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Summary

We show that privatization can be beneficial even if the government is rational and benevolent, and if the firm's economic and informational environment is independent of the governance structure. The model assumes that wage contracts between the firm's owner (government or private entrepreneur) and its manager are incomplete. Managerial incentive schemes are set optimal given this restriction. Nevertheless, the ownership structure feeds back on managerial effort because the initial contract is modified if one party in the relationship has a credible threat to quit or to shut down the firm. In particular, since benevolent government and profit-maximizing entrepreneur have different objective functions, the occurence of renegotiation is regime dependent. Public ownership is optimal if the firm operates under a serious shutdown threat. Conversely, privatization is strictly preferable if the firm's future survival does not crucially depend on the success of managerial effort.

Keywords: Privatization, incomplete contracts, innovative technologies

JEL: D23, H57, L51.

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1 Introduction

The last decade has witnessed a widespread political agreement on the welfare-enhancing effects of private governance. Public officials now assess privatization as a proper instrument to reduce slack, implement more efficient production technologies, or promote a faster development of promising product innovations. This view has been supported by empirical studies which largely report positive effects of privatization on the firm's productive efficiency.[1]

Perhaps surprisingly, economic theory has more difficulties to identify the merits of privatization, in particular when the government is assumed to behave purely benevolent. The public-choice oriented branch of the literature stresses the private goals of government officials, and welcomes privatization as a means to constrain self-interested bureaucrats or politicians [Shapiro and Willig (1990), Boycko, Shleifer and Vishny (1996)]. In a similar spirit, some authors start from the empirical observation that inefficient contracting prevents efficient outcomes in public firms: for example, governments often refrain from signing incentive contracts with their managers and workers, which can be seen as an exogenous impediment to optimal performance [see, e.g., Vickers and Yarrow (1988) and Bös (1991)].

These approaches provide reasonable arguments in favor of privatization. Yet, not all governments behave badly, in particular, if they are effectively controlled by their constituencies. Thus, the literature fails to answer the more fundamental question whether a *rationally acting and benevolent* government may be less suited to operate a firm than a private, profit-maximizing entrepreneur. In light of the work of Coase (1937) and Williamson (1985), it seems difficult to give an affirmative answer to this question. These authors conjectured that the entire economy should optimally be organized as a single firm governed by a chairman (a welfare-maximizing government in our context) who selectively intervenes into the decisions of lower hierarchy levels whenever an intervention increases the 'profit' of the whole organization. Only the recent property rights approach, which starts with the pioneering article by Grossman and Hart (1986), has resolved this so-called 'Williamson puzzle' and has succeeded in identifying the vices of centralized ownership. The main methodological corner stone

[1] For recent empirical assessments of international privatization programmes see Megginson, Nash and van Randenborgh (1994), and Martin and Parker (1997) for the UK.

of this theory is the idea that contracts are necessarily incomplete, which renders it possible to study the implications of different ownership structures.[2]

The present article follows this methodological paradigm.[3] We consider the privatization decision of a welfare-maximizing government under incomplete contracting. Specifically, we assume that an initial labor contract between the government (or a private owner) and the management can only be contingent on the firm's future operation, but cannot be conditional on the subsequent invention and implementation of an innovative and more efficient production technology.[4] The firm's manager can exert non-contractible investments to develop this innovative technology. After it has become clear whether his effort was successful and the innovative technology has become available, the firm can take up production. We suppose that, ignoring wage payments, both government and private owner find it always valuable to remain in business when the innovative technology can be utilized (accordingly, further production is then welfare-efficient). Because wage payments are taken into account, however, either owner can credibly threaten to shut down the firm when precontracted salaries exceed its respective gross-of-wages payoff. In equilibrium, manager and owner will renegotiate the initial compensation scheme when a credible shutdown threat exists. Since we consider a game with perfect information among the parties, the possibility to renegotiate ensures ex-post efficient production decisions; for concreteness, we suppose that renegotiations lead to the Nash-bargaining solution where the surplus from ongoing production is evenly shared among owner and manager.

As a key to our subsequent results, we find that governance structures differ in the set of situations where renegotiation under a given wage contract occurs. If the firm has remained public, the benevolent government has a relatively soft budget constraint [Kornai (1986)] since its gross welfare is defined as the sum of consumer surplus and

[2]When 'comprehensive' contracts are feasible, all agents can be tied by a so called 'grand contract' and property rights are not a meaningful concept. Contracts are comprehensive when they are contingent on any relevant contingency that is jointly observed by the parties. Therefore, even informational asymmetries between principal and agent, which are the focus of the standard contract-theoretical literature, do not preclude the optimality of grand contracts. See, for example, Hart and Holmström (1987), Holmström and Tirole (1989) and Hart (1995).

