Foreign Entry Deterrence by the Dominant Local Firm in the Existence of a Rent-Seeking Bureaucracy

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Abstract

In this paper the authors examine the relationship between local corruption and multinational investment. They construct a model of regulatory capture that highlights the interaction between a corrupt regulator, a local dominant firm and a multinational firm. The model suggests that entry by a multinational could have a variety of effects or corruption, both positive and negative. These include: decreasing corruption and regulatory distortion by reducing available rents and diluting incentives for paying bribes; increasing corruption and regulatory distortion by creating "competition" for regulatory bias; and increasing corruption while reducing distortion through dissipative competition for the regulator.

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1 Introduction

This paper examines a model of regulatory capture that highlights the interaction between a corrupt regulator, a local dominant firm and a multinational firm. We argue that studying corruption in the presence of multinational investment is important for at least three reasons:

First, while foreign direct investment (FDI) flows have the potential to make significant contributions to economic and social development, there exist widespread perception and anecdotal evidence that these flows are often restricted by corrupt practices of local or national government officials in different countries around the globe. In effect corruption is considered as a barrier to entry by multinational corporations (MNCs) into new markets. However, there is a distinct possibility that MNCs as the leading players in the international business arena may also choose to influence the local authorities. As long as their national governments turn a blind eye and thus the company can wash its hands clean after a corrupt dealing, corruption in the host country may very well increase the likelihood of foreign direct investment[1].

Driven by the quest for profits, typical MNCs evaluate alternative locations for their production facilities abroad. Their decisions largely depend on the investment climates in these locations and have important implications for productivity, employment, poverty and growth in each location. The investment climate is defined as the set of location specific factors shaping the opportunities and incentives for firms to invest productively, create jobs, and expand (World Development Report 2005).

Governments have not much to do with the geographical and market size aspects of the investment climate. However, they can exert a strong (positive/negative) influence on costs, risks and barriers to competition. Besides, firms are not blind to the gaps between formal rules and what happens in practice. In a way, it is inevitable that firms will try to (legally or illegally) influence policies in ways favorable to them. Thus, the interaction of formal policies and governance has a paramount importance in the investment climate assessment of firms and hence their strategic actions with one another and with the government.

Therefore, analyzing complex strategic actions of multinational firms, local incumbents and domestic bureaucracies and consequences of these actions might prove to be valuable especially after considering the growth in the relative importance of MNCs in recent decades. About one quarter of world trade is intra-firm; for U.S. trade, it is above one third. About 80 percent of U.S. exports are connected to MNCs. A widely used measure of the scope

[1] Egger and Winner (2005) find a clear positive relationship between corruption and inward FDI for a sample of 73 developed and less developed countries and the time period 1995-1999.

of multinational activity is flows of foreign direct investment (FDI). The average annual growth rate of FDI flows over the last 15 years exceeds 17 percent. In contrast, world trade has expanded by about seven percent and world output has risen about 4.8 percent on average over this time period (UNCTAD, World Investment Report 2005 and earlier years).

Second, prevention of corruption, improvement of governance and creation of good investment climates around the globe are all high priority international goals nowadays. In a world where advanced communications make information accessible at a very fast speed and a low cost, economic agents all over the world -private and public alike- have become increasingly aware of costs (to the society) and sometimes benefits (to the parties involved) of corrupt dealings. Hence, in the last decade, corruption has become an eminent item on the agenda of many international institutions. According to the OECD Convention of Combating Bribery of Foreign Public Officials in International Business Transactions, which was signed in 1997, and went into effect in 1999, bribery of foreign officials by firms from member countries is a crime. The UN Convention against Corruption, adopted in Mexico in December 2003 and went in force in 2005, is the first global instrument embracing a comprehensive range of anti-corruption measures to be taken at the national level.

These attempts led by the United States to level the playing field represent an enormous step towards global anti-bribery standards. Motivated by the argument that companies of its closest allies have long benefited at the expense of American business in the aftermath of the passing of the Foreign Corrupt Practices Act (FCPA) in 1977, the United States diligently worked for the accession of these new international measures towards anti-bribery. Yet, less than a handful of the 36 countries that have ratified the OECD's anti-corruption convention have undertaken any investigations or prosecutions.

