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Corruption and market reform

Kjetil Bjorvatn and Tina Søreide*

Norwegian School of Economics and Business Administration (NHH)
and Chr. Michelsen Institute (CMI).

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Abstract

Market reforms in developing and transition economies have sometimes failed to deliver the desired welfare effects. Corruption may be an important reason for the inefficiency of market reforms, such as privatization campaigns. The present paper demonstrates how corruption can affect the choice of buyer of a public asset. Our main result is that market reform in highly corrupt societies is likely to result in less competition and less economic efficiency than reform in less corrupt societies. We also demonstrate that the level of bribes in the sale of public assets does not necessarily increase in the government's emphasis on bribes.

Keywords: Corruption, market reform, privatization

JEL codes: F23, L12

1 Introduction

Privatization and deregulation are important ingredients of market reform programs in most developing and transition economies. These reforms are expected to improve economic efficiency by reducing the role of the state and increasing the degree of private sector competition in the economy.

*We would like to thank Karl Ove Moene and Susan Rose-Ackerman for useful comments. Communicating author: Tina Søreide, Chr.Michelsen Institute, P.O.Box 6033 Postterminalen, 5892 Bergen, Norway. e-mail: tina.soreide@cmi.no.

Despite the many examples of significant market improvements (Kikeri and Nellis, 2001), privatization and deregulation do not always deliver the expected results. Manzetti (1999, page 328) argues that many cases of privatization in South-America have resulted in more market concentration, not less. Puntillo (1996) reports that the hasty process of privatization in Russia in the 1990s often resulted in very limited improvements in productivity and negligible state revenue.

Corruption may be one reason for failure of privatization and deregulation to improve economic efficiency. In the words of Joseph Stiglitz (2002, page 58): “Perhaps the most serious concern with privatization, as it has so often been practiced, is corruption. (...) In country after country, government officials have realized that privatization meant that they no longer needed to be limited to annual profit skimming. By selling a government enterprise below market price, they could get a significant chunk of the asset value for themselves rather than leaving it for subsequent officeholders. In effect, they could steal today much of what would have been skimmed off by future politicians. Not surprisingly, the rigged privatization process was designed to maximize the amount government ministers could appropriate for themselves, not the amount that would accrue to the government’s treasury, let alone the overall efficiency of the economy.”

Accordingly, Manzetti and Blake (1996) argue that in the reforming Latin American countries privatization of public assets has replaced the sale of public contracts and jobs as the focal point of corruption. They refer to a number of cases, one of them being the privatization of the Banco Occidental de Descuento in Venezuela (see pages 681-682). “This bank was privatized via the sale of stock whose initial price was set by the Minister of the National Investment Fund (FIV), Gerver Torres, at the undervalued price of 320 bolivars (approximately \$6) a share, despite widespread knowledge of many offers to purchase the initial public offering at much higher prices.” A few weeks later, a single investor sold shares representing 35 per cent of the public offering at 2500 bolivars per share, cashing in a profit of \$34.9 million in just over one month on an investment of around \$5.1 million.

Reports on corruption in the sale of public assets appear frequently in other corners of the world as well. In Nigeria, for instance, the licensing of prime oil exploration acreage were put under investigations after controversial decisions to leave some prime blocks for separate discreet negotiation (Africa Confidential, 4 August 2000). The supply side of this kind of corruption is described by one of the more famous European corruption scandals. A

former senior official of Elf-Aquitaine, France's former state-owned oil company, admitted in court that Elf had paid bribes over the past 25 years to top African politicians and officials to obtain lucrative contracts on diversion of oil revenues. (Global Witness, July 12, 2000)¹.

One reason why corruption may be a particularly severe problem in the sale of public assets, is that it is typically very difficult to place a value on these assets. Hence, it is not easy for a third party to judge whether or not the price announced after the sale of the asset is reasonable or not. In the case of privatization, Rose-Ackerman (1999: 35) notes that: "Corrupt officials may present information to the public that makes the company look weak while revealing to favored insiders that it is actually doing well." There may be a gap between the actual price of the asset and the one announced to the public, with the difference ending up in the pockets of corrupt bureaucrats and politicians. This problem is a key concern in the present paper.

The link between corruption and the decision to privatize is discussed in Shleifer (1998), Shleifer and Vishny (1994), Laffont and Meleu (1999), and Coolidge and Rose-Ackerman (1997). In the present study, we take the sale of the public asset as given, and analyse how a government's preferences for bribes may affect the outcome of market reform. Market reform in the present context means the sale of a public asset that allows the entry of new producers in the market. Privatization is one example of the market reform we have in mind, and we shall sometimes refer to the reform simply as privatization. But our analysis is relevant also for other types of policies, such as the issuing of new investment and production licenses or the re-allocation of natural resources necessary for local production. Our model shows that the sale of the public asset by a highly corrupt regime may result in a highly concentrated industry structure and reduced economic efficiency. Moreover, the analysis demonstrates how the eagerness of the government to accept bribes affects the level of bribes in the sale of the public asset. Interestingly, the equilibrium size of the bribe may well fall as the propensity of the government to accept bribes increases.

Our paper is related to Norbäck and Persson (2001). Their major concern is the relation between privatization, foreign acquisition and entry modes. However, while Norbäck and Persson assume that the company offering the highest bid always obtains the state assets, the present paper emphasizes the

¹This scandal involves several French top politicians, and the case is again up for the court, see The New York Times, April 18, 2003.

importance of political consideration, more precisely, the trade-off between private welfare and bribes, in the choice of acquiring firm.

The paper proceeds as follows: Section 2 describes the model, the price, and the impact of political preferences for the outcome of a privatization. Section 3 applies the model to different market structures. Section 4 concludes.

