# Democracy, Rent Seeking, and Growth: Is There a U Curve?

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## Abstract

A simple two-sector endogenous growth model of government spending and growth is developed with a producing and a lobbying sector.  Lobbyists divert government spending for private gains.   One key innovation is this: With democratization, information (and power) becomes more diffused (public), allowing more lobbyists to lobby but reducing gains per lobbyist.   Thus, aggregate rents rise with the number of lobbyists but fall with increasing competition among them.  This simple mechanism produces a "U" curve in which growth falls with early democratization but rises later, and a related "inverted U" curve in which rents rise with early democratization but fall later.   Extensive empirical test of the interrelationship between growth, government spending, corruption (Proxy for rents) and democracy for 61 countries verify the key structural aspects of the model.

# DEMOCRACY, RENT SEEKING, AND GROWTH: IS THERE A U CURVE?

## I. INTRODUCTION

The question of whether democracy promotes economic growth, among its other social benefits, has alluded simple and unambiguous answers. The empirical evidence is quite mixed in this regard. For example, an overview of the literature suggests any of three logical possibilities; that democracies grow more rapidly (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 grow faster instead (Weede, 1983; Landau, 1986), or that statistically significant conclusions cannot be reached in this connection (Helliwell, 1992; Barro, 1996)[1]. Barro (1996) points that autocracy (lack of democracy) may in fact be growth promoting if it expands economic freedom 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)[2].

This paper is an attempt to seek a common theoretical explanation that can account for the various empirical tendencies just described. The explanation is advanced by developing a simple two-sector endogenous growth model which is empirically tested. This simple model is intended to capture a few key processes: the role of democratization in the spread of information, the impact that the diffusion of

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[1]For a more complete survey of this literature see Przeworski and Limongi (1993).

[2]The role of property rights in growth has been investigated in a recent paper by Knack and Keefer (1995).

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information has on changes in the patterns of rent seeking over time, and the impact of changes in rent seeking on the "productivity" of the public sector as society becomes more democratic. Consider the difference between a democracy and an autocracy: While the relation of the two regimes to markets and to property rights is conceptually ambiguous, as Barro (1996) pointed out, what is *conceptually* distinct is their information structure. In particular, one of democracy's inherent characteristics may be the greater evenness (uniformity) in distribution of information and power in the society, as compared to an autocracy. In our model, this consideration will impact the "productivity" of public spending and thus the rate of economic growth via an endogenous growth mechanism[3]: Because the asymmetry of information and power in an undemocratic structure *insulates* policy makers from public accountability, rent seeking (e.g., bribing public officials) may be more easily rewarded. As democratization facilitates the diffusion of information and power, the number of informed and "empowered" agents increases, and therefore more agents may engage in lobbying. At the same time, gains per lobbyist are likely to *decrease* with democratization for two reasons; increased competition for scarce resources among more lobbyists, and the higher costs to policy

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[3]The link between public spending and growth is articulated in an endogenous growth paper by Barro (1990), though the empirical evidence of this impact is mixed, ranging from no significant impact (e.g., Kormendi and Meguire, 1985), to negative impact (e.g., Landau, 1986, Grier and Tullock, 1989, Barth and Bradley 1987), to positive impact (e.g., Ram, 1986). Barro's (1990) endogenous growth model shows that when public spending involves expenditures on *public* goods with positive externalities that enter production, growth initially increases with spending but falls subsequently. Barro's empirical test of this hypothesis for a cross section of countries shows a significantly negative effect on growth, from government *consumption*, and an insignificant effect, from government *investment*. The latter is attributable as much to the possibility of the optimality of government investment, as Barro points out, as to the possibility that such investment has no bearing on long-run growth.

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makers (e.g., lower re-election chance, legal public investigations of the officials, etc.) of colluding with rent seekers and ignoring public welfare. By facilitating public revelation of such information, democratization raises these costs (penalties) to public officials. The extent of the trade-off between the number of lobbyists and the size of rents per lobbyist depends on how information is distributed which in turn depends on the extent of democracy. We will use this insight to show that growth rate follows a *U pattern* with democratization; it declines with more democratization in early stages and rises with more democratization in later stages. This key result is related to a conjugate pattern, an *inverted U* pattern, in which aggregate rents rise with more democratization early on, and fall with more democratization later. While the paper focuses on how the dynamics of the distribution of information (via democratization) influence growth, stressing rent seeking as the mechanism by which this impact occurs, an interesting paper by Alesina and Rodrik (1994) focuses on how the distribution of income and wealth impacts growth, stressing the Median Voter theory as the logical link. The two papers are therefore related in this perspective.[4]

Following the development of an analytical model that demonstrates the above arguments, the model is then empirically tested: Cross-country data from 61 countries are used to test, both the final (reduced form) effect of democracy on growth, *and* some of the key structural aspects of the model: the impact of democracy on rents and of rents on growth. Rent seeking is measured by "corruption" data obtained from a Country Risk study (see the empirical section). This measure is different from one developed by Rama (1993) who focused on laws and regulations regarding foreign trade restrictions. This is because our theory focuses on a different aspect of rents than does Rama's. In our theory rents enter as diversion of public funds for private gains, e.g.,

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[4]Related to lobbying and growth Mohtadi and Roe (1991) also have a paper which focuses on lobbying by *"public"* interest groups as distinct from rent seekers.

funds for private gains, e.g., embezzlement. This definition is closer to the definition of "corruption" than it is to that of trade restrictions. Moreover, trade restrictions are the (policy) "outcomes" of rent seeking activity, whereas the corruption variable used here is a more direct measure of rent seeking itself. Our measure is similar to the measure used by Mauro (1995) but covers a longer time period.

The findings provide strong evidence that democracy impacts growth via a non-linear "U"-like pattern, while it impacts rents via an "inverted U" pattern, supporting both elements of the theory. The finding that growth exhibits a non-linear "U" pattern in its relation to democracy encompasses, over the full range of democracy measure, all the various relations between democracy and growth that previous studies have found (positive, negative, or insignificant), but does that within a single analytical and empirical framework.

Other empirical findings also include a significantly negative association between rents, as measured by corruption, and growth. This is similar to the finding by Mauro (1995). Also interestingly, using education as a "control" regressor, we find that higher levels of secondary education are associated with smaller incidence of corruption.

In what follows, Section II develops the model; section III examines the empirical evidence, and section IV draws concluding remarks.

## II.  MODEL

Consider an economy that consists of n agents. Agents are of two types; m lobbyists (rent-seekers) with access to *information* on potential sources of rent and the *power* to influence policy makers, but with no production capital, and n-m producing-

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consuming households who own cumulative production capital but do not lobby. This functional separation of the two groups, based on ownership rights, oversimplifies a more complex reality where producers might engage in lobbying and lobbyists in production. Even under complete separation of the capital ownership and lobbying privileges, one might expect market transactions in the form of trading capital services (revenues from production) with lobbying services, for example when firms hire the services of outside lobbyists to lobby on their behalf. Ownership rights may be marketed, for example when firms purchase lobbying "rights" by hiring full-time lobbyists,[5] or by lobbyists ownership of production capital. In a developing world where "professional" lobbyists are not often legally sanctioned, ownership of production capital and "lobbying privileges" may be even less separated. In this paper we abstract from such overlaps. Though this simplification may be important for some purposes, it is not of major significance for the questions asked in this paper because the act of lobbying or influence exertion still responds to institutional structures and incentives in the same way, whether it is carried out by separate agents or is a sub-function of a given agent, occurring jointly with other functions. For analytical purposes, however, this separation of the agents simplifies the algebra greatly and this in turn helps to crystalize the key arguments of the paper more distinctly. We describe the behavior of each group presently:

### 1. Lobbyists:

Since they possess no physical capital, rent seekers derive their income purely from lobbying. For each rent seeker, i, these activities generate a fraction $g_i$ of the total government spending X (given). Thus the rent seeker's total income (before

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[5]This may be viewed as an application of the vertical integration literature (Williamson, 1975).

lobbying costs) is $g_i X$. Her effort level is represented by the fraction of her income that is spent on lobbying, $\beta_i$. Her net income therefore is, $y_i^\ell = (1-\beta_i)g_i X$. The fraction $g_i$ will be assumed to increase with lobbying effort, $\beta_i$. But it will also *decrease* as information *diffuses*, i.e., becomes less concentrated. More diffused information means more public accessibility. This increased publicness increases public accountability and the political costs, to policy makers, of ignoring public welfare. Naturally information is more public the more democratic is the society.

