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*Privatization and Changes in Corruption Patterns:
The Roots of Public Discontent*

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Privatization and Changes in Corruption Patterns:¹

The Roots of Public Discontent

David Martimort² and Stéphane Straub³

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First Version

Abstract

This paper offers a theory of how the degree of corruption that prevails in a society responds to changes in the ownership structure of major public service providers. We show that there are cases in which privatization, even though it fosters investments in infrastructure, also opens the door to more corruption. The public dissatisfaction towards privatization is then crucially affected by the changes in the degree and pattern of corruption. Our model thus helps understand the seemingly paradoxical situation prevailing in Latin America, where most studies find that privatizations have been efficiency-enhancing and have fostered investments and, at the same time, popular dissatisfaction with the process is extremely high, especially among the middle class. We show that this line of explanation is supported by evidence from surveys in the region.

¹We thank Paulina Beato for having initiated this research and the Inter-American Development Bank for its financial support. We also thank Antonio Estache and seminar participants at University of Edinburgh and the IDEI-IVE conference on “Public Services and Management: Designs, Issues and Implications for Local Governance” in Toulouse for useful comments. The usual disclaimer applies.

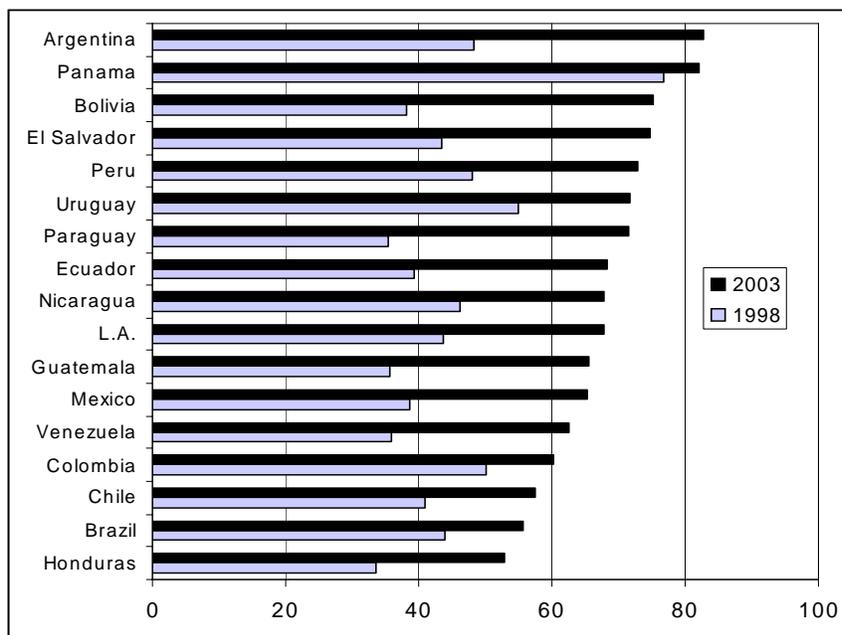
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1 Introduction

Since the second half of the 1980s, Latin America has been the leading region in attracting private participation in infrastructure projects, from telecommunication and energy (electricity and natural gas) to transport (roads, railways, ports and airports) and water (potable water and sewage). Between 1990 and 2001, this type of investments in the Latin American and Caribbean region amounted to \$361 bn., approximately 48% of the total for developing countries.¹ Looking from a different angle, in Latin America the proceeds from privatization in the period 1990-99 summed up to \$178 bn. (equivalent to 56.3% of total privatization revenues in the developing world).² Strikingly, by the early 2000s there was in most Latin American countries a strong and rising public discontent with the outcome of privatization, a decline in private investors' interest and an often open defiance from newly elected governments. By now, the optimistic mood of the 1990s is largely forgotten, and some even question the validity of the privatization paradigm that once was a cornerstone of reforms in the region. In some countries, renationalization is again on the agenda.

Figure 1: Percentage of respondents who (strongly) disagree that privatization has been beneficial for their country



Source: Latinobarometro 2001 and 2003.

¹See Harris (2003). Note that investment figures generally report commitments, and that effective investments end up being substantially lower (Estache, 2004).

²This should be compared, for instance with \$65 bn. in Eastern Europe and Central Asia, and \$44 bn. in East Asia and the Pacific (Chong and López-de-Silanes, 2004).

As far as public perceptions are concerned, the main evidence comes from *Latinobarometro*, a survey of public opinion conducted yearly in several Latin American countries since 1995.³ As of 2003, in the 17 countries surveyed, negative views of privatization ranged from 53% in Honduras to 83% in Argentina, for a Latin American average above 67%. Furthermore, negative opinions had increased significantly since 1998, going for example from below 50% to 83% in Argentina, from 38% to 75% in Bolivia and from 48% to almost 73% in Peru (see Figure 1).⁴

On the other hand, most evaluations of the impact of privatization point to improvements in financial and operating performance.⁵ For instance, Chong and López-de-Silanes (2004), in a recent effort to overcome the sample selection bias inherent to reduced sample studies and to get comparable data across seven Latin American countries (Argentina, Bolivia, Brazil, Chile, Colombia, Mexico, Peru), document improvements in profitability (net income to sales, operating income to sales), in operating efficiency (cost per unit, sales to assets and sales to employee ratio), and in output after the change in ownership.⁶

Additionally, a number of studies⁷ have focused on the impact of those privatizations on fiscal balance,⁸ social welfare,⁹ prices,¹⁰ employment,¹¹ and wages.¹² In a nutshell, it appears that to date, and despite a relatively adverse economic phase in the late 90s, privatization improved fiscal stability and had mostly neutral to positive effects on welfare and social outcomes,¹³ while the two areas in which some negative effects are observed are prices and employment.

The available evidence shows that prices may have increased in about half of the privatization cases, an evolution thought to be necessary to bring heavily subsidized prices in line with marginal costs, attract much needed investments and quality improvements, as well as allow tariff changes when cross-subsidies were eliminated. However, it has also been shown that price increases were sometimes due to large indirect tax premia on basic

³See www.latinobarometro.org (last visited 13/02/06).

⁴Dissatisfaction is computed as the sum of the shares of respondents who declare that they disagree or strongly disagree with the statement “Privatizations of state enterprises have been beneficial to the country”. Unfortunately, the questions’ wording regarding satisfaction with privatizations was changed in 2004, making comparisons difficult.

⁵See La Porta and López-de-Silanes (1999), Megginson and Netter (2001), Kikeri and Nellis (2002) *inter alia*.

⁶Note, however, that the timing of the privatization process is likely to be endogenous, still inducing a selection bias (Gupta, Ham and Svejnar, 2004).

⁷These papers are summarized and discussed in more details in Martimort and Straub (2005).

⁸See Davis, Ossowski, Richardson and Barnett (2000).

⁹Galiani, Gertler and Schargrotsky (2005), and McKenzie and Mookherjee (2003).

¹⁰McKenzie and Mookherjee (2003), Lora and Panizza (2002).

¹¹Kikeri and Nellis (2002), McKenzie and Mookherjee (2003).

¹²Kikeri and Nellis (2002), López-Calva and Rosellón (2002), and La Porta and López-de-Silanes (1999).

¹³Such as infant mortality in the case of water. More confirming evidence on welfare effects is however still necessary.

prices, so that infrastructure services have been used as tax handle by governments. As for employment, substantial initial job losses in the privatized firms were limited as a percentage of the total workforce and tended to be (at least partially) reversed in the medium run.¹⁴

Given this, there is little discussion that the relatively mixed balance on prices and employment, because it did not have a clear negative welfare impact, is unlikely by itself to explain the surge in discontent throughout the region. This suggests either a massive communication failure regarding the positive effects of reforms, or that some of the negative effects that shape the public disapproval have gone unnoticed.

A dimension of the problem that has been largely overlooked though, when trying to understand public perceptions of privatizations has to do with corruption and the perceived transparency of the privatization process on the one hand, and the way resulting gains and losses in terms of income distribution have affected different social groups.

While there is some evidence that petty corruption in the day-to-day operations of former public utilities may have decreased as a consequence of privatization,¹⁵ in particular because of better service coverage (less rationing), there is also a strong presumption that grand-level corruption may have been fuelled by the privatization process. This could seriously undermine its potential benefits by shifting the distribution of potential rents and also by possibly modifying the actual composition of the reform process.¹⁶

It is important to note that, as the ownership structure is modified, the groups likely to benefit from or to pay the cost of corruption change. As already noticed by Shleifer and Vishny (1994), while taxpayers are likely to suffer the primary burden of political subsidies and bribes under public ownership, the cost shifts to consumers of the specific services with private ownership. These different groups also have different levels of organization, homogeneity and costs of organizing themselves as active political actors. This in turn may have an impact on how much they would invest in uncovering and controlling corruption or, alternatively, on how much political pressure they would exert as constituencies.¹⁷

Moreover, the type of corrupt practices also changes in the process, from using SOEs as soft money transfer schemes to favored groups, to allowing greater prices to capture the benefits from increased efficiency. As corruption has consistently been ranked as a top preoccupation in the region, these shifts in corruption patterns are likely to constitute an

¹⁴Kikeri and Nellis (2002) report that significant labor reductions are mainly observed in the sub-group of non-competitive firms.

¹⁵See Clarke and Xu (2004).

¹⁶See Rose-Ackerman (1999), Estache (2004) and Martimort and Straub (2005), for a discussion of the channels through which corruption may destroy the benefits from privatizations. These include among others the use of inside information at the pre-award stage, renegotiations (Guasch, Laffont and Straub, 2003 and 2005; Engel, Fischer and Galetovic, 2003), and obstacles to the introduction of competition.

¹⁷See Olson (1971).

important explanation of the massive upsurge in dissatisfaction with privatizations.

Our theory shows how the degree of corruption responds to changes in the ownership structure of major public service providers. Our main conclusion is that there are cases where private ownership, even though it fosters efficiency-enhancing investments also opens the door to more corruption. In turn, public dissatisfaction towards privatization is crucially affected by this degree of corruption. More precisely, we shall argue that, although public and private ownerships are both subject to corruption, these corrupt deals are of different kinds, have different likelihoods in equilibrium, and might be perceived quite differently by the general public. The important point we want to stress is that corruption between non-benevolent public officials and the firm might emerge more easily, precisely for the very reasons that make privatization socially beneficial, namely *a harder budget constraint* due to restricted transfers between the State and the firm. A hardened budget constraint under private ownership fosters investments but also shifts the burden of corruption from taxpayers to consumers. Our model will thus explain a seemingly paradoxical situation where both efficiency and investments are fostered and, at the same time, corruption and dissatisfaction are more pronounced.

Let us see in more details how the ownership structure and the kinds of control rights exerted by public officials affect both the patterns of investment and corruption. Since Kornai (1986), it is by-now well known that public firms suffer from the so-called *soft-budget constraint*. As an owner, the government cannot refrain from siphoning the Treasury to cover the cost overruns of a public firm. Anticipating these extra subsidies, the managers of public firms have little incentives to cut on costs. Under-investment in cost-reducing infrastructure prevails under public ownership. The other consequence of allowing direct transfers between the government and the public firms is that any kind of collusion between public officials and the manager of the public firm takes the form of inflated subsidies, which siphon the Treasury to please private interests. Those manipulations are thus perceived as a burden only by taxpayers and do not appear significant to consumers.

