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ABSTRACT

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Why are firms more likely to pay bribes to bureaucrats to bend the rules in developing countries while they instead lobby the government to change the rules in more developed ones? Should we expect an evolution from bribing to lobbying, or can countries get trapped in a bribing equilibrium forever? Corruption and lobbying are to some extent substitutes. By bribing, a firm may persuade a bureaucrat to "bend the rules" and thus avoid the cost of compliance. Alternatively, firms may lobby the government to "change the rules". But there are important differences. While a change in the rules is more permanent, the bureaucrat can hardly commit not to ask for bribes also in the future. Based on this assumption, we show that (i) an equilibrium with corruption discourages firms to invest, (ii) firms bribe if the level of development is low, but (iii) they switch to lobbying if the level of development is sufficiently high. Combined, the economy might evolve from a bribing to a lobbying equilibrium, but too large bribes may discourage the necessary investments for lobbying eventually to become an equilibrium. The outcome is a poverty trap with pervasive corruption. This poverty trap is more likely if penalties on corruption are large and the regulatory costs are high.

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In India, as elsewhere in the developing world, the old business of corruption is meeting a new rival: the Washington-style business of persuasion [International Herald Tribune, May 31, 2006]

1. Introduction

Lobbying and corruption have been the subject of tremendous public interest and research. Somewhat surprisingly, however, these two means of influencing the regulatory environment have either been studied separately or viewed as basically being the same thing.[1] The question why firms choose to lobby or bribe, and the consequences of this choice, remains largely unanswered. In this paper we try to shed some light on the issue.

We define lobbying, taking the form of campaign contributions or influence-buying through other means, as an activity that aims at *changing* existing rules or policies. We view bribing, on the other hand, as an attempt to *get around* existing rules or policies.

While there is little comprehensive data on the extent of corruption and lobbying across countries, a common perception is that firms in developing countries are more likely to be forced to pay bribes to get around regulatory constraints while firms in developed countries are more prone to lobby the government to change rules that adversely affect them.[2] What can account for this difference between developed and developing countries? Should we expect an evolution from bribing to lobbying, as the quotation above suggests, or can countries get trapped in a bribing equilibrium forever?

Our starting point is that bribing and lobbying differ in important dimensions. For one, lobbying is a legal and regulated activity in many countries, while bribing is not. Second, a change in the rule brought in place through lobbying affects

[1] For example Coate and Morris (1999), building on Grossman and Helpman's (1994) lobbying model, interpret lobbying as a bribe. Schulze and Ursprung (2001) argue that the weighting factor in the same model, i.e. the weight the government places on political contributions versus aggregate welfare, measures the level of corruption in the political system.

[2] There is a fairly close (negative) correlation between various subjective measures of corruption and income (see, for example, Svensson 2005). There is also some preliminary evidence that the extent of lobbying increases with income. Using firm data from almost 4000 firms from 25 transition countries, Campos and Giovannoni (2005) find that the share of firms belonging to a lobby group increases with GDP per capita. They also find evidence suggesting that corruption and lobbying are substitutes; i.e., firms belonging to a lobby group are significantly less likely to pay bribes.

everyone, while the return to bribing typically is firm-specific, although there are potential externalities to both other firms and consumers.[3] Third, a government that ponders a change in the rule must weigh the benefit of income from lobbying with the expected net cost of the new rule (possibly on the whole electorate). A public official, on the other hand, weighs the private cost and benefits from accepting a bribe. Maybe most importantly, a rule-change brought in place through lobbying is typically more permanent while a bureaucrat hardly can commit to not ask for bribes also in the future.[4] After all, corrupt contracts are not enforceable in courts: since regulations shift control rights to the bureaucrats and therefore leave a lot of leeway for the official to renege on an agreement with the bribe-payer, the bureaucrat has an incentive to ask for bribes every year, or, in each period (Boycko, Shleifer, and Vishny, 1995). These incentives are reinforced by the fact that a firm typically does not deal with the same official over time.

In the paper, we present a simple growth model where firms initially are subject to a regulation. For example, an import licence is required to import essential inputs or the inputs are subject to a tariff. Instead of complying to the regulation, a firm can either bribe the official to "bend the rules" and be exempt from the regulation, or lobby the government to relax the requirements. If bribing, the firm will be exempted for one period but may very well be forced to pay bribes again in the future. If lobbying successfully, on the other hand, we assume that the rules are more permanently changed.

We show that as the economy grows, firms are more likely to switch from bribing to lobbying. Intuitively, lobbying takes place only when the amount of capital accumulated is large enough, because then the hold-up problem is so severe (bribes are so large) that it is better to lobby for a permanent change in the rules. However, the evolution from a bribing to a lobbying equilibria is not predetermined. Under certain conditions, countries may get stuck in a poverty-trap with extensive bribing forever. This poverty trap is more likely to occur if penalties on

[3] Clearly, not all forms of lobbying yield benefits that can be captured by competing firms. For example, firms may lobby for special tax breaks or for increased public spending on items (a new road to the factory) that only, or primarily, benefits the lobbying firm. We do not consider this forms of lobbying here.

[4] In section 6, we discuss some empirical support for the assumption that the effects of lobbying (if successful) are more permanent. A change of the rules may be governed by time-consuming procedural rules and it may also require the commission of reports to study impact and may need to be referred for consideration at various authorities and courts. Frequent changes in for example the tariff structure may also have an impact on a country's relation to its trading partners. All these factors suggest that it is costly to change the law frequently.

corruption are large and the regulatory costs are high.

The paper also studies equilibrium policies related to corruption. While tough penalties on corruption makes the firms more likely to lobby instead of bribe, conditional on the stage of development, they also increase the bribes a firm has to pay, and the incentives to invest are accordingly reduced. We show that equilibrium penalties increase in the level of development and that they crucially depend on the type of regulation (good or bad regulations) and the extent to which the government benefits from corruption.

Modern research on the economics of corruption began with Rose-Ackerman (1975, 1978). Following Becker and Stigler (1974), the early literature studied corruption primarily within a principal (government) agent (public official) framework. In this paper, on the contrary, we follow Shleifer and Vishny (1993) and take the principal-agent problem as given and instead focus on the consequences of corruption for resource allocation. As in Choi and Thum (1999), we study the effects of repeated extortion. However, our focus is primarily on the firms' behavior, rather than the bureaucrats'. More importantly, we focus on the choice between bribing and lobbying and the long-run consequences of this choice.[5] The literature on lobbying is reviewed in Austen-Smith (1997) and Grossman and Helpman (2002). Starting with the issue of interest group formation (Olson, 1965), the more recent literature looks at how and if lobbying influences policy choices in an environment with competing interests. Lobbying, either taking the form of strategic provision of information and advertising campaigns or through campaign contributions, can either influence policy makers' positions and actions or help preferred candidates to win elections. As argued in Grossman and Helpman (2002), the degree to which an organized industry can influence policy depends on the strength of its political organization and various industry characteristics. We take these results as a starting point and initially assume there is an exogenous cost of (successful) lobbying. Later on, we relax this assumption thus making the cost of lobbying endogenous. Unlike the lobbying literature, where firms (or special interests) cannot influence the implementing agency (through bribery), we explicitly study the choice between lobbying and bribery and the long-run consequences of this choice.

This paper is also related to the political economy literature on policy reform and policy persistence. Fernandez and Rodrik (1991) and Alesina and Drazen (1991) argue that informational asymmetries between winners and losers of the reform can explain why reforms are not undertaken (or are delayed). Brainard

[5] The literature on corruption is reviewed in Bardhan (1997) and Svensson (2005).

and Verdier (1997) and Coate and Morris (1999) instead stress the reaction of interest groups (for example an industry) to the introduction of a policy. When a policy is introduced, the beneficiaries will undertake costly actions to benefit from it and these actions will increase their willingness to lobby for the policy in the future. For example, trade protection may cause the benefiting industry to undertake less adjustment, increasing their willingness to pay for even more protection in the future. Our argument for policy persistence differ in important ways from these models. Specifically the policy in place (for example an import licensing requirement) is assumed to be costly for the firms. Thus, when firms lobby they do it to change the policy. Similar to the Brainard and Verdier (1994) and Coate and Morris (1999) models, adjustment is a key variable in our analysis. However, in our model, if firms undertake less adjustment or invest too little, because the discount or depreciation rates are high, they may never build up a sufficiently large stock of capital to make lobbying worthwhile. The economy will then be stuck in an equilibrium with policy persistence and bribing.