2 The model

Consider a country S implementing a market reform. The reform includes the privatization of a state-owned company, to be sold in one piece. We do not discuss *why* the market reform is taking place. It could be part of a reform program imposed on the country by the IMF as a condition for new loans. It could be the result of domestic political pressure to reform the economy as the result of, say, the electoral victory of a right-wing party. Or it could be based on a need to cut public sector costs by selling out a badly managed, loss making public enterprise.

There is more than one firm interested in acquiring the state owned-firm. The potential buyers may differ in various respects. In the present analysis we focus on differences along two dimensions, trade costs and ownership. In an extension to the model, we also discuss the issue of greenfield investment. These differences determine the profits for the firms obtainable by the acquisition, and hence their willingness to pay for the state-owned company. Similarly, the consequences on the local economy may differ, depending on which firm ends up acquiring the state-owned firm.

We restrict our attention to the case of two potential buyers of the state asset, firm 1 and firm 2. Firm 1 faces lower trade costs than firm 2 when selling goods to buyers in country S . Accordingly, with t_i representing per unit transaction costs of firm i exporting to country S , we have $0 \leq t_1 < t_2$. In the case of $t_1 = 0$, firm 1 is located in market S , and when this is the case, we consider both domestic and foreign ownership of this firm. When $t_1, t_2 > 0$, both firms are located abroad, and we assume that they are both foreign owned. In this case the state owned company is the only local producer prior to reform. Acquiring the state asset allows the buying firm to sell in the market without incurring any transaction costs.

Before showing their interest to the government by offering a price, and perhaps also a bribe, the two potential buyers analyze the market situation

that will occur in each possible outcome of the reform. The government of country S and the two firms are fully informed about the relevant payoffs of the game.

The firms sell an identical good q , the demand for which is given by $q = 1 - p$, where p is the market price for the good. Given the outcome that both firms operate in the market, there is Cournot competition between them. Marginal production costs are identical between the two firms and are normalized to zero. We assume that the acquiring firm can implement its technology in the acquired firm at zero cost. In the case of local duopoly prior to reform the local private firm may end up as a monopolist by acquiring the state-owned firm, given trade cost above a critical level. Under such a circumstance the operating profits are

$$\pi^m = \frac{1}{4}, \quad (1)$$

where superscript m denotes monopoly. In duopoly, equilibrium operating profits for the acquiring firm i are given by

$$\pi_i^d = \frac{(1 + t_j)^2}{9}, \quad i \neq j. \quad (2)$$

Operating profits for the non-acquiring, or “outside”, firm j , when exporting to country S , are given by

$$\hat{\pi}_j^d = \frac{(1 - 2t_j)^2}{9}, \quad (3)$$

where superscript d indicates duopoly. Consumer surplus under monopoly is given by

$$\sigma^m = \frac{1}{8}, \quad (4)$$

and in the duopoly case by:

$$\sigma_i^d = \frac{(2 - t_j)^2}{18}, \quad i \neq j, \quad (5)$$

when firm i is the acquiring firm and j the outside firm exporting to country S . The government’s choice of buyer is based on two considerations. On the one hand, it has to please the public in order to survive politically, for instance in order to be re-elected. This is an argument in favour of

maximizing private sector welfare, ω . On the other hand, government officials try to obtain personal benefits, i.e. to collect bribes, b . What we call a *bribe* may also represent other benefits to the politicians in charge, like payments to political parties or promises of lucrative career opportunities in the acquiring firm. Let the objective function of the government be given by:

$$U = (1 - \beta)\omega + \beta b, \quad (6)$$

where $\beta \in (0, 1)$ is the weight that the government places on collecting bribes relative to producing private welfare. We sometimes refer to β as the government's propensity to take bribes, and view it as a measure of government corruption. In a society where corruption is a marginal phenomenon, and/or where political competition is sufficiently tough to make private welfare the priority issue for the incumbent government, β can be expected to be low. In case corruption is rampant and/or the political opposition to the incumbent government is weak, β is likely to be high.

Private welfare is defined as consumer surplus, σ , plus the net profits of locally owned firms, μ_l . The sum of these two surpluses can be seen as a measure of economic efficiency in the economy. In addition, private sector welfare includes transfers to the private sector from the sale of the public asset, the size of these transfers being equal to the official price of the sale and denoted by λ . Private welfare when firm i acquires the state asset can therefore be written as

$$\omega_i = \sigma_i + \mu_l + \lambda. \quad (7)$$

We distinguish between the officially announced acquisition price, λ , and the *true* acquisition price, θ , that includes all kinds of payments from the firm acquiring the state-owned enterprise. The difference between the two is the size of the bribe, which for firm i is

$$b_i = \theta_i - \lambda. \quad (8)$$

We abstract from other sources of corruption income, such as firms' operating profits. Note that if a local firm acquires the state-owned firm, $\mu_l = \pi_l - \theta_l$, whereas if a foreign firm acquires the asset, $\mu_l = \hat{\pi}_l^d$.

The public is assumed to have no information about the true price of the transaction. However, the public may expect to see *some* income coming from the sale of the state asset, so the official price, λ , is likely to be positive.

If the private sector had information about the firms' willingness to pay for the public asset, it could insist on receiving a share of the true price. If this were the case, the size of λ would depend positively on the size of the true price, θ . With a completely uninformed private sector, there is no reason why there should be a relation between λ and θ .²

The sale of the public asset can be thought of as a two-stage process. First, the government chooses which firm to enter into negotiations with, based on a comparison of the two firm's potential in generating utility for the government. Second, the government and the chosen firm negotiate on the price of the state asset, which implies agreeing on the size of the bribe. We assume that the bribe is determined by a Nash bargaining solution.

