

Infrastructure and Public Utilities Privatization in Developing Countries

Emmanuelle Auriol and Pierre M. Picard

Should governments in developing countries promote private ownership and deregulated prices in noncompetitive sectors? Or should they run publicly owned firms and regulate prices at the expense of rents to insiders? A theoretical model is used to answer these normative questions. The analysis focuses on the tradeoff between fiscal benefits and consumer surplus during privatization of noncompetitive sectors. Privatization transfers control rights to private interests and eliminates public subsidies, yielding benefits to taxpayers at the cost of increased prices for consumers. In developing countries, where budget constraints are tight, privatization and price liberalization may be optimal for low profitability industries but suboptimal for more profitable industries. And once a market has room for more than one firm, governments may prefer to regulate the industry. Without a credible regulatory agency, regulation is achieved through public ownership. JEL codes: D82, H54, L33, L43, L51, O10

Over the last 25 years developing countries have drastically reduced their share of state ownership.¹ In most cases governments have privatized public assets because of critical budgetary conditions. During the 1980s debt crisis international financial institutions such as the World Bank and the International Monetary Fund made privatization a condition for economic assistance. Governments have continued to use privatization proceeds to relax their budget constraints.² The fiscal benefits of privatization are not limited to the

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1. Megginson and Netter (2001) estimate that output from state-owned enterprises in developing countries shrank from 16 percent of GDP in 1980 to 8 percent in 1996.

2. Using a panel of 18 developing countries, Davis and others (2000) show that privatization proceeds have been used to reduce domestic financing on a roughly one-for-one basis.

divestiture proceeds of public firms, which have been estimated at around \$50 billion a year in countries outside the Organisation for Economic Co-operation and Development (OECD) (Mahboobi 2000; Gibbon 1998, 2000). The benefits also encompass the possible termination of recurrent, inefficient subsidies to state-owned enterprises. This article studies the impact of macroeconomic fiscal objectives on the decision to privatize infrastructure and public utilities in developing countries.

Privatization involves well-known economic costs for industries with strong economies of scale. Infrastructure and utility owners benefit from market power. By giving up direct control of a firm's operations, governments lose control over prices—to the disadvantage of consumers. In theory this could be avoided by auctioning off markets on the basis of the lowest product or service price (see Estache, Foster, and Wodon 2002). However, in a survey of 600 concession contracts from around the world, Guasch (2004) shows that in practice contracts are tendered for the highest transfer or annual fee. Because fee payments rise with the profitability of the privatized firms, many governments choose policies that increase a firm's profitability, such as exclusivity periods and price liberalization.³ Prices are sometimes increased before privatization, to reduce a state enterprise's financing gap and to attract buyers. This was the case in Kenya, Senegal, and Zimbabwe, where governments increased electricity prices 10 percent at the time of the agreement with Vivendi Universal (AfDB and OECD 2003). An unaccounted for part of price increases stems from the termination of illegal connections (Birdsall and Nellis 2002; Estache, Foster, and Wodon 2002; AfDB and OECD 2003).

This article studies the privatization decision as the result of government's cost-benefit analysis. The social benefits from the cash flows generated by a public firm's divestiture and from the termination of subsidies to an unprofitable public firm are balanced against the loss in consumer surplus induced by higher prices in the privatized industries and forgone revenues from profitable public firms.

The model used here is static and therefore does not address the transition problem between public and private ownership. It compares social welfare under private and public ownership in industries and market segments with large investment costs. To obtain clear-cut results, privatization in this model corresponds to a situation where prices are free. Privatization is thus close but not equivalent to *laissez-faire* because entry remains regulated (through license and entry fees). By contrast, public ownership corresponds to a situation where both entry and prices are regulated. This approach is robust from a theoretical point of view. Indeed if, as is shown, privatization with free price setting dominates state ownership with benevolent regulation, privatization also dominates

3. Wallsten (2001) studies the impact of the exclusivity period on the privatization price of 20 telecommunication firms in 15 developing countries. Two-thirds of those countries chose to allocate exclusivity periods for an average of 7.4 years. Exclusivity more than doubled the price private investors paid for the firm—but at the cost of high prices and lower network growth for consumers.

in situations where prices are liberalized to a lesser extent and regulation is not benevolent.⁴

The dominance of privatization over benevolent regulation is not obvious. Indeed, the deadweight loss created by monopoly pricing is the rationale for setting up public ownership in the first place. Under perfect information governments are able to mimic the outcomes of private monopolies so that privatization is never optimal. However, under asymmetric information between governments and firms, privatization may dominate public ownership because the presence of information rents raises the social costs of subsidies.

In this article a main factor in privatization decisions is the opportunity cost of public funds, which captures the tightness of the government budget constraint. The privatization decision is shown to be a monotonic function of this opportunity cost of public funds when the profitability of a market is low, as it is with infrastructure such as roads or utility services to poor people. For low opportunity costs (as in the case of wealthy governments) public ownership dominates privatization, and for high opportunity costs (as in the case of financially strapped governments) the opposite holds. Consider the case where the government cannot finance an infrastructure project (for example, a water distribution network). Privatization is an appealing alternative because it is better to have a privately owned and operated infrastructure, even with monopoly distortion, than no infrastructure at all. By continuity the result still holds when the government is able to finance the infrastructure.

This monotonic relationship between privatization and the budget constraint breaks down, however, when natural monopolies are sufficiently profitable and when governments are not able to recoup large enough franchise fees or divestiture proceeds. Such situations often stem from developing countries' difficulties attracting investors when auctioning off profitable state enterprises.⁵ With underpriced public assets the privatization decision is shown to be optimal only for intermediate values of the opportunity cost of public funds.

The intuition is as follows: as before, for low opportunity costs of public funds, government bailouts of firms are cheap, and it is optimal to keep firms public, set prices close to marginal costs, and subsidize the firms so that they break even. For intermediate opportunity costs of public funds, bailout becomes costly, and governments prefer to privatize the public firms, cash the proceeds, and let private entrepreneurs manage firms. But for high opportunity costs of public funds, the privatization decisions differ because governments find it valuable to "hold up" on industries' rents. Governments do not privatize

4. Developing countries have generally failed to establish credible regulatory bodies because of governments' inability to commit. For instance, the concessions granted to private operators following the divestiture of Latin American public firms were renegotiated after an average of only 2.1 years (Laffont 2001; see also Guasch 2004).

5. According to Trujillo, Quinet, and Estache (2002), rarely do more than two bidders participate in auctions for major concession contracts in developing countries, so state enterprises are often sold at a discount to avoid the embarrassment of unsuccessful sales (see Birdsall and Nellis 2002).

profitable segments, choosing instead to operate them and to set private monopoly prices to reap maximum revenue.