Finally, it is possible to view our model as a formalization of the human capital theories of institutions. The human capital theories argue that growth in human capital and income cause institutional development (Lipset, 1960; and more recently Glaeser et al., 2004). Interpreting the rule as a composite measure of property rights protection, we provide a model with exactly this prediction. As income grow, the hold-up problem becomes so severe (too much must be paid in bribes) that firm owners have strong incentives to lobby for improved protection of property rights.

The paper is organized as follows. The next section presents a simple model of investments, bribing and lobbying. The model is solved in the following sections. Section 3.1 finds the equilibrium bribes; Section 3.2 derives the equilibrium investments levels; and Section 3.3 investigates when firms switch from bribing to lobbying. Throughout Section 3, we abstract from the government and treat both policies and the cost of lobbying as exogenous. These assumptions are relaxed in Section 4. In Section 5, several generalizations are discussed. The model yields a number of empirical predictions which are discussed in Section 6.

2. A Simple Model: Bribing, Lobbying and Growth

Each firm's production function is given by $f(k) = rk$, where r is a productivity parameter. To simplify, we let there be a large (infinite) number of firms, of

measure one, such that k represents both the aggregate and the firm-specific capital stock.

The firms face some regulation which it has to overcome. If it complies with the regulation, it costs c per unit of capital. The cost of compliance ck is proportional to k because the regulation constrains the entire production (which is proportional to k).

Instead of complying, a firm can pay a bribe B to the bureaucrat for "bending the rules" and letting the firm proceed without complying to the regulation. The size of the bribe B must be negotiated between the firm and the bureaucrat. We let the generalized Nash bargaining solution characterize the outcome of the negotiations, and the firm's relative bargaining power is α. Bribery is a crime and, by accepting the bribe, the bureaucrat faces a costs with expectation θxk.[6] The expected penalty, xk, is proportional to k to reflect that either (i) the penalty is increasing in the size of the crime (k), or (ii) smaller firms are less often investigated or can hide its crime more easily. The parameter θ measures the bureaucrat's personal stigma of being penalized or, alternatively, it may measure the bureaucrat's individual probability of being investigated. The θs are uniformly distributed on $[0, 1]$, they are iid across firms and time, but they are observed by the firm before it negotiates with the bureaucrat. Assume that $c < x$, such that at least some firms (or bureaucrats) choose to comply instead of bribe.[7]

As a second alternative to complying, the firms may lobby the government to *change* the rules. Such a change is likely to be more permanent than the bureaucrat's temporary bending of the rules. To simplify, we assume that a change in the rules removes the regulation forever, making $c = 0$.[8] The cost of lobbying, L, includes both the firms' cost of collective action as well as the costs associated with influencing the government to reform. While the total cost of lobbying is, for now, fixed at L, the allocation of this cost among the firms is determined

[6] If the firm were paying the penalty instead of the bureaucrat, the results would be similar.

[7] There are several interpretations that fit our model. For example, the rule could be interpreted as an industrial licensing requirement where either production or expansion are subject to administrative approval (the Indian Development and Regulation Act that required firms to apply for industrial license from a Licensing Committee in order to set up a new production unit, expand capacity of more than 25 % or manufacture a new product, as discussed in Aghion et al. (2005), is a real world example of such a regulation).

[8] All results continue to hold qualitatively if we instead assume that at each point in time there is some probability (strictly less than one) that the government changes the law again, making a new round of lobbying necessary. The main difference would be that lobbying would be less attractive, and bribing more likely, for the same parameter set.

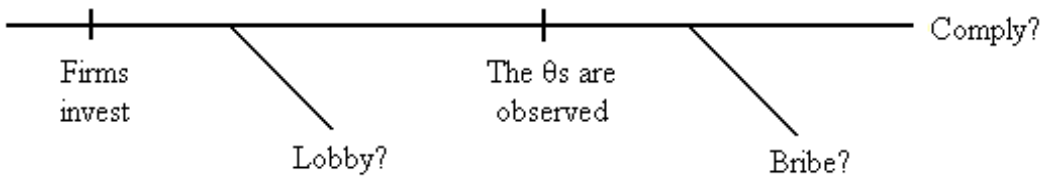

Figure 2.1: Timing of each period

by negotiations. Again, we let the Nash bargaining solution characterize this bargaining outcome.

In each period t, the timing is as follows (see Figure 2.1). First, the firms collectively decide whether to lobby the government to change the rules. Since the firms are identical in equilibrium, they all agree on whether (and when) to lobby. If the firms do not lobby, they proceed individually. Then, each firm observes the type of its bureaucrat and determines whether to negotiate a bribe B with the bureaucrat. If the negotiation breaks down or is never initiated, the firm complies. As already mentioned, the firm faces a new bureaucrat every period, such that this sequence repeats itself at each time t.[9]

Although it is convenient to refer to a "period" t, we let time be continuous in the model. This simplifies some of the calculations without affecting the results. The capital depreciates at the rate d, but each firm may increase its stock of capital by investing i_t at cost $zi_t^2/2$ in the beginning of each period:

$$\dot{k}_t = i_t - dk_t. \tag{2.1}$$

The subscript t is frequently suppressed for convenience.

The discount rate is δ. δ captures a firm's valuation of the future and may be small in unstable environments but large in consolidated democracies. In fact, δ

[9]However, to simplify, we assume that if the negotiations between the firms over whether to lobby breaks down, they will not try to lobby at a later period, either. Technically, this is an innocent assumption which just simplifies the bargaining game between the firms. Intuitively, it may be justified since the negotiations will never fail in equilibrium, and if it should do nevertheless, the firms may as well believe that this approach cannot work even in the future.

can be interpreted as the product of the pure time preference discount rate and the probability that the stock of capital will survive a war or expropriation by the government. The depreciation rate of capital, d, may also measure the amount the government expropriates as well as the physical depreciation of capital.

3. The Solution

We solve the model in three steps. First, we solve for the bribes and the implied profit functions. Based on this, the second subsection derives the investment levels, depending on whether the firms expect to bribe or lobby. In the third subsection, we investigate whether the firms actually prefer to lobby instead of to bribe, and how this choice depends on the level of development.

3.1. The Bribes

Before deciding whether to comply, a firm learns the type θ of its current bureaucrat. If $ck > \theta xk$, the firm and the bureaucrat can both be better off if the firm pay a bribe $B \in (\theta xk, ck)$ to the bureaucrat in order to get around the regulation. The size of the bribe is determined by negotiations between the firm and the bureaucrat. Relying on the generalized Nash bargaining solution, where α represents the firms bargaining power:

$$\max_B (ck_t - B)^{\alpha} (B - \theta xk_t)^{1-\alpha} \Rightarrow$$

$$B = (1 - \alpha) ck_t + \alpha x \theta k_t$$

If the firm's stock of capital k_t is large, the bribe is large for two reasons. First, a large k_t implies that the firm's cost of the regulation is large, and it is thus willing to pay more to get around it. Second, the bureaucrat's cost of bending the rules (θxk_t) is larger if the firm is large because it is more likely that a large firm will be investigated, or because the penalty of such a large crime is larger. Thus, large firms pay more bribes.[10]

Since θ is uniformly distributed on $[0, 1]$, the probability that a firm bribes is c/x, while it complies with probability $(1 - c/x)$. This is quite intuitive: The

[10] This is consistent with the findings in Svensson (2003). Instrumenting for the firm's profitability, he finds in a cross-section of firms in Uganda that firms that invest more and make higher profits also pay higher bribes.

larger is the cost of compliance relative to the expected penalty of corruption, the more firms prefer to bribe instead of comply.

Proposition 1: A fraction c/x of the firms bribe. The bribe B increases in k, c, x but decreases in α.