To model these arguments, let $\Omega(I;D)$ be the p.d.f. of information I, given the state of democracy, D. Let $\theta(D)$ be some measure of information spread, e.g., its second moment, $\theta(D) = \int \Omega(I;D)D^2 dI$. For reasons discussed later, the measure D is a real number in the interval [0,1] with 0 representing minimum or no democracy and 1, maximum democracy. (See the empirical section for actual measures of D). The payoff function $g_i$ for lobbyist i then falls with $\theta(D)$ while $\theta$ itself increases with D:

$$g_i = g_i[\beta_i, \theta(D)] \quad i=1...m, \quad \partial g_i/\partial \beta_i > 0, \ \partial g_i/\partial \theta_i < 0, \ \theta' > 0 \quad (0 < D, g_i < 1) \quad (1)$$

.Note that even as democracy reduces rents per rent seeker, overall rents need *not* fall as increasing publicness of information in a democracy also means greater public knowledge of the sources of rent, inducing more lobbyists to enter the field. This is an important point to which we return later.

The income of each lobbyist, $y_i^\ell$, net of lobbying costs, is given by:

$$y_i^\ell = (1-\beta_i)g_i(\beta_i, \theta(D))X \quad (2)$$

Rent seekers choose $\beta_i$ to maximize their income. Since they possess no cumulative capital, their optimization decision is purely static. This separation of the static

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and the dynamic features of the model makes the model analytically tractable.

$$\text{Maximize } y_i^{\ell} \atop \{\beta_i\} \longrightarrow (1-\beta_i)\partial g_i(\beta_i, \; \theta(D))/\partial \beta_i = g_i(\beta_i, \; \theta(D)) \qquad (3)$$

Equation (3) shows that the optimum $\beta_i$ is chosen such that the marginal cost of lobbying (left of "=") equals its marginal benefit (right side of "="). Thus, as the implicit solution to (3), optimum $\beta_i$ depends on the information diffusion function $\theta$ and, in turn, on D: $\beta_i^* = \beta_i^*(\theta(D))$. Since a rise in D and therefore $\theta$ reduces gains per lobbyist $(g_i)$ it is likely to discourage individual lobbying effort. Implicit differentiation of (3) in $\theta$ would establish functional conditions that make this possible.[6] However again, this property produces a "second order effect," that is not central to the qualitative results obtained later. For this reason, we will consider a separable form of the $g_i$ in $\beta_i$ and $D_i$:

$$g_i = \gamma_i(\beta_i) \cdot \phi(\theta(D)) \quad (\gamma_i' > 0, \Omega' < 0, \theta' > 0), \qquad (1')$$

Equation $(1')$ preserves the directional properties of the derivatives in (1), but produces an optimum lobbying effort independent of D:

$$(1-\beta_i^*)\gamma_i'(\beta_i^*) = \gamma_i(\beta_i^*) \qquad (3')$$

## 2. Government Budget:

The productive fraction of government spending, i.e., the part *not* appropriated by rents, enters the production function as a public input. Denoting this part by G, we find:

$$G = X - (\sum_i^m g_i)X \longrightarrow G = (1-mg)X \qquad (4)$$

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[6]From (3), $d\beta_i/d\theta = [(1-\beta_i)g_{i,\beta\theta} - g_{i,\theta}]/g_{i,\beta} < 0$ if $g_{i,\beta_i,\theta} < 0$.

where the second equation assumes *symmetry* among m lobbyists, dropping the subscript i. Let total rents equal R, so that R+G=X. Then r≡R/X=1-G/X is the fraction (0<r<1) of total public spending diverted to rents, or the *"rent to public spending ratio"*. Using equation (4), r=mg. Using (1'):

$$r = mg = m\gamma(\beta)\phi(\theta(D)) \tag{5}$$

As previously stated, democracy spreads information (and somewhat power), more evenly. Thus, it should increase political participation of *all* forms, including lobbying for rents. Assume that an increase in the measure D increases the size of the lobbying sector relative to total population m/n, as follows:

$$m/n = \mu(D) \quad (\mu' > 0). \tag{6}$$

Substituting into equation (5), the rent ratio r depends on the democracy measure D both via the function $g_i$ and via m, as follows:

$$r = n\gamma(\beta).\mu(D)\phi(\theta(D)) \quad (\mu' > 0, \phi' < 0, \theta' > 0) \tag{7}$$

Equation (7) captures the key trade-off of the paper and perhaps the key dilemma facing a democratizing society as more democracy poses countervailing influences on the phenomenon of rent seeking; it induces a greater number of rent seekers to enter the field, but it also reduces rents per individual rent seeker. The link between democracy and rent seeking, by means of the information structure, can be depicted in the following chart, where the signs denote the direction of impact:

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\begin{array}{ccccc}
D & \xrightarrow{+} & \theta & \xrightarrow{-} & g_i \\
{\scriptstyle +}\downarrow & & & & {\scriptstyle +}\downarrow \\
\dfrac{m}{n} & & \xrightarrow{\quad - \quad} & & r
\end{array}
$$
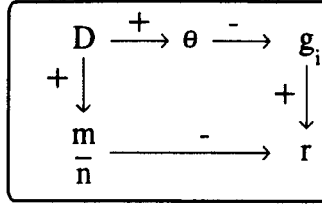
The structure of r would depend on functions $\mu(D)$ and $\phi(\theta(D))$. With respect to $\phi(\theta(D))$, because we know little about exactly how democracy facilitates the spread of information, the exact nature of $\theta(D)$ function is unknown. We circumvent this problem by considering the overall mapping of D to $g_i$ (equation 1'). Define this by $\Psi(D)$. Then from equation (1'), $\Phi(\theta(D)) \equiv \Psi(D)$ with $\Psi' < 0$. The function $\Psi(D)$ now represents the impact of democracy on the "rent ratio," via information. We assume a simple linear form for this function: $\Psi(D) = a - bD$ $(a, b > 0)$. With respect to the function $\mu(D)$, which increases in $\mu$, assume a similar linear form, $\mu(D) = c + dD$ $(a, b > 0)$. Apart from their simplicity, one justification for the second linear form may be that because lobbying is just another form of political participation (albeit perhaps socially undesirable), it would rise in direct proportion to democratization. The overall rent ratio function (r) that emerges from these linear forms is,

$$ r = n\gamma(\beta).(c+dD)(a-bD) \tag{8} $$

Since parameters a...d are all positive this quadratic form is *concave* and will have a maximum in $R+^2$ iff $d/c > b/a$. This is shown in Figure 1 and implies that the rent ratio (r) rises in early democratization and falls in mature democracies. The condition $d/c > b/a$ for this to hold means that with more democracy the rate at which rent seekers enter the field (d) is relatively large, and the rate at which individual rents fall (b) is relatively small. While this is one possible form of r(D), this particular form does appear to be strongly supported by the empirical evidence that we present in the next section. Moreover, it also explains certain anomalies or puzzles: For example, why is it possible that a democratic country such the US with its immense number of lobbyist

groups suffers less in terms of the adverse effects of such activities than a less democratic country, such as a developing country, where the number of lobbyist is probably more limited but where rent-seeking often has a more devastating impact in diverting resources from public spending (the "Swiss Bank Account" syndrome). Our model explains this by the existence of the *drop* in rents per lobbyist associated with the increased diffusion of information and openness under democracies.

## 3. Producing Households

The production function is assumed to be Cobb-Douglas in private capital, K, and public investment, G,similar to Barro (1990). So the output of the production sector, $y^p$, is:

$$y_j^p = K_j^\alpha G^{1-\alpha}, \qquad (0 < \alpha < 1; j = 1 \ldots n\text{-}m), \tag{11}$$

where j denotes jth producing household. To simplify, we abstract from any utility enhancing, but otherwise unproductive government spending. Adding that effect is simple, but takes away from the focus on productive government activities. Moreover, even those government programs on public goods and services that do not appear directly productive may well entail potential indirect productivity effects. For example, improving the quality of the environment, water supply, or social security may entail productivity gains via improved employee and citizen morale.

The income of the jth producing household is subject to an income tax at the rate $\tau$ that is used for government spending (see later). Thus, the dynamic budget constraint of the jth household is:

$$(1-\tau)K_j^\alpha \overline{G}^{1-\alpha} = C_j + \dot{K}_j \tag{12}$$

where the bar on G indicates its externality property as it is fixed to each household

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but endogenous in the aggregate, per equation 4. The government budget constraint is:

$$\tau\sum_{j}^{n-m} y_j^p = X \quad \longrightarrow \quad \tau(n-m)y^p = X, \tag{13}$$

where the second equation assumes symmetry among producing households. The idea that all government spending, including the part which benefits the lobbyists, is paid for by taxing producing households is similar to Weingast, Shepsle and Johnsen's (1981) concept of "distributive policies," where geographically concentrated programs that benefit specific groups are paid for by "generalized taxation" on all constituencies. However, we have made one simplifying assumption: Lobbyists who benefit from government spending do not pay any taxes. We make this assumption to avoid the complicating second order effect that arises because lobbyists activities generate taxable income with potential beneficial effects on G via the tax base.

