)}$$

□

Appendix B. Proof of Proposition 2

The approach is similar to that in Appendix A. Implicitly differentiate (10) in D. The resulting equation involves the term $[1-\beta_i^*-c\pi(D)]$. Use Eq. (10) again to eliminate this term. Invoking additivity in the resulting equation implies that $\partial^2 g^i/\partial\beta_i\partial\beta_j=0$. Invoking symmetry in that equation implies that $\partial\beta_i/\partial D=\partial\beta_j/\partial D$. The final simplified equation is:

$$\left[g^i\frac{\partial^2 g^i}{\partial\beta_i^2}-\left(\frac{\partial g^i}{\partial\beta_i}\right)\left[2\left(\frac{\partial g^i}{\partial\beta_i}\right)+\sum_{j=1,j\neq i}^{j=m}\frac{\partial g^i}{\partial\beta_j}\right]\right]\frac{\partial\beta_i}{\partial D}=\frac{\partial g^i}{\partial D}\cdot\frac{\partial g^i}{\partial\beta_i}-g^i\frac{\partial^2 g^i}{\partial\beta_i\,\partial D}$$
$$+c\pi'c\left(\frac{\partial g^i}{\partial\beta_i}\right)^2 \qquad \text{(B.1)}$$

From Appendix A, the large bracketed expression on the left is negative. Since g_i is a multiplicative function of D, per (5a), the first two terms on the right-hand side simplify to, $w'(D)\partial\gamma_i/\partial\beta_i\cdot[1-g^i]>0$. Thus the right-hand side is positive or, $\partial\beta_i/\partial D<0$. In equilibrium, it follows that,

$$\frac{\partial \beta^*}{\partial D}|_{\bar{m}} < 0 \tag{B.2}$$

□

Appendix C. Proof of Proposition 4

Implicitly differentiate (28) and solve for m_D to obtain:

$$m_D^{e*}(D) = -\frac{(1-\beta^*(.)-c\pi(.))\tilde{g}_D(.) - \beta_D^*(.).\tilde{g} - c\pi_D(.).\tilde{g}(.).}{(1-\beta^*(.))\tilde{g}_m - \beta_m^*(.)\tilde{g}} \tag{C.1}$$

where subscripts D(or m) represent differentiation with respect to D(or m). Since $\beta_m^* > 0$ (by Proposition 1) and $\tilde{g}_m < 0$, the denominator of (C.1) is negative. Since $\beta_D^* < 0$ (by Proposition 2) and $g_D^* > 0$, the numerator of (C.1) is positive when the derivative π_D is not very large. In this case, m_D^{e*} will be positive. In particular, π_D is given by inequality (32) in the text. □

Appendix D. Proof of Proposition 5

Differentiate (33) in D to obtain:

$$r_D^*(D) = \tilde{g}m_D^{e*} + m^{e*}(\tilde{g}_D + \tilde{g}_m m_D^{e*}) \tag{D.1}$$

Focusing on the right-hand side of (D.1), the first term is positive, if (32) holds. Using (C.1) to substitute for m_D^{e*} in the second term of D.1, we find:

$$r_D^*(D) = \tilde{g}m_D^{e*} + m^{e*}\tilde{g}\frac{\beta_m^*\tilde{g}_D - \beta_D^*\tilde{g}_m - c\pi_D\tilde{g}_m}{(1-\beta^*)\tilde{g}_m - \beta_m^*\tilde{g}} \tag{D.2}$$

In (D.2), the fraction has a negative denominator (same as in C.1). In its numerator, the three additive terms are, respectively, positive, positive and negative. If the condition stated in the proposition holds, the numerator of this fraction is positive and thus the fraction is negative. Since this fraction is multiplied by m, it follows that when m is small, the second term is small and thus the first term — i.e. the positive component — dominates, while for large m the second term — i.e. the negative component — dominates. Therefore r^* rises with m for small m and falls with m for large m. Since $m_D > 0$ when (32) holds, r^*exhibits a similar inverted U pattern in D that as in m. □

References

Acemoglu, D., Robinson, J., 2000. Inequality, growth and development: democratization or repression? European Economic Review 44, 683–693.

Alesina, A., Rodrik, D., 1994. Distributive politics and economic growth. Quarterly Journal of Economics 109, 465–490.

Barro, R., 1990. Government spending in a simple model of endogenous growth. Journal of Political Economy 98 [Part 2], S103–S125.

Barro, R., 1989. A cross-country study of growth, savings and government, Working Paper no. 2855, NBER.

Barro, R., 1996. Democracy and growth. Journal of Economic Growth 1, 1–27.

Barro, R., 1999. Determinants of democracy. Journal of Political Economy 107, S158–S183.

Barth, J., Bradley, M., 1987. The impact of government spending on economic activity. Working Paper, George Washington University.

Ehrlich, I., Lui, F., 1999. Bureaucratic corruption and endogenous growth. Journal of Political Economy 107 [Part 2], S270–S293.

Gastil, R., 1988–89. Freedom in the World: Political Rights and Civil Liberties. Freedom House, New York.

Grier, K., Tullock, G., 1989. An empirical analysis of cross-national economic growth, 1951–1980. Journal of Monetary Economics 24, 259–276.

Helliwell, J., 1994. Empirical linkages between democracy and economic growth. Working Paper no. 4066, NBER.

Jaggers, K., Gurr, T. Polity III: regime type and political authority, 1800–1994. Working Paper (ICPSR 6695), Inter-university Consortium for Political and Social Research, University of Michigan.

Knack, S., Keefer, P., 1995. Institutions and economic performance: cross-country tests using alternative institutional measures. Economics & Politics 7, 207–227.

Kormendi, R., Meguire, P., 1985. Macroeconomic determinants of growth: cross-country evidence. Journal of Monetary Economics 16, 141–163.

Landau, D., 1986. Government expenditure and economic growth in the less developed countries: an empirical study for 1960–1980. Economic Development and Cultural Change 35, 35–76.

Mauro, P., 1995. Corruption and growth. Quarterly Journal of Economics 110, 681–712.

Morris, S., 1991. Corruption and Politics in Contemporary Mexico. University of Alabama Press, Tuscaloosa.

Mohtadi, H., Roe, T., 1998. Lobbying, public goods and growth. European Journal of Political Economy 14, 453–473.

Murphy, K., Shleifer, A., Vishny, R., 1991. The allocation of talent: implications for growth. Quarterly Journal of Economics 106, 503–530.

Political Risk Services, International Country Risk Guide (ICRG), 1982–92.

Pourgerami, A., 1988. The political economy of development: a cross-national causality test of development-democracy-growth hypothesis. Public Choice 58, 123–141.

Przeworski, A., Limongi, F., 1993. Political regimes and economic growth. Journal of Economic Perspectives 7, 51–69.

Ram, R., 1986. Government size and economic growth: a new framework and some evidence from cross-sectional and time-series data. American Economic Review 76, 191–203.

Rama, M., 1993. Rent seeking and economic growth: a theoretical model and some empirical evidence. Journal of Development Economics 42, 35–50.

Scully, G., 1988. The institutional framework and economic development. Journal of Political Economy 96, 652–662.

Summers, R., Heston, A., January 1995. Annex: The Penn World Tables 5.6. Distributed by Disk.

Weede, E., 1983. The impact of democracy on economic growth: some evidence from cross-national analysis. Kyklos 36, 21–39.