[3]The application of incomplete contracting models to public policy issues is relatively new; for excellent treatments, see Tirole (1994) and Dixit (1996). Shleifer (1998) surveys arguments from the recent literature on privatization.

[4]For similar approaches in trade contexts, see Aghion and Tirole (1994), Hart and Moore (1999), Segal (1999), and Bös and Lülfesmann (1998).

profits. Conversely, the profit-maximizing owner of a private firm has a tighter budget constraint because she does not internalize consumer surplus from ongoing production.

These endogenously emerging differences at the bargaining stage give rise to the following results: in a first scenario, we suppose that the firm's established old production technology has become so ineffective that either owner goes out of business when no innovative technology can be implemented. Then, there exists an optimal initial wage contract (under which the manager recovers entire social surplus up to a constant) which leads to efficient investments and a first-best outcome under public governance. In contrast, underinvestments prevail if the firm has been privatized, and public governance is thus strictly welfare superior to private ownership. This outcome confirms the intution that a welfare-maximizing principal must attain at least the same welfare level as a private principal whose objective function exhibits profit rather than welfare objectives.

However, in a second scenario where the firm disposes of a *viable* basic technology that makes ongoing production efficient and profitable even without a technology change, our previous results are reversed. While public ownership may lead to suboptimal investments, private governance may now allow for an efficient outcome. Intuitively, first-best investments are reduced because the firm can still operate when no process innovation becomes available. Hence, the underinvestment problem in private procurement is alleviated and may entirely disappear. The manager of a public firm, however, now overinvests under the wage contract that was optimal in the scenario without viable basic technology: while he still obtains the entire social surplus from production when the innovative technology was successfully invented, wage renegotiations with the government allow him to accrue only some part of social surplus if this is not the case and the firm continues to utilize the basic technology. Thus, the manager's payoff difference between these two events is larger than the corresponding difference in social surplus, which leads him to expend too much effort. We also show that there may not exist another initial wage contract which induces efficient investments in equilibrium and, as a consequence, public governance may fail to reach the efficiency frontier. Parameterizing the probability that the firm can successfully be operated under the basic technology, we are also able to derive clearcut conclusions on the parameter regions in which one of the governance structures dominates the other: loosely speaking, the stronger the pressure to innovate, the better is the relative performance under

nationalization and vice-versa.

While our findings are partially in line with the informal literature on "soft budget constraints" in public firms due to time inconsistency problems,[5] the logic of our results is very different. A well-known argument on the desirability of privatization is that a government's welfare interest renders any shutdown threat in case of high cost realizations non-credible. The manager anticipates that the firm remains in operation even if he does not expend any effort, and thus does not engage in cost reductions. Conversely, a private owner has a credible threat to shut down the firm and dismiss the manager when costs are high and the firm goes bancrupt. As a response, the manager works harder to avoid this unfavorable outcome [Segal (1998)].

While intuitive, this soft budget constraint argument suffers from several flaws. First, it neglects that even a welfare-maximizing owner may initially sign wage contracts with its management that have to be renegotiated and therefore do not coincide with actual equilibriium wages. Second, and more fundamentally, the argument requires a non-credible commitment of the government not to intervene in the private firm's operations even if an ex-post inefficient shutdown decision is taken. This commitment is sequentially irrational because the government has an interest to bail out a private firm after bankruptcy.[6] Anticipating a government intervention, however, the manager of a private firm will not work more than his public counterpart. The goal of the present paper is to demonstrate that private ownership can be the optimal mode of governance even if the government cannot maintain an incredible commitment, and if initial wage contracts can be renegotiated. Despite optimal contracting and sequentially rational behavior of all parties, we identify situations where the harder budget constraint of a private owner leads to a more efficient outcome.

Our approach is related to other articles which analyze privatization in incomplete-contract frameworks with benevolent governments. Schmidt (1996a) postulates an interdependency between ownership mode and informational structure and assumes that privatization reduces the government's knowledge on the firm's production costs. This informational wedge can induce the firm's private owner-manager to work hard

[5] See Kornai (1986) who introduced the notion of soft budget constraints, and Maskin (1999) for a recent assessement of theoretical developments.

[6] In practice, governments often subsidize bankrupt private firms. In particular, bail-outs are often observed in industries with monopolistic structures, or in situations where the government aims to protect domestic industries or employment.

because rents at the production stage allow him to recover a return on his effort.[7] Intuitively, since the government does not observe the realization of production costs after privatization, ex post regulation generates an informational rent for the manager, and sacrifices allocative efficiency. The manager's informational rent, in turn, provides him with incentives to invest in cost reductions ex ante. Conversely, the government can easily enforce the efficient output level in a public firm, but at the same time the public manager does not engage in cost reductions since these investments do not affect his payoff. Hart, Shleifer and Vishny (1997) explore the effects of privatization in a model where the firm's manager (or owner-manager after privatization) can invest into cost-reducing and quality-improving technologies, respectively. Under nationalization, the implementation of either technology requires (Nash)bargaining between manager and government. This implies that the manager recovers only half of the marginal surplus from both activities, and therefore strictly underinvests. After privatization, the owner-manager can unilaterally implement the cost-reducing technology and becomes the residual claimant for that activity. As a result, he invests efficiently in cost reductions which makes privatization the efficient organizational mode (at least if the effort cost functions are separable).[8]