On the other hand, it has often been argued that a key benefit of private ownership comes from the fact that the government stays at arm's length with the private firm. By committing itself not to use lump-sum transfers to finance cost overruns, the government hardens the firm's budget constraint. This fosters cost-reducing investments and improves welfare. Indeed, in the absence of public funds, the manager of a private firm can only cover costs with the firm's revenues. However, raising price mark-ups to cover inefficient fixed costs also dampens demand. Under a hard-budget constraint, consumers discipline the firm. This increases incentives to realize cost-reducing investments. However, the hidden side of this *hard budget constraint* is that collusion between public officials and the firm takes now the form of softened price regulation. Consumers might be quite sensitive to the corresponding price increases. The burden of corruption is thus quite

different under private ownership and, as a result, the extent to which society perceives corruption changes with the ownership structure.

Literature Review: Our definition of ownership is standard. It relies on the unrestricted exercise of residual rights of control, which stems from the ability to use transfers to finance (or refinance) the firm under public ownership. This definition is thus the same as in Shleifer and Vishny (1994) and Bennesen (2000). However, because it is based on *informational asymmetries* to justify first the existing information rent of firms, second, the discretion of public officials, our model provides solid micro-foundations for the stakes of corruption. It does not a priori distinguish between the kinds of corruption which respectively takes place between a private manager and a public official or between a public manager and a public official as those previous studies. Any such difference comes from the existing differences in incentives that arise under both governance modes.

Although the soft versus hard budget constraint debate has by-now been put on firmer theoretical grounds,¹⁸ no one has to the best of our knowledge analyzed the consequences of tightening the firm's budget on the stakes and degrees of corruption that may emerge. Our paper bears some similarity with Coate and Morris (1995), who argue that inefficient redistributive tools may be used to transfer resources towards private interests. A similar phenomenon arises here: because it suppresses direct transfers from taxpayers to the public firm, privatization may change the collusive stakes between the public official and the firm, sometimes increasing that stake and making corruption more likely. As we do in this paper, Laffont and Tirole (1993, Chapter 15) argued that average cost pricing triggers more reaction from consumers in a model where the firm's private information is on its fixed cost and where collusion is not an equilibrium phenomenon.

Finally, the literature on privatization in developing countries, our primary concern, has by large ignored the possibly positive relationship between investment, privatization and corruption unveiled in our paper. On the relationship between privatization and corruption, a few papers deal with different aspects of the process.

At the theoretical level, Laffont (2005, Chapter 3) stresses instead that the mere fact of privatizing may be a corrupt political act. Boycko, Shleifer and Vishny (1996) develop a model of privatization in which privatization helps controlling political discretion, and introduce corrupt monetary transfers between managers and politicians as way to provide benefits to the latter more efficiently than through excess employment for example, thus arguing for a socially beneficial effect of corruption. Hoff and Stiglitz (2005) propose a model that explains how the privatization process in transition countries, because it was plagued with corruption, failed to generate a high level of demand for the establishment

¹⁸See Dewatripont and Maskin (1995), Kornai, Maskin and Roland (2002) and Segal (1999) for more recent contributions.

of the rule of law and led to an inefficient path of institutional change.

At the empirical level, Kaufman and Siegelbaum (1997) consider the privatization process that took place in the former Soviet Union and Central and Eastern Europe, and discuss how the scope and different methods employed to carry out privatization affected the likelihood of subsequent corruption. Clarke and Xu (2004) document how petty corruption in eastern European and central Asian utilities depends on the characteristics of bribe payers and takers, arguing in particular that corruption is lower with privatized and competitive utilities. Finally, anecdotal evidence and case studies on the link between privatization and corruption can be found in Manzetti (1999), Rose-Ackerman (1999) and Tulchin and Espach (2000) *inter alia*.

The paper is organized as follows. Section 2 presents our theoretical model. Section 3 analyzes the benchmark of a benevolent public official. We focus there on the benefits of private ownership in hardening the firm's budget constraint and its positive impact on investment. Section 4 introduces the possibility of corruption and derives its consequences both for public and private ownership. Section 5 discusses the incentives of consumers to react to an increase in their own perception of corruption. Section 6 presents and discusses stylized facts and estimations from surveys in Latin America supporting the analysis put forward in the theoretical model. Section 7 concludes. Proofs are relegated to an Appendix.

2 The Model

We investigate the impact of the ownership structure on the degree of corruption that prevails in the economy. To distinguish between the objectives of society as a whole and those of the potentially corrupt politician (decision-maker) in charge of designing the firm's regulation, we will use a three-tier model of incentive regulation, general public/government/firm, along the lines of Laffont and Tirole (1993, Chapters 13 and following).

◆ **Ownership structures:** We shall analyze two different ownership structures:

- **Public ownership:** The decision-maker can use the general Treasury to make monetary transfers to the firm.¹⁹ An incentive regulation of a public firm stipulates both the value of these transfers and the firm's output.
- **Private ownership:** No such direct transfers can be used. The private firm must cover its costs from its revenue. Although private, the firm is still subject to some

¹⁹See Schleifer and Vishny (1994) for a similar assumption.

regulation in the form of quantity/price restrictions, which affects the firm's revenue and its ability to cover its fixed-cost.

The basic difference between public and private ownerships comes thus from the government's inability to make direct transfers to the firm in the latter. This view is consistent with the host of evidence on the so-called soft-budget constraint faced by public firms. As an owner, the government cannot refrain from siphoning the general budget to cover cost overruns of public firms. Instead, the government, when its sole role consists in regulating a private firm, can no longer use the Treasury to increase the firm's revenues.²⁰ Of course, this difference in the firm's budget constraint also has implications on its ex ante incentives to reduce fixed-cost. We shall address the implications of different ownership structures on investments in Section 3.

◆ **Preferences:** Let us turn to a description of the objective functions of each player. Social welfare incorporates the utilities of consumers, taxpayers and shareholders of the firm.²¹ It writes as:

$$W = S(q) - P(q)q - (1 + \lambda)(t + s) + U + V, \quad (1)$$

where $S(q) - P(q)q$ is the consumers' net surplus from consuming q units of the good, t is the transfer from the general budget to the firm and U is the firm's profit. $S'(\cdot) = P(\cdot)$ is the inverse demand function which is decreasing. The cost of public funds λ will play an important role in the forthcoming analysis. It measures the extend of the government's budgetary problems.

The political decision-maker's utility can be written as:

$$V = s \geq 0, \quad (2)$$

where s is the share of the overall budget that this decision-maker can grasp for himself. The politician must of course obtain a positive utility from holding office.

One should not take too literally this term and view it only as the potential wage of holding office that a public official may secure. This may also stand for all the perquisites, prestige, career concerns that the politician may have. Note also that including the

²⁰Kaufmann and Siegelbaum (1997) provide evidence of such a hardening of the budget constraint of privatized firms in transition economies. Although ex post renegotiation of regulatory contracts, which has been widespread in Latin America (Guasch, Laffont and Straub, 2003 and 2005), may to some extent soften the budget constraint of the firm, the lags involved in the process still imply that private firms face harder budget constraints than their public counterpart.

²¹In the case of a public firm, one can assume that shares are equally distributed among the public, whereas only owners hold such shares in the case of private ownership. In both cases, the expression of social welfare remains of course the same.

politician's utility into the social objective function may be warranted even though the politician by himself is negligible. For instance, he may represent a group (tribe, interest group, family with large economic stakes, etc.), whose interests follow closely his own and are, at large, not negligible.

Once its investment I has already been sunk, the firm's profit, whether private or public, i.e., whether transfers are available or not, can be written as:

$$U = t + P(q)q - \theta q - K(I), \quad (3)$$

and we normalize at zero the firm's ex post outside opportunities.

This profit is made of any direct transfer from the government, the firm's revenue and is net of the production cost. This entails a fixed-cost related to the size of an ex ante investment I performed by the firm. This fixed-cost may for instance be viewed as the cost of operating an electricity, telecommunication or water network. We will assume that $K'(I) < 0$ with $K''(I) > 0$, so that a greater investment reduces the operating fixed-cost and does so at an increasing rate.

In many privatization cases, operators face well defined investment obligations, linked for example to the extension of the physical network. Without loss of generality, we normalize the size of this contractible and verifiable investment to zero. The investment I must therefore be understood as any additional "efficiency investment", which we assume is non-verifiable although observable by both parties.²² For instance, the government does not have the ability to commit beforehand to any regulatory scheme. The non-verifiable part of the firm's investment is thus under the threat of regulatory hold-up.

For further references, it may be useful to rewrite social welfare once the firm's transfer has been substituted as

$$W = S(q) + \lambda P(q)q - (1 + \lambda)(\theta q + K(I)) - \lambda(U + V) - I.$$

◆ **Information structure:** Asymmetric information is a key-ingredient of our modeling in two respects. First, it will justify the existence of information rents that the firm may get from holding private information. These rents are the key engine of investment under private ownership.²³ Second, the desire to keep those rents also creates a motive for capturing the politician and having him exert discretion to favor the firm rather than the general public.

Following the so-called New Regulatory Economics,²⁴ we will assume that the firm has private information on its marginal cost parameter θ . For simplicity, we adopt a simple

²²This observability is a standard assumption in the incomplete contract literature, see Hart (1995).

²³See Riordan (1990) and Schmidt (1996) for similar arguments.

²⁴See Laffont (1994).

discrete framework. This efficiency parameter may only take two values, $\theta \in \Theta = \{\underline{\theta}, \bar{\theta}\}$, with respective probabilities ν and $1 - \nu$.

Bridging this information gap between the firm and the rest of society, which remains uninformed, the politician observes a hard information signal $\sigma \in \Sigma = \{\theta, \emptyset\}$ with respective probabilities $\nu\varepsilon$ and $1 - \nu\varepsilon$. The firm and the politician both know σ . By hiding evidence that the firm is efficient, the politician may thus let the firm enjoy some rent. This discretion opens the door to the possibility that the politician get corrupted.

◆ **Corruption:** We shall assume that when the firm offers x dollars of bribes to the politician, the latter enjoys only a fraction kx of this amount. The non-negative parameter $k \leq 1$ thus reflects the efficiency of collusive side-deals. This parameter captures the extent to which norms of collusive behavior can easily be sustained or not, the degree of “corruption culture” that prevails in a society, the more or less important psychological costs that the public official might incur when being corrupted, the inefficiency that may be associated to non-monetary means of bribes between collusive partners, etc.²⁵

We shall assume that k is drawn according to a CDF $F(\cdot)$ with everywhere positive density $f(\cdot)$ on $[0, 1]$. Moreover, the following monotone hazard rate property is assumed to hold:

$$\frac{d}{dk} \left(\frac{F(k)}{f(k)} \right) > 0.$$

The collusion technology is known to both the firm and the politician but not to the general public.