This nonmonotonic result has important policy implications. While divestiture of profitable public firms may be optimal in developed countries, it is not necessarily so in developing countries, where budget constraints are tight and market institutions are weak. More specifically, the model suggests that public utilities in developing countries should focus on market segments where incomes and willingness to pay are high and should set prices high so that the public firms' profit can be used to subsidize new connections or other public goods.

Finally, when a firm's profitability rises substantially, the market has room for more than one firm. For large, profitable industries regulation of duopoly is shown to always be better than privatization with price liberalization. Market liberalization thus corresponds to the divestiture of a historical monopoly and the introduction of new entrants according to a regulatory scheme. It does not correspond to *laissez-faire*. This is a major concern in developing countries, which usually lack the human resources and institutions to implement effective regulation.

The article is organized as follows. Section I describes the model's relation to the literature. Section II presents the model and the main assumptions. Section III compares the performance of private and regulated monopolies, while section IV briefly discusses the duopoly case. Section V derives the optimal industrial policy. Section VI summarizes the results and offers some concluding remarks. For conciseness, all proofs are included in a supplementary appendix available at <http://wber.oxfordjournals.org>.

I. THE MODEL'S RELATIONSHIP TO THE LITERATURE

It is well known that public ownership generates inefficiencies because it encourages governments to bail out or subsidize money-losing firms. Kornai (1980) first termed such inefficiencies the "soft budget constraint" problem. This term explains many of the inefficiencies that occur in socialist economies, such as shortages or low price responsiveness.⁶ Since less efficient firms can rely on government funding, they lack the financial discipline for efficient management. For instance, under incomplete contracts soft budget constraints affect the level of investment by public managers. By hardening a firm's budget constraint, privatization helps restore investment incentives. The transfer from public to private ownership is therefore often advocated as a remedy for the poor economic performance of public enterprises (see, for instance, Dewatripont and Maskin 1995; Schmidt 1996; and Maskin 1999).

Another concern about public ownership is government lack of economic orientation. For instance, in Kornai and Weibull (1983), Shleifer and Vishny

6. Interesting surveys are available in Kornai (2000) and Kornai, Maskin, and Roland (2002).

(1997), and Debande and Friebel (2003) governments demonstrate “paternalistic” or political behaviors as they seek to protect employment; in Shapiro and Willig (1990) governments are malevolent. The main conclusion of these two strands of literature is that privatization improves firms’ internal efficiency.

Meggison and Netter’s (2001) review of 65 firm-level empirical studies confirms that private firms are generally more productive and more profitable than their public counterparts. However, in industries with increasing returns to scale the efficiency gains are not automatically passed along to consumers.⁷ Changing the ownership structure does not solve the problem of lack of competitive pressure (see Nellis 1999).

This article belongs to the traditional literature on regulation with adverse selection (see Laffont and Tirole 1993). It ignores the moral hazard issue discussed at length in the studies on the soft budget constraint and focuses instead on allocative efficiency and macro-fiscal balancing issues. A utilitarian government maximizes a weighted sum of consumer surplus and transfers from and to firms. The weight on transfers is the opportunity cost of public funds. As is standard in the regulation literature, the government is assumed to be able to commit to and offer complete contracts. When such contracts can be offered to both private and public firms, ownership is irrelevant.⁸

This article draws the line between public and private ownership by modeling the possibility of offering incentive contracts that regulate prices and production in public firms and of compensating those firms with subsidies. Private firms do not receive such contracts or subsidies and are therefore unregulated. Since the government is the residual claimant of a public firm’s profits or losses and since it wants to avoid service interruption, under asymmetric information money-losing firms are subsidized while more productive firms earn informational rents. Production is distorted to reduce these information costs, which in turn diminishes consumer surplus. Privatization reduces the need to subsidize low profitability firms and to distort their production below the monopoly level (due to adverse selection). Privatization is used for firms that have low profitability or low social benefits. To avoid the technicality of an additional principal-agent problem, the private owner is assumed to be the firm’s manager. The welfare comparison is thus between a benevolently regulated firm and a private monopoly charging the standard monopoly price.

Finally, the model can be related to the theory of public-private partnerships, which has received attention recently in national and international funding institutions (Vaillancourt Rosenau 2000; IMF 2004). The idea behind public-private partnerships is to make governments purchase the

7. Estache (2002) shows that technical and productive efficiency gains generated by Argentina’s 1990s utilities privatization have not been transmitted to consumers. The benefits were captured by the industry because of inefficient regulation.

8. When private and public structures have the same degree of contract completeness, ownership is irrelevant. This happens when the government is able to offer the same contracts to public and to private firms, as described in Baron-Myerson (1982) and Laffont-Tirole (1993).

service rather than the asset associated with providing a public good or a good for which there is a potential market failure. On the one hand, governments view public–private partnerships as a vehicle to shift investment costs off their books and to safeguard the execution of projects that would otherwise hardly materialize given their budget constraints. On the other hand, public–private partnerships are praised for their potential productive efficiency benefits.⁹ As the possible productivity inefficiencies are ruled out to focus on the allocative inefficiencies, it is no surprise that the benefits of privatization are aligned with this first view that emphasizes the fiscal benefits of privatization.

II. THE MODEL

The government has to decide whether an industry with increasing returns to scale should be under public or private control. *Regulation regime* is used here to refer to the case of government control of the production of a public firm. The government’s control rights are associated with accountability for profits and losses. That is, the government subsidizes the firm in case of losses and taxes the firm in case of profits. *Private regime* refers to the case in which the government imposes no control on the operations of a private firm and takes no responsibility for the firm’s profits or losses. That is, no transfer between the government and the private firm is possible once production has begun. This is a simplification, since in practice government might subsidize the private sector. However, subsidies are lower under private ownership than under public ownership, which is what matters for the results.¹⁰ Similarly, private firms do not pay a tax on profit, but they may pay an entry fee.¹¹

The model considers a normal good. It is common knowledge that the inverse demand function for $Q \geq 0$ units of the commodity is given by¹²

$$(1) \quad P(Q) = a - bQ$$

9. Public–private partnerships can be used to harden a firm’s budget constraint, as discussed earlier, and to bundle complementary tasks, such as constructing and operating infrastructure projects (see Hart 2003 and Martimort and Pouyet 2006).

10. For instance, in Burkina Faso government subsidies to state enterprises dropped from 1.42 percent of GDP in 1991 to 0.08 percent in 1999 as a result of privatization (AfDB and OECD 2003).

11. This is an artifact of the formalization. In the static model it is optimal for the government to sell the firm ex ante (that is, while it is in a position of symmetric information with respect to the firm) rather than to tax its profit ex post (that is, once the firm has learned its cost parameter and has an informational advantage). Empirical evidence shows that developing countries rely on entry fees to raise revenues from firms (see Auriol and Warlters 2005).