At the first stage, the government determines which firm to negotiate with. To determine the potential of the two firms' in generating utility for the government, we first consider the maximum bribe that each of the two firms is willing to offer. Note that there is a difference between a foreign owned and a locally owned firm in this respect. The government wishes to extract as high a bribe as possible from a foreign-owned firm. For a locally-owned firm, the situation may be different. The reason is that a bribe from a locally owned firm is paid for by "local" money, which has its counterpart in reduced profits for the local firm and hence reduced domestic private welfare. For $\beta < \frac{1}{2}$, the government views a dollar in the form of local profits as more worth than a dollar in the form of bribes. Hence, in this case the government is not interested in asking for bribes from a locally owned company. For $\beta > \frac{1}{2}$, however, the government places a higher weight on bribe income than local profits, and therefore also wants to extract as high a bribe as possible from the locally owned firm.

Consider first a sale to a foreign firm. The maximum payment that a foreign firm i is willing to offer in order to acquire the state owned firm is given by

$$b_i^{\max} = \pi_i - \hat{\pi}_i^d - \lambda, \quad (9)$$

where π_i is the operating profits that the firm would get after acquiring the state asset, and $\hat{\pi}_i^d$ is i 's operating profits as an outside firm, facing duopoly competition from the privatized firm. As noted above, λ is the part of the

²Note that if λ were a function of θ , the official price would be the equivalent of an income tax on the government. While this would modify our results by making bribes less attractive for a corrupt government, the basic mechanisms driving our model would survive as long as the marginal tax on bribe income is less than 100 percent.

acquisition price that is transferred to the private sector. Private welfare in case of a foreign acquisition is given by

$$\omega_i = \sigma_i + \hat{\pi}_l^d + \lambda, \quad (10)$$

where $\hat{\pi}_l^d$ is profits of the locally owned firm when it is outside the acquisition. Consider now selling to a locally owned firm. The maximum bribe that a locally owned firm l is willing to offer is given by

$$b_l^{\max} = \begin{cases} 0 & \text{for } \beta < \frac{1}{2} \\ \pi_l - \hat{\pi}_l^d - \lambda & \text{for } \beta > \frac{1}{2} \end{cases}. \quad (11)$$

Welfare derived from selling to a locally owned firm offering its maximal bribe can be expressed as³:

$$b_l^{\max} \Rightarrow \omega_l = \begin{cases} \sigma_l + \pi_l & \text{for } \beta < \frac{1}{2} \\ \sigma_l + \hat{\pi}_l^d + \lambda & \text{for } \beta > \frac{1}{2} \end{cases}. \quad (12)$$

Selling to a firm $j = i, l$ that offers its maximum bribe results in government utility:

$$U_j^{\max} = (1 - \beta)\omega_j + \beta b_j^{\max}. \quad (13)$$

The government sells to firm i as long as $U_i^{\max} > U_j^{\max}$, $i \neq j$. Denote as $\hat{\beta}$ the critical level of β below which the government prefers to sell to j and above which the preferred buyer is i . This critical β can be found by setting $U_i^{\max} = U_j^{\max}$, which results in:

$$\hat{\beta} = \frac{\omega_j - \omega_i}{\omega_j - \omega_i + b_i^{\max} - b_j^{\max}}. \quad (14)$$

Clearly, if one firm delivers both higher private welfare and higher bribes than its rival, this firm will be the preferred buyer of the state asset. The interesting problem arises when one firm delivers higher private welfare and the other higher bribes. In this case the government faces a trade-off. The outcome of this trade-off is determined by the degree to which the two firms differ in their respective “strengths”, i.e. in delivering private welfare or

³ $b_l^{\max} \Rightarrow \omega_l = \sigma_l + \pi_l - (b_l^{\max} + \lambda) + \lambda$
 $\beta < 0 \Rightarrow b_l^{\max} = 0 \Rightarrow \omega_l = \sigma_l + \pi_l - (0 + \lambda) + \lambda = \sigma_l + \pi_l$
 $\beta > 0 \Rightarrow b_l^{\max} = \pi_l - \hat{\pi}_l^d - \lambda \Rightarrow \omega_l = \sigma_l + \pi_l - \left((\pi_l - \hat{\pi}_l^d - \lambda) + \lambda \right) + \lambda = \sigma_l + \hat{\pi}_l^d + \lambda$

bribes, and in the weight the government places on these arguments in its objective function.

Based on (14) the government determines which firm to negotiate with. At the second stage of the government's decision process, it must negotiate the acquisition price, and therefore the bribe, with the chosen firm. Let the equilibrium bribe be defined by the Nash bargaining solution. We already know the firms' reservation bribes, as given by (9) and (11). Define the minimum bribe that the government would be willing to accept from firm i as b_i^{\min} . This is the bribe that firm i has to offer in order to match what the government could get by negotiating with the other firm. The minimum bribe that firm i must offer to win the auction is given by⁴:

$$b_i^{\min} = \frac{(1 - \beta)}{\beta} (\omega_j - \omega_i) + b_j^{\max}, \quad i \neq j. \quad (15)$$

Accordingly, there is only room for negotiation between the government and firm i as long as $b_i^{\max} \geq b_i^{\min}$. The equilibrium bribe is given by:

$$b_i^* = \gamma b_i^{\max} + (1 - \gamma) b_i^{\min}, \quad \text{for } b_i^{\max} \geq b_i^{\min}, \quad (16)$$

where γ represents the bargaining strength of the government relative to that of the acquiring firm.

3 Analysis

The description of the model so far shows that the choice of buyer for the public asset, as well as the level of bribes, is determined by ownership, trade costs, and the government's propensity to take bribes. In what now follows we analyze the outcome of the market reform as a function of the eagerness of the government in accepting bribes, under different assumptions of trade costs and ownership structure. Cases 1 and 2 consider the privatization of a state-owned firm producing a non-traded good. In the first case, the two firms are a locally owned private firm and a foreign firm, "foreign" both

⁴From (6) we know that $U_i = (1 - \beta)\omega_i + \beta b_i$, which can be expressed as $b_i = \frac{1}{\beta}(U_i - (1 - \beta)\omega_i)$. For firm i to win the tender, it has to match the maximum utility derived from selling the asset to its rival, j , defined as $U_j^{\max} = (1 - \beta)\omega_j + \beta b_j^{\max}$. With $U_j^{\max} = U_i$, we get (15).

in terms of ownership and initial location. We can think of this case as the privatization of a state-owned bank, where in the pre-reform market a locally owned private bank is also present in the market. A foreign bank is interested in entering the market through the acquisition of the state-owned bank. In the second case, the local competitor to the state-owned firm is foreign owned. In the bank example, this means that a foreign owned bank is already established in country S and that a second foreign bank without a presence in that market considers entering through the acquisition of the state-owned bank.