It is important to stress that the randomness of k renders invalid the Collusion-Proofness Principle.²⁶ For a given regulatory contract, which determines the possible stake of collusion between the politician and the firm, collusion may or may not happen depending on the prevailing technology. If the wage received when behaving and reporting socially valuable information exceeds the benefits of colluding, collusion does not occur and vice-versa. With the technology for side-contracting being common knowledge, raising the public official’s wage above these collusive benefits would be enough to always prevent collusion.²⁷ However, when the benefits from colluding are uncertain as assumed here, raising that wage above the maximal benefit corresponding to the extreme value $k = 1$ is certainly too costly. When $k = 1$, society finds it as costly to give up information rent to the regulated firm than to pay a regulator to bridge the informational gap.

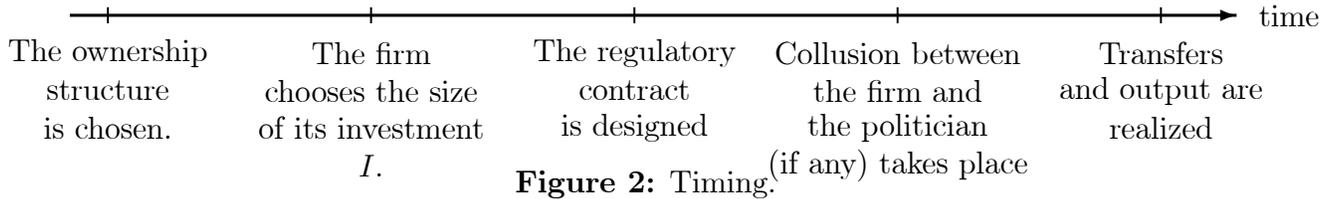
²⁵See Faure-Grimaud, Laffont and Martimort (2002) for further motivations behind this parameter.

²⁶See Tirole (1986) for a proof of this Principle in the case where the technology for side-contracting is common knowledge. Tirole (1992) also analyzed a model where the collusion technology k is unknown but may take only two values. He showed that collusion may be an equilibrium phenomenon when the efficient technology of collusion is unlikely. An example with a continuous support is also developed in Auriol (2006).

²⁷See again Tirole (1986, and 1992).

Instead, slightly reducing this wage induces some equilibrium corruption for the most efficient collusive technologies while corruption is still prevented for the least efficient ones. Moreover, doing so also reduces the budgetary burden of those wages. Hence, allowing some corruption in equilibrium is always optimal.

The timing of the game is in Figure 2.



From the Revelation Principle,²⁸ the most general class of contracts, which are feasible given the information structure is of the form

$$\left\{ s(\hat{\theta}, \hat{\sigma}); t(\hat{\theta}, \hat{\sigma}); q(\hat{\theta}, \hat{\sigma}) \right\}_{\hat{\theta} \in \Theta, \hat{\sigma} \in \Sigma},$$

where $\hat{\theta}$ is the firm's report on its cost and $\hat{\sigma}$ is the politician's report on the signal he has got on the firm's cost. For the sake of simplifying notations, we will denote such a contract

$$\left\{ (\underline{s}^*, \underline{t}^*, \underline{q}^*); (\underline{s}, \underline{t}, \underline{q}); (\bar{s}, \bar{t}, \bar{q}) \right\},$$

where $(\underline{s}^*, \underline{t}^*, \underline{q}^*)$ are respectively the politician benefits from holding office, the firm's transfer and its output when $\underline{\sigma} = \underline{\theta}$ (and thus $\theta = \underline{\theta}$). $(\underline{s}, \underline{t}, \underline{q})$ and $(\bar{s}, \bar{t}, \bar{q})$ are the same variables when $\sigma = \emptyset$ and respectively $\theta = \underline{\theta}$ and $\theta = \bar{\theta}$. Similar notations are used for the firm's profit $\underline{U}^*, \underline{U}$ and \bar{U} in each state of nature.

3 Benchmark: Benevolent Politician

A benevolent politician uses any piece of private information he may have learned on the firm to maximize social welfare and does not need to be paid any positive wage for doing so. Alternatively, with a benevolent politician, everything happens as if the efficiency of collusive deals k was identically null.

²⁸See Green and Laffont (1977), Myerson (1979) and Laffont and Martimort (2002).

◆ **Public Ownership:** When $\sigma = \underline{\theta}$ is observed and reported by the politician, the firm enjoys a profit

$$\underline{U}^* = \underline{t}^* + (P(\underline{q}^*) - \underline{\theta})\underline{q}^* - K(I) \geq 0. \quad (4)$$

When the uninformative signal $\sigma = \emptyset$ is instead observed by the politician, a regulatory mechanism is incentive-feasible when it satisfies the following incentive and participation constraints:

$$\underline{U} = \underline{t} + (P(\underline{q}) - \underline{\theta})\underline{q} - K(I) \geq \bar{t} + (P(\bar{q}) - \underline{\theta})\bar{q} - K(I) = \bar{U} + \Delta\theta\bar{q}, \quad (5)$$

$$\bar{U} = \bar{t} + (P(\bar{q}) - \bar{\theta})\bar{q} - K(I) \geq 0. \quad (6)$$

In two-types adverse selection problems as the present one where transfers are allowed, it is standard to show that only the efficient firm's incentive constraint and the inefficient one's participation constraint are relevant.²⁹

The optimal regulation with a benevolent politician under public ownership is summarized in the next proposition:

Proposition 1 : *Under public ownership and with a benevolent politician, the optimal outputs are respectively given by the following Ramsey formula:*

★ For an efficient firm, $\underline{q}_{Pu}^B = \underline{q}_{Pu}^{*B}$, such that

$$P\left(\underline{q}_{Pu}^B\right) - \underline{\theta} = -\frac{\lambda}{1+\lambda}P'\left(\underline{q}_{Pu}^B\right)\underline{q}_{Pu}^B; \quad (7)$$

★ For an inefficient firm,

$$P\left(\bar{q}_{Pu}^B\right) - \left(\bar{\theta} + \frac{\nu(1-\varepsilon)}{1-\nu}\frac{\lambda}{1+\lambda}\Delta\theta\right) = -\frac{\lambda}{1+\lambda}P'\left(\bar{q}_{Pu}^B\right)\bar{q}_{Pu}^B. \quad (8)$$

Only the efficient firm gets an information rent when $\sigma = \emptyset$. This rent does not depend on its ex ante investment:

$$\underline{U}_{Pu}^B = \Delta\theta\bar{q}_{Pu}^B > 0, \quad \text{and} \quad \bar{U}_{Pu}^B = \underline{U}_{Pu}^{*B} = 0. \quad (9)$$

The public firm does not invest, $I_{Pu}^B = 0$.

²⁹See Laffont and Martimort (2002, Chapter 2). In particular incentive constraints imply the standard monotonicity conditions $\underline{q} \geq \bar{q}$. We will see below that, when transfers are not allowed (i.e., the firm is private), even the inefficient firm's incentive constraint matters since only pooling mechanisms are possible ($\underline{q} = \bar{q}$).

Outputs follow traditional Ramsey formulas in this model with costly public funds. However, because of asymmetric information, the true cost of an inefficient firm $\bar{\theta}$ must now be replaced by its virtual cost $\bar{\theta} + \frac{\nu(1-\varepsilon)}{1-\nu} \frac{\lambda}{1+\lambda} \Delta\theta$, which is obviously greater. This reduces the output of an inefficient firm but also, and this is the benefit of doing so, the information rent that an efficient one gets.

Importantly, the rent of the efficient firm does not depend on its investment under public ownership. Indeed, any reduction in the fixed-cost that such investment would trigger is passed on to the taxpayers under public ownership. Those taxpayers reduce by the same amount the taxes they would pay to cover the firm's cost and have the firm at least break even. Nothing of this cost reduction is passed on to the firm itself, which thus does not internalize any of its investment. There is a complete dichotomy between the output decision, which depends only on variable costs, and the investment decision. In other words, under public ownership the source of the firm's information rent lies in its marginal cost only and the firm's incentives to invest are unrelated to its rent.

Because he cannot refrain from using those transfers and cannot commit to reward the investment, which is non-verifiable, the politician is unable to induce any investment from the public firm.³⁰

◆ **Private ownership:** Under private ownership, transfers are no longer feasible. The number of instruments, which can be used for screening purposes is thus reduced. As a result, only pooling mechanisms stipulating a constant output $\bar{q} = \underline{q}$ are available when the politician is uninformed, i.e., when $\sigma = \emptyset$. Of course, an optimal regulation can still set a different output \underline{q}^* when the politician is informed ($\sigma = \underline{\theta}$).

Proposition 2 : *Under private ownership and a benevolent regulator, the optimal outputs are function of the investment I and are respectively given by the following formula:*

★ For $\sigma = \underline{\theta}$,

$$P\left(\underline{q}_{Pr}^{*B}(I)\right) - \underline{\theta} = -\frac{\lambda^*(I)}{1 + \lambda^*(I)} P' \left(\underline{q}_{Pr}^{*B}(I)\right) \underline{q}_{Pr}^{*B}(I), \quad (10)$$

where $\lambda^*(I)$ is strictly decreasing in I and determined by the zero-profit condition

$$P\left(\underline{q}_{Pr}^{*B}(I)\right) = \underline{\theta} + \frac{K(I)}{\underline{q}_{Pr}^{*B}(I)}; \quad (11)$$

★ For $\sigma = \emptyset$, $\bar{q}_{Pr}^B = \underline{q}_{Pr}^B$ such that

$$P\left(\bar{q}_{Pr}^B(I)\right) - \bar{\theta} = -\frac{\tilde{\lambda}(I)}{1 + \tilde{\lambda}(I)} P' \left(\bar{q}_{Pr}^B(I)\right) \bar{q}_{Pr}^B(I), \quad (12)$$

³⁰This accords with general empirical findings, mentioned in the Introduction, that privatized firms become more efficient than their initial public counterparts.

where $\tilde{\lambda}(I)$ is strictly decreasing in I and determined by the zero-profit condition for an inefficient firm

$$P(\bar{q}_{Pr}^B(I)) - \bar{\theta} = \frac{K(I)}{\bar{q}_{Pr}^B(I)}. \quad (13)$$

Only the efficient firm gets an information rent

$$\underline{U}_{Pr}^B = \Delta\theta\bar{q}_{Pr}^B(I), \quad \text{and} \quad \underline{U}_{Pr}^{*B} = \bar{U}_{Pr}^B = 0. \quad (14)$$

The firm invests a positive amount I_{Pr}^B given by:

$$\nu(1 - \varepsilon)\Delta\theta\frac{\partial\bar{q}^B}{\partial I}(I_{Pr}^B) = 1. \quad (15)$$

The intuition behind this Proposition is straightforward. When regulatory transfers are banned, the only way that the firm's budget constraint can be satisfied is by decreasing output, raising the price mark-up (equations (10) and (12)) so that revenues cover the fixed-cost. Of course, doing so is easier and requires less output distortion when the fixed-cost itself is small enough (from a technical viewpoint the multipliers of the binding zero-profit constraints decrease in I). Output distortions, and thus the rent that an efficient firm gets, are now directly linked to the size of the investment. This desire for securing enough rent ex post whenever the benevolent political remains uninformed creates the firm's ex ante incentives to invest. Private ownership comes with a harder budget constraint and greater ex ante investment.³¹

4 Corruption

Let us now consider the case of a non-benevolent politician who can thus be corrupted by the industry. Contrary to most of the existing literature on capture,³² we assume that there exists a whole distribution of non-benevolent politicians, who differ in terms of their willingness to collude with private interests, or to put it differently, in terms of the transaction costs of collusive behavior that they face when engaging in side-deals. This assumption ensures that corruption is always an *equilibrium phenomenon*; i.e., at

³¹Although this result has the flavor of those found in Riordan (1990), Schmidt (1996) and Faure-Grimaud (2001), it should also be contrasted with those papers along several lines. In our model, the difference between the ownership structures comes from the different contracting abilities of the government as an owner and the government as a simple regulator, not from differences in the information structures as is assumed (in the first two pieces) or derived (in the last one) in these works. Although our analysis could be put on the firmer foundations used in those models, it does not seem useful for our current purposes. Also, investment in the previous literature affects the distribution of marginal cost, not the fixed-cost as here.