### 4. Growth

Each household solve the maximization problem:

$$\underset{\{C\}}{Max\,imize} \int_0^\infty U(C)e^{-\rho t}dt, \quad \text{subject to:} \quad C + \dot{K} = (1-\tau)K^\alpha \overline{G}^{1-\alpha}, \tag{14}$$

where $\rho$ is the discount factor. With a simple utility function $U=\ln(C)$, the per capita growth rate of consumption $(C^p)$ for this group is:

$$(\dot{C}/C)^p = \left[\alpha(1-\tau)(\overline{G}/K)^{1-\alpha} - \rho\right] \tag{15}$$

The G/K ratio is found in the aggregate by first writing production function (8) as $y^p/K$ $=(G/K)^{1-\alpha}$, and then expressing $y^p/K$ as $y^p/K = (y^p/X)\cdot(X/G)\cdot(G/K)$. Using equations (13) and

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(4) for $(y^p/X)$ and $(X/G)$ in this expression we get, $y^p/K = (G/K)/[\tau(n-m)\cdot(1-mg)]\cdot$ Setting equal to $y^p/K = (G/K)^{1-\alpha}$ and solving for $G/K$, we find:

$$G/K = [\tau(n-m)(1-mg)]^{\frac{1}{\alpha}} \tag{16}$$

Substituting into (15) gives an expression for the growth rate in terms of m, n, mg and the tax rate, $\tau$:

$$(\dot{C}/C)^p = \left[\alpha(1-\tau)\tau^{\frac{1-\alpha}{\alpha}}(n-m)^{\frac{1-\alpha}{\alpha}}(1-mg)^{\frac{1-\alpha}{\alpha}} - \rho\right] \tag{17}$$

Taxes are assumed to be exogenously set by the government and so steady-state growth prevails along which all variables grow at the same rate. (This can be seen from equations (4), (11), (13) and (17).) Particularly, since X grows at the same rate as $Y^p$ and therefore as other variables, lobbyists' income $(1-mg)X$ also grows at this common rate, even though this "ancillary" sector is not productive. Denoting this rate of growth by $\lambda$, we have:

$$\lambda = \left[\alpha(1-\tau)\tau^{\frac{1-\alpha}{\alpha}}(n-m)^{\frac{1-\alpha}{\alpha}}(1-mg)^{\frac{1-\alpha}{\alpha}} - \rho\right] \tag{18}$$

To re-express this in terms of the democracy measure D, substitute from (7) for mg (equaling r), and from (6) for $m = n\mu(D)$ to find:

$$\lambda = \left[\alpha(1-\tau)\tau^{\frac{1-\alpha}{\alpha}}[n(1-\mu(D)]^{\frac{1-\alpha}{\alpha}}[1-n\gamma(\beta)\mu(D)\Psi(D)]^{\frac{1-\alpha}{\alpha}} - \rho\right]. \tag{19}$$

This equation can also be expressed in terms of the rent ratio, r:

$$\lambda = \left[\alpha(1-\tau)\tau^{\frac{1-\alpha}{\alpha}}[n(1-\mu(D))]^{\frac{1-\alpha}{\alpha}}[1-r(D)]^{\frac{1-\alpha}{\alpha}} - \rho\right] \tag{19'}$$

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Apart from the important impact of democracy (D) on growth ($\lambda$) which will be discussed, observe that the government spending effect in (19) and (19$'$) enters via $\tau^{\frac{1-\alpha}{\alpha}}$ to represent the productive aspect of G, and via (1-$\tau$) to represent the contractionary effect of taxes. Should governments optimize, the effect of $\tau$ on growth will be zero *at the margin*. Rather, that assuming this optimizing behavior on the part of the government *a priori* we let the empirical evidence decide this issue.[7]

### 5. Democracy, Government Spending and Growth

In equations (19) or (19$'$) the impact of democracy on growth shows up in two ways, the "public spending diversion" effect, represented by $\{[1-n\gamma(\beta)\mu(D)\Psi(D)]\tau\}^{(1-\alpha)/\alpha}$ in (19), or $\{[1-r(D)]\tau\}^{(1-\alpha)/\alpha}$ in (19$'$) in which $\tau$ equals the share of government spending to output (eq. 13), and the "production diversion" effect, represented by $n[1-\mu(D)]$ in both equations. The "public spending diversion effect" brings out the non-linear effect of democracy on public spending G, via democracy's effect on the rent ration r [Recall that G=(1-r)X]. As seen earlier, this effect is nonlinear because with the spread of information and democratization, on the one hand, more individuals learn of the sources of rent and can lobby for them, and on the other, rents per lobbyist erode due to greater competition among lobbyists. The "production diversion" effect is however always adverse as it indicates switching of productive agents to lobbying (i.e., democracies would include more non-productive agents engaged in lobbying, whether the aggregate rent ratio is higher or lower).

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[7]In his 1990 paper, Barro attributes his empirically insignificant effect of government *consumption* spending on growth to the outcome of the underlying optimization behavior of the government. Here, more generality will be gained, if the question is left to be settled empirically without an *a priori* assumption in this regard.

To further analyze the nature of the non-linearity with regard to democracy's effect, recall the functional specification of $\Psi(D) = a - bD$ and $\mu(D) = c + dD$ discussed earlier. Then from equation (19) the democracy variable D shows up as a third degree polynomial. But since the measure D is chosen such that $0 \leq D \leq 1$, the $D^3$ effect can be ignored. Then the effect of D on $\lambda$ is convex, i.e., in the form of an inverted U, which is the reverse of the pattern in Figure 1. This is indicated in Figure 2. The simple algebra of this reversal is of course that the $\mu(D)\Psi(D)$ term in (19) shows up with a negative sign, an indication that rents reduce growth by reducing the size of useful public expenditures. This is also indicated in (19') by the simple negative relation between the rent ratio, r and the growth rate $\lambda$.

The above discussion presents a theoretical mechanism in which democracy impacts economic growth by influencing the nature of rent seeking behavior. The next section examines some of the key findings above with an extensive empirical test. The results turn out to support the existence of a non-linear "U"-like relation between economic growth and democracy. With the aid data on "corruption" that proxies "rent seeking" we examine some of the *"structural"* aspects of the model are also examined. The results strongly support the existence of an "inverted U"-like pattern in the effect of democracy on rent seeking. These and other aspects of the findings are discussed below.

### III. Empirical Evidence

#### 1. Empirical Model

The empirical evaluation of the theory involves three steps; (a), testing democracy's effect on rent seeking per equation (8) and figure 1; (b), testing democracy's effect on growth (via public spending) per equation (19) and figure 2; (c), linking the the first two steps by examining the effect of rent seeking on growth.

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Equation 19′, which resulted from substituting equation 8 into 19, suggested that this effect is negative. An adverse effect of rent seeking on growth would explain why democratization's effect on rent seeking and democratization's effect on growth produce opposite patterns. The steps are discussed more fully below.

### a. Rent seeking and democracy

Equation (8) and Figure 1 suggested that under a linear specification of functions, rents would rise in early democratization and fall in mature democracies. This can be tested by the following format:

$$r_i = a_1 + b_1.Z_i + c_1.DMC_i + d_1(DMC_i)^2 + \varepsilon_{1i} \tag{a}$$

where for country i, $r_i$ is the rent ratio described in the text, $Z_i$ is the vector of other exogenous variables and $\varepsilon_{1i}$ is normally distributed error. Theory predicts that $c_1 > 0$ and $d_1 < 0$.

### b. Democracy, Public Spending and Growth

Similarly, equation (19) and Figure 2 suggested that under a linear specification of functions, a parabolic relation between democracy and growth would result in which growth would fall with democratization early on, but rise in later stages. We test this relation by the following family of models:

$$g_i = a_2 + b_2.Z_i + c_2.XS_i + d_2.DMC_i + e_2(DMC_i)^2 + \varepsilon_{2i} \tag{b}$$

Here, $g_i$ is the long-run growth for country i, $XS_i$ is the share of government spending and $\varepsilon_{2i}$ is a normally distributed error term. This form of the equation amounts to *controlling* for the effect of government spending. An alternative form is to allow for

the *interaction* between government spending and democracy as would be suggested by the term $\{[1-n\gamma(\beta)\mu(D)\Psi(D)]\tau\}$ in (19). Equations of this form are:

$$g_i = a_3 + b_3.Z_i + c_3.XS_i + d_3.DMC_i*XS_i + e_3(DMC_i)^2*XS_i + \varepsilon_{3i} \qquad (b')$$

It may be noted that the variable $XS_i$ in these equations involves *total* (gross) spending by government ($X/y$ in the theory) which was set to the tax rate $\tau$ (see eqn. 19).