Whether a firm is complying or bribing, the regulation is costly. In fact, we may write a firm's expected profit as:

$$\begin{aligned} rk - E\min\{ck, B\} &= rk - (c/x)E\left[B|\theta < c/x\right] - (1 - c/x)ck \\ &= rk - (c/x)(1 - \alpha/2)ck - (1 - c/x)ck \\ &= (r - b)k, \text{ where} \end{aligned}$$

$$b \equiv c\left(1 - \alpha c/2x\right) \tag{3.1}$$

Since we have assumed $c < x$, b is increasing in c and x but decreasing in α. More extensive regulations (c) reduces profit both when the firm complies and when it bribes (as the equilibrium bribe is increasing in c). An increase in the bureaucrat's expected penalty of being corrupt (x) reduces profit by increasing the bribe (the firm must compensate the bureaucrat for the increased risk of accepting a bribe), while an increase in the firm's relative bargaining position (α) reduces the bribe paid (without affecting whether a firm bribes or complies).

3.2. Investments

3.2.1. Bribing and Investments

In order to solve for the equilibrium investments, consider, first, an equilibrium where bribing takes place forever. In such a steady state, each firm will at time t plan its investments in order to solve:

$$\max_{i_\tau} \int_t^\infty \left((r - b)k_\tau - \frac{z}{2}i_\tau^2\right) e^{-\delta(\tau - t)} d\tau \text{ s.t. } k_t \text{ and (2.1).} \tag{3.2}$$

If lobbying has taken place, such that the regulation is permanently relaxed, the firm's maximization problem is similar to (3.2) if just b is replaced with zero.

Proposition 2: (i) In a bribing equilibrium, investment i (3.3) decreases in b, i.e., investments are low if the penalty (x) and the regulatory cost (c) are large and the firm's bargaining power (α) is small. (ii) Investments are larger in a lobby equilibrium (where $b = 0$). (iii) In either case, investments are increasing in r but decreasing in d, δ and z.

$$i = \frac{r - b}{z\,(d + \delta)} = \frac{r - c\,(1 - \alpha c/2x)}{z\,(d + \delta)} \tag{3.3}$$

Proof: (3.2) is an optimal control theory problem, with the following current-value Hamilton function:

$$H = (r - b)k - \frac{z}{2}i^2 + p\,(i - dk)\,,$$

where p is shadow value of capital. The first-order conditions are:

$$\begin{aligned} \dot{p} - \delta p &= -\frac{\partial H}{\partial k} = -(r - b) + dp \\ \frac{\partial H}{\partial i} &= -zi + p = 0 \end{aligned} \tag{3.4}$$

Together with (2.1), this gives two differential equations with only one stable solution, which can be found straighforwardly:

$$i = \frac{p}{z} = \frac{r - b}{z\,(d + \delta)}$$

QED

The more capital the firm has, the higher the bribes will be. This discourages the firm to invest. Thus, bribing is a classical hold-up problem since the bureaucrat cannot commit to not ask for higher bribes in the future. Since the equilibirum size of the bribes increases in x but decreases in α, investments do the opposite. Thus, a harsh penalty on corruption reduces growth in a bribing equilibrium, because the bureaucrats then require higher bribes, worsening the hold-up problem. If c is larger, both the cost of compliance and the bribes are larger, and investments decrease for both reasons. When the regulation is relaxed, the firm can appropriate the full marginal product of capital r. As a result, investments are higher after firms have switched from bribing to lobbying. The third part of the proposition may be less surprising: As is standard, investments increase in the rate of return (r) but decrease in the marginal cost of investment (z), the depreciation rate (d), and the discount rate (δ).

3.2.2. Lobbying and Investments

Instead of complying or bribing, the firms may spend resources on lobbying the government for a more permanent relaxation of the regulation. The cost of such lobbying, L, includes both the firms' organizational cost as well as the cost to induce the government to change its legislation. Given these costs, we assume that the firms' collective action problem is solved and their decision is simply whether to bribe/comply or (collectively) lobby, and when to switch from one to the other.

Although the firms' collective cost of lobbying, L, is fixed in this section, the lobbying costs are not fixed for the individual firm. The firms negotiate the invididual contributions under the constraint that the sum of the firms' individual contributions must equal L. If the negotiations fail, the default is to continue to comply/bribe forever.

Proposition 3: A firm j's cost of lobbying (3.5) increases in its capital stock.

$$L_j = \frac{b(k_j - k)}{d + \delta} + L \tag{3.5}$$

Proof: Suppose, contrary to the assumption above, that there were n firms. By the proof of Proposition 5 below, the value of continuing to bribe forever is given by (3.8) below. The Nash bargaining solution is given by

$$\max_{L_j} \sqcap_j \left(V(k_j, 0) - V(k_j, b) - L_j\right) \text{ s.t. } \sum_j \frac{L_j}{n} = L \Rightarrow$$

$$\begin{aligned} V(k_j, 0) - V(k_j, b) - L_j &= \frac{1}{n} \sum_j \left(V(k_j, 0) - V(k_j, b) - L_j\right) \Rightarrow \\ \frac{bk_j}{d + \delta} - L_j &= \frac{b \sum_j k_j / n}{d + \delta} - L \Rightarrow \\ L_j &= \frac{b(k_j - k)}{d + \delta} + L \end{aligned}$$

where k is the average k_j. Clearly, this holds also in the limit when $n \to \infty$. *QED*

From Proposition 1 we know that a firm with more capital pays more bribes. Thus, it is more important for a large firm to change the rules and eliminate the bureaucrat's bargaining power. Firm j's eagerness to lobby, however, is exploited

by the other firms which can force i to bear more of the lobby costs. Thus, just as bribing generates a hold-up problem for the firm, so does lobbying. By investing, a firm becomes larger and will have to pay more of the costs of lobbying. Anticipating this, all firms are discouraged to invest.

Proposition 4: Anticipating lobbying at time T, each firm invests according to (3.3) at any time $t < T$.

Proof: Anticipating lobbying at time T, a firm's problem is:

$$\max_{i_\tau} \int_t^T \left((r-b)k_\tau - \frac{z}{2} i^2 \right) e^{-\delta(\tau - t)} d\tau + \left[V(k_T, 0) - L_i \right] e^{-\delta(T-t)} \text{ s.t. } (2.1)$$

By substituting for L_i from (3.5), it is straightforward to solve this optimal control theory problem and see that the solution for i is given by (3.3). *QED*

3.3. Lobbying

3.3.1. Lobbying and the Level of Development

We will now show that, typically, the firms bribe early in the development process (for a small k), while they at a later stage (for a larger k) switch to lobbying.

Proposition 5: (i) The firms prefer lobbying instead of bribing if k is sufficiently large, such that (3.6) holds. (ii) For a given k, the firms are more likely to lobby than bribe if b is large (x and c large but α small), while L, δ, d and z are small.

$$bk + \frac{b^2}{2z\left(d+\delta\right)^2} \geq \delta L \tag{3.6}$$

Proof: If bribing were to take place forever, the evolution of k follows from (2.1). Since i is constant, solving this differential equation gives:

$$k_\tau = \frac{i}{d}\left(1 - e^{-d(\tau - t)}\right) + k_t e^{-d(\tau - t)} \tag{3.7}$$

The present discounted value of the firm, at time t, would be (after substituting for i):

$$V(k_t, b) = \int_t^{\infty} \left((r-b)k_\tau - \frac{z}{2} i^2 \right) e^{-\delta(\tau - t)} d\tau = \frac{(r-b)k_t}{d+\delta} + \frac{(r-b)^2}{2z\delta\,(d+\delta)^2} \tag{3.8}$$

If lobbying had taken place, however, the firm's present value would be $V(k_t, 0)$. Thus, if lobbying is going to take place at time $T > t$, the firms' present value at time $t < T$ is

$$\int_t^{T} \left((r-b)k_\tau - \frac{z}{2} i^2 \right) e^{-\delta(\tau - t)} d\tau + \left[V(k_T, 0) - L \right] e^{-\delta(T-t)}$$