³²See Laffont and Tirole (1993, Chapter 15) for instance. A noticeable exception is Auriol (2006).

the social optimum, there is always some positive probability that the public official is corrupted.

To see that point formally, observe that the stake of corruption in our model is the rent $\Delta\theta\bar{q}_i$ ($i \in \{Pu, Pr\}$) that the firm can secure whenever the informed politician ($\sigma = \underline{\theta}$) reports instead having observed nothing ($\hat{\sigma} = \emptyset$). Whenever his benefits of doing so exceed the gains $\Delta\theta\bar{q}_i$ from being corrupted, the politician reports publicly the hard information signal on the firm being efficient and pockets the corresponding reward s_i^* . This occurs with probability

$$\Pr \left\{ \tilde{k}\Delta\theta\bar{q}_i \leq s_i^* \right\} = F \left(\frac{s_i^*}{\Delta\theta\bar{q}_i} \right).$$

Instead, when the collusion technology is sufficiently efficient, namely when $\tilde{k}\Delta\theta\bar{q}_i > s_i^*$, the politician hides evidence on the type of the firm and prefers to accept its favor rather than behaving.

When corruption is possible, we may write expected welfare under any ownership regime i ($i \in \{Pu, Pr\}$) as:

$$\begin{aligned} E_{(\theta,\sigma)}(W_i) &= \nu\varepsilon F \left(\frac{s_i^*}{\Delta\theta\bar{q}_i} \right) \left(S(\underline{q}_i^*) - \underline{\theta}\underline{q}_i^* - \lambda(\underline{t}_i^* + s_i^*) \right) \\ &\quad + \nu\varepsilon \int_{\frac{s_i^*}{\Delta\theta\bar{q}_i}}^1 \left(S(\underline{q}_i) - \underline{\theta}\underline{q}_i - \lambda\underline{t}_i + (\tilde{k} - 1)\Delta\theta\bar{q}_i \right) f(\tilde{k}) dk \\ &\quad + \nu(1 - \varepsilon) \left(S(\underline{q}_i) - \underline{\theta}\underline{q}_i - \lambda\underline{t}_i \right) \\ &\quad + (1 - \nu) \left(S(\bar{q}_i) - \bar{\theta}\bar{q}_i - \lambda\bar{t}_i \right) - K(I_i) - I_i, \end{aligned} \tag{16}$$

where $E_{(\theta,\sigma)}(\cdot)$ is the expectation operator and I_i represents the investment under the corresponding ownership structure.

The different terms on the right-hand side of (16) can be readily interpreted. The first term represents the expected welfare given that the politician is informed but corruption does not take place because the transaction technology is inefficient enough. Because of the cost of public funds, transferring money either to the politician or to the firm is costly. The second term represents expected social welfare when collusion does occur on the equilibrium path. The politician gives up any wage he may receive and prefers bribes. Because bribes are inefficient ways of transferring wealth, there is a dead-weight loss of corruption (the term $(\tilde{k} - 1)\Delta\theta\bar{q}_i < 0$) which is a cost of corruption. The third and fourth terms are easily interpreted as the expected welfare when the politician remains uninformed.

This expression shows that, whenever corruption occurs, the politician enjoys the benefits $\tilde{k}\Delta\theta\bar{q}_i$ and the firm, when public, receives a transfer \underline{t}_i from the general budget

even though the signal σ learned by the politician is informative. In that case, we assume that the politician has all the bargaining power in negotiating bribes with the firm, which therefore gets no rent.³³ Note also that, when corruption is an equilibrium phenomenon, the regulatory scheme is still designed to induce information revelation from the firm, but of course, this is costly in terms of information rent left to the firm and finally pocketed (at least partially) by the politician.

The optimal incentive regulation with corruption must maximize (16) subject to the incentive and participation constraints (4) to (6). Of particular importance is the optimization with respect to s_i^* , the politician's wage. To understand the corresponding first-order condition, it is useful to stress two different effects of raising s_i^* . On the one hand, raising s_i^* indeed increases the probability that the politician prefers not to be corrupted. On the other hand, doing so is of course socially costly.

To better understand this optimization, let us define $k_i^* = \frac{s_i^*}{\Delta\theta\bar{q}_i}$ as a new optimization variable, which replaces s_i^* . k_i^* is a threshold in the efficiency of the collusive technologies, above which corruption occurs in equilibrium. The corresponding first-order condition with respect to k_i^* becomes:³⁴

$$\left\{ \left[S(\underline{q}_i^*) - \underline{\theta}\underline{q}_i^* - (S(\underline{q}_i) - \underline{\theta}\underline{q}_i) \right] + \Delta\theta\bar{q}_i - \lambda[\underline{t}_i^* - \underline{t}_i] - (1 + \lambda)k_i^* \Delta\theta\bar{q}_i \right\} f(k_i^*) = \lambda F(k_i^*) \Delta\theta\bar{q}_i. \quad (17)$$

This condition can be simplified further by using the property of the optimal regulatory contract in each ownership regime. This is the task to which we now turn.

4.1 Public Ownership

Consider first the case of public ownership. Two remarks are in order. First, Proposition 1 shows that production is first-best, i.e., $\underline{q}_{Pu} = \underline{q}_{Pu}^*$ at the optimal contract if the politician is benevolent. It is easy to check that this condition still holds if the politician is corruptible.³⁵ Second, still using the fact that (4) and (5) are binding at the optimal contract, the difference between the firm's transfers when its type is reported by the politician and when it is not is given by:

$$\underline{t}_{Pu} - \underline{t}_{Pu}^* = \Delta\theta\bar{q}_{Pu}.$$

³³This assumption is without loss of generality and we could allow for a different distribution of the bargaining surplus. Note that empirically, politicians indeed seem to have captured the bulk of efficiency gains to the detriment of firms and, of course, consumers (see Estache, Guasch and Trujillo, 2003).

³⁴This condition is also sufficient thanks to the monotonicity of the hazard rate, which ensures quasi-concavity with respect to k_i^* .

³⁵See the Appendix for details.

Intuitively, when the politician is not corrupted but remains informed, he helps society to extract the efficient firm's rent $\Delta\theta\bar{q}_{P_u}$. This reduces the burden of incentive regulation on taxpayers by the same amount.

Finally, using the two remarks above helps simplifying (17) to get that $k_{P_u}^*$ solves:

$$k_{P_u}^* + \frac{\lambda}{1 + \lambda} \frac{F(k_{P_u}^*)}{f(k_{P_u}^*)} = 1. \quad (18)$$

Because the monotone hazard rate property holds, the left-hand side of (18) is strictly increasing and this equation admits a unique solution in $]0, 1[$ so that corruption is *always* an equilibrium phenomenon.

Proposition 3 : *The probability of corruption $1 - F(k_{P_u}^*)$ is always positive with public ownership and it increases with the cost of public funds λ .*

As λ increases, fighting corruption by raising $s_{P_u}^*$ becomes increasingly costly from a social viewpoint. It is then preferable to let more corruption occur at equilibrium. This comparative statics points at an interesting aspect of the analysis. Developing countries characterized by a large cost of public funds, because of large public deficits or highly distortionary and inefficient tax systems, are also likely to face a high level of corruption under public ownership. International agencies have often pushed the view that such countries should rely more on the private sector to undertake major investments in infrastructure. As we will point out below in more details, this may not be warranted, as corruption will still be present under private ownership and its scope will depend on the economic characteristics of the privatized sector.

The other impact of corruption is that it changes the firm's output and the distribution of rents, without nevertheless affecting the incentives to invest.

Proposition 4 : *Under public ownership and with a corruptible politician, the efficient firm always produces efficiently $\underline{q}_{P_u}^c = \underline{q}^{*c} = \underline{q}_{P_u}^B$, whereas the inefficient firm output becomes:*

$$P(\bar{q}_{P_u}^c) - \left(\bar{\theta} + \frac{\lambda\nu}{(1 + \lambda)(1 - \nu)} \left(1 + \varepsilon \left(\frac{1}{\lambda} \int_{k^*}^1 (1 - \tilde{k}) f(\tilde{k}) d\tilde{k} - F(k^*)(1 - k^*) \right) \right) \right) = \frac{-\lambda}{1 + \lambda} P'(\bar{q}_{P_u}^c) \bar{q}_{P_u}^c. \quad (19)$$

Only the efficient firm obtains a rent $\underline{U}_{P_u}^c = \Delta\theta\bar{q}_{P_u}^c$, which does not depend on the investment level, so that the public firm still has no incentives to invest and $I_{P_u}^c = 0$.

Everything happens as if the virtual cost parameter of an inefficient firm were now given by the following expression

$$\bar{\theta} + \frac{\lambda}{(1+\lambda)} \frac{\nu}{(1-\nu)} \left(1 + \varepsilon \left(\frac{1}{\lambda} \int_{k^*}^1 (1-\tilde{k}) f(\tilde{k}) d\tilde{k} - F(k^*)(1-k^*) \right) \right) \Delta\theta.$$

Compared with the case of a benevolent politician, this virtual cost is of course greater. This captures the fact that now distortions are also necessary to reduce the cost for society of having an informed but non-benevolent politician. Those additional distortions have two sources. First, they come from the fact that a non-negative and socially costly wage ($s^* = k^* \Delta\theta \bar{q}_{P_u}^c$) is given to the politician to ensure that he behaves at least when the technology of collusion is sufficiently inefficient, i.e., with probability $F(k^*)$; a greater output increases the firm's information rent and would require to raise the wage of the politician beyond the efficient level. Second, these distortions are also necessary when the technology of collusion is efficient enough. In that case, the informed politician is corrupted so that he does not reveal information. Society has to give up some information rent to the firm for inducing this information revelation. However, and this is a side-effect of corruption being an equilibrium phenomenon, this rent ends up being pocketed by the corrupted politician and this brings an extra cost under the form of a deadweight loss of collusion (the term $\int_{k^*}^1 (1-\tilde{k}) f(\tilde{k}) d\tilde{k}$ in the expression of the virtual cost parameter).

Finally note that, even with corruption, the public firm's expected rent does not depend on its investment, so that again public ownership goes hand in hand with some underinvestment.

4.2 Private Ownership

With private ownership, transfers can no longer be used and the optimal regulation entails some pooling when no informative signal is revealed by the politician ($\sigma = \emptyset$), namely $\underline{q}^* > \underline{q} = \bar{q}$.