The Convention defines *a corrupt act* as any inducement to a foreign public official to act or refrain from acting in order to obtain or retain business or other improper advantage. The *level of corruption* has two dimensions: The frequency of corrupt undertakings and the total value of bribes paid -or the magnitude of influences traded- which go hand in hand, i.e. in countries where bribery is the rule of the game more than a trifling proportion of firm revenues tend to represent the bribes paid. The investment climate surveys of World Bank show that majority of firms in developing countries expect to pay bribes. 43.1% of firms in Central and Eastern Europe, 50% in Sub-Saharan Africa, 68.8% in Latin America and the Caribbean, and 74.2% in South Asia reported bribes and the bribes as a share of their sales was reported to be 2.8%, 5.2%, 7% and 3.2%, respectively (World Development Report 2005, Table 2.1).

There is indeed a plethora of anecdotal evidence pointing out how commonly bribes are

used in international business affairs. It is reported that a "healthy" number of companies have admitted paying bribes under a new World Bank disclosure program. In certain jurisdictions companies were paying bribes in order to get a contract, to get a contract amended and even to get paid. (Reuters, August 31, 2006). In the last two years the United States Securities Exchange Commission and the Department of Justice, found a number of multinational corporations guilty of bribery to achieve a number of different outcomes using diverse strategies[2].

Last but not least, research on corruption is conducted mainly to address politics, public administration, law and judiciary. The literature on the effects of corruption on foreign direct investment decisions is at its infancy and mostly empirical. There is indeed a paucity of theoretical work on determinants, mechanisms, and consequences of the strategic interaction among a potential foreign entrant, local incumbents and a rent-seeking regulator. Different elements of this paper has been the subject-matter of well-established literature such as entry deterrence, regulatory capture, corruption and FDI. In the next section we present a brief survey of these literature and discuss what features we borrow from them and in what ways we extend some.

In this paper, we build a three player game between a corrupt regulator, a local dominant firm and a multinational firm. The firms first choose bribes for the regulator that are functions of their eventual profits. Given these bribes, the regulator chooses a regulatory variable by maximizing over an objective function of consumer welfare and the firm profits that is skewed in favor of the firms, according to their contributions.

[2] "Diagnostic Products Corporation: $4.8 million (May 2005): Diagnostic Products Corporation ("DPC") and its wholly owned Chinese subsidiary, DPC (Tianjin) Co. Ltd. ("DPC Tianjin") agreed to resolve its potential liability with the SEC and DOJ regarding violations of the FCPA. DPC reached an agreement with the SEC to disgorge $2.8 million in net profit earned in China for the period of its alleged misconduct, plus prejudgment interest. DPC Tianjin separately pled guilty to DOJ charges and agreed to pay an additional criminal penalty of $2 million. DPC, through DPC Tianjin, allegedly made illicit payments of approximately $1.6 million to doctors and laboratory staff in China to induce them to purchase DPC products.

Titan Corporation: $13 million (March 2005): The Titan Corporation ("Titan") pled guilty to violating the FCPA and agreed to pay a criminal fine of $13 million. Titan is a California-based military intelligence and communications company. It reportedly paid more than $2 million in illicit payments to officials in the African nation of Benin towards the election campaign of Benin's then-incumbent President, in exchange for preferential treatment for projects in Benin.

InVision Technologies: $800,000 (December 2004): InVision Technologies, Inc. ("InVision") agreed to pay a penalty of $800,000 to the United States for violating the FCPA. InVision is a California-based public company that sells airport security screening products. Investigations by the DOJ and the SEC revealed that InVision was aware that its agents and distributors in Thailand, China and the Philippines had paid or offered to pay money to foreign officials to increase the sales of its products." (Mondaq, August 19, 2006).

We consider two major cases. In the first case, the regulation in question is anti-competitive, but is not biased against the multinational firm. In this case bribes are strategic substitutes for the two dominant firms — each firm's bribe is decreasing in the level of the other's bribe. In the second case regulation is biased in favor of the local firm so that the multinational firm pays a bribe in order to reduce the level of protectionist regulation. In this case bribes may be strategic complements or substitutes.