Cases 3 and 4 consider privatization in a market for tradeables. In terms of ownership structure, Case 3 is identical to Case 1. A locally owned private firm and a foreign based, foreign-owned firm compete for the state-owned firm. As an example, we can think of the privatization of a state-owned car producer. Prior to the reform, a locally owned, private car producer operated side by side with the state owned firm, possibly also facing competition from a foreign car producer exporting to country S . With the privatization of the state-owned production unit, the foreign car producer has the option of entering the market through a cross-border acquisition in addition to exports. Case 4 is identical to Case 2 in terms of ownership structure. But now one of the foreign firms, or both of them, are located outside country S prior to the reform, and face the choice of entry through acquisition or exports. We can think of it as the privatization of a state-owned car producer that prior to reform either operated as a monopolist or faced competition from imported cars. In the monopoly case, the reform would entail both the privatization of the state-owned firm and the opening up for imports. The four cases are summarized in Table 1 below

Table 1. The cases

	Local vs. foreign firm	Foreign firms only
Non-traded goods	Case 1	Case 2
Traded goods	Case 3	Case 4

In an extension to the model, we discuss the implications of allowing for greenfield investment in addition to exports and acquisition as an entry mode into country S .

3.1 Case 1

Consider the case where firm 1 is a domestically owned firm. Firm 2 is foreign owned. Trade costs are such that the foreign firm cannot profitably export to country S, i.e. $t_2 > \frac{1}{2}$. If firm 1 acquires the asset it gets a monopoly position in the market. If firm 2 acquires the asset, the two firms enter into duopoly competition.

$$b_1^{\max} = \begin{cases} 0 & \text{for } \beta < \frac{1}{2} \\ \pi^m - \hat{\pi}_1^d - \lambda = \frac{1}{4} - \frac{1}{9} - \lambda & \text{for } \beta > \frac{1}{2} \end{cases}. \quad (17)$$

$$b_2^{\max} = \pi_2^d - \lambda = \frac{1}{9} - \lambda \quad (18)$$

and

$$b_1^{\max} \Rightarrow \omega_1 = \begin{cases} \sigma^m + \pi^m = \frac{1}{8} + \frac{1}{4} & \text{for } \beta < \frac{1}{2} \\ \sigma^m + \hat{\pi}_1^d + \lambda = \frac{1}{8} + \frac{1}{9} + \lambda & \text{for } \beta > \frac{1}{2} \end{cases}, \quad (19)$$

and when selling to the foreign firm as:

$$\omega_2 = \sigma_2^d + \hat{\pi}_1^d + \lambda = \frac{4}{18} + \frac{1}{9} + \lambda. \quad (20)$$

Using equations (17) to (20) in (14), we can find the critical levels of β for which the government is indifferent between selling to firm 1 or 2. There are two such critical levels of β . One for $\beta < \frac{1}{2}$, which we shall call $\hat{\beta}_a$, and one for $\beta > \frac{1}{2}$, which we shall call $\hat{\beta}_b$. It is straightforward to show that

$$\begin{aligned} \hat{\beta}_a &= \frac{72\lambda - 3}{144\lambda - 11} \\ \hat{\beta}_b &= \frac{7}{9} \end{aligned}. \quad (21)$$

Using (17) to (20) in (15), we can find b_i^{\min} . Figure 1 illustrates the minimum and maximum bribe levels as functions of β , as well as the critical levels of β , for a given value of λ . The shaded areas illustrate the negotiation room, i.e. the distance between reservation bribe of the acquiring firm and the government.

For $\beta < \hat{\beta}_a$, the government sells the asset to firm 1, taking no bribe. For $\hat{\beta}_a < \beta < \hat{\beta}_b$, the asset is sold to firm 2. For $\beta > \hat{\beta}_b$, firm 1 buys the asset and pays a bribe. An increase in λ shifts b_1^{\min} and b_2^{\min} downwards and reduces $\hat{\beta}_a$ while leaving $\hat{\beta}_b$ unchanged. From (21) we find that $\lambda \geq \frac{1}{24}$

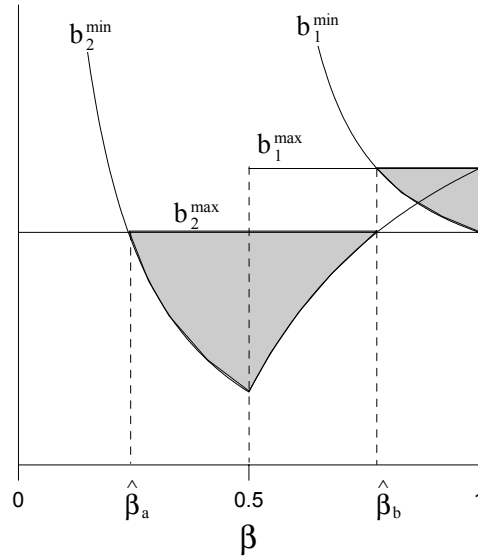


Figure 1: Case 1

implies $\hat{\beta}_a \leq 0$. Hence, if the official acquisition price exceeds this level, the government prefers to sell to the foreign firm for all values of $\beta < \hat{\beta}_b$.