The present paper may be seen as complementary to these approaches: in contrast to Schmidt, we do not postulate a connection between governance mode and informational structure. In contrast to Hart et al., we do not impose the assumption that a public manager cannot be made residual claimant for his own cost savings (while a private manager-owner can).[9]

The remainder of the paper is organized as follows. Section 2 introduces and solves the basic model. Section 3 extends this model by introducing a viable basic technology. Section 4 summarizes and discusses the main results, and Section 5 concludes.

[7] In Shapiro and Willig (1990), privatization also erects an informational barrier between regulator and firm. In their model, his bad knowledge prevents the self-interested regulator from pursuing own idiosyncratic goals, which can explain for the benefits of privatization.

[8] To implement quality improvements, the private owner still has to bargain with the government, and therefore underinvests in the same way as a public manager.

[9] In addition, the firm's operations are delegated to to an employed manager in our model. Delegation would invalidate the benefits of privatization in Hart, Shleifer and Vishny, while Schmidt (1996b) shows that the outcome remains qualitatively unaffected provided that the employed manager is an empire builder.

2 A Simple Framework

2.1 Model Description

There are three parties, the government (G), a private owner (P), and a manager (M). All parties are risk neutral and have complete information throughout the game. Initially, the government owns a monopolistic enterprise that can be sold to a private entrepreneur at an initial date. If the government wants to privatize, G and P agree on a sales contract and the private entrepreneur becomes residual claimant for the firm's nonverifiable return streams.[10] If the enterprise is not privatized, it remains in public hands. Under either governance structure, the self-interested (and indispensable) manager M runs the firm. After the governance structure has been chosen, owner $O \in \{G, P\}$ and manager therefore sign a wage contract w that is explained below.

Before production takes place, M can invest in the development of a process innovation which (when implemented) lowers the fixed costs of production from $\tilde{\delta} > 0$ to zero. The corresponding non-verifiable effort is indicated as e, and represents the ex-ante probability with which the innovation is invented. We suppose that the manager's investment costs are an increasing and convex function $\psi(e)$ and in order to ensure interior solutions, impose the Inada conditions $\psi_e(0) = 0$ and $\psi_e(e) \to \infty$ for $e \to 1$ (subscripts denote derivatives).

After it has become clear whether the innovative technology T_I is available, the firm can take up production y. Defining $S(y)$ as consumer surplus and $\Pi(y) = R(y) - C(y)$ as the firm's variable profits (i.e., revenues minus variable production costs), the welfare-maximizing quantity is assumed to be positive and represented by

$$y^{FB} = \arg\max_y \{S(y) + \Pi(y)\}. \tag{1}$$

When the welfare-government has retained ownership, it will always set marginal-cost prices and produce the efficient quantity. In contrast, a private owner has an intrinsic interest to choose monopoly prices in order to maximize profits. Therefore, it is optimal

[10] Below, we will see that the optimal privatization contract stipulates not only a fixed sales price t, but also entails two regulatory components: first, it allows the government to prescribe a production level after the state of the world has been realized (or, equivalently, a consumer price). Second, the contract specifies a wage level w which is paid to the manager. Alternatively, if ownership changes do not render previous wage contracts spurious, G and M can agree on a salary before the privatization contract is signed.

for the government to preserve the right to regulate the privatized firm's output level, and y^{FB} again prevails.[11] Thus, governance structures do not differ in their allocative implications. Throughout the paper, we will assume that

$$\Pi(y^{FB}) > 0 \tag{2}$$

so that the private owner's gross-of-wages profits are positive even if she produces the efficient (rather than the profit-maximizing) quantity. Since y^{FB} equalizes consumer price and marginal costs, (2) always holds under the standard assumption that the variable cost function is convex in output.