Our preliminary analysis shows that the presence of the multinational could have a variety of effects. In the former case, these include a reduction in corruption due to decreased rents and a corresponding decrease in the ability and desire to subvert the regulator. In the latter case an increase in competition for the regulator's attentions could result in a higher level of distortional corruption as one party or the other bids to "win" the regulator to their side, or an increase in relatively benign dissipative corruption where each side bids to maintain the regulator's neutrality.

The paper proceeds as follows. Section 2 presents the background focusing on the relevant parts of entry deterrence, regulatory capture, corruption and FDI literatures. Section 3 introduces the model focusing on two cases in a static setting. The last section presents concluding remarks and directions for future work.

2 Background

There are four strands of literature that are relevant to our analysis. The *first* one is the literature on foreign direct investment, too vast to be addressed here at length (Markusen (2002), Feenstra (2003 Chapter 11) and citations therein). The *second* line of literature relevant for the proposed research considers the causes and consequences of corruption in general. There is a voluminous theoretical literature on corruption. An excellent recent survey of this literature is provided by Jain (2001). The work spans many different areas such as the impact of corruption on regulatory discretion, existence of rents and opportunities for rent-seeking, and civil service wage policy.[3] There are also studies that consider the impact of corruption on various aspects of economic systems such as growth, military expenditure and procurement, delivery of public services, and inequality.[4]

[3] For the impact of corruption on regulatory discretion see Kaufmann and Siegelbaum (1997), Johnson, Kaufmann and Ziodo-Laboton (1999). For the existence of rents and opportunities for rent-seeking see Mixon et al (1994), Ades and DiTella (1997b), Goel and Nelson (1998), Jain and Titiroglu (2000). For civil service wage policy see Van Rijckeghem and Weder (1997).

[4] For the impact of corruption on growth see Mauro (1995), Ades and DiTella (1997a), Johnson et al (1997), Tanzi and Davoodi (1997), on military expenditure and procurement see Naylor (1998), Gupta et al

The natural approach of the economist to corruption control is to reduce the imperfect competition to get rid of the economic rents which sustain the existence of bribery (Rose-Ackerman, 1978). However, Bliss and Di Tella (1997) argue that competition is not necessarily an exogenous parameter to be varied to see how corruption is affected. They show that even in the existence of perfect competition, at the expense of the exiting firms corruption generates its own surplus. They define two types of corruption: (i) Cost-reducing (The corrupt regulator can reduce the costs for the producer in return for corrupt payments.) and (ii) surplus shifting (If there are surpluses in production, it is better to let corrupt regulator to take part of it rather than losing it all.) In our model the corruption is the second kind and part of the firm profits are captured by the regulator in return for favors made.

Lately corruption and its impact on FDI have brought forth a wide range of ideas in which the two may be related. A unanimous majority in the literature does lean towards the idea that corruption and FDI are not entirely unrelated. However, there is a considerable amount of disagreement in how these two are related. Wei (2000) examines a panel of bilateral FDI stocks from 12 source countries to 45 host countries and finds a statistically significant impact of host country corruption on inward FDI. Likewise, Wei (1997) shows that uncertainty in corruption levels negatively affects the inward FDI. Aizenman and Spiegel (2002) posit that domestic agents have a comparative advantage over foreign agents in overcoming some of the obstacles associated with corruption and weak institutions and suggest that corruption discourages FDI more severely than it does domestic investment. See also Habib and Zurawicki (2002) who analyze the relation between corruption and FDI in a cross-section of 89 countries and find that corruption acts as an impediment for FDI.

Egger and Winner (2006) propose a different aspect of the FDI and corruption relationship by suggesting that corruption may cause increases in both the revenues and the costs of the firm. They find a negative relationship between bilateral stocks of outward FDI and corruption, which implies that the cost effects tend to dominate the revenue effects. They find this negative relationship between FDI and corruption to be more prominent in developed economies as compared to less developed economies. In contrast, Hines (1995) finds no considerable impact of corruption on overall inward FDI in host countries. He investigates the effects of the Foreign Practices Act of 1977 on subsequent FDI growth in host countries originating in the United States. His study shows that the Act puts US firms at a competitive disadvantage in corrupt countries. In these countries FDI flows originating in the US were found to be significantly lower than those in the non-corrupt countries

(2000b), on delivery of public services see Gupta et al (2000a), and on inequality see Gupta et al (1998).

following the Act's passage.