12. To keep the analysis simple a linear product demand is considered. However, the results are robust to a more general demand function. For instance, models with isoelastic demand functions require numerical simulations but yield similar results. Computations are available from the authors on request.

where $a > 0$ and $b > 0$. The gross consumer surplus is therefore

$$(2) \quad S(Q) = \int_0^Q P(x) dx = aQ - \frac{b}{2}Q^2.$$

The analysis here focuses on infrastructure and utilities, which require firms to sink large investments. Technically, they involve increasing-returns-to-scale technology so that cost functions are subadditive. As in Baron and Myerson (1982), this is modeled by simply assuming that the cost function includes a fixed cost, $K > 0$, and an idiosyncratic marginal cost, β_i . To produce q_i units of the commodity, firm $i = 1, \dots, N$ has the following cost function:

$$(3) \quad C(\beta_i, q_i, K) = K + \beta_i q_i.$$

Firm i must make investment K before discovering β_i . The β_i 's are independently and identically distributed on the interval $[\underline{\beta}, \bar{\beta}]$ according to the density and cumulative distribution functions $g(\cdot)$ and $G(\cdot)$. This law is common knowledge. The expectation operator is denoted by E , the average marginal cost by $E\beta$, and the variance of marginal cost by $\sigma^2 = \text{var}(\beta)$. Neither the government nor the competitors of firm i observe β_i .

The fixed cost K is large, so that the maximum number of firms N that can survive under *laissez-faire* is small. More specifically, the following assumption is made:

$$(4) \quad K \geq \frac{(a - E\beta)^2}{16b} + \frac{\sigma^2}{4b}$$

which implies that $N \leq 2$.¹³

The firms are profit maximizers. The profit of firm $i = 1, \dots, N$ is

$$(5) \quad \Pi_i = P(Q)q_i - C(\beta_i, q_i, K) + t_i$$

where t_i is the net transfer that the firm receives from the government (subsidies minus taxes and franchise fees).

The government is utilitarian and maximizes the sum of consumer and producer surpluses minus the social cost of transferring public funds to the firm. The transfer to the firm can be either positive (a subsidy) or negative (a tax).

13. To see how this assumption is computed, see endnote 3 in the supplementary appendix at <http://wber.oxfordjournals.org>.

The government's objective function is

$$(6) \quad W = S(Q) - \sum_{i=1}^N C(\beta_i, q_i, K) - \lambda \sum_{i=1}^N t_i$$

where λ is the opportunity cost of public funds. For λ close to 0 the government maximizes the consumer surplus; for larger λ the government assigns more weight to taxpayer surplus (that is, on transfers).

The term $1 + \lambda$ measures the social cost of transferring one unit of money from the government to the firm. That is, government pursues multiple objectives, such as producing public goods, regulating noncompetitive industries, and controlling externalities, under a single budget constraint. The opportunity cost of public funds is the Lagrange multiplier of this constraint. It tells how much social welfare can be improved when the budget constraint is relaxed by one unit of money; it includes forgone benefits of alternative investment choices and spending.¹⁴ In practice, any additional investment in infrastructure or public utilities implies a reduction of the production of essential public goods, such as national security and law enforcement, or any other commodities that generate externalities, such as health care and education. It may also imply a rise in taxes or public debt. All these actions have a social cost that must be compared with the social benefit of the additional investment.

In developed countries λ is usually assumed to be equal to the deadweight loss due to imperfect income taxation. It is estimated at around 0.3 (Snower and Warren 1996). In developing countries low income levels and difficulties implementing effective taxation are large constraints on the government budget. The ratio of tax revenue to GDP for 1995, for example, was 36.1 percent for OECD countries (see OECD.org) compared with 18.2 percent for developing countries (based on a sample in Tanzi and Zee 2001). All else being equal, the opportunity cost of public funds is higher when government revenue is lower, and as a result, the opportunity cost of public funds in developing countries is likely to be higher than 0.3. The World Bank (1998) suggests an opportunity cost of 0.9 as a benchmark. But the value is much higher in heavily indebted countries.

III. PRIVATIZATION OF A NATURAL MONOPOLY

When K is large, a natural monopoly emerges: $N \in \{0,1\}$. Since there is at most one firm, the firm index can be dropped temporarily, leaving the

14. The opportunity cost of public funds is different from the marginal cost of public funds, which measures the deadweight loss from the marginal increase of a specific tax rate (see Warlters and Auriol 2006). Assuming an exogenous constant opportunity cost of public funds has proved useful in discussing the relationship between incentive and budget balance issues (see, for example, Laffont and Tirole 1993 and Picard 2001a).

production of the monopoly equal to total production, Q . Regulation aims to correct the distortion associated with monopoly pricing. Theory suggests that welfare should never be smaller under benevolent regulation than under laissez-faire. This is shown to not always be the case under asymmetric information.

Private Monopoly

The production level of a private monopoly is not controlled by the government, but the government can control firm entry by auctioning the right to operate. Let $F(\lambda) \geq 0$ be the (exogenous) franchise fee that a private firm pays to the government to operate in the product market. This fee depends on λ [see assumption (13) below]. The firm faces the following sequential choices. First, it chooses whether to enter the market by paying the franchise fee, $F(\lambda)$, and making the investment, K . After entry, nature chooses the marginal cost, β , according to the distribution function, $G(\cdot)$. The private firm learns β and chooses a production level, Q . No transfer is made after entry and realization of the marginal cost, β : the firm never receives a subsidy from the government, nor does it pay a tax.¹⁵ The firm's profit is

$$(7) \quad \Pi^{PM} = \max_Q P(Q)Q - \beta Q - K - F(\lambda).$$

The optimal production is independent of K and $F(\lambda)$:

$$(8) \quad Q^{PM} = \frac{a - \beta}{2b}.$$

If a is smaller than the firm's marginal cost, β , production falls to 0. To rule out a corner solution in the paper, a is assumed not to be too small:

$$(9) \quad a \geq \max \left\{ 2\bar{\beta}, \bar{\beta} + \frac{G(\bar{\beta})}{g(\bar{\beta})} \right\}.$$

Substituting Q^{PM} in equations (5) and (6) yields the ex ante profit and welfare of a private monopoly:

$$(10) \quad E\Pi^{PM} = V - K - F(\lambda)$$

$$(11) \quad EW^{PM}(\lambda) = \frac{3}{2}V - K + \lambda F(\lambda)$$

15. Auriol and Picard (2005) discuss the privatization of a monopoly with ex post renegotiation and an endogenous franchise fee.

where

$$(12) \quad V = \frac{E(a - \beta)^2}{4b}$$

is the firm's operating profit. A monopoly is privately feasible if it is ex ante profitable. This requires that $V \geq K$ and that $F(\lambda) \in [0, V - K]$. Similarly, a monopoly is socially valuable if it yields ex ante positive welfare. Comparing equations (10) and (11) shows that monopolies are socially valuable but privately infeasible when $V < K < \frac{3}{2}V$.