If the manager's effort is unsuccessful and he did not invent the new production technology, the firm can still operate under an established basic technology T_B with positive fixed costs, $\tilde{\delta} > 0$. Throughout the present section, we suppose that $\hat{delta} > S(y^{FB}) + \Pi(y^{FB})$. This assumption reflects a scenario where changes in market conditions or increases in fixed costs have made the basic technology so ineffective that the firm has to shut down when no technology change takes place.[12]

Importantly, owner O and manager M cannot be forced to take up production if the corresponding utility of (at least) one party is smaller than its respective default payoff. Let $w = (w_1, w_0)$ be the initial wage contract. Since returns and effort are non-contractible, this contract can only be contingent on the firm's subsequent operation: while the manager obtains w_1 if production is taken up, he receives a precontracted redundancy payment w_0 if the firm shuts down.[13] Define $\Delta w \equiv w_1 - w_0$. Then, the manager is willing to produce if and only if

$$U^M(w,1) = w_1 \geq w_0 = U^M(w,0) \quad \Longleftrightarrow \quad \Delta w \geq 0. \tag{3}$$

where $U^M(w,1)$ and $U^M(w,0)$ represent his utility levels (after investments have been sunk) when the firm remains in business or closes down, respectively.

[11] We follow Segal (1998) and Schmidt (1996a,b) in assuming that output levels cannot be predetermined in the initial privatization contract, i.e., contracts have to remain incomplete in this respect. Alternatively, we could assume that the consumer demand is completely unelastic [for examples, see Hart et al. (1997)].

[12] In the subsequent Section 3, we will allow for a 'viable' basic technology where $\tilde{\delta}$ can be so small that the firm should continue to operate even if T_I has not been invented.

[13] Hence, the labor contract is a contract 'at will' that does not incorporate individual breach penalties. Labor relationships are regularly governed by at will contracts [see MacLeod and Malcomson (1993) and Malcomson (1997)].

The government is benevolent; its objective function exhibits the sum of consumer and producer surplus minus wages that are paid to the manager.[14] Accordingly, if the firm has remained under public ownership, the government agrees to production under the initial wage contract if

$$U^G(w,1) = S(y^{FB}) - \Pi(y^{FB}) - w_1 \geq -w_0 \quad \Longleftrightarrow \quad \Delta w \leq S(y^{FB}) + \Pi(y^{FB}). \tag{4}$$

Conversely, the private entrepreneur's utility is defined as profits minus wage payments. Hence, she cannot credibly insist on renegotiation if

$$U^P(w,1) = \Pi(y^{FB}) - w_1 \geq -w_0 \quad \Longleftrightarrow \quad \Delta w \leq \Pi(y^{FB}). \tag{5}$$

Accordingly, production takes place under the initial terms of contract if and only if

$$S(y^{FB}) + \Pi(y^{FB}) \geq \Delta w \geq 0 \quad \text{if } O = G; \tag{6}$$

$$\Pi(y^{FB}) \geq \Delta w \geq 0 \quad \text{if } O = P. \tag{7}$$

Note that, even for initial contracts that violate (6) and/or (7), O and M will still agree to start production whenever the innovation has been invented. However, this ex-post efficient decision now requires renegotiation between O and M because exactly one of the parties credibly rejects to operate the firm under the initial terms of contract. In line with the literature, we suppose that renegotiations lead to a sharing rule according to the Nash-bargaining solution: under this rule, owner and manager receive their default payoffs $-w_0$ and w_0, respectively, while the joint surplus from production is evenly shared. If the innovation has not been invented, there is no room for renegotiation because production is inefficient and there exists no contract (either initially signed or renegotiated) under which both parties would agree on further production. Therefore, the firm is shut down and the manager receives the precontracted redundancy payment w_0. (Later on, we will allow for a viable basic technoloogy where the firm remains in operation even if T_I is not available; see Section 3 below).

Taken together, we consider the following stage game under complete information:

- *Stage 0:* The government decides whether to privatize the public enterprise. In case of privatization, the firm is sold to a profit-maximizing entrepreneur at a

[14] For simplicity, we do not incorporate shadow costs of public funds, λ, nor do we suppose that the government values the manager's utility as parameterized by some multiplier λ^M. Positive values λ, λ^M would modify the government's objective function to $U^G(\lambda) = S(\cdot) + [\Pi(\cdot) - w_1](1+\lambda) + \lambda^M U^M$ [see Laffont and Tirole (1993)], but not affect our qualitative results.

fixed sales price t that extracts all future profits. Moreover, the government retains the right to decide on the subsequent output level y, and obliges the private owner to make a certain wage offer at stage 1.

- *Stage 1:* Owner and manager sign a labor contract (w_0, w_1) that can be contingent on the firm's subsequent operation.

- *Stage 2:* The manager exerts a nonmonetary investment (effort). A higher effort level increases the probability that an innovative production technology T_I becomes available to the firm.

- *Stage 3:* Nature decides whether T_I is invented.

- *Stage 4:* The innovative technology T_I (if available) can now be implemented, possibly after renegotiation between O and M on the precontracted wage. Alternatively, the enterprise is shut down, in which case M receives a redundancy payment and the game ends.

- *Stage 5:* Output y^{FB} is produced and sold to consumers, wage payments are provided. The game ends.