In short, there are indeed a few mostly empirical studies and the provided evidence is mixed. The literature on corruption and FDI connection is slender and even more so on the theoretical front. One of the contributions of our paper is to fill this gap in the literature by offering a theoretical analysis that takes into consideration not just how corruption may restrict FDI flows, but also how corruption may facilitate them.

The *third* line of literature relevant to our work is the one about regulatory capture. When regulating, governments face a basic tension between firm preferences and public interest and at a lower echelon a tension between preferences of different firms. For example, most firms would enjoy monopolies to increase their profits and to reduce the pressure of inventing, which is clearly against the public interest. If the government starts discussing reducing barriers to competition, the proposal will surely be resisted by the incumbents and supported by outsider firms and consumers (if they are organized). In this scenario, "the government intervenes to redress [a] market failure, and corruption emerges as an unpleasant side effect of necessary intervention" (Acemoglu and Verdier, 2000, p.196). This view is more in line with Pigou's (1938) public interest theory of regulation.

Stigler (1971) in his theory of regulatory capture argues that the regulation of entry keeps out the new entrants rand raises incumbents' profits. It ultimately leads to greater market power and profits rather than benefits to consumers. De Soto (1990), on the other hand claim that politicians use regulation both to create rents and to extract them through campaign contributions, votes, and bribes. Both of these views address rent creation and extraction through the political process. The former underlines the benefits to the industry, while the latter focuses on the benefits to the politicians even when the industry is left worse off by regulation.

On the empirical front Djankov et.al. (2002) present new data on the regulation of entry of start-up firms in 85 countries. Their data cover the number of procedures, official time, and official cost that a start-up must bear before it can operate legally. They find that countries with heavier regulation of entry have higher corruption and larger unofficial economies, but not better quality of public or private goods. Evidence supplied by Djankov et.al is inconsistent with public interest theories of regulation, but supports the regulatory capture view that entry regulation benefits politicians and bureaucrats.

Based on the Business Environment and Enterprise Performance Survey of firms in transition economies Hellman et.al. (2002) find that foreign firms magnify the problems of state capture and procurement kickbacks, while paying a lower overall bribe burden than domestic firms. They also indicate that different types of foreign investors engage in

particular types of corruption tailored for their specific needs.

In our model, we will stay agnostic about what kind of favors are provided by the regulator in return for a share of profits. Later on, we will supply case studies for different direct and indirect competition reducing strategies. An example of a direct competition reducing strategy can be putting a limit to the entry of new firms and charging a bribe from the incumbents. On the other hand, the rent-seeking bureaucrat in charge of enforcing the level of pollution, for example, may allow a different level in exchange for a bribe and hence indirectly hinder competition in that sector.

The *last* strand of literature relevant to our work is the strategic models of entry deterrence. Wilson (1991) provides an excellent survey of this voluminous literature and categorizes these models into three classes: (i) Preemption models stand on the existence of costly irreversible investments which provide entry deterring commitment and thus enhance incumbents' competitive strength. (ii) Signaling models explain how an incumbent firm credibly communicates that discourages entry sometimes via limit pricing and sometimes via attrition. (iii) Predation models involve battling a current entrant to deter subsequent entry by intimidation and sustaining a vicious reputation.

Preemption and predation models are more relevant for the purpose of the current paper. A capital intensive firm, for example, can induce its rivals to exit the industry by lobbying for higher wages and thus raising their labor-intensive rivals' costs. Product standards and other anti-competitive government regulations can effectively raise rivals' relative compliance costs and force them to exit. The term government assisted predation coined by Miller and Pautler (1985) is defined as the use of the coercive powers of government by incumbent firms in their favor against their rivals.

3 Model

In this section we present a general framework for studying how two dominant firms — a local dominant firm and a multinational — would interact in the presence of a corrupt regulator. We assume a model of regulatory capture, where a relatively benign regulator sets a regulation that is potentially beneficial to consumers, but is bribed in order to shift her preferences toward profit and away from consumer welfare.