Because public funds are costly, the ex ante welfare, $EW^{PM}(\lambda)$, increases linearly with $F(\lambda)$. The maximum entry fee that the government can collect is the maximum price a risk-neutral entrepreneur would agree to pay for the monopoly concession: $F^* = \max\{0, V - K\}$. In practice, international capital flows depend on country risk ratings, so that developing country governments do not collect F^* (see Brewer and Rivoli 1990).¹⁶ Because of debt service, social instability, perceived corruption in the administration, and lack of transparent and predictable political and judicial institutions, private investors, especially foreign ones, are reluctant to invest in developing countries.¹⁷ In this model a large λ translates into a bad rating. That is, countries characterized by a large λ are also countries that get low privatization proceeds. To capture this idea, the following assumption is made:¹⁸

$$(13) \quad F(\lambda) \in [0, F^*] \text{ is nonincreasing and weakly convex in } \lambda \geq 0.$$

Regulated Monopoly

Under public ownership the government is accountable for the firm's profits and losses and monitors the production of the regulated monopoly. The timing is as follows: The government first chooses to make investment K . Nature chooses the marginal cost, β , according to the distribution function $G(\cdot)$. The firm's manager learns β . The government proposes a production and transfer contract, $(Q(\cdot), t(\cdot))$. Finally the regulated firm chooses and implements a production level in this contract.

16. The ratings reflect the ability and willingness of a country to service its financial obligation. See, for instance, the Global Risk Assessments website, www.grai.com/links.htm.

17. For instance, in 1999 foreign direct investment inflows to the 49 least developed countries (10 percent of world population) was 0.5 percent of world flows. Since less than 10 percent of this investment was cross-border merger and acquisition (including privatization), privatization proceeds are lower in poor countries than in rich ones, even with many privatizations.

18. The theory of predatory governments is another justification for assumption 13 (see, for instance, Evans 1989).

Symmetric information. Suppose that the government observes the realization of β . It then solves $\max_{\{Q, t\}} W$, such that $\Pi \geq 0$, where W and Π are defined in equations (5) and (6). Since λ is positive, transfers to the regulated firm are costly and must be reduced to the breakeven point, $\Pi = 0$. That is, $t^{RM*} = -P(Q)Q + K + \beta Q$. Substituting this expression in equation (6), and maximizing W with respect to Q yields

$$(14) \quad Q^{RM*}(\beta) = \frac{1 + \lambda}{1 + 2\lambda} \frac{a - \beta}{b}.$$

Inserting Q^{RM*} in equation (6) and computing the expected value of W yields the ex ante welfare under symmetric information

$$(15) \quad EW^{RM*}(\lambda) = (1 + \lambda) \left(2 \frac{1 + \lambda}{1 + 2\lambda} V - K \right)$$

where V is as defined in equation (12). The government invests K in a regulated firm only if equation (15) is positive. The ex ante welfare increases linearly in V and is nonmonotonic in λ if $V > K$: that is, it decreases for small λ and increases for large λ .

For small λ the government incurs few social costs transferring money to the regulated firm, which then produces quantities close to the first-best level (at a price that is close to marginal cost); that is, $\lim_{\lambda \rightarrow 0} Q^{RM*} = (a - \beta)/b$ and therefore $P[(a - \beta)/b] = \beta$. At this price the regulated firm cannot recover its fixed cost, but this loss is compensated for by a public transfer to the firm, $t = K > 0$. And the government will continue to subsidize the regulated firm as long as λ remains small enough. By contrast, for large λ the government is more interested in receiving transfers from the firm than in maximizing consumer surplus. In the limit it seeks the maximum revenue from the firm, and it chooses the production level of a private monopoly, $\lim_{\lambda \rightarrow \infty} Q^{RM*} = (a - \beta)/2b = Q^{PM}$, mimicking private firm behavior.

Asymmetric information. Under asymmetric information the government does not observe β . To entice the firm to reveal its true cost, an incentive compatibility constraint is needed. Taking this constraint into account implies that in the government objective function the marginal cost, β , is replaced by the virtual cost (see Laffont and Tirole 1993):

$$(16) \quad c(\beta, \lambda) = \beta + \frac{\lambda}{1 + \lambda} \frac{G(\beta)}{g(\beta)}.$$

The virtual cost includes the marginal cost of production, β , and the marginal cost of information acquisition, $(\lambda/1 + \lambda)(G(\beta)/g(\beta))$. To avoid the technicalities of

“bunching,” the standard assumption of monotonic hazard rate is made:¹⁹

$$(17) \quad \frac{G(\beta)}{g(\beta)} \text{ is nondecreasing.}$$

Thus $c(\beta, \lambda) \geq \beta$, and by assumption (17), $c(\beta, \lambda)$ increases in β and λ . Let

$$(18) \quad V^{RM}(\lambda) = \frac{E(a - c(\beta, \lambda))^2}{4b}.$$

It is the function V in equation (12) evaluated at $c(\beta, \lambda)$ instead of β . This implies that $V^{RM}(\lambda)$ decreases in λ . Following Baron and Myerson's (1982) approach yields the following proposition, which proof is standard (see Laffont and Tirole 1993):

LEMMA 1. *Under asymmetric information the optimal production and the ex ante welfare under a regulated monopoly are those under the symmetric information case evaluated at the virtual cost, $c(\beta, \lambda)$:*

$$(19) \quad Q^{RM}(\beta) = Q^{RM*}(c(\beta, \lambda))$$

$$(20) \quad EW^{RM}(\lambda) = (1 + \lambda) \left(2 \frac{1 + \lambda}{1 + 2\lambda} V^{RM}(\lambda) - K \right).$$

Since $c(\beta, \lambda) \geq \beta$, $Q^{RM}(\beta) \leq Q^{RM*}(\beta)$ for any β . Moreover, since $c(\beta, \lambda)$ increases in β , the distortion is larger at higher marginal costs. Indeed, by lowering the production of inefficient firms, the government reduces the overall incentive to report inflated costs. This strategy lowers the firm's informational rent and the cost of information revelation. Comparing equations (12) and (18) shows that $V^{RM}(\lambda) \leq V$ for all $\lambda \geq 0$. Hence, the ex ante welfare of a regulated monopoly is lower under asymmetric information than under symmetric information, $EW^{RM}(\lambda) \leq W^{RM*}(\lambda)$.

Regulation or Privatization?

This section compares the welfare level generated by a private monopoly with that generated by a regulated monopoly. First is the symmetric information case.

19. When the hazard rate is not increasing monotonically, the virtual cost [equation (16)]—and thus the regulated output [equation (19)]—are not monotonic. Output is thus not an invertible function of the type β , and the government cannot infer each firm's type by observing its output level. Unable to distinguish the types of firms, the government must bunch various types in a same contract.