As a benchmark for subsequent reference, we compute the effort level that maximizes welfare (and the government's ex-ante objective function)

$$W(e) = u^G(e) = e[S(y^{FB}) + \Pi(y^{FB})] + (1-e)0 - \psi(e). \tag{8}$$

Accordingly, the first-best investment level e^{FB} is implicitly defined by

$$\psi_e(e^{FB}) = S(y^{FB}) + \Pi(y^{FB}). \tag{9}$$

A first-best outcome thus requires that e^{FB} is implemented, and that the welfare-optimal quantity y^{FB} is produced whenever the innovative technology has been invented. In the next section, we will examine whether there exist ex-ante contracts (w_1, w_0) which render a first-best outcome feasible under either governance structure.

2.2 Equilibrium Analysis

We now solve the model which was introduced in the preceding subsection. Since we know that the production level (if any) will be y^{FB} under both governance structures,

we are mainly concerned with managerial investments in presence of renegotiation. Hence, we start our analysis at date 2 where the privatization decision has been taken and a wage contract between O and M has been signed. Define the manager's expected utility from an ex-ante point of view as

$$u^M(w) = eU^M(w,1) + (1-e)w_0 - \psi(e) = w_0 + e[U^M(w,1) - w_0] - \psi(e) \qquad (10)$$

and recall that $U^M(\cdot,1)$ indicates his continuation utility in states where the innovation has been invented, or not. Note that the possible redundancy payment w_0 allows it to implement any desired distribution of total surplus between the parties, while investment incentives depend only on Δw. Moreover, manager and owner will agree upon an initial contract where M's expected equilibrium utility is at least as large as his exogenous reservation payoff $\bar{u}^R$, i.e., $u^M(w) \geq \bar{u}^R$. In what follows, we characterize equilibrium wages for the whole range of initial compensation schemes, and then compute the manager's investment level under either governance structure. A rational government should privatize at date 0 if and only if, under the optimal wage contract, private governance allows for a welfare-improvement over the public ownership regime.

Public Governance

Suppose that the government did not privatize at date 0. Then, it will sign a labor contract (w_0, w_1) with the public manager. Since G's authority always allows her to command the welfare-optimal production level y^{FB} ex post, we only have to examine whether some initial contract (w_0, w_1) leads M to choose efficient investments. Recalling that the initial salary w_1 will be renegotiated if $\Delta w < 0$ or $\Delta w > S(y^{FB}) + \Pi(y^{FB})$, we can calculate equilibrium wages w_1^e (which coincide with the manager's continuation utility) as a function of the initial wage contract,

$$w_1^e(w) = U^M(w,1) = \begin{cases} w_1 & \text{if } S(y^{FB}) + \Pi(y^{FB}) \geq \Delta w \geq 0, \\ w_0 + (S(y^{FB}) + \Pi(y^{FB}))/2 & \text{otherwise.} \end{cases} \qquad (11)$$

Whenever both parties prefer production under the initial terms of contract to a shutdown, no renegotiation occurs. Conversely, when the initial wage (difference) is negative or larger than gross-of-wages welfare, renegotiations become necessary to ensure further operations of the firm. Recall that the redundancy payment w_0 will never be renegotiated: when the development of the innovation was unsuccessful, it is ex post efficient to shut down the firm; the owner refrains from production and no renegotiation

on w_0 arises because the parties face a zero-sum game. Inserting these equilibrium figures into (10) and maximizing, the utility-maximizing investment level e^G is implicitly defined by

$$\psi_e(e^G(w)) = \begin{cases} \Delta w & \text{if } S(y^{FB}) + \Pi(y^{FB}) \geq \Delta w \geq 0, \\ ((S(y^{FB}) + \Pi(y^{FB}))/2 & \text{otherwise.} \end{cases} \tag{12}$$

It is now straightforward to interpret these equilibrium efforts: under any contract that will be renegotiated on the equilibrium path, M underinvests because he obtains only a fraction $1/2$ rather than the full social return on his investments. Conversely, in the contract range where renegotiation can be avoided, $e^G(.)$ strictly increases in Δw, and an initial contract characterized by $\Delta w^* = S(y^{FB}) + \Pi(y^{FB})$ implements efficient investments. Accordingly, public governance leads to a first-best outcome when the proposes an optimal initial labor contract.