Maximizing over T, the first-order condition becomes

$$\begin{aligned} \left((r-b)k_T - \frac{z}{2} i^2 \right) e^{-\delta(T-t)} + \left[\frac{\partial V(k_T, 0)}{\partial k_T} \frac{\partial k_T}{\partial T} - \frac{\partial L}{\partial T} \right] e^{-\delta(T-t)} \\ + \left[V(k_T, 0) - L \right] \left(-\delta e^{-\delta(T-t)} \right) = 0 \end{aligned} \tag{3.9}$$

Eliminating the term $e^{-\delta(T-t)}$, substituting for i and setting $\partial k_T / \partial T = i - dk_T$ and $\partial L / \partial T = 0$, this becomes:

$$\begin{aligned} \left((r-b)k_T - \frac{z}{2} \left(\frac{r-b}{z\,(d+\delta)} \right)^2 \right) + \left[\frac{r}{d+\delta} \left(\frac{r-b}{z\,(d+\delta)} - dk_T \right) \right] \\ -\delta \left[\frac{rk_T}{d+\delta} + \frac{r^2}{2z\delta\,(d+\delta)^2} - L \right] = 0 \end{aligned} \tag{3.10}$$

Collecting the terms give:

$$-bk_T + \frac{-(r-b)^2 + 2r(r-b) - r^2}{2z\,(d+\delta)^2} + \delta L = 0, \text{ which is} \tag{3.11}$$

$$bk_T + \frac{b^2}{2z\,(d+\delta)^2} = \delta L \tag{3.12}$$

The second-order condition is trivially fulfilled. *QED*

Lobbying is costly, so it is tempting for the firms to delay this. But as k grows, the bureaucrat continues to ask for larger and larger bribes. When k and the bribes are sufficiently large, the firms switch from bribing to lobbying. Since the bureaucrats cannot commit to not ask for higher bribes in the future, they eventually "price themselves out of the market". Instead, firms turn to politicians and lobby.

Naturally, for a given k, lobbying is more attractive if the bribes are large; i.e., if x and c are large while α is small. Moreover, since the bribes are fractions of all future profits, lobbying is more attractive if the present discounted value of future profit is large; i.e., if investing is cheap (z small), depreciation little (d small) and the future important (δ small).

3.3.2. The Timing of Lobbying

Combining Proposition 2 and 5 leads to the main result of the paper: While Proposition 5 says that the firms are more inclined to lobby instead of bribing when k is large, Proposition 2 states that the growth rate of k depends on whether the firms actually lobby or bribe. Thus, there may be an evolution where the firms bribe for low k, but when time passes and k increases, the firms eventually reaches a stage where they switch to lobbying. However, the hold-up problem between the bureaucrat and the firm implies that investments are lower under the bribing than under the lobbying equilibrium. It is thus possible that the investment level is so low that the firms never switch from bribing to lobbying. Then, the economy is stuck in a "poverty trap" with bribing forever: The bribes are so large that the firms are discouraged to invest, and the capital stock never reaches the level necessary to switch to lobbying.

Proposition 6: The firms will eventually switch from bribing to lobbying if and only if (3.13) holds. Then, the time T of the switch is given by (3.14). That is, if r is large while L, d, δ and z are small, lobbying is more likely to eventually take place, and if it does, it does so at an earlier point in time.

$$\frac{b(r-b)}{dz\,(d+\delta)} + \frac{b^2}{2z\,(d+\delta)^2} > \delta L \tag{3.13}$$

$$\frac{b(r-b)}{dz\,(d+\delta)}\left(1-e^{-dT}\right) + bk_0e^{-dT} + \frac{b^2}{2z\,(d+\delta)^2} = \delta L \tag{3.14}$$

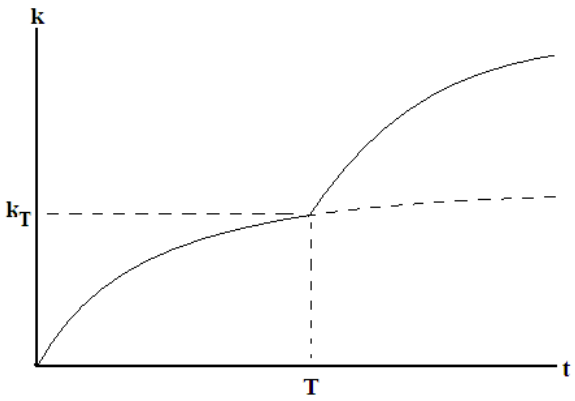

Figure 3.1: Investments increase after firms switch from bribing to lobbying

Proof: In order to find the time of lobbying, substitute (3.7) in (3.12) at $\tau = T$ and set $k_t = k_0$ at $t = 0$. (3.12) becomes:

$$b\frac{i}{d}\left(1 - e^{-dT}\right) + bk_0e^{-dT} + \frac{b^2}{2z\left(d+\delta\right)^2} = \delta L$$

Substituting for i:

$$\frac{b(r-b)}{dz\left(d+\delta\right)}\left(1 - e^{-dT}\right) + bk_0e^{-dT} + \frac{b^2}{2z\left(d+\delta\right)^2} = \delta L$$

The left-hand side is increasing in T for k_0 small. For lobbying eventually to take place, it is necessary that this expression holds for some positive T. That is, it is necessary that the left-hand side is larger than the right-hand side for $T \to \infty$. This requires (3.13). *QED*

The result follows from Propositions 2 and 5. Investments are larger if r is large while d, δ and z are small, and the level of development will then sooner reach the critical k where the firms switch to lobbying. Moreover, the critical k is lower if r is large while d, δ and z are small, since then lobbying is more attractive for any given k. Therefore, countries where firms face a low investment costs (e.g., an efficient transportation system), a low depreciation rate (e.g., a favorable physical environment or efficient provision of complementary public capital), and

patient investors (e.g., due to a stable socio-economic environment) are more likely over the long run to switch from a bribing to a lobbying equilibrium. In other words, starting in a bribing equilibrium, pro-growth policies or institutions have a multiplicative effect - they affect capital accumulation directly and they make a switch from bribing to lobbying more likely. On the other hand, the incentives to lobby for a relaxation of the regulation will be weaker in countries facing exogenous or self-imposed constraints on capital accumulation. As a result, they may be stuck in an equilibrium with low income and bribing.

The effect of b (and thus c and x) is ambiguous. While a larger b makes the firms more tempted to lobby for a given k, it reduces investments (and thus k) at all stages, making the firms less likely to reach a capital level sufficient to make lobbying attractive. Since (3.13) and (3.14) are inverse U-shaped in b, it is clear that a *moderate* b makes lobbying more likely.[11] Thus, an increase in the expected penalty of corruption, x, has two effects. It raises the expected bribe and thus makes lobbying more attractive. However, it also adversely affect investment and thus k, making it less likely that the critical value of k defined by (3.6) will ever be reached. Since a *moderate* b makes lobbying more likely, heavy regulation or red tape (which increase c) may need to be accompanied by small penalties x (reducing b) in order to avoid a poverty trap.

Corollary 1: If $b \geq \bar{b} \equiv r(d+\delta)/(d+2\delta)$, an increase in b (x, c or a decrease in α) makes a reform (lobbying) less likely to take place and thus increases the risk of a poverty trap.

4. Governments and Politics

The model above compared bribing and corruption in a simple model where the cost of lobbying were fixed and the government absent. In this section, we introduces the government and its preferences. This allows us to endogenize the cost of lobbying and study the government's optimal policies.

[11] Roughly, the intuition is as follows. While the benefit of lobbying is approximately kb, the capital stock is proportional to $(r-b)$. Thus, when b is small, an increase in b increases the incentives to lobby relatively more than it reduces the capital stock, and overall, lobbying occurs faster. But if b is large, the benefit of lobbying is already large. Then, a larger b reduces the capital stock so much that lobbying takes place later and less likely.

4.1. Governments and Lobbying

There are two reasons (at least) why the government would care about regulation. The existence of regulation may, of course, be intended to serve a purpose. With environmental regulation, for example, unregulated firms or firms that do not comply may pollute and cause some externality on the rest of the society. For each unit of production that does not comply, we let the externality be measured by e. One may say that if $e > c$, the regulation appears valuable since the benefit of compliance is larger than the cost. If $e < c$, on the other hand, the regulation appears more like "red tape" since the cost of compliance exceeds the actual benefit.