PROPOSITION 2. *Under symmetric information public regulated monopoly dominates privately feasible monopoly regardless of whether the privately feasible monopoly is franchised.*

This proposition is intuitive. Under symmetric information a benevolent government cannot generate less welfare than a private monopoly because, for any realization of β , the government can at least replicate the outcome of a private firm. Nevertheless, for large opportunity costs of public funds a regulated monopoly under symmetric information brings barely more welfare than a private monopoly when a private monopoly pays the maximum franchise fee, F^* .²⁰ In other words the welfare of a regulated monopoly is almost equal to the welfare of a private monopoly for large λ . From this argument it can be inferred that, for large enough λ , the asymmetry of information in the regulated monopoly gives rise to additional information cost, which makes this configuration less attractive for the government. More formally, it is readily shown that the welfare function of the regulated monopoly has an asymptote with slope equal to $V - K$ under symmetric information and to

$$(21) \quad \lim_{\lambda \rightarrow \infty} \frac{EW^{RM}(\lambda)}{\lambda} = V^{RM}(\infty) - K$$

under asymmetric information. Because the former is larger than the latter, it can be deduced that privately feasible monopolies dominate regulated monopolies for large enough λ . Let the fixed cost, K , satisfy the following condition:

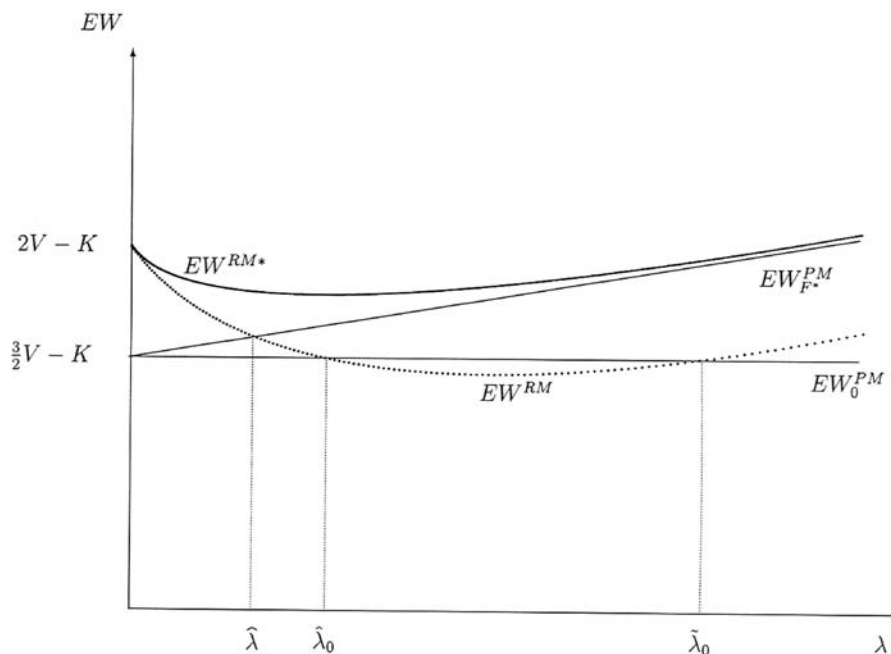
$$(22) \quad V \geq K \geq V \left(2\sqrt{\frac{B + V^{RM}(\infty)}{V}} - \frac{B + V}{V} \right) \text{ with } B = E \left[\frac{a - \beta G(\beta)}{b g(\beta)} \right].$$

The interval defined in condition (22) is nonempty. Indeed, $2\sqrt{(B + V^{RM}(\infty))/V} - (B + V)/V < 1$ is equivalent to $B^2 + 4V(V - V^{RM}(\infty)) > 0$, which is always true since $V > V^{RM}(\infty)$. The left side of condition (22) implies that the fixed cost is small enough so that a monopoly is privately feasible [see equation (10)]. The right side implies that the fixed cost is large enough so that the monopoly is not too profitable.

Proposition 3 is the main finding of this article: under condition (22) privatization dominates benevolent regulation for at least some value of the opportunity cost of public funds.

20. When $F = F^*$, $EW^{RM*}(\lambda) = ((1 + \lambda)/(1 + 2\lambda))V + (1 + \lambda)(V - K)$, whereas $EW_{F^*}^{PM}(\lambda) = V/2 + (1 + \lambda)(V - K)$. The two functions have a common asymptote with slope $V - K$ (figure 1).

FIGURE 1. Welfare for Private and Regulated Monopoly



Source: Authors' analysis.

PROPOSITION 3. *If assumptions (4), (9), (13), and (17) hold and if the fixed cost, K , lies in the nonempty range defined by condition (22), two cases are possible:*

- (1) $\lim_{\lambda \rightarrow +\infty} F(\lambda) \geq V^{RM}(\infty) - K$: *there exists a unique threshold, $\hat{\lambda}$, such that privatization dominates regulation if and only if $\lambda > \hat{\lambda}$.*
- (2) $\lim_{\lambda \rightarrow +\infty} F(\lambda) < V^{RM}(\infty) - K$: *there are two thresholds $\hat{\lambda}$ and $\tilde{\lambda}$, $\hat{\lambda} < \tilde{\lambda}$ such that privatization dominates regulation if and only if $\lambda \in [\hat{\lambda}, \tilde{\lambda}]$.*

In other words for any franchise fee function $F(\cdot)$, which includes the case $F(\cdot) \equiv 0$, there exists a range of fixed costs, K , and costs of public funds, λ , so that the government prefers privatization (see figure 1). The bold solid curve depicts the ex ante welfare of regulated monopoly under symmetric information (RM^*), and the bold dotted curve depicts the ex ante welfare under asymmetric information (RM). The ex ante welfare of regulated monopoly is nonmonotonic in λ and it is higher for low and high values of λ than for intermediate ones. The thin solid straight lines represent the two boundaries of the ex ante welfare of a private monopoly (PM) (that is, for $F(\lambda) \equiv F^*$ and for $F(\lambda) \equiv 0 \forall \lambda \geq 0$). Depending on the franchise fee function, $F(\lambda)$, the welfare function associated with a private monopoly varies between these two bounds.

Privatization with price liberalization dominates a benevolent regulation under public ownership for (at least) intermediate values of opportunity costs

of public funds. On the one hand, when the franchise fee, $F(\lambda)$, is large (that is, $F(\lambda) \geq V^{RM}(\infty) - K, \forall \lambda \geq 0$), the opportunity costs supporting privatization belong to an unbounded range $[\hat{\lambda}, +\infty)$. The optimal industrial policy is monotonic in λ . On the other hand, when the franchise fee falls below the threshold $V^{RM}(\infty) - K$, the optimal industrial policy is nonmonotonic in λ . For intermediate values of λ , privatization with price liberalization dominates regulation under public ownership. The opposite conclusion holds for lower and larger values of λ .