Private Governance

After the firm has been privatized and a wage contract has been signed, the manager's utility continuation utility is again defined by (10). His actual equilibrium payoff, though, differs from that under public governance since equilibrium wages for given initial contracts may not coincide. To see this, recall (7) to find that

$$U^M(w,1) = w_1^e(w) = \begin{cases} w_1 & \text{if } \Pi(y^{FB}) \geq \Delta w \geq 0, \\ w_0 + \Pi(y^{FB})/2 & \text{otherwise.} \end{cases} \tag{13}$$

These findings reflect that the private owner has a harder budget constraint than the government. P can credibly threaten to shut down the firm when the wage is above variable profits (rather than welfare). In contrast to the usual implications of hard and soft budget constraints, however, renegotiation ensures that efficient production will be realized. Noting that $\Delta w \leq \Pi(y^{FB})$ is now necessary to prevent renegotiation, we find that the maximal effort level is attained by a contract characterized by $\Delta w = \Pi(y^{FB})$ under which $\psi_e(e^P) = \Pi(y^{FB})$ so that $e^P < e^{FB}$. The reason for this underinvestment is very intuitive: since the private owner's valuation of production is smaller than the social valuation, he cannot credibly promise the manager a wage difference which is high enough to make M residual claimant with respect to welfare.[15]

We can now state the following proposition:

[15]We supposed that the privatization contract prescribes w. In the setting analyzed in the present section, is easy to see that P will voluntarily offer a contract $\Delta w = \Pi(y^{FB})$ because the implied effort level maximizes the joint payoff $e\Pi(y^{FB}) - \psi(e)$ of P and M.

Proposition 1. *Suppose that it is efficient to shut down the firm unless the innovative technology is invented. Then, a first-best result is attained under public governance, while suboptimal investments prevail after privatization.*

According to this result, private ownership is not the efficient form of governance when the successful development of an innovative technology is a precondition for the firm's survival. We thus find that, perhaps in tension with common beliefs, privatization is not a means to enhance managerial effort if owners sign optimal wage contracts with their managers. Our result also suggests that the government's soft budget constraint - here interpreted as its intrinsic willingness to pay high wages - has positive effects on the attainable outcome.[16] The next section will show that these implications may be reversed when a failure to innovate does not necessarily imply a shutdown of the firm.

3 Viable Basic Technology

3.1 The Model

In the basic model of Section 2, we supposed that the firm's future survival depends on the successful development of an innovative production technology. This case was meant to reflect an economic situation where market conditions have changed so dramatically, or established production processes have become so ineffective, that it is welfare-efficient to shut down the firm when no cost reductions (in our model, a decrease in fixed costs $\tilde{\delta}$) are realized. The present section abandons this extreme assumption, and analyzes a more general scenario where it can be efficient (and even profitable for a private owner) not to go out of business even if no innovative technology is implemented.

To accommodate this scenario, we extend the previous model in the most simple way. Specifically, we now suppose that, with an exogenous ex ante probability q, the fixed costs $\tilde{\delta}$ which have to be incurred under the basic technology are low enough that ongoing production is efficient and even profitable. We define the fixed costs as a binary random variable $\tilde{\delta} \in \{\delta, \delta'\}$, $\delta < \delta'$ that is drawn by nature at date 3 after M

[16] Note that, when $\Pi(y^{FB}) < 0$ so that a private owner is not willing to operate the firm even if $\Delta w = 0$, the government will intervene and the governance structure is irrelevant. Conversely, if the government behaves sequentially irrational and does not intervene, a private firm will never start production.

expended his investments. Supposing that $\delta' > S(y^{FB}) + \Pi(y^{FB})$, future production becomes inefficient when high fixed costs δ' are realized. Then, as in the basic model of Section 2, a shutdown cannot be avoided. However, when the low realization of fixed costs $\delta < \Pi(y^{FB})[< S(y^{FB}) + \Pi(y^{FB}]$ is drawn by nature, future production remains viable even under the basic technology, and production is not terminated under either governance structure. Let

$$q = \text{prob}\,\{\tilde{\delta} = \delta\}, \quad q \in [0, 1], \tag{14}$$

be the ex-ante probability for low fixed costs, that is, the probability with which the firm remains in operation even if the new technology is not invented. Note that the analysis in the basic model of Section 2 corresponded to an economic environment where $q = 0$.

Because innovative and basic technology differ only in the fixed costs of production, the efficient investment level y^{FB} is still determined by (1). On the other hand, our extension affects the first-best optimal investment level e^{FB}, which now maximizes

$$W(e; q) = u^G(e; q) = e[S(y^{FB}) + \Pi(y^{FB})] + (1-e)q[S(y^{FB}) + \Pi(y^{FB}) - \delta] - \psi(e). \tag{15}$$