A second reason for preferring regulation is that it generated revenues.[12] The bribes collected by the bureaucrat may benefit the government indirectly because with high expected bribes, the bureaucrats' wages can be reduced. Or, the bribes may directly benefit the government if it can control the bureaucrats and thereby collect a fraction f of the bribes.[13]

In addition to these concerns, the government may also care about the level of development, k, by itself. After all, k measures the amount of taxable output and the activity in the economy, with all possible externalities such as employment and spillover-effects on other industries. To capture the concerns for development and growth, we let g measure the government's benefit of a larger k.

The government's objective function can thus be written as:

$$u_G = f(c/x)c(1 - \alpha/2)k - e(c/x)k + gk \tag{4.1}$$

The first term captures the benefit of the bribes. The fraction of firms that bribe is

[12] De Soto (1989) and Shleifer and Vishny (1993) argue that regulations are partly instituted to provide public officials the power, or the property rights, to demand and collect bribes. Evidence of this is provided in Wade's (1982) account of corruption in the canal irrigation department in a South Indian state. Wade describes how some irrigation engineers raise vast amounts in bribes from the distribution of water and contracts, and redistribute part to superior officers and politicians. The system of corruption is institutionalized and there is even a second-hand market for posts that provide the holder an opportunity to extract bribes. The existence of entry fees for positions in the bureaucracy is documented in many other developing and transition countries (see World Bank, 1998).

[13] The bureaucrats suffer from the expected penalties, θx. But since this may be interpreted as a pure transfer from the bureaucrat to the government, we let only the bribe itself enter the government's utility function. For example, the government may collect θx directly and the bureaucrat's utility $b - \theta x$ indirectly (by reducing the salary). The sum of these two terms is simply b.

c/x, and, conditional on bribing, the expected (and average) bribe is $c(1-\alpha/2)k$. The second term captures the negative externality by those (c/x) firms that do not comply. Both e and f are constants, not functions.

If lobbying has taken place, there are no bribes being paid and no firms comply. Then, the government's payoff is:

$$u_G = (g-e)k$$

Lobbying itself may also be beneficial to the government, of course, and this value is normalized to one (ensuring transferable utility between the government and the firms). For lobbying to be successful, the firms need to compensate the government for the loss it faces when relaxing the rules. If f is large, these losses are due to less bribes being collected. If e is large, instead, the losses come from the externality that arise without regulation. Just as argued in the previous section, there might also be some fixed cost associated with lobbying, $\underline{l}$.[14]

Endogenizing the costs of lobbying in this way, we achieve the pararell result to Proposition 5.

Proposition 7: Lobbying replaces bribing if (4.2) holds. (i) If $h > 0$, this is more likely for large k. (ii) For a given k, lobbying is more likely to replace bribing if e and f are small but g large.

$$hk_T \geq \delta\underline{l} + \frac{b(2(e-g)-b)}{2z\,(d+\delta)^2}\,, \text{ where} \tag{4.2}$$

$$h \equiv (1-f)(1-\alpha/2)c^2/x + (c-e)(1-c/x) \tag{4.3}$$

Proof: In a bribing equilibrium, the present discounted value of the government's utility function is found by simply integrating (4.1). This gives:

$$[(f(1-\alpha/2)c-e)(c/x)+g]\,K(k,b), \text{ where} \tag{4.4}$$

[14] To simplify, we assume that the firms have all bargaining power relative to the government, and can give a take-it-or-leave-it offer when offering lobby contributions. However, *any* allocation of bargaining power (and thus the surplus) between the firms and the government would give exactly the same results in this section, since whether and when to lobby is determined by maximizing the joint surplus between the firms and the government.

$$
\begin{aligned}
K(k,b) &= \int_t^{\infty} k_\tau e^{-\delta(\tau-t)} d\tau = \frac{r-b}{zd\delta\,(d+\delta)} + \frac{1}{(d+\delta)}\left(k_t - \frac{r-b}{zd\,(d+\delta)}\right) \\
&= \frac{r-b}{z\delta\,(d+\delta)^2} + \frac{k_t}{(d+\delta)}
\end{aligned}
$$

If the government "gives in" after lobbying, c and b become 0, and the government's utility therefore:

$$(g-e)\,K(k,0)$$

The cost of lobbying is the difference in the government's utility, plus the fixed cost:

$$
\begin{aligned}
L(k) &= (f(1-\alpha/2)c-e)(\frac{c}{x})K(k,b) + eK(k,0) - g\left[K(k,0)-K(k,b)\right] + \underline{l} \\
&= \frac{nk}{d+\delta} + \frac{(r-b)\left[(f(1-\alpha/2)c-e)c/x\right] + re - gb}{z\delta\,(d+\delta)^2} + \underline{l} \\
&= \frac{nk}{d+\delta} + \frac{(r-b)n + b(e-g)}{z\delta\,(d+\delta)^2} + \underline{l}, \text{ where} \qquad (4.5) \\
n &\equiv f(c/x)(1-\alpha/2)c + e(1-c/x) \qquad (4.6)
\end{aligned}
$$

Unlike before, L is now a function of k, $L(k)$. This should obviously be recognized when the firms are choosing the optimal time for lobbying. Substituting for $L(k)$ into the earlier first-order condition (3.9) gives our new first-order condition:

$$
\left((r-b)k_T - \frac{z}{2}i^2\right)e^{-\delta(T-t)} + \left[\frac{\partial V(k_T,0)}{\partial k_T}\frac{\partial k_T}{\partial T} - \frac{\partial L(k_T)}{\partial k_T}\frac{\partial k_T}{\partial T}\right]e^{-\delta(T-t)}
$$
$$
-\left[V(k_T,0) - L(k_T)\right]\delta e^{-\delta(T-t)} = 0
$$

Eliminating the term $e^{-\delta(T-t)}$, substituting for investments i and setting $\partial k_T/\partial T = i - dk_T$ and $\partial L/\partial k = n/\,(d+\delta)$, this becomes:

$$
\left((r-b)k_T - \frac{z}{2}\left(\frac{r-b}{z\,(d+\delta)}\right)^2\right) + \left[\left(\frac{r}{d+\delta} - \frac{n}{d+\delta}\right)\left(\frac{r-b}{z\,(d+\delta)} - dk_T\right)\right]
$$
$$
-\delta\left[\frac{rk_T}{d+\delta} + \frac{r^2}{2z\delta\,(d+\delta)^2} - L(k_T)\right] = 0
$$

Substituting for $L(k_T)$ from (4.5) and collecting the terms give:

$$\begin{aligned}
-k_T(b-n) + \frac{-(r-b)^2 + 2(r-n)(r-b) - r^2 + 2(r-b)n + 2b(e-g)}{2z(d+\delta)^2} + \delta\underline{l} &= 0 \Rightarrow \\
-k_T(b-n) + \frac{-(r-b)^2 + r^2 - 2rb + 2b(e-g)}{2z(d+\delta)^2} + \delta\underline{l} &= 0 \Rightarrow
\end{aligned}$$

$$k_T(b-n) = \delta\underline{l} + \frac{b(2(e-g)-b)}{2z(d+\delta)^2} \tag{4.7}$$

Defining $h \equiv b - n$ and subsituting for b and n gives Proposition 7.

QED

Part (ii) does not come as a surprise: If the government benefits from compliance (e) or the bribes (f), it is naturally reluctant to relax the rules that generates these benefits. And if g is small, the government does not want to relax the rules even if this increases growth. In these circumstances, it is expensive to persuade the government to relax the rules, lobbying is costly and takes place only for very large k, if at all.

Unlike in the previous section, the cost of lobbying is a function of k. This function is increasing for two reasons: First, when k is large, so is the amount of production that ought to be regulated. Second, when k is large, so are the bribes that benefit the government. Thus, when k is large, the rules become more important to the government and it becomes more costly to lobby and persuade the government to relax the rules.