To understand Figure 1, let us go through the costs and benefits of selling to the local firm versus the foreign firm. There are two advantages of selling to the foreign firm. First, to the benefit of consumers foreign entry will lead to duopoly competition. Second, a foreign acquisition means that the state asset is paid for by foreign money. Contrast this to bribes paid by the local firm, which would reduce local profits and hence private welfare. Similarly, there are two benefits of selling to the local firm. First, by avoiding entry of the foreign firm, the local firm gains. Second, since the local firm gains a monopoly position by acquiring the state asset, whereas the foreign firm only gains a duopoly position, the willingness to bribe is higher for the local firm. Note, however, that this only applies for $\beta > \frac{1}{2}$. For $\beta < \frac{1}{2}$, the optimal bribe paid by the local firm is zero.

For $\beta < \hat{\beta}_a$, the government prefers to sell the asset to the locally owned firm, firm 1. The reason is that the alternative, namely selling to the foreign firm, would lead to profit shifting in favor of the foreign company. For $\lambda < \frac{1}{24}$, the profit shifting effect dominates the gain in consumer surplus plus the official transfer of income from selling the asset to the foreign firm. Hence,

private welfare is an argument in favor of selling to the local firm. And for low levels of β , private welfare is indeed the government's main concern.

An increase in β means a larger weight being placed on bribes. Firm 2 has the advantage of bringing in foreign money, and wins the bidding contest for $\hat{\beta}_a < \beta < \hat{\beta}_b$. As β approaches unity, the government cares mostly about the size of the bribe and is not so concerned with the source of the bribe, i.e. whether it is paid for by foreign money or local money. Hence, for $\beta > \hat{\beta}_b$, firm 1, which is the higher bidder, wins the contest.

The equilibrium bribe depends on the negotiation strength of the government relative to that of the firm, γ , as described in (16). Figure 2 shows the equilibrium bribe level, denoted by b^* , as a function of β for $\gamma = \frac{1}{2}$.

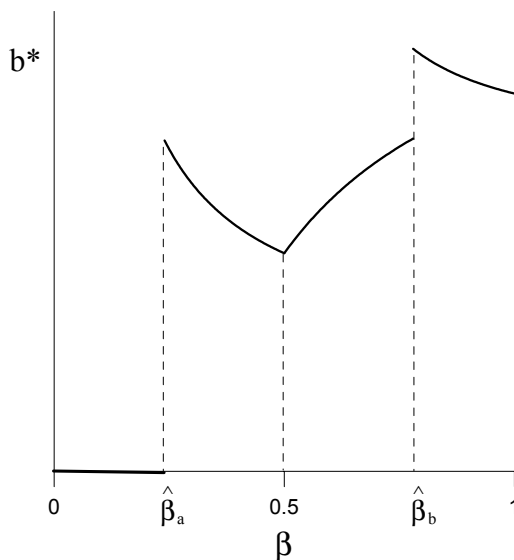


Figure 2: Equilibrium bribe: Case 1

Clearly, the relation between the eagerness of the government to accept bribes and the equilibrium level of bribes is fairly complex. For $\beta < \hat{\beta}_a$ the equilibrium bribe is zero since private sector profits carry a larger weight than bribe income in the government's utility function. At $\beta = \hat{\beta}_a$ there is a discrete jump in the bribe level, as the government enters into negotiations with the foreign firm rather than the local firm. The bribe compensates for the business stealing effect from the locally owned firm to the foreign firm resulting from a foreign acquisition.

An increase in β in the interval $\hat{\beta}_a < \beta < \frac{1}{2}$ leads to a reduction in the equilibrium bribe level. As we can see from Figure 1, the reason is that b_2^{\min} goes down. And the reason that b_2^{\min} goes down is that the more weight that the government places on bribe income, the less firm 2 needs to bribe in order to win the contract. For $\frac{1}{2} < \beta < \hat{\beta}_b$ the equilibrium bribe rises with β . Technically, the reason is that b_2^{\min} increases together with the fact that there is a discrete jump in b_1^{\max} at $\beta = \frac{1}{2}$, resulting in $b_1^{\max} > b_2^{\max}$. Intuitively, now that the government cares more about bribes it is less concerned about local private welfare. This is an advantage for firm 1, which has the higher willingness to bribe. Firm 2 still wins the contract, but has to pay a higher bribe in order to win the contract as β goes up.

At $\hat{\beta}_b$ the government is indifferent between selling to firm 1 and firm 2. At this point there is a discrete jump in the bribe. In order to win the contract, firm 1 has to compensate for the fact that it does not bring in foreign money, and the compensation takes the form of paying a higher bribe. An increase in β for $\beta > \hat{\beta}_b$ reduces the acquisition price. Intuitively, as β increases, the government becomes increasingly focused on the size of the bribe, and less concerned with who pays for it. The advantage of the foreign firm, namely that it pays with foreign money, is therefore reduced. Hence, the bribe that firm 1 must pay in order to win the contest is also reduced.

It may be interesting to consider the impact of corruption on private welfare in the present case. The effects of political preferences on private welfare and state revenues can be summarized as:

$$\omega = \begin{cases} \sigma^m + \pi^m & = \frac{1}{8} + \frac{1}{4} & \text{for } \beta < \hat{\beta}_a \\ \sigma_2^d + \hat{\pi}_1^d + \lambda & = \frac{4}{18} + \frac{1}{9} + \lambda & \text{for } \hat{\beta}_a < \beta < \hat{\beta}_b \\ \sigma^m + \hat{\pi}_1^d + \lambda & = \frac{1}{8} + \frac{1}{9} + \lambda & \text{for } \beta > \hat{\beta}_b \end{cases} . \quad (22)$$

As discussed earlier, $\hat{\beta}_a > 0$ requires $\lambda < \frac{1}{24}$. Hence, comparing private welfare for $\beta < \hat{\beta}_a$ with $\hat{\beta}_a < \beta < \hat{\beta}_b$, we can conclude that as long as $\hat{\beta}_a > 0$ applies, private welfare is higher in the former case than in the latter. Comparing the situation where $\hat{\beta}_a < \beta < \hat{\beta}_b$ with that of $\beta > \hat{\beta}_b$, it is clear that private welfare is higher in the former case. Hence, increased corruption leads to a reduction in private welfare in the present scenario.