Condition (17) can now be simplified to get the new expression of the cut-off:

$$k_{P_r}^* + \frac{\lambda}{1+\lambda} \frac{F(k_{P_r}^*)}{f(k_{P_r}^*)} = \frac{S(\underline{q}_{P_r}^*) - \underline{\theta} \underline{q}_{P_r}^* - [S(\bar{q}_{P_r}) - \bar{\theta} \bar{q}_{P_r}]}{(1+\lambda) \Delta\theta \bar{q}_{P_r}}. \quad (20)$$

Again $\underline{q}_{P_r}^*$ and \bar{q}_{P_r} take the same values defined in (10) to (13), i.e. just helping the firm to cover its fixed-cost in each state of nature.

To better understand (20) and compare it with (18), let us assume that $\Delta\theta$ is small enough. In that case, the multipliers of the firm's break-even constraints $\lambda^*(I)$ and $\tilde{\lambda}(I)$, when the politician is informed and when he is not respectively, are close to each other.

The following approximation holds:³⁶

$$k_{Pr}^* + \frac{\lambda}{1 + \lambda} \frac{F(k_{Pr}^*)}{f(k_{Pr}^*)} \approx \frac{1 + \tilde{\lambda}(I)}{1 + \lambda} < 1 \quad \Leftrightarrow \quad \tilde{\lambda}(I) < \lambda. \quad (21)$$

This gives immediately:

Proposition 5 : *Assume that $\Delta\theta$ is small enough, then the probability of corruption $1 - F(k_{Pr}^*)$ under private ownership is larger than the probability of corruption $1 - F(k_{Pu}^*)$ under public ownership if and only if $\tilde{\lambda}(I) > \lambda$.*

To understand the intuition behind this proposition, note that, under private ownership, the gains from having a non-corrupted politician are no longer pocketed by taxpayers but by consumers, who pay a lower price for the firm's output when it is efficient and the politician is informed. For $\Delta\theta$ small enough this gain on the consumers' surplus can be approximated by $(1 + \tilde{\lambda}(I))\Delta\theta\bar{q}_{Pr}$. This is nothing else than the information rent of an efficient firm conveniently weighted by a factor $1 + \tilde{\lambda}(I)$ to capture the impact that a truthful report of the politician has on hardening the efficient firm's break-even constraint.

As the firm's investment decreases and breaking even becomes harder, the multiplier $\tilde{\lambda}(I)$ increases. By the same token, the probability of corruption increases as well. This points to a negative correlation between investment and corruption under private ownership.³⁷

However, our model is consistent with the possibility that a positive investment under private ownership also comes with more corruption than under public ownership. Indeed, when the cost of public funds λ is not too large, for instance because the government's deficit is small or because the taxation system is relatively efficient, the probability of corruption under public ownership is small. It can be made even smaller than under private ownership.

To understand the impact of the ownership structure on corruption, first note that transferring one more dollar from society, and most specifically taxpayers, to a politician in order to prevent corruption has a cost $1 + \lambda$ on the general budget of the State, where λ is the cost of public funds. This extra dollar prevents the public firm from siphoning public funds at the same rate. Instead, under private ownership, public funds can no longer be siphoned that way. Consumers now bear the cost of corruption in terms of higher prices. The transfer of wealth from society, and now more specifically from consumers, to the politician has a cost $1 + \tilde{\lambda}(I)$ where $\tilde{\lambda}(I)$ is actually the shadow cost of the private

³⁶See the Appendix for details.

³⁷Dal Bo and Rossi (2003) provide evidence of a negative correlation between efficiency and corruption for the electricity sector in Latin America. Estache (2004) reviews additional references from South Asia, Africa and Eastern Europe.

firm's budget constraint, which, of course, depends on its investment I . However, fighting corruption by raising the wage of the public officials still requires to withdraw $1 + \lambda$ from the State's budget.

Comparisons between the two different ownership structures in terms of corruption follow immediately. When $\tilde{\lambda}(I) < \lambda$, there is less equilibrium corruption under private ownership than under public ownership. It becomes relatively difficult to transfer resources for corrupted activities and fighting them is comparatively easier. Instead, when $\tilde{\lambda}(I) > \lambda$, private ownership also generates more corruption. The degree of equilibrium corruption is greater when efficiency and investments are themselves greater.

Our model also predicts that a shift towards private ownership may thus increase corruption when $\tilde{\lambda}(I)$ is larger than λ . This is likely to be the case for regulated sectors which, when public, enjoyed large subsidies from the rest of the economy, or sectors which involve large fixed-costs and require significant output distortions and large mark-ups to help private firms break-even. This indicates when the paradoxical situation in which investment and increased corruption go hand in hand is more likely to prevail. Sectors like water and transport are typical candidates for that paradox since they tend to be net recipients of transfers from the state³⁸ and involve large sunk investments. These are also sectors that typically remain non-competitive, making corruption through price manipulation easier in the absence of any kind of benchmarking.³⁹

For completeness, let us analyze the impact of corruption on outputs and investment in the case of private ownership. Looking at (16) in the case where transfers are banned and outputs \underline{q} and \bar{q} are pooled together, we observe that outputs and investments are unchanged. The only role of corruption is to make it more likely that an efficient firm produces $\bar{q}_{Pr}^B(I)$ instead of $\underline{q}_{Pr}^{*B}(I)$.

Both when the politician is not corrupted and reports publicly this information and when he is corrupted and pockets the rent for himself, the private firm is expropriated by the politician from the rent it may get in state $\sigma = \underline{\theta}$. This reduces the benefits of investing for the private firm (term $1 - \varepsilon$) and yields the same investment level as with a benevolent politician.

Summarizing, we get:

Proposition 6 : *Under private ownership and with a corruptible politician, outputs are again only defined by the firm's break-even conditions, so that formula (10) to (13) still hold. The investment remains unchanged and is still equal to its value with a benevolent*

³⁸See Guasch, Laffont and Straub (2003).

³⁹Of course, the speed at which competition is introduced is then determined simultaneously with corruption, as argued on the basis of case studies by Manzetti (1999) and Rose-Ackerman (1999).

political:

$$I_{Pr}^c = I_{Pr}^c.$$

5 The Perception of Corruption

We have established so far conditions under which a shift to private ownership of a major public service provider may increase the incidence of corruption. In this section, we discuss how the cost of this corruption affects different social groups and how this may shape their evaluation of the process. Interest groups may form as effective watchdogs and reduce the likelihood of corruption through different channels. They may themselves gather information and make it available to the general public. They may also induce more coverage by medias of instances of misbehavior by public officials. Individuals can react to what they think are high prices due to corruption by voting against tenured politicians if they expect higher utility levels under alternative and uncorrupted political regimes.

We will argue that the firm's ownership structure has important implications for the political reactions of both individuals and interest groups faced with the threat of corrupt activities.

Both individuals' and groups' incentives to react to corruption are of course related to the per-capita stake of doing so as well as to various transaction or psychological costs. Following an insight due to Olson (1971), corruption might become less likely when small, homogeneous, less disperse interest groups facing lower transaction costs of organizing themselves intervene. For individuals, acting politically against the threat of corruption might necessitate investing in education and information to understand the terms of the political debate and the basic trends at play. In any case, various factors may influence the incentives of both interest groups and individuals to have a disciplinary effect on presumed corrupted politicians.

For the purpose of our discussion, it is useful to distinguish the exogenous versus endogenous determinants of these incentives. On the one hand, individuals in a given population might be differentiated according to a number of exogenous aspects, including in particular their income level and their geographical location. On the other hand, the economic stakes of different individuals are endogenously determined in our model by the difference in ownership structures and thus regulatory policies.

To capture more formally the role of groups and individuals (excluded consumers, served consumers, taxpayers) as disciplinary devices for corrupted politicians, we will assume that they may react *ex post*, i.e., once the politician has already reported $\hat{\sigma} = \emptyset$,

to check whether that report is truthful or not. Depending on whether unorganized individuals or better organized interest groups are concerned, this reaction might take different forms, from not voting for incumbents to a greater involvement in political life and lobbying campaigns against corruption. All those political actions represent the actual level of discontent that society may face in front of the presumption of a corrupted economic life. At this stage, we do not need to be too explicit about the disciplinary role that individuals/interest groups may exert on corruptible politicians.⁴⁰ Formally, let us denote by x_i^j the probability that a group/individual j gets concerned about the likelihood of corruption in ownership regime i . This probability should be a function of its stake S_i^j in correcting the politician's misbehavior, namely:

$$x_i^j = G^j(S_i^j).$$

with $G_S^j > 0$ and $G^j(0) = 0$. This function $G^j(\cdot)$ itself depends on the group/individual j to capture some fundamental heterogeneity across them.

As a change in ownership occurs, the probability that different groups/individuals react to corruption changes. For instance, taxpayers are by definition inactive under private ownership since regulated transfers are banned. Instead, they might perceive corruption under public ownership since such corruption increases the burden of taxation for taxpayers. This is the reverse for consumers, who are more prone to perceive corruption when they face a high price for the service. The respective assessment of the benefits of the privatization process for those different groups can then be viewed as the difference $\Delta x^j = x_{Pu}^j - x_{Pr}^j$, which encapsulates how the privatization process affects the incentives to react of the concerned constituency (maybe through an impact on access, prices, quality, etc.).

Let us now illustrate in more details how taxpayers and consumers may perceive differently the shift from public to private ownership. First, observe that, under public ownership, only taxpayers may suffer from the possible corruption of the politician, which takes the form of increased transfers and thus a higher tax burden. On the other hand, whether officials are corrupted or not, an efficient firm must be paid enough transfer to reveal information but its output remains efficient, so consumers have no incentives to react to corruption because their net surplus remains the same whether $\hat{\sigma} = \underline{\theta}$ or $\hat{\sigma} = \emptyset$ and $\hat{\theta} = \underline{\theta}$. As such, corruption is not perceived by consumers.

More precisely, under public ownership, the taxpayers' stake $S_{Pu}^{taxpayers}$ for intervening and checking potential corrupt behavior is given by the difference between what they pay in case the politician is corrupted and information revelation has to be induced from the firm itself and what they would pay in terms of wages to the politician in case the

⁴⁰See nevertheless the Appendix where we develop a bare-boned model of such a disciplinary role in the case where consumers are organized as efficient watchdogs.

politician chooses not to be corrupted. This yields the following expression:

$$S_{P_u}^{taxpayers} = \nu\varepsilon \int_{k_{P_u}^*}^1 (\underline{t}_{P_u} - (t_{P_u}^* + s_{P_u}^*)) f(\tilde{k}) d\tilde{k} = \nu\varepsilon \Delta\theta \bar{q}_{P_u} (1 - k_{P_u}^*) (1 - F(k_{P_u}^*)).$$

Note that this stake increases with the probability of corruption under public ownership, i.e., when the taxation system is sufficiently inefficient. Taxpayers are more likely to perceive the cost of corruption under public ownership when the cost of public funds is large. To the extent that taxpayers represent a minor, wealthier share of society (which is the case in most Latin American countries) and that an increase in the tax burden due to corruption can be easily disguised as coming from deteriorating macroeconomic conditions (Shleifer and Vishny, 1994), the quantity $\Delta x^{taxpayers} = G^{taxpayers}(S_{P_u}^{taxpayer})$ is likely to be small. Even if it is significant, this quantity remains positive, showing that taxpayers enjoy a shift towards private ownership and, as such, are not likely to express any discontent.⁴¹

Under private ownership, corruption is more easily readable by the general public, who, as consumers, might observe a significant price increase and may suspect from that the existing corruption. The consumer's expected stake for reacting to the threat of corruption under private ownership is now given by:

$$S_{P_r}^{consumers} = \nu\varepsilon (1 - F(k_{P_r}^*)) (S(\underline{q}_{P_r}^*) - P(\underline{q}_{P_r}^*) \underline{q}_{P_r}^* - (S(\bar{q}_{P_r}) - P(\bar{q}_{P_r}) \bar{q}_{P_r}))$$

where $1 - F(k_{P_r}^*)$ is the probability of corruption under private ownership and \bar{q}_{P_r} is the output level given this level of corruption.