It is possible that rapid economic growth may itself accelerate the pace of institutional reform that lead to democracy. This raises the possibility of "simultaneity" which has been raised by others (e.g., Przeworski and Limongi, 1993). To account for this simultaneity both equations above are tested by a 2SLS method in which a second equation accounts for the possible effects of various regressors on democracy and its square:

$$DMC_i = m_1 + n_1 \cdot W_i + p_1 \cdot g_i + u_{1i} \qquad (b'')$$

$$DMC_i^2 = m_2 + n_2 \cdot W_i + p_2 \cdot g_i + u_{2i} \qquad (b''')$$

where $W_i$ is the vector of other regressors and $u_{1i}$ and $u_{2i}$ are random disturbance terms.

### c. Rent Seeking and Growth

The third step examines the relation between rent seeking and growth, and the *consistency* of this relation with the first two steps. To elaborate, consider the theoretical model. There, the reason why democracy's effect on growth ("U" pattern) was the reverse of the effect of rent-seeking on growth ("inverted U") was the negative relation between rents and growth, based on equation (19'). Therefore this relation must be examined. We test for the possibility of the adverse effect of rents on growth, as follows:

$$g_i = a_4 + b_4.Z_i + c_4.XS_i + d_4.DMC_i + e_4.r_i + \varepsilon_{4i}, \qquad (c)$$

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in which government spending is a "control" variable (analogous to eq. a), as well as by a fuller test of equation (19′) involving the *interaction* between public spending with rents and public spending and democracy. The general form of these equations is[8]:

$$g_i = a_s + b_s.Z_i + c_s.XS_i + d_s.XS_i*DMC_i + e_s.XS_i*r_i + \varepsilon_{si} \qquad (c')$$

Finally, since rents depend on democracy, one may consider an econometric form in which the *fitted* values of $r_i$ (say $\tilde{r}_i$), obtained from the regression of rents against democracy (equation a), are used as instrument of $r_i$ in equations (c) and (c′).

## 2. Data and Measurement

Data covers 61 countries. This was the largest subset to contain data on all variables. The complete data set is reported in the Appendix. Growth ($g_i$) is measured by real per capita growth rate for the 1970-1992 period and government spending ($XS_i$) is measured for the base-year 1970,[9] using the Summers and Heston (1995) data set (an expansion on Summers and Heston (1991)[10]. Democracy is measured for 1972-88 period from

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[8]According to equation (19′) a third interaction term, $XS_i*D_i*r_i$ also exists. We ignore considerations of this term because it produces a second order effect and does not have a direct interpretation.

[9]Though an earlier starting date of 1960 was available for growth calculations, compatibility with other variables' in the model led to 1970 as starting point of growth measurement. Using the same source, the share of public sector, represented in our model by $\tau$ is measured by real government share of GDP in 1985 international prices (their G variable). We call this variable XS.

[10]We also tried the Easterly-Rebelo (1993) data for government *investments*. However, because of the small size of the sample that resulted from the overlap of several data

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the well known Gastil data set (1988-89) which remains among the most consistent and widely used in the literature. (See below for more details). To do Gastil's 7 rankings of "Political Freedoms" are added to his 7 rankings of "Civil Rights, leading to a composite measure that ranges from 2 to 14. Since Gastil's rankings are in the order of decreasing democracy, they are linearly transformed by subtracting the index from 15 so that composite index, now ranging from 1 to 13, *increases* with democracy. To conform this to the requirement of the theory, the measure must be a fraction. Thus, it is normalized by diving by 13 (the maximum distance).

Economic rent is measured using data on "Corruption" from the ICRG data set provided by the Political Risk Services. The data covers the 1984-1992 period[11] and indicates the extent to which, "high government officials are likely to demand special payments," and "illegal payments are expected in lower levels of government", in the form of "bribes connected with import and export licenses, exchange controls, tax assessments, policy protection, or loans." (Knack and Keefer, 1995). This definition makes the "Corruption" variable particularly suitable for use as a proxy for rents because the focus is on activities that involve extraction of rents from the government and this is what the model requires. Corruption may in fact represent an extreme form of rent seeking. But to the extent the theoretical concept of rent seeking represents appropriation of public funds for *private* goals, the use of corruption as a proxy seems justified.[12] In addition to Political Risk Services, a study by Mauro (1995) uses "corruption" data for his study from a different source. However, Mauro's variable, as

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sets, the results were not as reliable.

[11]For a few countries the converge is for the 1982-92 period.

[12]Less severe forms of rent seeking may entail some spillover to other members of society. This has not been the focus of our theory, but has been modeled separately in a paper by Mohtadi and Roe (1991).

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reported in his study, covers only the 1980-1983 period, a period much shorter than the period covered by the ICRG. Nonetheless we also use the Mauro variable and find results consistent with our findings. Since the corruption scores in the ICRG source are given in the order of *decreasing* corruption, the variable is transformed by subtracting it from its maximum value of 7. The resulting measure *increases* with higher corruption.

Finally, the "control regressor vector" $Z_i$ include two variables measured at the base-period, following the established convention (e.g., Barro, 1990); base-year per capita GDP (using Summers and Heston data), as a test of so called "conditional convergence", and human capital following the pioneering models of Lucas (1988) and Romer (1990) and the pioneering empirical test of (Barro, 1991). For this variable the main source was the direct UNESCO data on primarily and secondary school enrollment ratios for the base-period of 1970, but we also tried the Barro and Lee (1993) data on the "stock" of human capital. (See the results for a discussion of both data sets.)

## 3. Results

Table 1-7 report the heteroscedasticity-corrected results. Table 1 strongly supports the "inverted U hypothesis" that rents, here proxied by the corruption, rise with democratization early on, and fall subsequently. The robustness of this result is seen by the large significance of democracy coefficients and by the persistence of this significance in various forms. Figure 3 illustrates this "inverted U", using values from the first column of table 1 which control for no other regressors. As indicated by the coefficient sizes, more democracy is associated with an actual "downturn" in Figure 3, supporting the theory (i.e. Figure 1), though the downturn is relatively small. Thus, full democracies end up with somewhat higher rents than autocracies, but still lower rents than incomplete democracies which exhibit highest rents.

Table 1 also shows that corruption falls significantly with base year per capita

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income only when education is absent (column 2), but when education is present, this base-year effect is no longer significant (columns 4 and 6). By contrast, education--in the form of secondary schooling--consistently and significantly corresponds, to less corruption, *whether or not* base-year per-capita income is present (columns 5 and 6). Thus, in addition to democracy, secondary education seems to be a "dominant" regressor in explaining corruption.

Tables 2 and 3 examine the second and *key* aspect of the theory, i.e., the relation between democracy, public spending and growth. In table 2, the first five columns adopt simple Least Squares (OLS), but the second five columns adopt Two-Staged-Least Squares (2SLS) to allow for possible *simultaneity* between growth and democracy. In almost all its forms, table 2 supports the "U hypothesis", i.e., that controlling for public spending, growth rate falls significantly with early democratization but rises later. However, the statistical significance of democracy coefficients increase markedly under the 2SLS compared to OLS, suggesting that accounting for the simultaneity of growth and democracy yields stronger support for the "U pattern". Again, secondary schooling seems to mildly correlate with this "U effect" as the effect is less pronounced when secondary schooling is explicitly introduced. Results from table 2 are depicted in Figure 4.[13] Since the size and significance of the coefficient of $DMC^2$ is of the same order as the linear term, the curve in Figure 4 will have an *actual* "turn around", and this effect is stronger than in Figure 3.

Other findings from table 2 include government spending's negative and generally insignificant effect (except perhaps in the last column), a point that we will discuss

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[13]Figure 4 uses coefficients from columns 1 or 6 of Table 2 which are identical. This choice reflects the fact that there are the least number of "controls" (only base-year per capita income), thus allowing for a more accurate representation in Figure 4. The vertical axis for growth, is adjusted for inclusion of base-year per capita income.

in relation to table 3. Also, the negative coefficient of base-year per capita income is significant everywhere in table 2 except where secondary schooling is controlled for, suggesting some correlation of an otherwise significant "conditional convergence" effect with secondary schooling. Finally, secondary education, itself, positively and significantly affects growth (columns 4, 5, 9 and 10), in line with New Growth Theories. However, since primary education does not show this tendency, combining the two education variables (columns 2,3,7,8) dilutes the positive secondary education results, yielding positive but insignificant outcome.[14]

Table 3 tests the *interactive* impact of democracy and public spending on growth. The general regression forms are guided by equation (b'). This is the linearized version of equation (19), with the vector $Z$ added to indicate the two "control regressors", base-year per capita income and human capital. In this form democracy is the variable that *"conditions"* the impact of public spending on growth. Here, the "U pattern" is still present, as the theory suggested, but the effect is somewhat weaker than in table 2. It is interesting to note that compared with table 2, the *direct* effect of public spending is now *positive* and marginally significant (except where

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[14]The human capital variables used upto this point are from UNESCO directly. However, regressions based on the Barro and Lee (1993) data on human capital *stock* were tried similar to those in Table 2. The results produced no significant effect of democracy on growth and also showed "conditional divergence" (i.e., positive coefficient of base year per capita), the latter, contrary the evidence from the past studies. Further inquiry revealed that the frequency distribution function for the sample that uses the Barro-Lee data was concentrated on lower or zero growth countries, while the UNESCO-based sample showed a near normal distribution. This revelation is consistent with the insignificance of the democracy variable in the Barro-Lee set: Most countries in the Barro-Lee based sample are clustered around the bottom ("valley") of the U curve, where the slope is flat (near zero) and thus the effect of democracy on growth, negligible. For this reason, we continue to use the more representative sample that includes the UNESCO data set.

secondary schooling is controlled for), once its impact via democracy is accounted for.