The preference for private feasible monopolies is not explained by the possibility of collecting franchise fees. As shown in the supplementary appendix, even with no fee, $F(\lambda) \equiv 0$, the interval $[\hat{\lambda}_0, \tilde{\lambda}_0]$ where privatization dominates regulation is nonempty (see figure 1). The intuition for this result is as follows. Private entrepreneurs enter the business if their firm is ex ante profitable. After the investment the private firm makes a large or a low operating profit depending on the realization of technical and demand uncertainties. Private entrepreneurs, who bet their own assets (or shareholders assets) on the firm, are accountable for these profits and losses. By contrast, under regulation accountability lies with the government, which bears the business risk and must grant ex post subsidies to unprofitable firms. Under asymmetric information the regulated firm uses the transfers to acquire a positive informational rent. The government prefers that the private sector take over when the social cost of the information rent outweighs the social benefit of controlling the firm's operation. As suggested by condition (22) and shown in section V this ultimately depends on the profitability of the industry market segment.

Numerical Assessment for $\hat{\lambda}$

Independent of the privatization proceeds and fees, privatization with price liberalization dominates a benevolent regulation under public ownership for intermediate values of λ . The relevance of this result depends on what "intermediate" means. If λ is very high, privatization will never be optimal. The lowest value of the opportunity cost, $\hat{\lambda}$, for which privatization becomes attractive, is obtained when the highest franchise fee F^* is applied (see figure 1). It solves $EW^{RM}(\lambda) = EW_{F^*}^{PM}(\lambda)$, which is equivalent to

$$(23) \quad 4(1 + \lambda)^2 V^{RM}(\lambda) = (3 + 2\lambda)(1 + 2\lambda)V.$$

To obtain an explicit value for $\hat{\lambda}$, β is assumed to be uniformly distributed over $[\underline{\beta}, \bar{\beta}]$.²¹ Using equations (16) and (18), under the uniform distribution equation (23) is equivalent to $4E((1 + 2\lambda)(a - \beta) - \lambda(a - \bar{\beta}))^2 = (3 + 2\lambda)(1 + 2\lambda)E(a - \beta)^2$. Both the right and left sides can be divided by a^2 to show that $\hat{\lambda}$ depends only on $\underline{\beta}/a$ and $\bar{\beta}/a$. Under the uniform specification

21. The simulation results are robust to other statistical specifications (for example, normal distribution).

TABLE 1. Minimum Opportunity Costs, $\hat{\lambda}$, above which Privatization is Preferred

$\hat{\lambda}$	$\underline{\beta}/a=0.0$	0.1	0.2	0.3	0.4
$\bar{\beta}/a=0.1$	1.14				
0.2	0.71	1.07			
0.3	0.52	0.66	0.99		
0.4	0.42	0.48	0.60	0.90	
0.5	0.35	0.38	0.44	0.54	0.81

Source: Authors' analysis.

the demand intercept a satisfies assumption (9) if and only if $a \geq 2\bar{\beta}$. This implies that $0 \leq \underline{\beta}/a < \bar{\beta}/a \leq 0.5$. Table 1 displays $\hat{\lambda}$ for the admissible values of $\underline{\beta}/a$ and $\bar{\beta}/a$.

The opportunity cost of public funds is generally assessed to be around 0.3 in developed countries (see, for instance, Snower and Warren 1996) and higher in developing countries. If demand and cost functions are reasonably approximated by linear functions and satisfy assumption (9), which is an empirical issue, $\hat{\lambda}$ lies below the range of the opportunity costs prevailing in developing countries. The results in table 1 also show that privatization is more likely as technological uncertainty rises (that is, $\hat{\lambda}$ decreases with $(\bar{\beta} - \underline{\beta})/a$). Indeed, larger cost uncertainty implies more information asymmetry between firms and governments and hence larger information rent in the regulated structures.

IV. LIBERALIZATION REFORM: THE DUOPOLY CASE

This section briefly explores the optimal industrial organization when the fixed cost, K , becomes smaller or, equivalently, when the value of operating the firm after investment, V , becomes larger.²² Following Auriol and Laffont (1992), a regulated duopoly is compared with a private duopoly, modeled as a Cournot duopoly with asymmetric information between firms.²³ To simplify the exposition, franchising is ruled out as well:

$$(24) \quad F(\lambda) \equiv 0.$$

In this model the benefit of choosing a regulated duopoly originates from the sampling gain, as first analyzed by Auriol and Laffont (1992). That is, variable costs are lower in a duopoly because the regulator can choose the most efficient supplier of two firms. Monitoring a regulated duopoly is thus equivalent to monitoring a regulated monopoly for which the investment level is $2K$

22. In the last two decades some industries (such as telecommunications) have experienced dramatic technological and demand changes because of decreased fixed costs and increased demand.

23. For conciseness, mixed duopolies with a regulated and a private firm are excluded here. See Cremer, Marchand, and Thisse (1989) and Picard (2001b) for a policy discussion of mixed duopolies.

and the marginal cost is $\min \{\beta_1, \beta_2\}$. Since β_1 and β_2 are assumed to be independently and identically distributed, $\min \{\beta_1, \beta_2\}$ is distributed according to $g_{\min}(\beta) = 2(1 - G(\beta))g(\beta)$. Let

$$(25) \quad V^{RD}(\lambda) = \int_{\underline{\beta}}^{\bar{\beta}} \frac{(a - c(\beta, \lambda))^2}{4b} g_{\min}(\beta) d\beta$$

which is the monopoly expression $V^{RM}(\lambda)$ in equation (18) with the density function $g(\beta)$ replaced by $g_{\min}(\beta)$. The next result is established under the assumption that $G(\beta)$ is the uniform distribution, yielding a proposition that applies for a more general distribution.²⁴

PROPOSITION 4. *If the firms' marginal costs are independently and uniformly distributed over $[0, \bar{\beta}]$ and assumptions (9) and (24) hold, a private duopoly is never optimal.*

In a regulated duopoly only the firm with the lowest marginal cost produces, which maximizes productive efficiency. By contrast, in a private duopoly there is excessive entry and inefficient allocation of production. The advantage of private structures thus disappears once more than one firm can enter the market.²⁵ For very profitable market segments the optimal choice is thus between regulated monopoly and regulated duopoly. Let $K^{RM/RD}(\lambda)$ be the value of the fixed cost such that the government is indifferent between a regulated monopoly and a regulated duopoly (that is, such that $EW^{RM}(\lambda) = EW^{RD}(\lambda)$):

$$(26) \quad K^{RM/RD}(\lambda) = \frac{1 + \lambda}{1 + 2\lambda} (V^{RD}(\lambda) - V^{RM}(\lambda)).$$

Under asymmetric information the sampling gain is measured by $K^{RM/RD}(\lambda)$ so that a regulated duopoly is optimal whenever the entry fixed cost, K , is lower than $K^{RM/RD}(\lambda)$.²⁶

24. See the supplementary appendix at <http://wber.oxfordjournals.org>.

25. This result may seem at odds with theories where private structures perform better with more entrants (see, for instance, Vickers and Yarrow 1991 and Segal 1998). A basic difference in this model lies in the intensity of competition within private and regulated structures. Private firms compete in quantities so that the addition of a firm does not fully eliminate market power and profits. By contrast, information costs fall when a second firm is added in the regulated market (see Auriol and Laffont 1992).