In this preliminary model, we focus on two stages. In the first stage, a local dominant firm (D) and a multi-national firm M choose bribes $b_i \in [0,1]$, $i \in \{D, M\}$ for the local regulator R. These bribes are fractions of gross profit. In the second stage, given the bribes, the regulator chooses a regulatory action k, where the possible k are given by a

finite segment of real numbers $[0, \bar{k}]$. We consider two cases, one where the regulation affects the firms symmetrically and the other where regulations are given a local bias, and hurt the multi-national firm.

In an (hypothetical, at this point) final stage the firms compete in the market using actions x_i. We assume that there are well defined best response functions and that there is a unique and stable Nash equilibrium that depend smoothly on k, actions $x_i^*(k)$. This yields profits as functions of k $\pi_i^*(k)$. We remain agnostic as to the exact nature of the regulator's action and the actions of the firms. Generally these actions will either be price or quantity but could be location or quality or anything else.

Gross profits are given by $\pi_i(k)$. Profits net of bribes are $U_D = (1 - b_D)\pi_D(k)$ for the local firm and $U_M = (1 - b_M)\pi_M(k) - P(b_M)$ for the multinational, where $P(b_M)$ is a reputational cost for the multi-national of paying a bribe.

It will be convenient to assume that consumer surplus is concave in the regulator's action k and is decreasing for at least some finite k. This is consistent, for example, with the imposition of minimum quality standards. For relatively low standards, consumers may benefit from increased regulation if the increased standard does not create a high barrier to entry. However, as standards increase, the number of firms able to supply the good will fall more rapidly, and the decrease in competition may start to have a greater effect than any increase in quality.

The regulator's payoff function is a weighted sum of profits and consumer surplus:

$$U_R = (\lambda_D b_D + 1)\pi_D(k) + (\lambda_M b_M + 1)\pi_M(k) + CS(k)$$

Note that the λ_i measures the marginal utility of firm i's bribe (effectively, how willing the regulator is to be subverted by each firm). We assume that there is some unique and locally stable $k^*(b)$ that is smooth and finite over $b \in [0, 1]$.

We restrict our attention to sub-game perfect equilibria.

3.1 Industry Wide Case (Symmetric Treatment)

In this case, the action of the regulator is anti-competitive in ways that suppresses competition from smaller, fringe firms, either through labor or quality standards, environmental regulations or other scale economy restrictions. These regulations should help both the local dominant firm (D) and the multinational firm (M), so that their profits are increasing

in the regulator's action k. We also assume that k's effect on profit is diminishing:

$$\frac{\partial \pi_i(k)}{\partial k} > 0, \quad \text{and}$$
$$\frac{\partial^2 \pi_i(k)}{\partial k^2} < 0$$

for all i, $i \in \{D, M\}$.

Given the proposed bribes, the first order condition for the regulator is:

$$\frac{\partial U_R}{\partial k} = (\lambda_D b_D + 1) \underbrace{\frac{\partial \pi_D}{\partial k}}_{+} + (\lambda_M b_M + 1) \underbrace{\frac{\partial \pi_M}{\partial k}}_{+} + \frac{\partial CS(k)}{\partial k} = 0$$

Note that the last term must be negative at an interior equilibrium, given that the first two are positive.

The second order condition is negative by assumption on the shape of profit and consumer surplus:

$$soc_k = \frac{\partial^2 U_R}{\partial k^2} = (\lambda_D b_D + 1) \underbrace{\frac{\partial^2 \pi_D}{\partial k^2}}_{-} + (\lambda_M b_M + 1) \underbrace{\frac{\partial^2 \pi_M}{\partial k^2}}_{-} + \underbrace{\frac{\partial^2 CS(k)}{\partial k^2}}_{-} < 0.$$

For an interior solution to k, if a firm increases its bribe to the regulator then the optimal level of k increases:

$$\frac{\partial k^*(b)}{\partial b_i} = \lambda_i \frac{\partial \pi_i}{\partial k} \frac{1}{-soc_k} > 0. \tag{1}$$

This effect is decreasing both in own bribe and the other firm's bribe:

$$\frac{\partial^2 k^*(b)}{\partial b_i^2} = \lambda_i^2 \frac{\partial \pi_i}{\partial k} \frac{\partial^2 \pi_i}{\partial k^2} \frac{1}{(-soc_k)^2} < 0,$$
$$\frac{\partial^2 k^*(b)}{\partial b_i \partial b_j} = \lambda_i \lambda_j \frac{\partial \pi_i}{\partial k} \frac{\partial^2 \pi_j}{\partial k^2} \frac{1}{(-soc_k)^2} < 0.$$