Other features of table 3 are similar to table 2, including the "conditional convergence" and the role of secondary education. As in table 2, the first part of table 3 (first 9 columns) is estimated using OLS, while the last 3 columns use a 2SLS, accounting for simultaneity between growth and democracy. That the 2SLS estimates in this case improve the significance of most of the coefficients, suggests "reverse" causality (from growth to democracy) continues to play an important role in this interactive form as it did in democracy's direct role (table 2).

The paper's underlying hypothesis is best described as "triangular" consisting of the linkages between (a), democracy and rent seeking, (b) democracy and growth and (c), rent seeking and growth. So far, we have examined relationships (a) and (b). Table 4-7 examine the last relationship. Since democracy's effects on rent seeking follows an "inverted U" curve (table 1, Figure 3), and its effect on growth, a "U" Curve (tables 2 and 3, Figure 4), rent seeking must negatively impact growth. This last hypothesis finds support in the empirical literature (e.g., Mauro, 1995) and in our own model in the coefficient of the term r(D) in equation (19'). Tables 4 and 5 examine the effect of rent seeking on growth directly, while tables 6 and 7 do so via the interaction of government spending (XS) with democracy and rent seeking, per equation (19').[15] Tables 5 and 7 are identical to tables 4 and 6, respectively, except that rent seeking is proxied instead of the corruption variable (CP) by its *fitted* value (CPF) obtained from regressing CP against DMC and its square, per table 1. The reason for this is to examine, in addition to corruption's effect on growth, the effect of corruption-- *conditioned* by the influence of democracy--on growth. In this way, democracy's direct and indirect influence on growth (via corruption) are both accounted for (see eq. 19').

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[15]This equation also implies a third term, GS*DMC*r, which is a third order effect and is ignored in Tables 6 and 7.

In tables 4 and 5, columns 1-9 are estimated by OLS and, to account for simultaneity effects, columns 10-12 are estimated by 2SLS. Both tables indicate an overall adverse effect of rent seeking on growth, represented by the coefficients of CP in table 4 and CPF in table 5. In table 4, this effect is significant when secondary education is absent, but the presence of secondary education reduces the significance substantially. This may be expected, as table 1 already indicated that higher secondary schooling significantly reduced corruption. Corruption then is associated with lower growth partly because it involves higher incidence of secondary schooling. However, when corruption is conditioned on democracy (i.e., CPF in table 5), even with secondary schooling present, the corruption coefficient retains some of its significance (columns 9 and especially 12, where simultaneity is considered), pointing to some "autonomous" explanation of the adverse effect of corruption, outside of education.

Finally, in table 5 the XS variable remains insignificant while the "direct" democracy effect becomes marginally significant *and* switches sign to negative in columns 9 and 12. This may be due to an underlying positive collinearlity between democracy and schooling (in the form of secondary education), because only in these two columns the DMC variable and secondary schooling appear jointly. To the extent that in the fully specified equation (columns 9 and 12 in table 5), the democracy variable has a negative effect, this result is consistent with the model and reflects the "production-diversion" effect (the term $n[1-\mu(D)]$ in equations 19 and 19′), where more democracy implies, among other things, a conversion of producers to lobbyists.

Table 6 and 7 examine the interactive effect of government spending--with rent seeking (corruption) and with democracy--on growth. The tables are modeled after equation (19′), but ignore the "third order" effects in that equation. The two tables differ only by the use of actual versus "fitted" values of corruption, where the latter is estimated as in table 5. One interesting feature is that while the effect of XS*CP

(or XS*CPF) is negative and at times significant (columns 2 and 5 in both tables, and additionally, column 6 in table 7), the effect of XS--when entered directly--is *positive* (and at times mildly significant). Thus, the coefficient of the XS variable switches signs, from its earlier values in tables 4 and 5. This turn-around could be associated with the introduction of the interaction effects and especially the interaction effect, XS*CP, since this is the more significant interaction term. This result is consistent with the notion that public spending can be productive once the adverse influence of rent seeking of public spending is controlled for, which the model suggested. Since data on taxes are not available for this sample,[16] public spending here embodies both the positive externality of public goods and the contractionary effect of taxes, as seen in equations (19) and (19'). Because the net effect of public spending (when rent seeking is controlled for) is positive, one may speculate that the externality effect of public spending dominates the tax effect. Other features, i.e., the education effect and the base-year per capita income effect, are the same as before.

To sum, the last four tables show that corruption adversely impacts long-run growth, consistent with the model, both directly and by reducing the size of productive public spending.

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[16]To our knowledge, the only data on taxes are from Easterly and Rebelo (1993). But this data is available only for 28 countries from the OECD and Latin America group. Intersecting this data set with ours (for other variables in our model) reduced the size still further. Moreover, for reasons discussed in conjunction with the Barro-Lee (1993) data set, we need a representative sample of countries. Yet, this small data set would exclude most developing countries and many regions of the world.

# V. SUMMARY AND CONCLUSION

This paper has developed a simple two-sector endogenous growth model of government spending and growth in which some agents lobby the government to divert public funds to private gains, while others engage in production. As societies democratize information and power becomes "less privileged" and more diffused. This causes more lobbyists to enter the field *and* simultaneously less gains to accrue per lobbyist. This simple mechanism produces a "U" pattern in which economic growth falls with early democratization efforts but eventually rises. Parallel to this process, economic rents from lobbying are found to rise in early democracies but fall in mature democracies.

Empirical test of the theory for 61 countries supports both of the above results. This finding might explain why the previous efforts in finding a relation between democracy and growth have produced *mutually exclusive* outcomes, consisting of either a positive, or a negative, or an insignificant relation, as they have assumed a *linear* underlying model.

We have not considered panel properties of the data; neither have many previous investigations of the democracy-growth nexus. One reason is that the evolutionary and gradual nature of democratization means very small variance of the democracy variable over the short-run and therefore little statistical association with growth from one period to the next. Thus little would be gained by adding a time-dimension.

The existence of a non-linear relation between democracy and growth adds to the present understanding of this relation to a considerable extent. Moreover, though other mechanisms could be postulated to explain such non-linearity, our notion of information diffusion and rent seeking behavior is one that is both intuitive and borne by our own empirical evidence. Future works may identify other mechanisms for the observed pattern or provide more detailed description of the information channel.

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## Rent and Democracy[*]