26. Since the distribution function $g^{min}(\beta)$ stochastically dominates $g(\beta)$ and since $(a - c(\beta, \lambda))^2/4b$ decreases in β , it can be deduced that $V^{RD}(\lambda) \geq V^{RM}(\lambda)$. However, the larger λ is, the lower is the impact of the sampling gain and the smaller is the government's preference for regulated duopoly.

V. OPTIMAL INDUSTRIAL POLICY

Under complete information the government can always replicate the production decisions of private firms so that privatization is never optimal. The optimal industrial policy varies according to whether the investment cost, K , is large (no production), medium (regulated monopoly), or small (regulated duopoly). Under asymmetric information, information costs alter this result. Still, the optimal decision depends on the fixed cost, K . Let $K^{RM}(\lambda)$ be the threshold such that the government is indifferent between a regulated monopoly and no production; that is, such that $EW^{RM}(\lambda) = 0$. It is easy to check that

$$(27) \quad K^{RM}(\lambda) = \frac{2 + 2\lambda}{1 + 2\lambda} V^{RM}(\lambda)$$

where $V^{RM}(\lambda)$ is as defined in equation (16). Similarly, let $K^{RM/PM}(\lambda)$ be the value of the fixed cost such that the government is indifferent between a regulated monopoly and a private monopoly; that is, such that $EW^{RM}(\lambda) = EW^{PM}$. It is easy to check that

$$(28) \quad K^{RM/PM}(\lambda) = \frac{2(1 + \lambda)^2}{\lambda(1 + 2\lambda)} V^{RM}(\lambda) - \frac{3V}{2\lambda}.$$

PROPOSITION 5. *If the firm's marginal cost is independently and uniformly distributed over $[0, \tilde{\beta}]$ and assumptions (9) and (24) hold, then optimal industrial policy under asymmetric information is to set:*

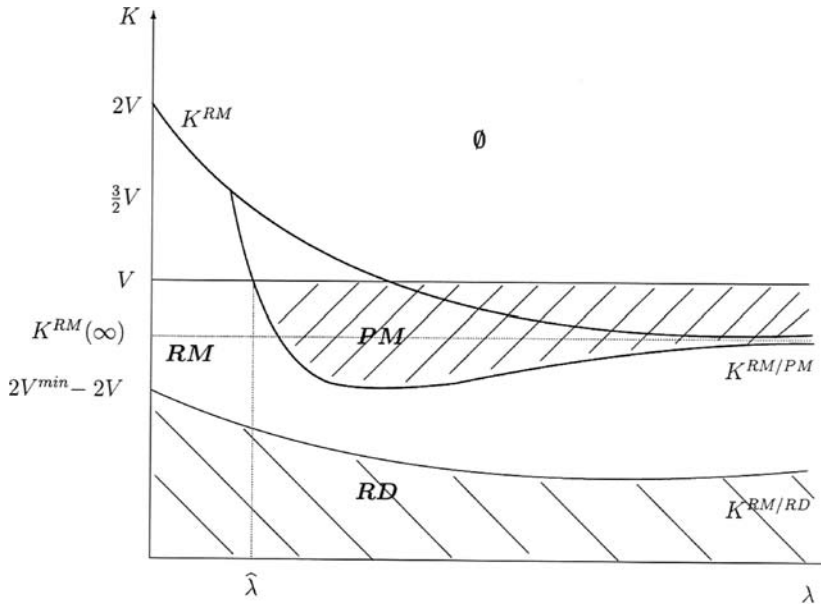
- *no production if $K > \max \{V, K^{RM}(\lambda)\}$*
- *a private monopoly if $K^{RM/PM}(\lambda) < K \leq V$*
- *a regulated monopoly if $K^{RM/RD} < K \leq \min \{K^{RM/PM}(\lambda), V\}$ or if $V \leq K < K^{RM}(\lambda)$*
- *a regulated duopoly if $K \leq K^{RM/RD}(\lambda)$.*

Although this proposition assumes that $G(\beta)$ is the uniform distribution, the result applies to more general distributions.²⁷

Because developing countries have large opportunity costs of public funds, they can implement industrial policies that strongly differ from those implemented in developed countries (see figure 2). The discussion here is limited to four cases that depend on the profitability of the market segment. Profitability is assessed by the difference between the operating profit of the private firm, V , and the fixed cost level, K . In the following discussion V is fixed to a constant and K is successively decreased.

27. See the supplementary appendix at <http://wber.oxfordjournals.org>.

FIGURE 2. Optimal Industrial Policy



Source: Authors' analysis.

The first case occurs for large fixed costs, $K > V$. The market segment is not privately profitable and is socially beneficial only if the opportunity cost of public funds, λ , is small enough. The optimal industrial policy is thus to establish a public regulated firm for low λ or to supply nothing at all for high λ . In figure 2, public regulated monopolies that are desirable under asymmetric information are depicted by the white area denoted RM , while the case for no production corresponds to the area denoted \emptyset . This is a case for public provision and ownership of firms in unprofitable segments. Examples are rural infrastructure projects (secondary roads or rural electrification) that are supplied only by wealthy countries and that are usually priced at marginal cost to rural populations. In poor countries the opportunity costs of subsidizing such infrastructure are higher than its social returns. As a result, poor countries choose not to offer such infrastructure or try to get rid of the unprofitable public firms in charge of them.

The second case occurs for smaller fixed costs that belong to the range $[K^{RM}(\infty), V]$. In this case a private firm finds it profitable to enter and to supply its output at the monopoly price. In contrast to the first case, the government can now organize supply through a private firm. The optimal industrial policy is monotonic in the opportunity cost of public funds, λ : a public regulated firm is preferred if λ is small enough, and privatization is preferred otherwise. In figure 2 the case for a public regulated firm is depicted by the white area denoted RM , and the case for privatization by the hatched area above the curve $K^{RM/PM}$ and denoted PM .

To understand why privatization can be a better alternative than public provision, consider a poor country government that is unable to finance an infrastructure project, such as a small water network or electricity generation facility (that is, a case where K lies below V and above the curve K^{RM} with λ high enough). The optimal solution is for a private firm to invest in the infrastructure in exchange for being allowed to charge monopoly pricing because it is better to have a privately owned and operated infrastructure with monopoly price distortion than no infrastructure at all. By continuity, this conclusion holds when the government gets a (moderate) benefit from financing the infrastructure.