If the costs of bribing increases faster in k than the cost of lobbying, however, lobbying will ensure that the rules are relaxed when k is sufficiently large. This requires h (defined by (4.3)) to be positive. When is that the case? It is useful to consider each of the government's concerns in turn.

First, suppose that $e = 0$ such that the regulation is just motivated by the bribes, $f > 0$. By introspection, it is clear that $h > 0$ even if $f = 1$. This means that as k grows, the cost of the rules (bk) increases faster than the government's revenues from the bribes. The reason is that some firms choose to comply instead of bribe, and these firms pay a cost which is not captured by the government. For a sufficiently large k, this cost is so large that the firms switch from bribing to lobbying. Thus, even in a situation where the government is a pure rent-maximizer and can collect all bribes from bureaucrats ($f = 1$), the regulation is more likely to be relaxed as k increases.

Second, suppose $e > 0$, motivating the regulation. Note that even if $e > c$, h may still be positive, such that the regulation is relaxed (by lobbying) for a sufficiently large k. This result follows from the fact that not all firms comply, and the bribes these non-compliers are paying may not be fully captured by the government. Only if $f = 1$, such that the government is able to collect *all* the bribes, it is sufficient that $e > c$ for the rules always to be in place (then $h < 0$). The lower is f, the larger must e be for the rules to survive. "Good" rules (with a sufficiently large e) are never lobbied away. "Bad" rules or red tape (where $e < c$), however, are relaxed by lobbying for sufficiently large k.

Corollary 2: If $e < c$, the rules are relaxed (by lobbying) for sufficiently large k.

Of course, it is not sufficient that $h > 0$ for lobbying to eventually replace bribing. In addition, k must reach the critical level, defined by (4.2). Just as before, the level of development is determined by Proposition 2. For any given k, (4.2) is more likely to hold if e and f are small but g is large. We can thus conclude that lobbying replaces bribing sooner if the regulation is not valuable (e small), the bribes are hard to collect (f small) while growth is beneficial (g large). Otherwise, k may never reach the level (4.2) necessary for lobbying to take place.

4.2. Short-term Policies

So far, we have treated the parameters c, x, and α as fixed. To some extent, however, these may be the outcome of a deliberate choice by the government. Since we have defined the government's utility function, we can easily study its optimal choice of these variables.

Setting policies in a dynamic framework brings us to the question of whether the government can commit to its choices. One extreme view is that the government is totally unable to commit, and that it thus sets policies in each period, with no promises for the policies tomorrow. The other extreme view is that the government can perfectly well commit to policies in the future, for example by setting policies now that will always be in place. We will analyze both these cases, recognizing that the reality is probably somewhere in between. Since we have assumed that the firms make a take-it-or-leave-it offer to the government when lobbying, the government sets its policies just as to maximize its utility given that bribing will remain forever (since this is the utility it will receive even if firms lobby).

Let's start with the no-commitment case, assuming that every period t starts with the government setting its policy for that period.[15] Since investment decisions depend on the expected *future* policies, the actual policy at time t will not affect any investment decision.

By changing c or x, the government affects the fraction of firms (c/x) that bribe instead of comply. As noticed by the subsection above, the government may benefit from both compliance and corruption, but these two concerns are clearly in conflict when the government can influence c/x.

From the government's utility function (4.1), we immediately find:

Proposition 8: With short-term policies, the government prefers to set (i) a large c if and only if f is large and e is small, (ii) a large x if and only if e is large and f is small, and (iii) a small α in any case.

Proof: When taking the derivatives of (4.1), we can ignore the policies' effects on i and k (since these depend on *future* policies, not current policies):

$$\begin{aligned} \frac{\partial u_G}{\partial c} &= f(1-\alpha/2)2ck/x - ek/x \\ \frac{\partial u_G}{\partial(-1/x)} &= -f(1-\alpha/2)c^2k + eck \\ \frac{\partial u_G}{\partial \alpha} &= -fkc^2/2x \end{aligned} \tag{4.8}$$

The derivative is taken with respect to $(-1/x)$ instead of x for convenience only (the two derivatives are obviously of the same sign). Although these derivatives do not pin down the optimal policies (the proposition refers to the sign of the derivatives), there are two alternative ways of pinning these down. Either these derivatives could be set equal to some marginal cost of adjusting these policies, or the derivatives could be set equal to zero given some boundaries on $c \in [\underline{c}, \overline{c}]$, $x \in [\underline{x}, \overline{x}]$ and $\alpha \in [\underline{\alpha}, \overline{\alpha}]$.[16] In any case, Proposition 8 follows. *QED*

[15] Thus, we now assume the government cannot create a reputation for time-consistency.

[16] If κ represents U-shaped cost functions proportional to k, the first-order conditions would be:

$$\begin{aligned} f(1-\alpha/2)2c/x - e/x &= \kappa_c'(c) \\ -f(1-\alpha/2)c^2 + ec &= \kappa_x'(x) \\ -fkc^2/2x &= \kappa_\alpha'(\alpha) \end{aligned}$$

Clearly, κ_c must be sufficiently convex and $\kappa_\alpha'(\alpha) < 0$ for interior solutions to exist.

These results are quite intuitive. In the "red tape" case (f large), the government prefers bribing instead of compliance. By decreasing x and increasing c, more firms bribe, and the bribes are larger. In the "good regulation" case (e large), the government prefers firms to comply, so it sets x large while making the cost of compliance small. In either case, the government prefers to give most bargaining power to the bureaucrat (small α), because this increases the bribes without affecting anything else.

4.3. Long-term Policies and Development

Above, the government had a short-term perspective since its policies at time t did not affect the firms' investment decision. The investments depend instead on the expectation over future policies. Thus, the government would be better off if it somehow could commit to its policies. To the extent that policies are costly to change and thus sticky (just as a change of the rules is assumed to be permanent), the government is indeed able to commit. Thus, suppose that the government at time t can set its policies and these will be in place forever.[17]

Taking into account the long-term consequences of its policies, the government realizes that c, x, and α affect the investment levels of the firms. To the extent that the government benefits from economic growth or a higher level of development (i.e., $g > 0$), it may want to reduce c and x and increase α, since each of these changes increases growth.

Proposition 9: If the government can commit to its policies, (i) the optimal choice of regulation-cost c, penalty x, and bureaucrat's power $(1-\alpha)$ are lower than the short-term optimal policies, but (ii) c, x and $(1-\alpha)$ increase in k.

Proof: With commitment to policies, the government's intertemporal utility is:

$$[f(1-\alpha/2)c - e)(c/x) + g]\, K(k,b).$$

[17] Ideally, the government would prefer to commit to time-dependent policies, but these are probably even harder to commit to, as they will hinge on future parameters that may not be verifiable.

The derivatives w.r.t. c, $(-1/x)$ and α becomes:

$$\begin{aligned}
&\left[f(1-\alpha/2)2c/x - e/x\right] K(k,b) + \left(\frac{u_G}{k}\right)\frac{\partial K(k,b)}{\partial c} \\
&\left[ec - f(1-\alpha/2)c^2\right] K(k,b) + \left(\frac{u_G}{k}\right)\frac{\partial K(k,b)}{\partial(-1/x)} \\
&\left[-fc^2/2x\right] K(k,b) + \left(\frac{u_G}{k}\right)\frac{\partial K(k,b)}{\partial \alpha}
\end{aligned} \tag{4.9}$$

where:

$$\begin{aligned}
\frac{\partial K(k,b)}{\partial c} &= \frac{-1+\alpha c/x}{z\delta\left(d+\delta\right)^2} < 0 \\
\frac{\partial K(k,b)}{\partial(-1/x)} &= \frac{-\alpha c^2/2}{z\delta\left(d+\delta\right)^2} < 0 \\
\frac{\partial K(k,b)}{\partial \alpha} &= \frac{c^2/2x}{z\delta\left(d+\delta\right)^2} > 0
\end{aligned}$$

For each of the first-order conditions (4.9), the first bracket is simply the derivative in the no-commitment case (4.8). The second terms take into account the long-run effects on investment and growth, and their signs determine how the choice of policies differ from the no-commitment case. As in the previous subsection, to pin down optimal policies, the derivatives (4.9) could be equalized to marginal costs of adjusting the policies, or the derivatives could be set equal to zero given some boundaries on $c \in [\underline{c}, \overline{c}]$, $x \in [\underline{x}, \overline{x}]$ and $\alpha \in [\underline{\alpha}, \overline{\alpha}]$. In any case: By comparison, when the government can committ to its policies, it prefers lower c and x and a larger α than if the policies are short-term (where the second terms are absent). However, when k increases, K increases and the first term becomes relatively more important, and the second term relatively less important. Thus, when k and thus K are small, it is relatively more important to have small c and x and a large α.