3.1.1 The Firms

Firm i's first order condition is:

$$\frac{\partial \pi_i}{\partial b_i} = -\pi_i(k^*(b)) + (1 - b_i) \left(\frac{\partial \pi_i}{\partial k} \frac{\partial k}{\partial b_i} \right) = 0.$$

Substituting in 1 from above yields:

$$\frac{\partial \pi_i}{\partial b_i} = -\pi_i(k^*(b)) + (1 - b_i) \lambda_i \left(\frac{\partial \pi_i}{\partial k} \right)^2 \frac{1}{-soc_k}$$

Each firm is willing to pay a positive bribe as long as the regulator cares enough about the firm's bribe (λ_i) and profit is effected strongly by k.

The second order conditions are:

$$\frac{\partial^2 \pi_i}{\partial b_i^2} = \overbrace{-2\left(\frac{\partial \pi_i}{\partial k}\frac{\partial k}{\partial b_i}\right)}^{-} + (1-b_i)\left(\underbrace{\frac{\partial \pi_i}{\partial k}}_{+}\underbrace{\frac{\partial^2 k}{\partial b_i^2}}_{-} + \underbrace{\frac{\partial^2 \pi_i}{\partial k^2}}_{-}\underbrace{\left(\frac{\partial k}{\partial b_i}\right)^2}_{+}\right) < 0$$

In the industry case where marginal effects are positive, the second order condition is negative.

The cross partial is:

$$\frac{\partial^2 \pi_i}{\partial b_i \partial b_j} = \overbrace{-\left(\frac{\partial \pi_i}{\partial k}\frac{\partial k}{\partial b_j}\right)}^{-} + (1-b_i)\left(\underbrace{\frac{\partial \pi_i}{\partial k}}_{+}\underbrace{\frac{\partial^2 k}{\partial b_i \partial b_j}}_{-} + \underbrace{\frac{\partial^2 \pi_i}{\partial k^2}}_{-}\underbrace{\frac{\partial k}{\partial b_i}\frac{\partial k}{\partial b_j}}_{+}\right) < 0$$

From the IFT, we have:

$$\frac{\partial b_i}{\partial b_j} = \frac{\partial^2 \pi_i}{\partial b_i \partial b_j}\frac{1}{-soc_{b_i}} < 0$$

Not surprisingly, in the the case where both firms benefit from the regulation, an increase one firm's bribe will decrease the other firm's bribe.

3.1.2 Example

As a stylized example, suppose that the local and multinational firms act as dominant firms relative to a competitive fringe (f). The regulator sets quality requirements that translate into increases in fixed costs for all firms. We assume marginal costs $2c_f q > 2c_D q > 2c_M q$.

Because there is free entry in the fringe firms, the market price is determined by the minimum average cost of the fringe firms. From $\pi_f = pq_f - c_f q_f^2 - F$, the minimum average cost yields a price $p = 2\sqrt{c_f F}$. Assuming that F is not high enough to eliminate the fringe, the dominant firms have gross profits $\pi_i = F\left(\frac{c_f}{c_i} - 1\right)$.

Note that for any F we need the demand at p, $D(2\sqrt{c_f F})$ to be larger than the sum of the dominant firm's output at the point where their marginal costs hit p. Demand is decreasing in price (and fixed costs) but is increasing function of quality (and therefore fixed costs). We use a stylized consumer surplus function $AF(1-F)$ to capture the idea that small increases in F will benefit consumers, but with larger F the price effect of F dominants.