**Rent Ratio**

**(r = mg)**
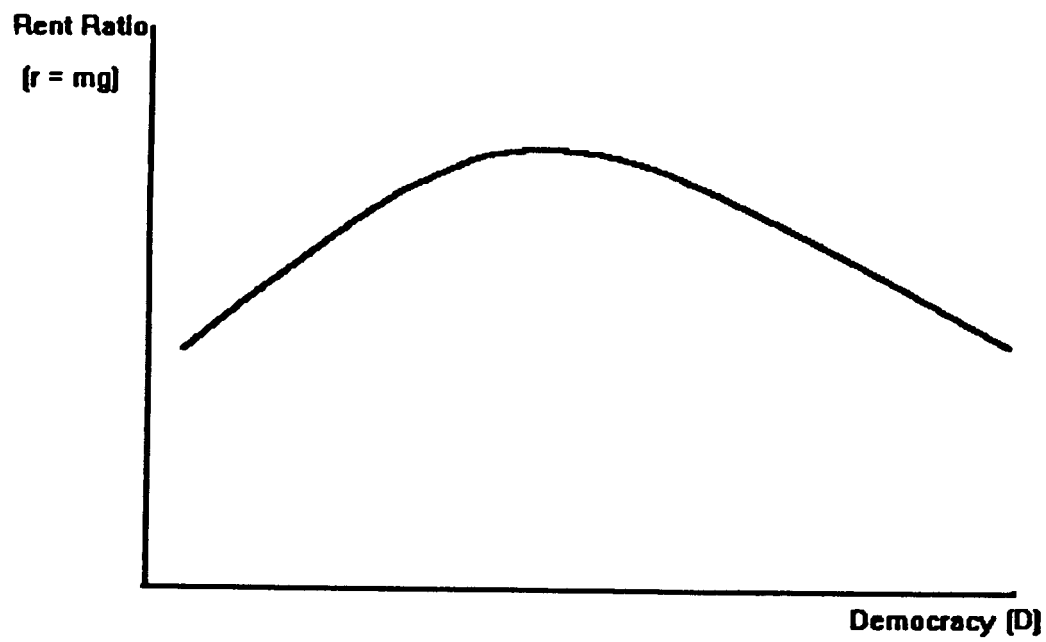
**Democracy (D)**

*Source : Based on theoretical derivation

**Figure 1**

## Growth and Democracy[*]



**Growth**
**(λ)**

**Democracy (D)**

*Source : Based on theoretical derivation

**Figure 2**

Table 1

| Independent Variables: | Dependent Variable : Corruption (Rent) (1982 - 1994) | | | | | |
|---|---|---|---|---|---|---|
| Constant | -0.025 | 0.33 | 0.11 | 0.25 | 0.517 | 0.52 |
| | (-0.57) | (1.67) | (1.16) | (1.26) | (9.43) | (2.81) |
| GDP per cap: base yr. | | -0.03 | | -0.02 | | -0.001 |
| | | (-1.77) | | (-0.70) | | (-0.014) |
| Enroll (pri+sec): base yr. | | | -0.14 | -0.92 | | |
| | | | (-1.76) | (-0.93) | | |
| Enroll (pri): base yr. | | | | | -0.007 | -0.007 |
| | | | | | (-0.15) | (-0.14) |
| Enroll (sec): base yr. | | | | | -0.21 | -0.21 |
| | | | | | (-2.16) | (-1.69) |
| Democracy (DMC) | 1.75 | 1.55 | 1.62 | 1.57 | 0.81 | 0.81 |
| | (8.97) | (7.51) | (7.48) | (7.85) | (3.81) | (3.97) |
| DMC2 | -1.14 | -1.04 | -1.11 | -1.07 | -0.94 | -0.94 |
| | (-6.82) | (-6.18) | (-6.45) | (-6.73) | (-4.69) | (-5.05) |

Numbers in parenthesis are t-statistics. The results are corrected for heteroscedasticity.

"Fitted" Corruption (Rent) versus Democracy

Figure 3

Table 2

| Independent Variables: | Dependent Variable :Growth (1970 -1992) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | OLS Estimates | | | | | 2SLS Estimates | | | | |
| Constant | 17.89 | 17.21 | 20.4 | 19.18 | 22.29 | 17.89 | 17.21 | 20.4 | 19.18 | 22.29 |
| | (2.53) | (2.79) | (2.77) | (3.05) | (2.93) | (3.37) | (3.20) | (3.56) | (4.17) | (4.48) |
| GDP per cap: base yr. | -1.41 | -1.68 | -1.95 | -0.83 | -1.09 | -1.41 | -1.68 | -1.95 | -0.83 | -1.09 |
| | (-2.25) | (-2.41) | (-2.52) | (-1.07) | (-1.26) | (-2.78) | (-2.51) | (-2.84) | (-1.20) | (-1.55) |
| Enroll (pri+sec): base yr. | | 2.45 | 2.71 | | | | 2.45 | 2.71 | | |
| | | (1.01) | (1.20) | | | | (1.03) | (1.15) | | |
| Enroll (pri): base yr. | | | | 0.57 | 0.75 | | | | 0.57 | 0.74 |
| | | | | (0.47) | (0.67) | | | | (0.42) | (0.55) |
| Enroll (sec): base yr. | | | | 5.57 | 5.57 | | | | 5.57 | 5.57 |
| | | | | (2.58) | (2.50) | | | | (2.28) | (2.31) |
| Gov. Spending (XS) | -0.06 | | | | -0.06 | -0.06 | | | | -0.06 |
| | (-1.28) | | | | (-1.24) | (-1.41) | | | | (-1.52) |
| Democracy (DMC) | -15.61 | -15.22 | -16.01 | -10.46 | -11.31 | -15.61 | -15.22 | -16.01 | -10.46 | -11.31 |
| | (-2.05) | (-2.01) | (-2.15) | (-1.58) | (-1.71) | (-2.70) | (-2.61) | (-2.78) | (-1.93) | (-2.10) |
| DMC2 | 12.01 | 12.06 | 12.77 | 9.02 | 9.8 | 12.01 | 12.06 | 12.77 | 9.02 | 9.8 |
| | (1.92) | (1.92) | (2.06) | (1.55) | (1.71) | (2.59) | (2.56) | (2.73) | (1.86) | (2.03) |

Numbers in parenthesis are t-statistics. The results are corrected for heteroscedasticity.

"Fitted" Growth versus Democracy
(Control : Base year per capita GDP)



Figure 4

Table 3

| Independent Variables: | Dependent Variable : Growth (1970 - 1992) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS Estimates | | | | | | | | | 2SLS Estimates | | |
| Constant | 11.25 | 13.75 | 13.25 | 13.83 | 15.89 | 14.8 | 20.95 | 20.37 | 21.35 | 13.25 | 14.8 | 21.35 |
| | (2.23) | (2.45) | (2.28) | (2.37) | (2.63) | (2.52) | (2.96) | (3.04) | (3.04) | (2.45) | (2.60) | (4.36) |
| GDP per cap: base yr. | -1.02 | -1.43 | -1.4 | -1.54 | -1.86 | -1.83 | -1.17 | -1.13 | -1.06 | -1.4 | -1.82 | -1.06 |
| | (-1.92) | (-2.18) | (-2.13) | (-2.03) | (-2.37) | (-2.38) | (-1.29) | (-1.29) | (-1.24) | (-2.68) | (-2.64) | (-1.51) |
| Enroll (pri+sec): base yr. | | | | 2.38 | 2.06 | 2.23 | | | | | 2.23 | |
| | | | | (1.06) | (0.90) | (0.93) | | | | | (0.93) | |
| Enroll (pri): base yr. | | | | | | | 0.28 | 0.31 | 0.28 | | | 0.28 |
| | | | | | | | (0.23) | (0.26) | (0.24) | | | (0.21) |
| Enroll (sec): base yr. | | | | | | | 5.5 | 5.47 | 6.32 | | | 6.32 |
| | | | | | | | (2.59) | (2.62) | (2.83) | | | (2.62) |
| Gov. Spending (XS) | | 0.2 | 0.21 | | 0.19 | 0.23 | | 0.05 | -0.01 | 0.21 | 0.23 | -0.01 |
| | | (1.74) | (1.64) | | (1.65) | (1.71) | | (0.72) | (-0.18) | (1.46) | (1.54) | (-0.17) |
| Democracy (DMC) | | | 0.44 | | | 1.11 | | | -3.38 | 0.44 | 1.11 | -3.38 |
| | | | (0.18) | | | (0.40) | | | (-1.10) | (0.13) | (0.33) | (-1.02) |
| DMC*XS | -0.32 | -0.89 | -0.91 | -0.35 | -0.89 | -0.94 | -0.4 | -0.56 | -0.4 | -0.91 | -0.94 | -0.4 |
| | (-1.32) | (-1.91) | (-1.88) | (-1.39) | (-1.91) | (-1.93) | (-1.75) | (-1.54) | (-1.09) | (-2.39) | (-2.46) | (-1.18) |
| DMC2*XS | 0.26 | 0.66 | 0.66 | 0.29 | 0.67 | 0.67 | 0.4 | 0.54 | 0.51 | 0.66 | 0.68 | 0.52 |
| | (1.15) | (1.78) | (1.78) | (1.24) | (1.82) | (1.82) | (1.81) | (1.63) | (1.59) | (2.37) | (2.41) | (1.88) |

Numbers in parenthesis are t-statistics.  The results are corrected for heteroscedasticity.