Corruption is likely to weight heavily on the public's perception of the privatization process when consumers of the public service represents a sizeable share of society. Specifically, the quantity $\Delta x^{consumers} = -G^{consumers}(S_{P_r}^{taxpayer})$ is more likely to be significant and, in any case, is negative.⁴² This points to the fact that consumers are more likely to express their discontent as ownership shifts to the private sector. Our model thus shows that while the increase in corruption is likely to be linked to a general increase in dissatisfaction, the changing pattern of corruption implies that this increase will be stronger among the middle class, both because of their exogenous characteristics and because they are the big losers in the biased distribution of efficiency gains.

⁴¹Since $G^{taxpayers}(S_{P_r}^{taxpayers}) = 0$. Note that they still might express some discontent to the extent that they are consumers as well.

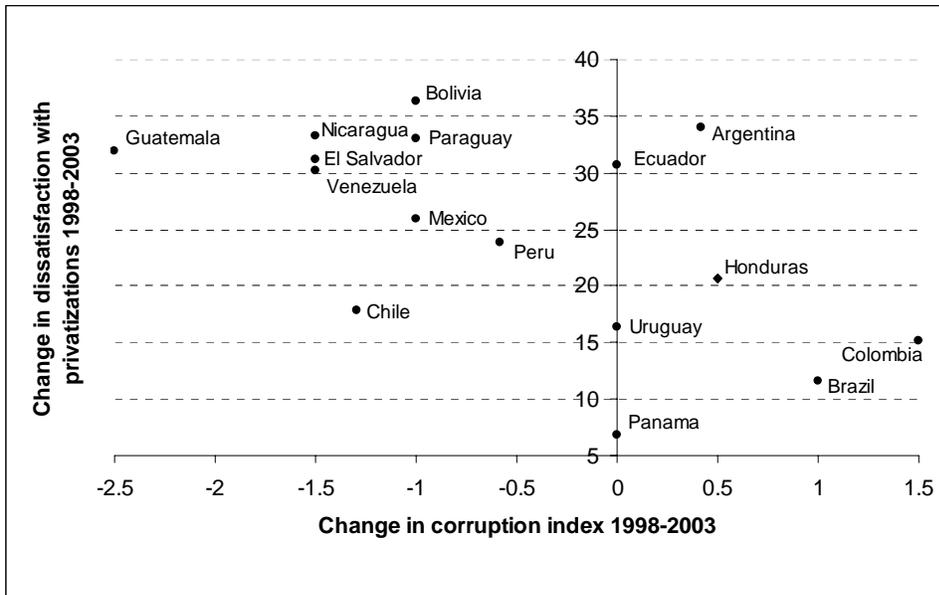
⁴²Here again, $G^{consumers}(S_{P_u}^{consumers}) = 0$.

6 Stylized Facts and Discussion

We have shown that a shift towards private ownership of key regulated industries is likely to result in a situation characterized by both increased efficiency and more corruption, and by a higher level of discontent among middle class consumers. In what follows, we present supportive stylized facts documenting the link between corruption, the perception thereof, and the public expressions of distrust toward the benefits of privatization.

Figures 3 and 4 present simple scatter plots of changes in the degree of dissatisfaction with privatization over the period 1998-2003 versus either the change or the absolute level of a corruption index.⁴³ The correlation coefficients are -0.58 and -0.51 respectively.

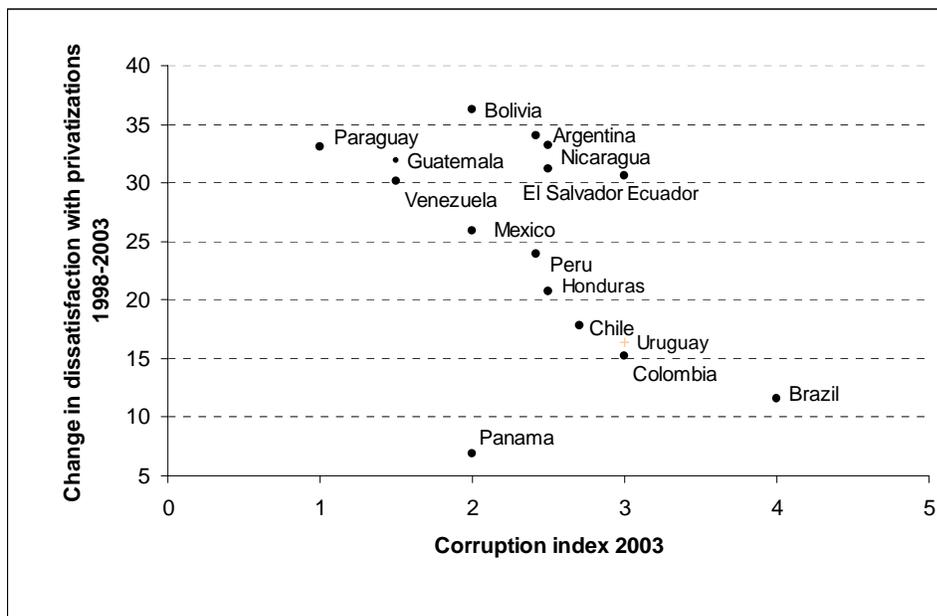
Figure 3: Correlation between changes in dissatisfaction with privatizations and changes in corruption, 1998-2003.



Sources: Latinobarometro and International Country Risk Guide

⁴³Dissatisfaction figures are from Latinobarometro (see footnote 4). The corruption index used is from Political Risk Service. The scale goes from 0 to 6, with a higher score denoting less corruption. Note that in the Latin American sample, between 1998 and 2003, average corruption actually increased by two thirds of the 1998 standard deviation.

Figure 4: Correlation between changes in dissatisfaction with privatizations, 1998-2003, and corruption, 2003.



Sources: Latinobarometro and International Country Risk Guide

These correlations are consistent with a wealth of anecdotal evidence on the long tradition of corruption that has plagued Latin American economic policy making, especially when it comes to the sale of public firms.⁴⁴ In many cases, like the corruption scandal that resulted in the eviction of the Brazilian president Fernando Collor de Mello in 1992 or the revelation on some of the deals made under the Menem presidency in Argentina, the whole privatization process came under suspicion and this created a deep public distrust in this type of policy intervention and in market reforms more generally. Moreover, anti-privatization lobbies often capitalized on such cases, thus giving high visibility to the issue.

Although these correlations do of course not establish a causal link between the feeling that corruption has increased, or has not been addressed properly, and the dissatisfaction with privatization, it is possible to further document the relationship between both in the respondents' answer to the successive surveys. First, note that corruption is consistently perceived as a major issue by respondents across Latin America. In 1998, 94.9% overall (96% in 2000) consider it to be a serious or very serious problem.⁴⁵

As for the link between perceptions, in 2003, people were asked whether they considered that progress was made in reducing corruption.⁴⁶ Dissatisfaction with privatization

⁴⁴See for example Manzetti (1999) and Tulchin and Espach (2000).

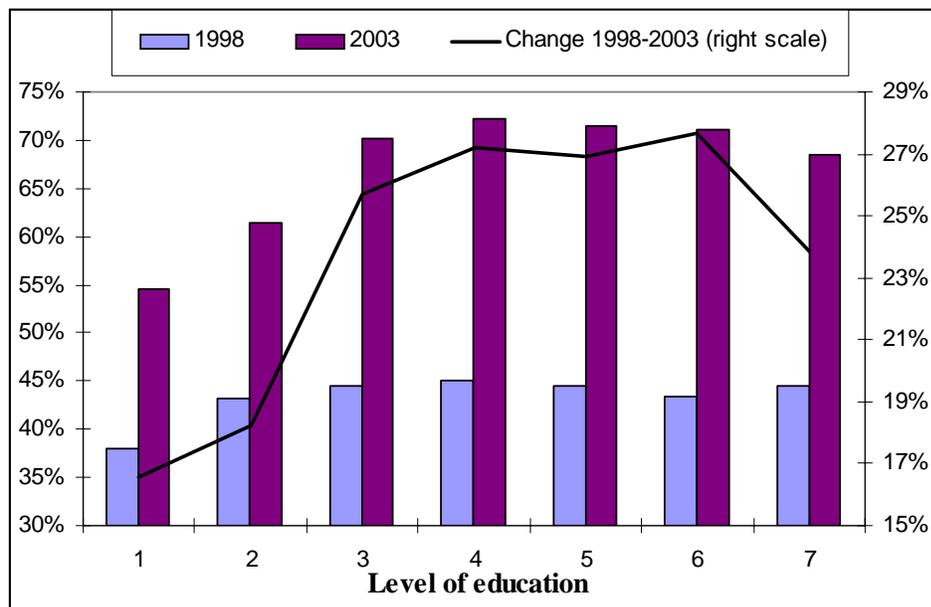
⁴⁵The question was not included again in this form in later surveys.

⁴⁶People were asked whether there had been a lot/some/little or no progress.

is higher among those answering that no or little progress was made (71.2% and 69.5% respectively), than among more optimistic respondents considering that some or a lot of progress was made (60.3% and 58.5% respectively). Thus, a similar pattern is obtained using individual survey answers on corruption rather than country level subjective indices.

Moreover, perceptions of corruption are linked to the political economy of the process and the shifts that privatizations induce in the distribution of costs and benefits. Indeed, another striking figure coming out of opinion polls is the fact that the middle class is in general more critical of privatization than any other group. Looking at education levels, Latinobarometro data show that dissatisfaction is stronger among those with some secondary or technical education than among the groups with either no education or complete college education and that, from 1998 to 2003, the biggest increase in dissatisfaction with privatizations was recorded for groups with intermediate education levels (Figure 5).