Differentiating this concave program with respect to e, we obtain

$$\psi_e(e^{FB}(q)) = [S(y^{FB}) + \Pi(y^{FB})](1 - q) + q\delta > 0. \tag{16}$$

This solution reflects the uncertainty faced by the manager: with probability q, the continuation equilibrium is characterized by ongoing production even if managerial effort was not successful, and the marginal return on investments is just δ. With opposite probability $(1 - q)$, the firm's survival requires the invention of T_I. Therefore, the marginal return from investments in this state is higher because only a successful innovation prevents the firm's shutdown. In the game between owner and manager, renegotiation again leads to the ex-post efficient production decision. For any initial contract the manager chooses his effort level to maximize his utility function

$$u^M(w) = w_0 + e[U^M(w, I) - w_0] + (1 - e)q[U^M(w, B) - w_0] - \psi(e), \tag{17}$$

where $U^M(w, I)$ and $U^M(w, B)$ now indicate his continuation payoff when the innovation has been invented, or it has not been invented but the basic technology remains viable, respectively. Differentiation of this objective function with respect to e yields

the manager's equilibrium effort $e^O(w,q), O \in \{G,P\}$, which is now implicitly determined as

$$\psi_e(e^O) = U^M(w,I) - qU^M(w,B) - w_0(1-q), \quad O \in \{G,P\}. \tag{18}$$

The next subsection analyzes both regimes, public and private governance. To simplify the subsequent exposition, define $G_i = S(y^{FB}) + \Pi(y^{FB}) - \delta_i$, $i \in \{I,B\}$ as the government's ex-post payoff before wage payments when technology T_i is implemented [recall that $\delta_I = 0$]. Likewise, we will refer to $P_i = \Pi(y^{FB}) - \delta_i$ as a private owner's gross-of-wages profits.

3.2 Equilibrium Analysis

3.2.1 Public governance

Before we offer a detailed analysis, is is useful to reconsider the contract $\Delta w^* = G_I$ which was optimal in the setting of Section 2: if $q = 0$, this contract leads the manager to invest $e^G = S(\cdot) + \Pi(\cdot)$, a level that coincides with $e^{FB}(q=0)$. We will show that the same contract Δw^* triggers overinvestments for any $q > 0$. To see this, note that the manager still obtains the entire social surplus (up to the constant w_0) when the innovation is successfully invented and implemented. However, if the new technology has not become available while the basic technology remains viable (nature has drawn $\tilde{\delta} = \delta$), ongoing production is efficient but the government credibly refuses to pay the precontracted salary [note that $\Delta w^* = G_I > G_B$]. Therefore, the parties will renegotiate the manager's compensation scheme, and M recovers only half of social surplus from production when T_I has not been invented. Consequently, his private investment incentives now exceed the socially efficient level and the manager overinvests in order to increase the probability of innovation and to ensure himself the corresponding high salary.

It remains to analyze whether some other contract generates efficient investments. To answer this question, it is again convenient to compute the manager's equilibrium effort for all possible initial contracts. Table 1 below summarizes the public manager's equilibrium payoffs as a function of the initially contracted wage differential and the state of nature.[17]

[17]We suppose that, when both technologies are viable, the manager prefers to work under the

Δw	T_I not invented/T_B viable $U^M(w, B)$	T_I invented $U^M(w, I)$
$0 \leq \Delta w \leq G_B$	w_1	w_1
$G_B < \Delta w \leq G_I$	$w_0 + [S(y^{FB}) + \Pi(y^{FB}) - \delta]/2$	w_1
$\Delta w > G_I$	$w_0 + [S(y^{FB}) + \Pi(y^{FB}) - \delta]/2$	$w_0 + [S(y^{FB}) + \Pi(y^{FB})]/2$

Table 1

These outcomes are easily explained. A precontracted non-negative wage difference is renegotiated only if further production is efficient, but the government is not willing to remain in business under the initial compensation scheme. First, if the innovation has been invented, this implies that any contract characterized by $\Delta w \leq G_I$ is never renegotiated, and the manager's equilibrium wage is w_1. Second, when T_I has not become available but the basic technology remains viable, the initial contract is not renegotiated if $\Delta w \leq G_B = S(\cdot) + \Pi(\cdot) - \delta \, [< G_I]$. In all other cases, the parties rescind the precontracted compensation scheme and share gross welfare from production [starting from their default payoffs w_0 and $-w_0$, respectively]. This gross welfare depends on the production technology that is efficient and utilized in equilibrium.

Inserting the continuation utilities derived in table 1 into (18), we obtain

$$\psi_e(e^G(w,q)) = \begin{cases} \Delta w(1-q) & \text{if } G_B \geq \Delta w \geq 0, \\ \Delta w - q(S(y^{FB}) + \Pi(y^{FB}) - \delta)/2 & \text{if } G_I \geq \Delta w > G_B, \\ (S(y^{FB}) + \Pi(y^{FB}))(1-q) + q\delta)/2 & \text{otherwise.} \end{cases} \tag{19}$$

A comparison with the first-best effort level derived in (16) immediately reveals that, for any q, underinvestments prevail for contracts characterized by $\Delta w \leq G_B$ or $\Delta w > G_I$.

efficient technology T_I at any given wage. Therefore, no renegotiations arise when both technologies are viable and the initial wage contract is within the interval $G_B \geq \Delta w \geq 0$, since the manager cannot credibly threaten to implement T_B when the government does not increase his wage payment. Conversely, one could imagine that the implementation of T_I imposes some positive switching costs on M, who therefore prefers to work under the basic technology. Then, any initial wage contract from the interval $\Delta w \leq G_B$ will be renegotiated in order to obtain the manager's consent to the efficient technology. While we do not analyze this case to simplify the exposition, one can show that all of our subsequent results still apply.