Table 4

| Independent Variables: | Dependent Variable : Growth (1970 - 1992) | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | OLS Estimates | | | | | | | | | 2SLS Estimates | | |
| Constant | 14.01 | 16.44 | 15.98 | 15.28 | 17.93 | 17.28 | 18.26 | 20.92 | 21.15 | 15.98 | 17.28 | 21.15 |
| | (2.28) | (2.27) | (2.43) | (2.51) | (2.43) | (2.49) | (2.88) | (2.74) | (2.78) | (3.03) | (3.09) | (4.03) |
| GDP per cap: base yr. | -1.24 | -1.43 | -1.38 | -1.53 | -1.75 | -1.7 | -0.78 | -1.01 | -0.91 | -1.38 | -1.7 | -0.91 |
| | (-1.94) | (-1.99) | (-2.11) | (-2.10) | (-2.15) | (-2.15) | (-0.95) | (-1.10) | (-1.04) | (-2.63) | (-2.46) | (-1.29) |
| Enroll (pri+sec): base yr. | | | | 1.36 | 1.53 | 1.72 | | | | | 1.72 | |
| | | | | (0.55) | (0.65) | (0.76) | | | | | (0.72) | |
| Enroll (pri): base yr. | | | | | | | 0.08 | 0.2 | 0.22 | | | 0.22 |
| | | | | | | | (0.06) | (0.15) | (0.17) | | | (0.16) |
| Enroll (sec): base yr. | | | | | | | 5.27 | 5.29 | 5.87 | | | 5.87 |
| | | | | | | | (2.33) | (2.24) | (2.37) | | | (2.31) |
| Gov. Spending (XS) | | -0.05 | | | -0.05 | -0.05 | | -0.05 | -0.05 | | -0.05 | -0.05 |
| | | (-1.21) | | | (-1.22) | (-1.22) | | (-1.16) | (-0.93) | | (-1.29) | (-1.34) |
| Democracy (DMC) | | | 0.33 | | | 0.62 | | | -1.46 | 0.33 | 0.62 | -1.47 |
| | | | (0.20) | | | (0.40) | | | (-0.93) | (0.19) | (0.35) | (-0.83) |
| Corruption (CP) | -4.72 | -4.87 | -5.07 | -4.56 | -4.69 | -5.04 | -2.28 | -2.43 | -3.05 | -5.07 | -5.04 | -3.05 |
| | (-2.29) | (-2.31) | (-1.94) | (-2.18) | (-2.20) | (-1.95) | (-1.01) | (-1.03) | (-1.16) | (-2.05) | (-2.03) | (-1.18) |

Numbers in parenthesis are t-statistics. The results are corrected for heteroscedasticity.

**Table 5**

| Independent Variables: | Dependent Variable : Growth (1970 -1992) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OLS Estimates | | | | | | | | | 2SLS Estimates | | |
| Constant | 15.94 | 18.64 | 17.62 | 17.42 | 20.37 | 20.11 | 19.56 | 22.51 | 26.35 | 17.62 | 20.11 | 26.35 |
| | (2.21) | (2.34) | (2.54) | (2.54) | (2.58) | (2.77) | (2.81) | (2.77) | (2.81) | (3.35) | (3.54) | (4.37) |
| GDP per cap: base yr. | -1.38 | -1.58 | -1.41 | -1.7 | -1.94 | -1.95 | -0.88 | -1.12 | -1.09 | -1.41 | -1.95 | -1.09 |
| | (-1.93) | (-2.07) | (-2.25) | (-2.29) | (-2.36) | (-2.52) | (-1.04) | (-1.20) | (-1.26) | (-2.78) | (-2.84) | (-1.55) |
| Enroll (pri+sec): base yr. | | | | 1.52 | 1.7 | 2.71 | | | | | 2.71 | |
| | | | | (0.60) | (0.70) | (1.20) | | | | | (1.16) | |
| Enroll (pri): base yr. | | | | | | | 0.24 | 0.38 | 0.74 | | | 0.74 |
| | | | | | | | (0.19) | (0.31) | (0.67) | | | (0.55) |
| Enroll (sec): base yr. | | | | | | | 5.08 | 5.05 | 5.57 | | | 5.57 |
| | | | | | | | (2.38) | (2.32) | (2.50) | | | (2.31) |
| Gov. Spending ( XS) | | -0.05 | -0.06 | | -0.05 | -0.06 | | -0.05 | -0.06 | -0.06 | -0.06 | -0.06 |
| | | (-1.23) | (-1.28) | | (-1.25) | (-1.29) | | (-1.19) | (-1.24) | (-1.41) | (-1.49) | (-1.52) |
| Democracy (DMC) | | | 2.79 | | | 3.51 | | | -3.7 | 2.79 | 3.51 | -3.7 |
| | | | (1.17) | | | (1.43) | | | (-1.54) | (1.28) | (1.56) | (-1.72) |
| Fitted Corruption (CPF) | -6.53 | -6.81 | -10.5 | -6.36 | -6.64 | -11.17 | -3.51 | -3.86 | -8.56 | -10.5 | -11.17 | -8.56 |
| | (-1.99) | (-2.10) | (-1.92) | (-1.89) | (-2.01) | (-2.06) | (-1.11) | (-1.24) | (-1.71) | (-2.58) | (-2.73) | (-2.03) |

Numbers in parenthesis are t-statistics. The results are corrected for heteroscedasticity.

**Table 6**

| Independent Variables: | Dependent Variable : Growth (1970 - 1992) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Constant | 11.34 (2.18) | 12.3 (2.10) | 12.17 (2.25) | 13.3 (2.33) | 13.83 (2.29) | 13.66 (2.35) | 19.55 (2.83) | 19.52 (2.80) | 19.11 (2.86) |
| GDP per cap: base yr. | -1.06 (-1.86) | -1.24 (-1.86) | -1.22 (-1.99) | -1.46 (-1.97) | -1.55 (-2.01) | -1.53 (-2.02) | -0.99 (-1.10) | -0.99 (-1.09) | -0.94 (-1.07) |
| Enroll (pri+sec): base yr. | | | | 1.84 (0.81) | 1.47 (0.62) | 1.51 (0.65) | | | |
| Enroll (pri): base yr. | | | | | | | -0.001 (-0.001) | -0.04 (-0.03) | -0.06 (-0.04) |
| Enroll (sec): base yr. | | | | | | | 5.97 (2.69) | 5.67 (2.70) | 5.89 (2.73) |
| Gov. Spending (XS) | 0.07 (1.61) | | 0.07 (1.46) | | 0.06 (1.37) | 0.06 (1.20) | | 0.02 (0.31) | 0.06 (0.65) |
| XS*DMC | 0.03 (0.42) | | 0.009 (0.10) | 0.03 (0.48) | | 0.01 (0.19) | -0.01 (-0.19) | | -0.05 (-0.60) |
| XS*CP | -0.16 (-1.14) | -0.22 (-1.95) | -0.22 (-1.53) | -0.16 (-1.17) | -0.02 (-1.82) | -0.21 (-1.48) | -0.1 (-1.34) | -0.14 (-1.10) | -0.16 (-1.13) |

Numbers in parenthesis are t-statistics. The results are corrected for heteroscedasticity.
DMC and CP are defined previously.

Table 7

| Independent Variables : | | | Dependent Variable : Growth (1970 - 1992) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Constant | 11.36 | 14.23 | 13.75 | 13.96 | 15.99 | 15.89 | 20.11 | 20.56 | 20.37 |
| | (2.24) | (2.28) | (2.45) | (2.38) | (2.48) | (2.63) | (2.80) | (2.86) | (3.04) |
| GDP per cap: base yr. | -1.04 | -1.5 | -1.43 | -1.55 | -1.85 | -1.86 | -1.06 | -1.14 | -1.13 |
| | (-1.92) | (-2.03) | (-2.18) | (-2.04) | (-2.24) | (-2.37) | (-1.14) | (-1.22) | (-1.29) |
| Enroll (pri+sec): base yr. | | | | 2.39 | 1.64 | 2.06 | | | |
| | | | | (-1.06) | (0.69) | (0.90) | | | |
| Enroll (pri): base yr. | | | | | | | 0.14 | 0.19 | 0.31 |
| | | | | | | | (0.11) | (0.15) | (0.26) |
| Enroll (sec): base yr. | | | | | | | 5.96 | 5.27 | 5.47 |
| | | | | | | | (2.68) | (2.62) | (2.61) |
| Gov. Spending ( XS) | 0.16 | 0.18 | | | 0.15 | 0.17 | | 0.08 | |
| | (1.65) | (1.71) | | | (1.53) | (1.62) | | (0.86) | |
| XS*DMC | 0.08 | | 0.12 | 0.1 | | 0.14 | -0.006 | | |
| | (0.72) | | (1.00) | (0.88) | | (1.13) | (-0.09) | | |
| XS*CPF | -0.02 | -0.38 | -0.58 | -0.27 | -0.37 | -0.59 | -0.11 | -0.24 | -0.47 |
| | (-1.18) | (-2.02) | (-1.78) | (-1.28) | (-1.93) | (-1.82) | (-1.56) | (-1.45) | (-1.63) |

Numbers in parenthesis are t-statistics. The results are corrected for heteroscedasticity.
DMC and CPF are defined previously.