3.2 Case 2

We now turn to the case where both firms are foreign owned. The assumptions regarding trade costs are exactly as in Case 1. Following the same procedure as in the previous case, the maximum bribe levels and levels of private welfare can be described as follows:

$$b_1^{\max} = \pi^m - \hat{\pi}_1^d - \lambda = \frac{1}{4} - \frac{1}{9} - \lambda, \quad (23)$$

$$b_2^{\max} = \pi_2^d - \hat{\pi}_2^d - \lambda = \frac{1}{9} - 0 - \lambda, \quad (24)$$

$$\omega_1 = \sigma^m + \lambda = \frac{1}{8} + \lambda. \quad (25)$$

$$\omega_2 = \sigma_2^d + \lambda = \frac{4}{18} + \lambda. \quad (26)$$

Using equations (23) to (26) in (14), we can find the critical level of β , below which the government chooses to negotiate with firm 2 and above which it chooses firm 1, as:

$$\hat{\beta} = \frac{7}{9} \quad (27)$$

As in Case 1, we can find b_i^{\min} by using equations (23) to (26) in (15). Figure 3 illustrates Case 2, for a given level of λ . An increase in λ leads to a downward shift in b_1^{\min} and b_2^{\min} , while leaving $\hat{\beta}$ unchanged.

Case 2 is less complex than Case 1. The choice of buyer affects private welfare only through its effect on consumer surplus. Moreover, the distinction between local and foreign money does not apply. The advantage of firm 2 is that it provides competition and therefore higher consumer surplus and private welfare. The advantage of firm 1 is that it has a higher willingness to pay bribes. A government largely concerned with private welfare would choose to sell to firm 2, whereas a highly corrupt government would sell to firm 1. In Figure 2, the critical level of corruption is given by $\hat{\beta}$.

There will be a discrete jump in the bribe level at $\hat{\beta}$. To acquire the state asset, firm 1 must compensate for the loss in consumer surplus from changing from duopoly to monopoly. An increase in β for $\beta > \hat{\beta}$ lowers the bribe in equilibrium for $\gamma < 1$, i.e. as long as the acquiring firm has some bargaining power. The less the government cares about private welfare, the less bribes firm 1 needs to pay to win over firm 2 in the acquisition game.

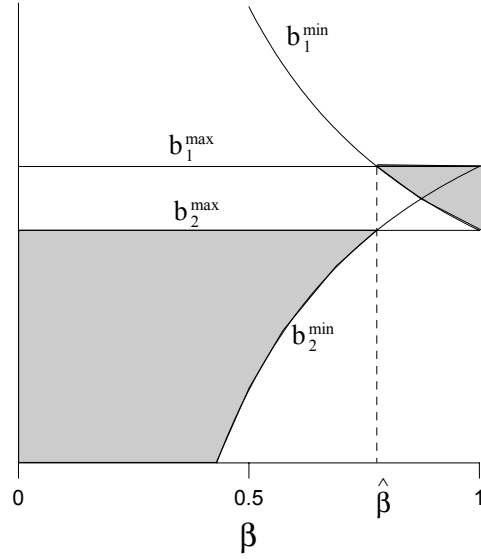


Figure 3: Case 2

For $\beta < \hat{\beta}$, the bribe level is likely to increase with the level of β . The less the government cares about private welfare, the higher is the bribe that firm 2 needs to pay in order to win the bidding contest. Note that for sufficiently low levels of β there may be no bribe at all if the negotiation power of firm 2 is sufficiently strong. Indeed, the government may offer a subsidy to firm 2 to induce it to acquire the public asset. In this case, too, corruption has a clearly negative effect on private welfare:

$$\omega = \begin{cases} \sigma^m + \lambda & = \frac{1}{8} + \lambda & \text{for } \beta < \hat{\beta} \\ \sigma_2^d + \lambda & = \frac{4}{18} + \lambda & \text{for } \beta > \hat{\beta} \end{cases} . \quad (28)$$

Acquisition by the foreign based firm leads to higher consumer surplus and therefore higher private welfare. An increase in β such that we cross $\hat{\beta}$, leads to a change from foreign acquisition to local acquisition, and hence a reduction in private welfare.

3.3 Case 3

Consider now the possibility of profitable exports of firm 2, i.e. $t_2 \leq \frac{1}{2}$. We start with the case where firm 1 is locally owned. Maximum bribes and

welfare can be found as:

$$b_1^{\max} = \begin{cases} 0 & \text{for } \beta < \frac{1}{2} \\ \pi_1^d - \hat{\pi}_1^d - \lambda = \frac{(1+t_2)^2}{9} - \frac{1}{9} - \lambda & \text{for } \beta > \frac{1}{2} \end{cases} . \quad (29)$$

$$b_2^{\max} = \pi_2^d - \hat{\pi}_2^d - \lambda = \frac{1}{9} - \frac{(1-2t_2)^2}{9} - \lambda \quad (30)$$

Note that b_1^{\max} for $\beta > \frac{1}{2}$ equals b_2^{\max} for $t_2 = \frac{2}{5}$. This means that for $\frac{2}{5} < t_2 < \frac{1}{2}$, firm 1 has the larger willingness to bribe, given $\beta > \frac{1}{2}$. For $t_2 < \frac{2}{5}$, firm 2 has the larger willingness to bribe.