Developing countries offer many examples of such privatization through concession, lease, and greenfield contracts. For instance, many developing countries have started build-operate-and-transfer road programs, wherein private firms finance the sunk costs associated with building highways in exchange for a long-term license to exploit a monopoly position.²⁸ China, Malaysia, and Thailand have implemented such programs in water, and Chile and Mexico in sanitation (World Bank 1997). In many places the privatization process is less formal. For instance, in Sub-Saharan Africa water and electricity services are offered by an informal sector made up of thousands of small-scale private and unregulated providers (see Auriol and Blanc forthcoming). As predicted by theory, they serve the middle class and the poor at prices that are much higher than public utility prices. Kariuki and Schwartz (2005) estimate that nearly half the urban population in Africa relies on such private services for water.

The third case occurs when K is lower than $K^{RM}(\infty)$. In contrast to the second case, the optimal industrial policy is no longer monotonic in λ . This property, discussed earlier, is reflected in figure 2 by the fact that curve $K^{RM/PM}$ is nonmonotonic in λ . For exposition $\underline{K}^{RM/PM}$ is defined as the minimum of $K^{RM/PM}$ (that is, $\underline{K}^{RM/PM} = \min_{\lambda} K^{RM/PM}(\lambda)$), and the discussion is limited to fixed costs in the interval $[\underline{K}^{RM/PM}, K^{RM}(\infty)]$. Then, as the opportunity cost of public funds, λ , increases, the optimal industrial structure successively switches from a public regulated firm to a private firm and then back to a public regulated firm. The difference from the second case is that when λ is large enough the government seeks to extract the maximum revenue from the public firm by setting high prices. This case shows that, while the divestiture of a profitable public firm may be optimal in countries with intermediate costs of public funds, it is not necessarily optimal in developing countries, where budget constraints are tight and market institutions are weak.

The fixed-line and long distance segments of the telecommunication industry illustrate the nonmonotonic result. Anania (1992) shows how developing countries collected revenues from the profitable segments of public

28. Trujillo, Quinet, and Estache (2002) show that transport privatization leads to a reduced need for public investment.

telecommunication companies, such as international calls, to subsidize mail service and to ease their budget deficits. This experience indicates that the interests of developing countries in the privatization of the telecommunication sector strongly differed from those of developed countries.

Although governments in developed countries also care for the revenues generated by their utilities,²⁹ their effective taxation systems make them less greedy about the potential revenue of natural monopoly markets.³⁰ In developing countries privatization of profit centers of public utility is socially inefficient. By eliminating cross-subsidies between various market segments or industries, privatization generally increases the fiscal costs related to unprofitable segments and reduces political support from harmed (usually poor) consumers (Estache and Wodon 2006; Trujillo, Quinet, and Estache 2002).

The fourth case takes place at low enough fixed costs. With a large surplus at stake, a private Cournot duopoly is never optimal. Governments choose between regulated public structures with one or two firms, depending on whether opportunity cost of public funds is small or large. In figure 2, a regulated duopoly is preferred to a regulated monopoly in the hatched area below the curve $K^{RM/RD}$ denoted RD . This sheds light on the relationship between market liberalization on the one hand and technological improvement and product demand growth (illustrated by a fall in the ratio K/V) on the other hand. Market liberalization corresponds to the divestiture of the historical monopoly and the introduction of new entrants but is not equivalent to laissez-faire. Prices and entry should remain regulated to protect consumers against firms' tendency to reduce competition by setting low capacity levels or even by organizing collusion (not modeled here). With a large surplus at stake, ownership is not the key to the allocative efficiency problem; regulation is. Empirical evidence supports this result.³¹

VI. CONCLUSION

This article compares the welfare of a public firm with regulated prices and the welfare of a private firm with liberalized prices for different values of opportunity costs of public funds. It shows that the privatization decision nontrivially depends on the value of opportunity costs of public funds and on the

29. The United States adopted a federal excise tax on telephony services in 1898. Opponents of the tax argue that it is distortive; proponents insist that the revenue is needed. The 3 percent tax yielded \$5.185 billion in 1999.

30. In most countries the bulk of government revenue is raised through taxation. Governments do, however, obtain substantial revenue from a number of other sources. "On the whole this non-tax revenue is more important for developing as opposed to industrial countries, comprising about 21 percent compared to 10 percent of total revenue" (Burgess and Stern 1993, p. 782).

31. For instance, for telecommunications in Africa and Latin America, Wallsten (2001) found that privatization does not yield improvements except when accompanied by an independent regulator. For more on telecommunication reforms in developing countries, see Auriol (2005).

profitability in the market segment where the firm operates. Since the opportunity cost of public funds is higher in developing countries than in developed countries, optimal privatization policies are likely to differ between those countries, as highlighted in the four following cases.

First, a market segment can have such low profitability that no private firm is able or willing to cover it. This situation is typically encountered in secondary road or electrification projects in low-density areas. A public firm is then the natural option, provided that the opportunity cost of public funds is not too high. Otherwise, the service is not offered. Empirical evidence is consistent with this result. The share of people in poor rural areas that do not have access to any service is larger in developing countries than in developed ones.

Second, the market segments can be profitable enough to allow a private firm to enter. Privatization with price liberalization then dominates regulation if the opportunity cost of public funds is large enough. As a result, the provision of utility services and infrastructure is more market oriented in developing countries than in developed ones. This is consistent with empirical evidence. For instance, Kariuki and Schwartz (2005) estimate that nearly half of urban dwellers in Africa (that is, the middle class and the poor) rely on private providers for water service. The private (informal) providers are bridging the utility service gap at a high cost; their prices are up to 10 times those of public providers. The result is also consistent with developing countries' use of concession, lease, and greenfield contracts, such as build-operate-and-transfer programs for highways, sanitation, and water networks.

Third, when market segments are more profitable, privatization choice is restricted to intermediate opportunity costs of public funds. The government indeed finds it optimal to set up a public firm for large enough opportunity costs of public funds. Very poor countries are plagued with financial problems and welcome the potential revenue that can be extracted from a public firm. Privatization of profitable public utilities, such as fixed-line or international telecommunication services, is therefore not efficient.

Fourth, the market segment can be so profitable that a second firm is able to enter. Then privatization with price liberalization is not optimal. As shown in the booming mobile telecommunication industry, regulation is a keystone for successful liberalization reforms.

In contrast to many contributions on privatization, the discussion here focuses on the two issues of allocative efficiency and macroeconomic financial constraint. The empirical literature in development studies provides ample evidence of the relationship between those two issues in natural monopoly and oligopoly markets in developing countries. Nevertheless, as noted, improvements in productive efficiency associated with privatization have also been highlighted in the theoretical and empirical literature. The authors hope that this article helps readers find a balance between those issues.

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