3.2 D only

In this case, we assume asymmetry in the effect of the regulator's action: it is positive for the local dominant firm and negative for the multi-national. We also assume that the

positive effect is diminishing and the negative effect increasing (in magnitude).

$$\begin{aligned}
\frac{\partial \pi_D(k)}{\partial k} &> 0, \quad \text{and} \\
\frac{\partial^2 \pi_D(k)}{\partial k^2} &< 0 \\
\frac{\partial \pi_M(k)}{\partial k} &< 0, \quad \text{and} \\
\frac{\partial^2 \pi_i(k)}{\partial k^2} &< 0
\end{aligned}$$

The first order condition for the regulator is now:

$$\frac{\partial U_R}{\partial k} = (\lambda_D b_D + 1) \underbrace{\frac{\partial \pi_D}{\partial k}}_{+} + (\lambda_M b_M + 1) \underbrace{\frac{\partial \pi_M}{\partial k}}_{-} + \underbrace{\frac{\partial CS(k)}{\partial k}}_{?} = 0$$

We assume that there is some unique and locally stable $k^*(b)$.

The second order condition is:

$$\frac{\partial^2 U_R}{\partial k^2} = (\lambda_D b_D + 1) \underbrace{\frac{\partial^2 \pi_D}{\partial k^2}}_{-} + (\lambda_M b_M + 1) \underbrace{\frac{\partial^2 \pi_M}{\partial k^2}}_{-} + \underbrace{\frac{\partial^2 CS(k)}{\partial k^2}}_{-} < 0$$

If the dominant firm pays a bribe to the regulator it will tend to increase the level of k as before. But now if the multinational firm pays a bribe it will tend to decrease the level of k,

$$\frac{\partial k^*(b)}{\partial b_M} = \lambda_M \frac{\partial \pi_M}{\partial k} \frac{1}{-soc_k} < 0.$$

The magnitude of this effect is again decreasing for both bribes:

$$\frac{\partial^2 k^*(b)}{\partial b_D^2} = \lambda_D^2 \frac{\partial \pi_D}{\partial k} \frac{\partial^2 \pi_D}{\partial k^2} \frac{1}{(-soc_k)^2} < 0,$$

and

$$\frac{\partial^2 k^*(b)}{\partial b_M^2} = \lambda_M^2 \frac{\partial \pi_M}{\partial k} \frac{\partial^2 \pi_M}{\partial k^2} \frac{1}{(-soc_k)^2} > 0.$$

Note that because k is decreasing in b_M, the positive second derivative means that the magnitude of the effect of increasing b_M on k is decreasing.

Finally, the cross effect of b_M on $\frac{\partial k^*(b)}{\partial b_D}$ will be negative. An increase in the multinational's bribe will decrease the marginal effect of the local firm's bribe:

$$\frac{\partial^2 k^*(b)}{\partial b_D \partial b_M} = \lambda_D \lambda_M \frac{\partial \pi_D}{\partial k} \frac{\partial^2 \pi_M}{\partial k^2} \frac{1}{(-soc_k)^2} < 0.$$

Conversely, an increase in the local firm's bribe will increase the effect of the multinational firm's bribe:

$$\frac{\partial^2 k^*(b)}{\partial b_M \partial b_D} = \lambda_D \lambda_M \frac{\partial \pi_M}{\partial k} \frac{\partial^2 \pi_D}{\partial k^2} \frac{1}{(-soc_k)^2} > 0.$$

Both of these effects follow from the declining marginal benefit of the regulator's actions on the firms' profits. They are simply moving in opposite directions.

Firm i's first order condition is still the same:

$$\frac{\partial \pi_i}{\partial b_i} = -\pi_i(k) + (1 - b_i)\left(\frac{\partial \pi_i}{\partial k}\frac{\partial k}{\partial b_i}\right)$$

Or, substituting in from above,

$$\frac{\partial \pi_i}{\partial b_i} = -\pi_i(k) + (1 - b_i)\lambda_i \left(\frac{\partial \pi_i}{\partial k}\right)^2 \frac{1}{-soc_k}$$

Again, the firm is willing to pay a positive bribe as long as the regulator cares enough about the multi-national's bribe and profit is effected strongly by k.