$$b_1^{\max} \Rightarrow \omega_1 = \begin{cases} \sigma_1^d + \pi_1^d = \frac{(2-t_2)^2}{18} + \frac{(1+t_2)^2}{9} & \text{for } \beta < \frac{1}{2} \\ \sigma_1^d + \hat{\pi}_1^d + \lambda = \frac{(2-t_2)^2}{18} + \frac{1}{9} + \lambda & \text{for } \beta > \frac{1}{2} \end{cases} , \quad (31)$$

$$\omega_2 = \sigma_2^d + \hat{\pi}_1^d + \lambda = \frac{4}{18} + \frac{1}{9} + \lambda. \quad (32)$$

As in Case 1 we can find the critical levels of β for which the government is indifferent between selling to one firm or the other by using equations (29) to (32) in (14). These are:

$$\begin{aligned} \hat{\beta}_a &= \frac{18\lambda - 3t_2^2}{36\lambda - 8t_2 + 5t_2^2} , \\ \hat{\beta}_b &= \frac{4-t_2}{9t_2} \end{aligned} , \quad (33)$$

which are identical to the critical values defined by (21) for $t_2 = \frac{1}{2}$, i.e. where exports yields zero profits. A reduction in t_2 reduces $\hat{\beta}_a$ and increases $\hat{\beta}_b$, thereby increasing the interval of β 's for which the government prefers to sell to firm 2. Intuitively, the possibility of firm 2 entering country S with exports lowers firm 1's willingness to bribe, since monopoly is no longer a possible outcome. Hence, b_1^{\max} goes down for $\beta > \frac{1}{2}$. Moreover, for $\beta < \frac{1}{2}$ the profit shifting argument in favor of selling to the local firm is weakened as t_2 goes down, since lower t_2 increases the market share captured by the foreign exporter.

From (33) we see that $\hat{\beta}_b$ reaches unity for $t_2 = \frac{2}{5}$. For trade costs below this level, a government characterized by $\beta > \frac{1}{2}$ would never sell to the local firm. We can also find that $\hat{\beta}_a$ reaches zero for $t_2 = \sqrt{6}\sqrt{\lambda}$. For trade costs below this level, a government characterized by $\beta < \frac{1}{2}$ would never sell to the local firm. Hence, a combination of high t_2 and either very high or very

low β is necessary for firm 1 to succeed in acquiring the state asset. For t_2 below a critical level, firm 2 will be the acquiring firm irrespective of β .

How does the degree of corruption affect private welfare in this case? The effects can be summarized as:

$$\omega = \begin{cases} \sigma_1^d + \pi_1^d & = \frac{(2-t_2)^2}{18} + \frac{(1+t_2)^2}{9} & \text{for } \beta < \hat{\beta}_a \\ \sigma_2^d + \hat{\pi}_1^d + \lambda & = \frac{4}{18} + \frac{1}{9} + \lambda & \text{for } \hat{\beta}_a < \beta < \hat{\beta}_b \\ \sigma_1^d + \hat{\pi}_1^d + \lambda & = \frac{(2-t_2)^2}{18} + \frac{1}{9} + \lambda & \text{for } \beta > \hat{\beta}_b \end{cases} . \quad (34)$$

Given that $\hat{\beta}_a > 0$ applies, we know that $t_2 > \sqrt{6}\sqrt{\lambda}$. And in this case, we know that private welfare is higher for $\beta < \hat{\beta}_a$ than for $\hat{\beta}_a < \beta < \hat{\beta}_b$. Moreover, private welfare is clearly higher for $\beta > \hat{\beta}_b$ than for $\hat{\beta}_a < \beta < \hat{\beta}_b$ given $t_2 > 0$. Hence, private welfare drops with the degree of corruption in the government.

3.4 Case 4

Case 4 analyses the situation where both firms are foreign owned. We allow $t_1 \geq 0$, but stick to our assumption that $t_2 > t_1$. Maximum bribes and private welfare can be expressed as:

$$b_1^{\max} = \pi_1^d - \hat{\pi}_1^d - \lambda = \frac{(1+t_2)^2}{9} - \frac{(1-2t_1)^2}{9} - \lambda, \quad (35)$$

$$b_2^{\max} = \pi_2^d - \hat{\pi}_2^d - \lambda = \frac{(1+t_1)^2}{9} - \frac{(1-2t_2)^2}{9} - \lambda, \quad (36)$$

Note that $b_1^{\max} = b_2^{\max}$ for $t_2 = \frac{2}{5} - t_1$. For t_2 higher than this level, firm 1 has the higher willingness to bribe, whereas for t_2 lower than this level, firm 2 has the higher willingness to bribe.

$$\omega_1 = \sigma_1^d + \lambda = \frac{(2-t_2)^2}{18} + \lambda. \quad (37)$$

$$\omega_2 = \sigma_2^d + \lambda = \frac{(2-t_1)^2}{18} + \lambda. \quad (38)$$

Using the same procedure as in the previous cases, we can find:

$$\hat{\beta} = \frac{4 - (t_1 + t_2)}{9(t_1 + t_2)} \quad (39)$$

Note that for $t_1 = 0$, the critical value of β defined in (39) becomes identical to $\hat{\beta}_b$ in Case 3. And with $t_1 = 0, t_2 = \frac{1}{2}$, then $\hat{\beta} = \frac{7}{9}$, as in Case 2. From (39) we see that for $t_2 = \frac{2}{5} - t_1, \hat{\beta} = 1$. Hence, even a government completely focused on corruption would choose to sell to firm 2 for $t_2 < \frac{2}{5} - t_1$. For $t_2 > \frac{2}{5} - t_1$, however, a sufficiently corrupt government would prefer to sell to firm 1. We know from the discussion above that for $t_2 > \frac{2}{5} - t_1$, firm 1 has a higher willingness to bribe than firm 2. For a sufficiently high β , the bribe argument may induce the government to sell to firm 1, although selling to firm 2 would generate higher private welfare. Private welfare is given by:

$$\omega = \begin{cases} \sigma_1^d + \lambda & = \frac{(2-t_2)^2}{18} + \lambda & \text{for } \beta < \hat{\beta} \\ \sigma_2^d + \lambda & = \frac{(2-t_1)^2}{18} + \lambda & \text{for } \beta > \hat{\beta} \end{cases} . \quad (40)$$

Since $t_2 > t_1$, an acquisition by firm 2 leads to higher consumer surplus and therefore higher private welfare. Hence, corruption leads to lower private welfare also in this case.