Figure 5: Dissatisfaction with privatizations by level of education

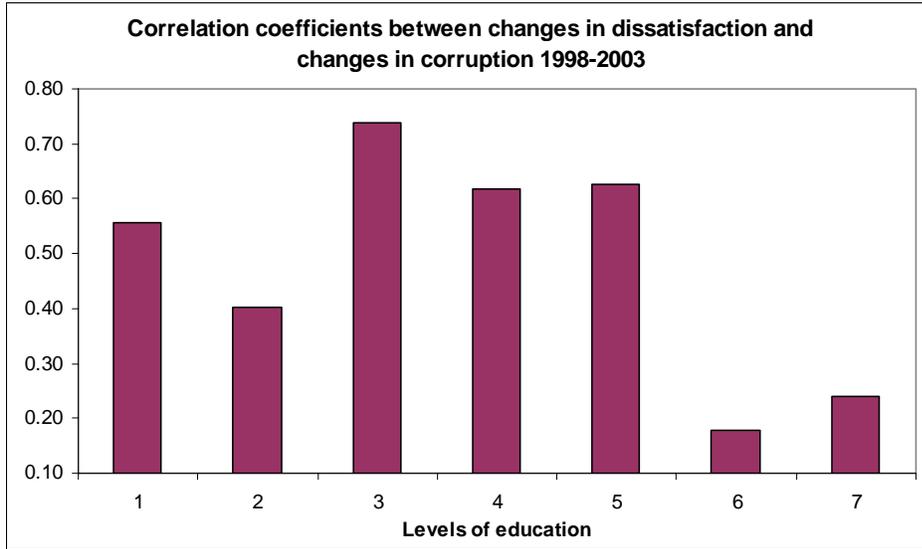


Levels of education: 1.= illiterate; 2 Basic incomplete; 3 = Basic complete; 4 = Secondary, medium, technical incomplete; 5 = Secondary, media, technical complete; 6 = Superior incomplete; 7 = Superior complete.

Source: Latinobarometro 1998 and 2003.

Finally, for the groups that express the highest levels of dissatisfaction and have increased their criticisms the most, we also observe strong correlation coefficients across countries between these changes in dissatisfaction and the changes in corruption, meaning again that the correlation observed in Figures 3 and 4 above are mainly driven by dissatisfaction among the middle class (Figure 6).

Figure 6: Correlation coefficients between changes dissatisfaction and in corruption



Source: Latinobarometro 1998 and 2003

Simple estimation results further support these stylized facts. Table 1 presents results from ordered probit estimations based on the individual answers to the Latinobarometro survey between 1998 and 2003. The dependent variable is the degree of satisfaction with privatizations expressed by respondents. For the sake of conciseness we present only the results for the explanatory variables relevant to our analysis, i.e. corruption and the level of education, while indicating the other types of control variables included in the analysis. In all cases, year and country dummies are included. In columns 2 to 4, we add individual characteristics, dummies capturing individual asset holdings, access to basic services, survey answers on political and governance aspects and a measure of the extent of current privatization in the country. The resulting sample includes between 61,576 and 82,139 individuals across 17 countries and 5 years.⁴⁷

The effect of corruption proves remarkably robust in all specifications, being significant at the 1% level. The negative sign means, as expected, that an increase in the index (less corruption) implies a higher level of satisfaction. In columns 2 to 5, the education level of the survey respondent exhibits the expected inverse U-shaped pattern. Finally, in column 5, we interact corruption with dummies for basic, medium or superior education and confirm that the effect of corruption is stronger and more significant for individuals with intermediate levels of education.

Table 1: Ordered probit estimations.

⁴⁷The Latinobarometro survey was not carried out in 1999.

	(1)	(2)	(3)	(4)	(5)
Year dummies	Yes	Yes	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes	Yes	Yes
Individual characteristics		Yes	Yes	Yes	Yes
Individual assets			Yes	Yes	Yes
Access to services			Yes	Yes	Yes
Additional survey answers				Yes	Yes
Privatization proceeds				Yes	Yes
Corruption	-0.052 (6.40)**	-0.052 (6.37)**	-0.044 (5.32)**	-0.030 (3.04)**	
Education		0.038 (4.81)**	0.027 (3.18)**	0.026 (2.77)**	0.073 (3.97)**
Education ²		-0.007 (7.10)**	-0.004 (3.88)**	-0.004 (3.07)**	-0.008 (3.73)**
Corruption * basic educ dummy					-0.023 (2.13)*
Corruption * med educ dummy					-0.033 (3.24)**
Corruption * sup educ dummy					-0.030 (2.52)*
N	82139	82119	78170	64329	61576
Educ. threshold		2.73	3.27	3.64	4.38

Ordered probit estimations. Absolute value of z statistics in parentheses (* significant at 5%; ** significant at 1%)
Notes: Dependent variable is categorical variable on whether the privatizations of state enterprises have been beneficial to the country. It takes values 1 to 4 (1= strongly agrees, 2= agrees, 3= disagrees, 4= strongly disagrees). Individual characteristics include *sex* and *age*. Individual assets include dummies for *color TV set, fridge, computer, wash machine, phone line, car, holiday house, tenancy vs. ownership*. Access to services includes dummies for *potable water, hot water and sewage*. Additional survey answers refer to political and governance aspects: *left/right*, and *trust in judicial power*. Proceeds is a dummy equal to one if privatization proceeds exceed US\$ 2000 mill. Corruption and education are defined as previously.

These facts can be related straightforwardly to our theoretical framework. Indeed, we expect individuals' incentives to form groups and actively engage in watchdog activities, and therefore their awareness of the level of corruption, to be related to the per-capita stake as well as to their transaction costs of doing so. First, individuals have exogenous characteristics, which are unlikely to be substantially modified by the occurrence of privatizations.⁴⁸

A pervasive characteristic of infrastructure services is the fact that some geographical areas are more expensive to serve for a variety of reasons, including distance to the existing network, low population density and low levels of consumption. Consumers in these areas also have a lower likelihood to engage in monitoring activities and express concerns about privatizations. Moreover, under public ownership, electricity, telecommunication or water

⁴⁸McKenzie and Mookherjee (2003) show that even the medium run effect of privatization on income is in general relatively small and is likely to be second order compared to the impact of other economic events.

networks in Latin America have typically failed to provide universal service to such less profitable categories of consumers, general located in poor rural communities as well as some less developed urban areas. The fact that many of them have gained access to the service after the change in ownership is likely to exert an important and positive effect on their perception of the benefits of the process.⁴⁹

On the other hand, middle class consumers have higher incentives to care about corruption, both for exogenous reasons linked to their characteristics and tradition, and because they face higher stakes of doing so, as shown in the model. As they interpret any evidence of corruption as operating a transfer, through higher prices, of a chunk of the efficiency gains from them to corrupt politicians and firm managers, they indeed express stronger dissatisfaction with the privatization process.

Looking more closely at prices, the policy literature suggests several mechanisms through which such transfers may have been realized. The first one is a change in the structure of taxes. In most Latin American countries, middle class households pay little direct income taxes. On the other hand, privatizations have included significant increases in more regressive indirect taxes as a way for the government to capture efficiency gains. While in absolute terms the impact of privatization on middle class groups seem to have been mostly neutral to positive (McKenzie and Mookherjee, 2003), this change in the structure of prices and taxes is likely to have fuelled their perception of corruption. The stylized facts are indeed consistent with the story in our model, in which governments and firms conceal information on efficiency gains and agree on high service prices. The fact that in many cases basic prices decreased, while tariffs including prices and indirect taxes increased, seems to indicate that these taxes were used by government to subsequently capture the surplus created by efficiency-enhancing privatizations.⁵⁰

Finally, an additional potential channel involves quality effects, as there is a presumption that part of the price increases could in practice also have taken place through hidden quality reductions (Estache, 2004). Indeed, quality concerns are a well known aspect of high-powered regulatory schemes such as price caps. Again, insufficient quality improvements in the face of well publicized efficiency gains may have lead to the perception of an unfair distribution of these gains, although more evidence is still due on this aspect.

⁴⁹Empirically, access by new customers makes up the bulk of the positive welfare impact observed in most sectors (McKenzie and Mookherjee, 2003). Note, however, that in many countries and sectors significant affordability problems remain for poor households, in particular in terms of connection costs (Estache, 2004).

⁵⁰See further evidence on the biased distribution of efficiency gains in Estache, Guasch and Trujillo (2003).

7 Conclusion

It is a well admitted point that the ownership pattern of firms has strong impact on the hardness of their budget constraints, and thus has significant effects on cost-reducing investments. What is less known is the fact, stressed by our theoretical model, that ownership also impacts on the incentives of corrupt politicians to engage in informed side-deals and on the nature of those side-deals. Far from reducing corruption as it could have been a priori thought, privatization only changes the pattern of corruption deals and the identity of the groups most likely to suffer from it. Taxpayers suffer from corruption when firms are public, while consumers are harmed in the case of private firms.

How the likelihood of corruption changes as sectors get privatized depends on fine details like the cost of public funds of the economy under scrutiny, or the size of the investment undertaken in the privatized sector at hands. There is therefore no contradiction between the fact that privatization triggers efficiency-enhancing investments by hardening the firm's budget constraint, and at the same time results in an increased likelihood of corruption and more aggregate dissatisfaction.

Various stylized facts suggest that the absolute welfare impact of changes in ownership in infrastructure sectors is unlikely to explain by itself the extremely high level of discontent observed throughout Latin America. They rather indicate that the political economy of the process may matter, in the sense that a fraction of the population, mostly the middle class, appears to be much more critical of privatization, probably on the ground that they perceive the reforms as opening possibilities for corrupt deals that they can only guess as consumers and, for this reason, consider themselves as the big losers in this occasion.

As the theoretical model shows, one channel for this is the fact that the hardening of the soft-budget constraint of public firms consecutive to the move to private ownership has shifted the burden of corruption from the general budget and therefore taxpayers, to the price of services, affecting middle class consumers directly and more visibly. So, the mixed results in terms of prices have fuelled discontent among the middle class, not so much because of a huge impact on these households' budget, but because their failure to decrease to reflect much publicized efficiency gains was interpreted as evidence of a corrupt allocation of efficiency gains in favor of firms and politicians.

Our model helps understand the skyrocketing discontent with privatizations expressed by citizens all over Latin America and the Caribbean region in Latinobarometro opinion surveys. As a matter of fact, this discontent appears to be strongly correlated with both changes and absolute levels of corruption perceptions at the country level. Moreover, this correlation is mostly driven by middle class groups, consistently with a framework in

which they are both directly affected by corrupt deals that drive prices up and they are the more likely to organize and try to control wrongdoings in the privatization process.

Subsequent research should investigate further the structure of the dynamic political equilibrium that may emerge from the repeated interactions between corrupted politicians, individuals and interest groups, who might express their discontent towards privatization through political actions. Far from being taken as exogenous as we did in our above analysis, the degree of privatization and the nature of the sectors, which are actually privatized, might then reflect the tension that corruptible politicians feel when torn between cajoling private interests and securing political support from middle classes. In that respect, one major lesson of our findings is that, beyond the ownership structure in itself, the transparency of the relationship between the State and infrastructure service providers is a key ingredient to minimize the threat of corruption.