QED

If k is small, such that the economy is not yet developed, then the dynamic effects are very important. In order to encourage growth, the government prefers low regulation costs and small penalties for corruption: harsh penalties increase the bribes and reduce investments. As k grows, however, the dynamic effects are relatively less important and the static, or short-sighted, concerns more so. Then,

the optimal c and x increase, and α decreases to the extent the government can affect these variables.

As in Section 4.2, equilibrium policies are functions of the preference parameters e and f. However, unlike the short-term case, equilibrium policies now also depend the value (g) the government places on income (in the short-run case, k is taken as given). A larger g results in lower c and x and a larger α since the effects on growth become more important.

One special case arises if the government has the same preferences as the bureaucrat ($f = 1$, $e = g = 0$). Then, it prefers a low x and a high c to encourage bribing. To earn high bribes in the future, however, c should be small initially so that firms invest. Once k becomes large, the government raises c in order to gain more bribes. Similarly, the government may set a large α initially so that firms invest. Once k is large, however, the short-term concern dominates and the government prefers making bureaucrats powerful (α small) in order to raise the bribes.

Another special case is when the government is "honest"; i.e., when $f = 0$. Then, it is optimal for the government to set c low to encourage compliance. The equilibrium choice of x balances the gains of having firms complying (more likely if x is large) with the concerns for growth (decreasing in x). As k grows, the short-term concern dominates and so does the penalty, x.

5. Robustness and Extensions

The analysis above is a first attempt of comparing corruption and lobbying and the transition from the former to the latter. Much more research needs to be done, however, as we have relied on a number of simplifying assumptions. This section discusses some of these assumptions and suggests how they might be relaxed.

5.1. Continuous vs Discrete Time

Some assumptions are more technical of nature. For example, while we occassionally talk about "period t", time is assumed to be continuous. A discrete time model may be easier to interpret. Fortunately, all our results survive in a discrete-time version of the model. Assuming continuous time is only due to convenience, since it simplifies the analysis.

5.2. Lobbying Lasts Forever?

The assumed difference between bribing and lobbying is extreme in that while bribing has a temporary effect, lobbying is assumed to relax the rules forever. A more general model would allow the rules to stay in place only a certain number of periods, or let the rules change back to the original form with some positive probability every period. As long as this probability were less than one, the results above would continue to hold. Once the capital level is sufficiently large, firms lobby instead of bribe. New results would emerge, however: The more stable the rules were, the larger the investments would be, and the more likely it is that the firms eventually will start to lobby. While it is straightforward to introduce some stability-parameter (or number of periods before the rules can change again), in a more general model the degree of instability should be related to politicians' possibilities to commit and thus the political system. This deserve a careful study, beyond the scope of this paper. As a first exploration, we find it useful to assume that the government can (commit to) relax the rules forever.

5.3. Imperfect Credit Markets

Lobbying may require a substantial amount of resources by the firms, particularly because it compensates the government once and for all. In our analysis, this caused no problems since the firms simply maximized their intertemporal profit. In reality, firms may face credit constraints making them unable to overcome the cost of lobbying. How would this change the analysis? Suppose the firms could borrow an amount sk for "free" (to an interest rate of one), while additional loans are priced at an interest rate $R > 1$. Such a high interest rate makes lobbying less attractive, particularly when k is small and a lot of borrowing is necessary. As k grows, however, the effective cost of lobbying, $L + R(L - sk)$, decreases since less money needs to be borrowed at the high interest rate. When k is sufficiently large, firms can afford to lobby. Thus, imperfect credit constraints strengthen our results since it then becomes more likely that the cost of lobbying (as a function of k) increases less than the cost of bribing.

5.4. The Number of Firms

Another simplifying assumption is to let there be an infinite number of firms. An earlier version of this paper assumed n firms. With a finite number of firms,

Proposition 4 would no longer hold, since the firms would invest more they approached T, the time when they switch from bribing to lobbying. Specifically, with n firms, each firm would receive $1/n$ of the total surplus of lobbying at time T. Approaching the time of lobbying, T, firm i's investment would increase since the return of investments after T is larger (of which firm i captures $1/n$). As n increases, however, the $1/n$-effect decreases, and so do the investments prior to T. This implies that investments at $t < T$ is smaller if n is larger. Thus, a large number of firms makes lobbying less likely to eventually replace bribes, and if it does, it does so at a later point in time. Note that a larger n makes lobbying less likely because of the larger hold-up problem reduces the incentives to invest, not because of any assumed "collective action" problem. If $n \to \infty$, the $1/n$ effect vanishes and investments do not increase at all when t approaches T. This simplifies the analysis and is our reason for assuming an infinite number of firms.

5.5. Competition and the Market Structure

We have assumed firms to be identical and ignored the market structure: there is no competition between the firms. This allowed us to isolate the difference between a temporary bending and a more permanent change of the rules. In reality, the market structure may also be an important ingredient for firms' decision over whether to lobby or bribe. If, for example, the firms' capital stocks generate a negative externality on the other firms (since prices are depressed), then firms anticipate that this negative externality will be even larger if they collectively lobby, since this would increase aggregate investments. Thus, they may prefer to continue in a bribing equilibrium simply because this limits competition between the firms. This reasoning might be particularly important if the market is open to entry. If relatively few firms have entered the market, they might rationally anticipate that many more firms will enter if they lobby the government to relax the rules permanently. Lobbying would intensify the competition and reduce the firms' profit. Thus, the firms currently in place may choose to not lobby, and instead bribe, just to keep potential firms out of the market. Hence, the bribing equilibrium may remain in place since it functions as a barrier to entry. Later in the development process, however, many more firms may already be present in the market, and the threat of further entry might be relatively smaller. Then, the firms find it more attractive to lobby for a permanent change of the rules, and a switch from bribing to lobbying may occur. This would strengthen the above results.

6. Discussion

Corruption and lobbying are to some extent substitutes. Through lobbying a firm may be able to change existing rules to the firm's advantage. Through bribery a firm may get the bureaucrat to bend the rules and thus avoid the full cost of compliance. However, there are differences and in this paper we have primarily focused on one: The effect of lobbying is more permanent than bribing. We believe this is a realistic starting point. Promises by individual bureaucrats not to ask (or extort) for bribes in the future are not credible because contracts cannot be written (since corruption is an illegal activity) and since firms will deal with different officials over time. And while policy also changes over time, we have in mind larger structural reforms, such as a trade reform, that shift property rights from bureaucrats to firm owners. Such policy reforms are typically more permanent. As an example, of the 111 countries classified as either open or closed (to trade) by Sach and Warner (1995), *no* country that had reformed and thus was classified as open in the early period (1970-1989) was classified as closed in the 1990-1999 period (Wacziarg and Welch, 2003).

The analysis has yielded a number of empirical predictions. While it is beyond the scope of this paper to look at them seriously, it is worth noting that many of the predictions are consistent with existing evidence. For example, our main result of the paper is that firms prefer bribing to lobbying early in the development process but that at a later stages, when firms have invested more, they are more likely to lobby the government. However, since corruption discourages investments, the economy may be trapped in a bribing equilibrium with so little investments that the firms never switch from bribing to lobbying. The steady-state prediction for the cross-country relationship between income (or capital) and corruption is thus a decomposition of countries into two groups: One with high corruption and low investment and income and one with low corruption and high investment and income. As discussed above, this is broadly consistent with the available evidence on corruption and income. More specifically, there is some preliminary evidence, based on firm data from transition countries, that the extent of lobbying increases with income and that firms belonging to a lobby group is significantly less likely to pay bribes (Campos and Giovannoni, 2005). Campos and Giovannoni (2005) also find that in politically less stable countries, firms are more likely to bribe and less likely to join a lobby group. To the extent that the degree of political instability increases the rates of depreciation and discounting, this fact is also consistent with our theory (see also Section 5.5).