| S-H Code | Country Name | Avg. Growth Rate (70-92) | Per Capita GDP (70) | Gov Spending (70) | Avg. Corruption (rent) Index(82-93) | Avg. Democracy Index (72-88) | Enrollment Pri & Sec (70) | Enrollment Primary (70) | Enrollment Sec (70) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ALGERIA | 0.02 | 1824 | 13.8 | 0.51 | 0.24 | 45 | 75 | 11 |
| 2 | ANGOLA | 0 | 1171 | 19.1 | 0.57 | 0.12 | 40 | 75 | 9 |
| 4 | BOTSWANA | 0.004 | 815 | 21.7 | 0.45 | 0.76 | 47 | 66 | 8 |
| 12 | CONGO | 0.016 | 1671 | 35.8 | 0.57 | 0.17 | 97 | 168 | 25 |
| 14 | EGYPT | 0.022 | 1162 | 33.6 | 0.67 | 0.41 | 52 | 68 | 32 |
| 15 | ETHIOPIA | -0.021 | 297 | 17.2 | 0.63 | 0.13 | 12 | 18 | 4 |
| 16 | GABON | 0.004 | 3693 | 10.2 | 0.76 | 0.23 | 88 | 168 | 16 |
| 17 | GAMBIA | 0.019 | 728 | 15.9 | 0.57 | 0.72 | 21 | 32 | 9 |
| 18 | GHANA | -0.002 | 1062 | 17.1 | 0.64 | 0.31 | 43 | 58 | 9 |
| 19 | GUINEA | 0.023 | 467 | 12.8 | 0.5 | 0.12 | 24 | 33 | 13 |
| 22 | KENYA | 0.022 | 589 | 25.3 | 0.59 | 0.37 | 42 | 64 | 9 |
| 25 | MADAGASCAR | -0.027 | 1146 | 14.2 | 0.43 | 0.36 | 48 | 84 | 11 |
| 30 | MOROCCO | 0.023 | 1352 | 13.4 | 0.65 | 0.47 | 32 | 55 | 12 |
| 33 | NIGER | -0.013 | 802 | 21.3 | 0.5 | 0.17 | 8 | 14 | 1 |
| 34 | NIGERIA | 0.016 | 767 | 20 | 0.74 | 0.47 | 21 | 34 | 4 |
| 39 | SIERRA LEON | -0.027 | 1439 | 39.5 | 0.77 | 0.38 | 23 | 34 | 9 |
| 40 | SOMALIA | 0.007 | 918 | 9.9 | 0.58 | 0.09 | 6 | 10 | 4 |
| 42 | SUDAN | -0.005 | 901 | 39.5 | 0.74 | 0.34 | 21 | 33 | 6 |
| 44 | TANZANIA | 0.021 | 424 | 30.5 | 0.55 | 0.23 | 22 | 36 | 3 |
| 49 | ZAMBIA | -0.008 | 1113 | 34.3 | 0.67 | 0.36 | 51 | 70 | 12 |
| 54 | CANADA | 0.023 | 10122 | 14 | 0.14 | 1 | 100 | 118 | 77 |
| 55 | COSTA RICA | 0.01 | 2901 | 20.6 | 0.29 | 1 | 75 | 108 | 28 |
| 58 | EL SALVADOR | 0.002 | 1813 | 18.1 | 0.68 | 0.59 | 59 | 78 | 23 |
| 60 | GUATEMALA | 0.005 | 2028 | 9.3 | 0.71 | 0.5 | 38 | 59 | 11 |
| 63 | JAMAICA | 0.01 | 2646 | 9.6 | 0.69 | 0.81 | 66 | 101 | 24 |
| 64 | MEXICO | 0.022 | 3985 | 6.9 | 0.59 | 0.58 | 69 | 106 | 23 |
| 66 | PANAMA | 0.013 | 2584 | 22.4 | 0.7 | 0.38 | 77 | 105 | 41 |
| 72 | U.S.A. | 0.015 | 12969 | 15.7 | 0.26 | 1 | 105 | 109 | 100 |
| 73 | ARGENTINA | -0.032 | 5642 | 10 | 0.48 | 0.6 | 74 | 104 | 37 |
| 74 | BOLIVIA | 0.002 | 1657 | 18 | 0.76 | 0.58 | 56 | 71 | 20 |
| 75 | BRAZIL | 0.023 | 2427 | 11.9 | 0.46 | 0.65 | 58 | 87 | 28 |
| 77 | COLOMBIA | 0.021 | 2140 | 10.5 | 0.57 | 0.78 | 63 | 102 | 23 |
| 81 | PERU | -0.01 | 2736 | 14.8 | 0.6 | 0.63 | 75 | 107 | 35 |
| 84 | VENEZUELA | -0.003 | 7738 | 8.7 | 0.6 | 0.91 | 75 | 100 | 41 |
| 90 | INDIA | 0.022 | 801 | 24.1 | 0.61 | 0.76 | 54 | 68 | 34 |

Appendix (Contd)

| S-H Code | Country Name | Avg. Growth Rate (70-92) | Per Capita GDP (70) | Gov Spending (70) | Avg. Corruption (rent) Index(82-93) | Avg. Democracy Index (72-88) | Enrollment Pri & Sec (70) | Enrollment Primary (70) | Enrollment Sec (70) |
|---|---|---|---|---|---|---|---|---|---|
| 91 | INDONESIA | 0.051 | 715 | 10.7 | 0.82 | 0.36 | 43 | 69 | 12 |
| 92 | IRAN | -0.008 | 4858 | 7 | 0.58 | 0.29 | 54 | 83 | 26 |
| 93 | IRAQ | 0.022 | 4413 | 22.1 | 0.72 | 0.11 | 47 | 67 | 24 |
| 94 | ISRAEL | 0.023 | 5994 | 39 | 0.29 | 0.83 | 79 | 132 | 33 |
| 95 | JAPAN | 0.034 | 7304 | 8.7 | 0.27 | 0.98 | 96 | 101 | 91 |
| 96 | JORDAN | 0.023 | 1422 | 26.2 | 0.53 | 0.28 | 55 | 72 | 33 |
| 97 | KOREA, SOUTH | 0.077 | 1677 | 12.5 | 0.55 | 0.4 | 76 | 104 | 41 |
| 98 | KUWAIT | 0.015 | 10367 | 8.41 | 0.59 | 0.46 | 77 | 90 | 69 |
| 106 | PHILIPPINE | 0.009 | 1404 | 14.8 | 0.75 | 0.51 | 87 | 108 | 48 |
| 109 | SINGAPORE | 0.068 | 3022 | 10.8 | 0.3 | 0.43 | 77 | 105 | 47 |
| 113 | THAILAND | 0.044 | 1528 | 13.1 | 0.56 | 0.55 | 58 | 82 | 16 |
| 116 | AUSTRIA | 0.025 | 7504 | 13.7 | 0.27 | 1 | 96 | 105 | 90 |
| 121 | DENMARK | 0.018 | 9662 | 17.8 | 0.14 | 1 | 87 | 98 | 74 |
| 122 | FINLAND | 0.019 | 8108 | 12.6 | 0.14 | 0.86 | 91 | 121 | 77 |
| 123 | FRANCE | 0.019 | 9193 | 14.3 | 0.22 | 0.93 | 92 | 118 | 74 |
| 126 | GREECE | 0.01 | 4223 | 10.9 | 0.38 | 0.82 | 86 | 106 | 66 |
| 130 | ITALY | 0.024 | 7558 | 11.8 | 0.47 | 0.95 | 79 | 107 | 59 |
| 131 | LUXEMBOURG | 0.025 | 9785 | 10.1 | 0.14 | 0.98 | 85 | 99 | 51 |
| 132 | MALTA | 0.06 | 2437 | 21.5 | 0.51 | 0.82 | 71 | 114 | 52 |
| 134 | NORWAY | 0.031 | 8034 | 14.9 | 0.14 | 1 | 89 | 105 | 86 |
| 136 | PORTUGAL | 0.006 | 3316 | 13.8 | 0.37 | 0.82 | 75 | 95 | 52 |
| 138 | SPAIN | 0.024 | 5861 | 8.5 | 0.37 | 0.77 | 92 | 131 | 57 |
| 139 | SWEDEN | 0.012 | 10770 | 20.1 | 0.14 | 1 | 91 | 97 | 85 |
| 142 | U.K. | 0.019 | 8527 | 18.4 | 0.22 | 1 | 93 | 111 | 75 |
| 145 | AUSTRALIA | 0.014 | 10767 | 10.5 | 0.27 | 1 | 96 | 106 | 83 |
| 147 | NEW ZEALAND | 0.009 | 9376 | 13.7 | 0.14 | 1 | 89 | 102 | 69 |

Column 1: The Summer Heston Country Code.
Column 3: Average Growth rates calculated form S-H data.
Column 4-5: 1970 : Base Year.
Column 6: Average value of Corruption (Rent) calculated from International Country Risk Guide (ICRG) data.
Column 7: Average Democracy calculated from the Gastil data, for some years observations are biannual.
Column 8-11: Data Collected from the UNESCO yearbook.

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