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Appendix

• **Proof of Proposition 1:** Let us first rewrite expected welfare with a benevolent politician and public ownership as:

$$\begin{aligned}
\underset{(\theta, \sigma)}{E}(W) &= \nu \varepsilon (S(\underline{q}^*) + \lambda P(\underline{q}^*) \underline{q}^* - (1 + \lambda) \underline{\theta} \underline{q}^* - \lambda \underline{U}^* - \lambda \underline{V}^*) \\
&\quad + \nu (1 - \varepsilon) (S(\underline{q}) + \lambda P(\underline{q}) \underline{q} - (1 + \lambda) \underline{\theta} \underline{q} - \lambda \underline{U} - \lambda \underline{V}) \\
&\quad + (1 - \nu) (S(\bar{q}) + \lambda P(\bar{q}) \bar{q} - (1 + \lambda) \bar{\theta} \bar{q} - \lambda \bar{U} - \lambda \bar{V}) \\
&\quad - (1 + \lambda) K(I) - I,
\end{aligned} \tag{A1}$$

where I is the observable investment choice made by the firm.

The optimal contract maximizes (A1) subject to (4), (5), (6) and the following binding participation constraints of the public official

$$\underline{V}^* = \underline{V} = \bar{V} = 0, \tag{A2}$$

since there is no need to pay the benevolent politician in any state of nature. All those constraints are of course binding at the optimum. Hence, we get (9).

Inserting the corresponding values of the firm's information rent in the different states of nature into the objective function and optimizing with respect to outputs yields (7) and (8).

Finally, the firm chooses to invest to maximize its expected return. Given that the only state of nature where the firm gets some information rent occurs with probability $\nu(1 - \varepsilon)$, but that in this case the rent does not depend on the firm's investment, we trivially get:

$$I^e = \arg \max_{I \geq 0} \nu(1 - \varepsilon) \Delta \theta \bar{q}_{Pu}^B - I = 0. \tag{A3}$$

■

• **Proof of Proposition 2:** Expected social welfare with a benevolent politician who does not need to be paid to report information can now be written as:

$$\underset{(\theta, \sigma)}{E}(W) = \nu \varepsilon (S(\underline{q}^*) - \underline{\theta} \underline{q}^*) + \nu (1 - \varepsilon) (S(\underline{q}) - \underline{\theta} \underline{q}) + (1 - \nu) (S(\bar{q}) - \bar{\theta} \bar{q}) - K(I) - I. \tag{A4}$$

Under private ownership, the optimal regulatory contract maximizes (A4) subject to (5), the incentive constraint of an inefficient firm and the participation constraints of both types of firm:

$$\underline{U}^* = (P(\underline{q}^*) - \underline{\theta}) \underline{q}^* - K(I) \geq 0, \tag{A5}$$

$$\bar{U} = (P(\bar{q}) - \bar{\theta}) \bar{q} - K(I) \geq 0, \tag{A6}$$

where (A5) now replaces (4) and (A6) replaces (6).

Finally, (5) implies that, when $\sigma = \emptyset$, a $\underline{\theta}$ -firm makes a positive profit.

To simplify the analysis we also assume that $K(I)$ is not too large so that (A5) and (A6) define non-empty constrained sets.

Of course, (A5) and (A6) are necessarily binding at the optimum. We denote $\lambda^*(I)$ and $\tilde{\lambda}(I)$ the corresponding multipliers and note that increasing I reduces $K(I)$ and relaxes the constraints so that $\lambda^*(\cdot)$ and $\tilde{\lambda}(\cdot)$ decrease with I .

Similarly, setting \underline{q} such that the efficient firm breaks even (i.e., $(P(\underline{q}) - \underline{\theta})\underline{q} = K(I)$) also violates the incentive constraint (5), which is thus again binding so that

$$(P(\underline{q}) - \bar{\theta})\underline{q} = (P(\bar{q}) - \bar{\theta})\bar{q}, \quad (\text{A7})$$

and thus $\underline{q} = \bar{q}$. Without transfer, the best that can be done is to offer a pooling contract.⁵¹

Note that \bar{q}_{Pr}^B is lower when $K(I)$ increases, i.e., when I decreases.

The firm chooses ex ante an investment level I_{Pr} such that

$$I_{Pr} = \max_{I \geq 0} \nu(1 - \varepsilon)\Delta\theta\bar{q}_{Pr}^B(I) - I,$$

where we make explicit the dependence of \bar{q}_{Pr}^B on I . This yields (15). ■

• **Proof of Proposition 3:** Note from (18) that $k_{Pu}^* \in]0, 1[$. Moreover making explicit the dependence on λ :

$$\frac{dk_{Pu}^*}{d\lambda} = -\frac{1}{(1 + \lambda^2)} \frac{F(k_{Pu}^*)}{f(k_{Pu}^*) \left[1 + \frac{\lambda}{1 + \lambda} \frac{d}{dk} \left(\frac{F}{f} \right) \Big|_{k_{Pu}^*} \right]} < 0$$

and thus $1 - F(k_{Pu}^*)$ increases with λ . ■

• **Proof of Proposition 4:** We optimize (17) subject to (4) and (5). Those constraints are obviously binding, inserting their expression as function of outputs and optimizing with respect to outputs yields the result. ■

⁵¹Indeed, since we have $\bar{q}_{Pr}^B > \bar{q}^M$ where \bar{q}^M is the monopoly output such that $P(\bar{q}^M) - \bar{\theta} = -P'(\bar{q}^M)\bar{q}^M$, from $\tilde{\lambda}(I) > 0$, we may have a solution $\tilde{q} < \bar{q}^M$ to (A7). However, this solution is always dominated from a social welfare point of view since, when $\bar{q}^M < \underline{q}^{FB}$ (where $(P(\underline{q}^{FB}) = \underline{\theta})$), we have:

$$S(\bar{q}_{Pr}^B) - \underline{\theta}\bar{q}_{Pr}^B > S(\bar{q}^M) - \underline{\theta}\bar{q}^M > S(\tilde{q}) - \underline{\theta}\tilde{q}.$$

• **Approximation for (20):** When $\Delta\theta$ is small enough, the right-hand side of (20) can be approximated by:

$$\begin{aligned}
\frac{1}{(1+\lambda)\Delta\theta\bar{q}_{Pr}} \left\{ \Delta\theta\bar{q}_{Pr} + (P(\underline{q}_{Pr}^* - \underline{\theta})(\bar{q}_{Pr} - \underline{q}_{Pr}^*)) \right\} &= \frac{1}{(1+\lambda)\Delta\theta} \left\{ \Delta\theta + \frac{K(I_{Pr})}{\underline{q}_{Pr}^*\bar{q}_{Pr}}(\bar{q}_{Pr} - \underline{q}_{Pr}^*) \right\} \\
&= \frac{1}{(1+\lambda)\Delta\theta} \{P(\underline{q}_{Pr}^*) - P(\bar{q}_{Pr})\} = -\frac{P'(\underline{q}_{Pr}^*)(\underline{q}_{Pr}^* - \bar{q}_{Pr})}{(1+\lambda)\Delta\theta} \\
&= \frac{P'(\underline{q}_{Pr}^*)}{(1+\lambda) \left(P'(\underline{q}_{Pr}^*) + \frac{K(I_{Pr})}{\underline{q}_{Pr}^*\bar{q}_{Pr}} \right)} = \frac{1 + \tilde{\lambda}(I)}{1 + \lambda}, \tag{A8}
\end{aligned}$$

where the last equality uses (10) and (11). Finally, we obtain (21). ■

• **Proof of Proposition 5:** Direct from the text. ■

• **Proof of Proposition 6:** Taking again (17) as the objective function and optimizing subject to (A5) and (A6) gives the result. ■

• **The Consequences of Countervailing Power and the Role of Watchdogs:** Suppose that an interest group hurt by the threat of corruption may intervene as an effective watchdog, providing information on the politician's misbehavior.⁵² This may be by acquiring ex post information on σ conditionally on $\hat{\sigma}$ being uninformative. We will assume that, if this interest group successfully reacts, it learns $\sigma = \underline{\theta}$ with probability one.

Let us derive the outcome of the model when consumers are active watchdogs under private ownership. A politician when caught corrupted loses both the benefit of the bribe he would have received otherwise and the benefits of holding office s^* (because he may not be reelected or he may be put in jail and lose his reputation and prestige). Under private ownership, as consumers are the only checks on politician misbehavior, (16) becomes thus:

$$\begin{aligned}
\frac{E}{(\theta, \sigma)}(W_{Pr}) &= \nu \varepsilon F \left[\frac{s_{Pr}^*}{\Delta\theta\bar{q}_{Pr}} \right] \left(S(\underline{q}_{Pr}^*) - \underline{\theta}\underline{q}_{Pr}^* - \lambda s_{Pr}^* \right) \\
&\quad + \nu \varepsilon (1 - x_{Pr}^{cons}) \int_{\frac{s_{Pr}^*}{\Delta\theta\bar{q}_{Pr}}}^1 (S(\bar{q}_{Pr}) - \underline{\theta}\bar{q}_{Pr} - (1 - \tilde{k})\Delta\theta\bar{q}_{Pr}) f(\tilde{k}) d\tilde{k} \\
&\quad + \nu \varepsilon x_{Pr}^{cons} \int_{\frac{s_{Pr}^*}{\Delta\theta\bar{q}_{Pr}}}^1 (S(\underline{q}_{Pr}^*) - \underline{\theta}\underline{q}_{Pr}^*) f(\tilde{k}) d\tilde{k} \\
&\quad + \nu (1 - \varepsilon) (S(\bar{q}_{Pr}) - \underline{\theta}\bar{q}_{Pr}) + (1 - \nu) (S(\bar{q}_{Pr}) - \bar{\theta}\bar{q}_{Pr}) - K(I_{Pr}) - I_{Pr}.
\end{aligned}$$

⁵²For a model along these lines see Laffont and Tirole (1993, Chapter 15).

In optimizing social welfare, we will assume that \underline{q}_{Pr}^* and \bar{q}_{Pr} are still given by the zero profit constraints of the firm (11) and (13),⁵³ so that the probability x that corruption is detected and does not occur is taken as fixed.

The cut-off value k_{Pr}^* now solves the following equation:

$$k_{Pr}^* + \frac{\lambda}{1 + \lambda} \frac{F(k_{Pr}^*)}{f(k_{Pr}^*)} = \frac{(1 - x_{Pr}^{cons})(S(\underline{q}_{Pr}^*) - \theta \underline{q}_{Pr}^* - [S(\bar{q}_{Pr}) - \bar{\theta} \bar{q}_{Pr}]) - x_{Pr}^{cons} k_{Pr} \Delta \theta \bar{q}_{Pr}}{(1 + \lambda) \Delta \theta \bar{q}_{Pr}}, \quad (\text{A9})$$

with the following approximation when $\Delta \theta$ is small enough

$$\left(1 + \frac{x}{1 + \lambda}\right) k_{Pr}^* + \frac{\lambda}{1 + \lambda} \frac{F(k_{Pr}^*)}{f(k_{Pr}^*)} = \left(\frac{1 + \tilde{\lambda}(I_{Pr})}{1 + \lambda}\right) (1 - x). \quad (\text{A10})$$

The impact of consumers' ex post check is straightforwardly seen from (A10). It unambiguously reduces the threat of corruption. Two effects are nevertheless at work. On the one hand, output is raised from \bar{q}_{Pr} to \underline{q}_{Pr} in case corruption is detected. This increases welfare and makes it more attractive to reduce the probability of corruption. On the other hand, there is no longer any need to reward indirectly the politician through bribes. ■

⁵³This will typically be the case when x is small enough.