The second order conditions are, for the dominant firm:

$$\frac{\partial^2 \pi_D}{\partial b_D^2} = \overbrace{-\left(\frac{\partial \pi_D}{\partial k}\frac{\partial k}{\partial b_D}\right)}^{-} + (1 - b_D)\left(\underbrace{\frac{\partial \pi_D}{\partial k}}_{+}\underbrace{\frac{\partial^2 k}{\partial b_D^2}}_{-} + \underbrace{\frac{\partial^2 \pi_D}{\partial k^2}}_{-}\underbrace{\left(\frac{\partial k}{\partial b_D}\right)^2}_{+}\right) < 0,$$

and for the multi-national firm,

$$\frac{\partial^2 \pi_M}{\partial b_M^2} = \overbrace{-\left(\frac{\partial \pi_M}{\partial k}\frac{\partial k}{\partial b_M}\right)}^{-} + (1 - b_M)\left(\underbrace{\frac{\partial \pi_M}{\partial k}}_{-}\underbrace{\frac{\partial^2 k}{\partial b_M^2}}_{+} + \underbrace{\frac{\partial^2 \pi_M}{\partial k^2}}_{-}\underbrace{\left(\frac{\partial k}{\partial b_M}\right)^2}_{+}\right) < 0.$$

What we are interesting in is how the two bribes interact.

From the IFT, we have:

$$\frac{\partial b_D}{\partial b_M} = \overbrace{-\underbrace{\frac{\partial \pi_D}{\partial k}}_{+}\underbrace{\frac{\partial k}{\partial b_M}}_{-}}^{+} + \underbrace{(1 - b_D)}_{+}\underbrace{\left(\overbrace{\underbrace{\frac{\partial \pi_D}{\partial k}}_{+}\underbrace{\frac{\partial^2 k}{\partial b_D \partial b_M}}_{-}}^{-} + \overbrace{\underbrace{\frac{\partial^2 \pi_D}{\partial k^2}}_{-}\underbrace{\frac{\partial k}{\partial b_D}}_{+}\underbrace{\frac{\partial k}{\partial b_M}}_{-}}^{+}\right)}_{?}\frac{1}{-soc_{b_D}} ?0$$

$$\frac{\partial b_M}{\partial b_D} = \overbrace{-\underbrace{\frac{\partial \pi_M}{\partial k}}_{-}\underbrace{\frac{\partial k}{\partial b_D}}_{+}}^{+} + \underbrace{(1 - b_M)}_{+}\underbrace{\left(\overbrace{\underbrace{\frac{\partial \pi_M}{\partial k}}_{-}\underbrace{\frac{\partial^2 k}{\partial b_M \partial b_D}}_{+}}^{-} + \overbrace{\underbrace{\frac{\partial^2 \pi_M}{\partial k^2}}_{-}\underbrace{\frac{\partial k}{\partial b_M}}_{-}\underbrace{\frac{\partial k}{\partial b_D}}_{+}}^{+}\right)}_{?}\frac{1}{-soc_{b_M}} ?0$$

3.3 Reputation

There are considerable reputation costs of engaging in bribery for the multinational corporations in particular. It is a widely accepted fact that even allegations of paying bribes in a foreign country can reduce consumer demands for corporate products, plunge the company's share price, make it difficult to recruit outstanding new staff, spark political and media investigations, and massively divert top management from crucial operational work.

So far we have not carefully examined the role of reputation in this paper. As currently formulated, reputation effects serve to reduce the multinational firm's ability to compete for the corrupt regulator's favors, but should not affect the overall framework that we have constructed.

4 Conclusion and Directions for Future Work

This paper examined a model of regulatory capture that highlighted the interaction between a corrupt regulator, a local dominant firm and a multinational firm. We built a three player game between a corrupt regulator, a local dominant firm and a multinational firm. We considered two major cases. In the first case, the regulation in question was anti-competitive, but was not biased against the multinational firm. In this case bribes were strategic substitutes for the two dominant firms — each firm's bribe was decreasing in the level of the other's bribe. In the second case regulation was biased in favor of the local firm so that the multinational firm would pay a bribe in order to reduce the level of protectionist regulation. In this case bribes may be strategic complements or substitutes.

Our preliminary analysis showed that the presence of the multinational could have a variety of effects. In the former case, these include a reduction in corruption due to decreased rents and a corresponding decrease in the ability and desire to subvert the regulator. In the latter case an increase in competition for the regulator's attentions could result in a higher level of distortional corruption as one party or the other bids to "win" the regulator to their side, or an increase in relatively benign dissipative corruption where each side bids to maintain the regulator's neutrality.

The future version of the paper will address the issues incomplete information and reputation costs in a dynamic setting.

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