The analysis also highlights the role of commitment. In reality, the degree to which governments and/or bureaucrats can commit to the future differs across countries for various institutional and historical reasons. According to the model, this variation will affect firms' incentives to lobby and bribe. For example, the hold-up problem will be much less severe if the bureaucracy is coordinated and can commit to not ask for higher bribes when a firm's willingness to pay increases (i.e., when k increases). In this case, high growth and bribery can go hand-in-hand as some suggest is the situation in China, for example.

Introducing the government, and thus making the cost of lobbying endogenous, yields additional predictions. For example, while our model does not address why firms are regulated in the first place, it has predictions on the evolution (or liberalization) of the regulatory framework over time. Specifically, it suggests that the regulatory framework tends to be more "efficient" over time. At least this is the case if the economic, political, and institutional environment is such that firms have strong incentives to invest. To exemplify, consider two types of regulations: one put in place out of public interest, for example out of health or environmental concerns, and one instituted to provide bureacrats with the power to demand bribes. Proposition 7 then tells us that firms over time are more likely and at an earlier point in time to lobby for the removal of the "bad" regulations while the "good" regulations are less likely to be relaxed. At least with respect to the regulation of trade, this prediction is consistent with available evidence. For example, in the 1970-1989 period, 70 percent of the countries classified by Sach and Warner (1995) were closed. In the 1990-1999 period, this number has fallen to below 30 percent (Wacziarg and Welch, 2003).

Apart from the the cross-country predictions, the theory has also cross-sectional implications. If the firm's (or industry's) activity is viewed negatively, because of negative externalities in production (such as pollution), or because the output in itself is viewed as bad (such as production of illegal drugs), then the cost of lobbying is higher and it is less likely that the firms in the industry will ever lobby the government to relax the regulation. Even in the long run, firms in such an industry will resort to corruption to influence the regulatory environment. However, if the government benefits from the firm's activity, for example due to some positive production externality, then the cost of lobbying is low. As a result, firms would be more likely to lobby and do it early. Our model also suggests that the size of an industry is a predictor of when and if firms switch from bribing to lobbying. Of course, k is endogenous in the model, so simple cross-sectional estimates of the size of an industry and the extent of bribing cannot be used to

test this prediction. Fortunately, our model identifies a set of variables that only affects equilibrium bribes through their effect on k; i.e., the model identifies a set of instrument variables that can be used to test this and other predictions of the model.

The results of the paper show how the evolution from bribing to corruption hinges upon parameters related to the economy and the political environment. Tough penalties on corruption, for example, may not be a good thing, since they lead to larger bribes and thus lower investments. This is particular the case if the cost of compliance is large and in early phases of development (when capital accumulation is relatively more important). To the extent that poor countries regulate business more than rich countries, as suggested in Djankov et al. (2002), both these results suggest that the penalty of corruption should be low in poor countries.

In general, the goverment has access to several instruments to compensate bureaucrats, enforce policy and fine offenders and, depending on what instrument is used, the outcome will be affected. This motivates our study of the government's optimal policies, whether the regulation is in place to raise money or to regulate the market. Generally, we find that equilibrium penalty and amount of regulation increase in the stage of development.

This paper is only a first attempt to compare bribing and lobbying as alternative influence-seeking activities. Future research should further explore how the equilibrium regime depends on the market structure and the environment more generally. This is necessary not only to understand large cross-country variations in corruption and lobbying activities, but also in order to derive policies that mitigates costly rent-seeking activities.

References

[1] Aghion, P., R. Burgess, S. Redding, and F. Zilibotti, 2005, "Entry Liberalization and Inequality in Industrial Performance", *Journal of the European Economic Association*, 3 (2-3), pp. 291-302.

[2] Alesina, A., and A. Drazen, 1991, "Why are stabilizations delayed?", *American Economic Review* 81, 1170-88.

[3] Austen-Smith, 1997, "Interest groups: Money, information, and influence", in D. C. Mueller (ed.), *Perspectives on Public Choice*, Cambridge University Press: New York.

[4] Bardhan, P., 1997, "Corruption and Development: A Review of Issues", *Journal of Economic Literature*, 35, pp. 1320–46.

[5] Becker, G. and G. Stigler, 1974, "Law Enforcement, Malfeasance and the Compensation of Enforcers", *Journal of Legal Studies*, 3:1, pp. 1-19.

[6] Boycko, M., A. Shleifer and R. Vishny, 1995, *Privatizing Russia*, Cambridge, MA: MIT Press.

[7] Brainard, S. L. and T. Verdier, Thierry, 1997, "The political economy of declining industries: Senescent industry collapse revisited", *Journal of International Economics*, 42(1-2), pp. 221-237.

[8] Campos, N. and F. Giovannoni, 2005, "Lobbying, Corruption and Political Influence in Transition Countries", mimeo.

[9] Choi, J. P. and M. P. Thum, 1998, "The Economics of Repeated Extortion", Columbia University Working Paper No. 9899-03.

[10] Coate, S. and S. Morris, 1999, "Policy persistence", *American Economic Review*, 89 (5), pp. 1327–1336.

[11] De Soto, H., 1989, *The Other Path*, New York: Harper and Row.

[12] Djankov, S., R. La Porta, F. Lopez-De-Silanes and A. Shleifer, 2002, "The Regulation of Entry", *Quarterly Journal of Economics*, 117:1, pp. 1-37.

[13] Fernandez, R. and D. Rodrik, 1991, "Resistance to reform: Status quo bias in the presence of individual specific uncertainty", *American Economic Review* 81, 1146-55.

[14] Glaeser, E. L., R. LaPorta, F. Lopes-de-Silanes and A. Shleifer. "Do Institutions Cause Growth?". *Journal of Economic Growth* 9(3): 271-303.

[15] Grossman, G. and E. Helpman, 1994, "Protection for sale", *American Economic Review*, 84(4), pp. 833–850.

[16] Grossman, G. and E. Helpman, 2002, *Special Interest Politics*, Cambridge, MA: MIT Press.

[17] Lipset, S. 1960. *Political Man: The Social Basis of Politics.* New York: Doubleday & Company.

[18] Olson, M, 1965, *The Logic of Collective Action.* Harvard University Press, Cambridge.

[19] Rose-Ackerman, S., 1975, "The Economics of Corruption", *Journal of Public Economics*, 4:187-203.

[20] Rose-Ackerman, S., 1978, *Corruption: A Study in Political Economy*, New York: Academic Press.

[21] Sachs, J. D. and A. Warner, 1995, "Economic Reform and the Process of Global Integration", *Brookings Papers on Economic Activity*, no. 1, pp. 1-118.

[22] Schulze, G., Ursprung, H., 2001, "The political economy of international trade and the environment", in Schulze, G., Ursprung, H. (Eds.), *International Environmental Economics: A Survey of the Issues*, Oxford University Press, Oxford.

[23] Shleifer, A. and R. Vishny, 1993, "Corruption", *Quarterly Journal of Economics*, 108:3, pp. 599-617.

[24] Svensson, J., 2003, "Who Must Pay Bribes and How Much?" *Quarterly Journal of Economics*, 118:1, pp. 207-30.

[25] Svensson, J., 2005, "Eight Questions about Corruption", *Journal of Economic Perspectives*, 19 (5): 19-42.

[26] Wacziarg, R, and K. H. Welch, 2003, "Trade Liberalization and Growth: New Evidence", NBER Working Paper #10152.

[27] Wade, R., 1982, "The System of Administrative and Political Corruption: Canal Irrigation in South India", *Journal of Development Studies*, 18, pp. 287-328.

[28] World Bank, 1998, New Frontiers in Diagnosing and Combating Corruption, PREM notes No. 7, Washington DC, World Bank