3.5 Extension: Greenfield investment

The analysis has focussed on acquisition and trade as entry modes for a foreign firm. How would allowing for greenfield investment affect the model? Consider first the competition between a firm located in market S and a foreign based firm, as in Cases 1, 2, and 3. When greenfield investment is the most profitable alternative to acquisition as entry mode for the foreign firm, clearly the local firm has no incentive to bid for the state asset: The outcome would in any case be duopoly competition with a foreign affiliate located in market S . Since local consumers are also indifferent with respect to the choice of buyer, the outcome is necessarily one in which the foreign firm acquires the assets for sale.

The more interesting situation is the one in which neither of the two firms is present in country S prior to the reform, which is the market structure analysed in Case 4. Assume that the best outside option for the firm facing higher trade costs (firm 2) is to enter through a greenfield investment. Firm 1, on the other hand, chooses exports as its best alternative to acquisition. With F denoting greenfield investment costs, maximum bribes can be expressed as:

$$b_1^{\max} = \pi_1^d - \hat{\pi}_1^d - \lambda = \frac{1}{9} - \frac{(1-2t_1)^2}{9} - \lambda, \quad (41)$$

$$b_2^{\max} = \pi_2^d - (\hat{\pi}_2^d - F) - \lambda = \frac{(1+t_1)^2}{9} - \left(\frac{1}{9} - F\right) - \lambda, \quad (42)$$

Note that $b_1^{\max} = b_2^{\max}$ for $F = \frac{1}{9}t_1(2 - 5t_1) \equiv F^*$. For $F < F^*$, firm 1 has the higher willingness to bribe, whereas firm 2 offers the higher bribe for $F > F^*$. Intuitively, when greenfield costs are low, firm 2 prefers greenfield investment to acquisition as mode of entry. Private welfare is given by:

$$\omega_1 = \sigma_1^d + \lambda = \frac{4}{18} + \lambda. \quad (43)$$

$$\omega_2 = \sigma_2^d + \lambda = \frac{(2-t_1)^2}{18} + \lambda. \quad (44)$$

Note that country S consumers are better off if the state assets are sold to firm 1, which would trigger greenfield investment by firm 2, and hence a duopoly between two producers located in the country. The alternative, selling to firm 2, is less attractive for consumers, since after the privatization, one of the producers, firm 1, would be located outside country S . This would involve trade costs, and the market price would therefore be higher than if the assets were sold to firm 1.

Since $\omega_1 \geq \omega_2$ in the present case, we know that firm 2 has a chance of winning the tender only if it offers the higher bribe. And this is true only for $F > F^*$. Hence, for $F < F^*$ we know that firm 1 will be the preferred buyer irrespective of the corruption level in the government: It offers both higher private welfare and more bribes. For $F > F^*$, however, a sufficiently corrupt government would prefer to sell to firm 2. More generally, we can find the critical level of β below which firm 1 buys the state asset and above which firm 2 wins the tender as:

$$\hat{\beta} = \frac{t_1(4-t_1)}{9(t_1^2 + 2F)} \quad (45)$$

Clearly, corruption may harm private welfare in the present case by inducing the government to sell to firm 2 rather than to firm 1.

4 Concluding remarks

Market reform in itself is no guarantee of improved economic efficiency. The success depends on the resulting industrial structure in each specific market.

In the sale of public assets we have seen that the resulting allocation of market power is subject to the politicians' choice of buyer. Corruption may affect this choice and therefore reduce economic welfare. Politicians primarily concerned with attracting bribes are inclined to sell the asset to the firm offering the highest bribe. This firm is not necessarily the one offering the highest surplus for the consumers in the economy, but rather the one acquiring the greater market power.

In addition to analyzing the choice of buyer, our study shows how the propensity to accept bribes affects the size of the bribe in equilibrium. Interestingly, by weakening the government's bargaining position in the privatization process, an increase in the weight that a government places on bribes may result in lower bribes in equilibrium.

We have restricted the analysis to a situation with only two firms interested in buying the state asset. Extending the model to include several firms would, however, not change the results qualitatively. Basically, more firms means tougher post-reform competition. Hence, firms' willingness to pay, and bribe, for the state asset goes down.

In the present paper, we have focussed on the choice of buyer of the privatized firm as the government's only choice. However, our study suggests that the opportunity to gain bribes may have an impact on the government's choice of trade and investment policy. Governments concerned about bribes may try to keep entry barriers high in order to increase post-reform profits and hence the willingness of firms to bribe. This is consistent with the results of Ades and Di Tella (1999) who have carried out an empirical study of the relation between the industrial organization of the briber's market and the extent of corruption. They conclude: "...corruption is higher in countries where domestic firms are sheltered from foreign competition by natural or policy induced barriers to trade, with economies dominated by a few number of firms, or where antitrust regulation is not effective in preventing anticompetitive practices. The size of the effect is rather large..." The possibility of trade and investment policy being used strategically by corrupt governments to elicit bribes is a natural extension of the present model and is left for future research.

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Summary

Market reforms in developing and transition economies have sometimes failed to deliver the desired welfare effects. Corruption may be an important reason for the inefficiency of market reforms, such as privatization campaigns. The present paper demonstrates how corruption can affect the choice of buyer of a public asset. Our main result is that market reform in highly corrupt societies is likely to result in less competition and less economic efficiency than reform in less corrupt societies. We also demonstrate that the level of bribes in the sale of public assets does not necessarily increase in the government's emphasis on bribes.

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