Therefore, we can confine attention to the interval $\Delta w \in (G_B, G_I]$. Note that

$$\frac{de^{FB}(q)}{dq} = -G_B < -\frac{G_B}{2} = \frac{de^{G}(\Delta w \in (G_B, G_I], q)}{dq}. \tag{20}$$

Since we know that the upper-boundary wage differential $\Delta w = G_I$ implements efficient investments when $q = 0$, (20) implies that the same contract induces M to overinvest for any $q > 0$. Accordingly, we have the following condition for the implementability of efficient investments under public governance: M must weakly underinvest at the lower bound of the relevant interval, $\Delta w = G_B$. Inserting this wage differential into (18) and solving for q, we can compute the threshold probability q^G as

$$q^G = \min\{\frac{2\delta}{S(y^{FB}) + \Pi(y^{FB}) - \delta}, 1\}. \tag{21}$$

This parameter constitutes an upper bound on the range of initial probabilities q where efficient investments are attainable. This finding immediately allows us to state

Proposition 2. *Public ownership implements the efficient outcome whenever $q \in [0, q^G]$, while the first best is unfeasible for any $q \in (q^G, 1]$. Specifically, this inefficiency range is non-empty (i.e., $q^G < 1$) whenever $S(y^{FB}) + \Pi(y^{FB}) > 3\delta$.*

The proposition asserts that public governance fails to achieve efficiency when the established basic technology remains viable with high probability, and gross-of-wages welfare is sufficiently large. Inspection also reveals that the threshold probability q^G converges to zero when consumer surplus and/or profits sufficiently exceed the fixed costs δ. Our findings suggest that, for a wide range of economic circumstances, a public enterprise fails to attain the first best even if the government as owner of the firm is purely benevolent. The next subsection explores whether privatization can be a remedy to overcome the investment inefficiencies that prevail under public governance.

3.2.2 Privatization

Unlike the government, a profit-maximizing owner is not concerned with consumer surplus. Therefore, she will at stage 4 not agree to any wage payment that exceeds gross profits $P_i \equiv \Pi(y^{FB}) - \delta_i$, $i \in \{I, B\}$. Since $P_i < G_i$, the interval boundaries P_B and P_I are now smaller than their counterparts under public governance. As in the

public ownership case, we must distinguish between three intervals of initial contracts. Table 2 below summarizes the manager's equilibrium utilities in all states of the world and for all initial compensation schemes.

Δw	T_I not invented but T_B viable $U^M(w,B)$	T_I invented $U^M(w,I)$
$0 \leq \Delta w \leq P_B$	w_1	w_1
$P_B < \Delta w \leq P_I$	$w_0 + [\Pi(y^{FB}) - \delta]/2$	w_1
$\Delta w > P_I$	$w_0 + [\Pi(y^{FB}) - \delta]/2$	$w_0 + [\Pi(y^{FB})]/2$

Table 2

Inserting these utilities into (18), we obtain the equilibrium effort defined by

$$\psi_e(e^P(w,q)) = \begin{cases} \Delta w(1-q) & \text{if } P_B \geq \Delta w \geq 0 \\ \Delta w - q(\Pi(y^{FB}) - \delta)/2 & \text{if } P_I \geq \Delta w > P_B \\ (\Pi(y^{FB})(1-q) + q\delta)/2 & \text{otherwise.} \end{cases} \tag{22}$$

Again, it is easy to check that only the wage interval $\Delta w \in (P_B, P_I]$ is a candidate for efficient investments. Note that

$$\frac{de^P(q, \Delta w \in (P_B, P_I])}{dq} = -[\Pi(y^{FB}) - \delta] > -[S(y^{FB}) + \Pi(y^{FB}) - \delta] = \frac{de^{FB}(q)}{dq} \tag{23}$$

and recall from our previous analysis that the manager underinvests for $q = 0$. Accordingly, we have a necessary (though not sufficient) prerequisite for efficient investments in a nonempty interval of parameters q: namely, the manager overinvestments for $q = 1$ under an initial contract characterized by $\Delta w = P_I$. Inspection shows that this condition

$$e^P(\Delta w = P_I, q = 1) = \frac{\Pi(y^{FB}) + \delta}{2} > \delta = e^{FB}(q = 1) \tag{24}$$

indeed applies because $\Pi(y^{FB}) > \delta$. Inserting $\Delta w = P_I$ into (18)) and solving for q, we can also define $\underline{q}^P < 1$ as the minimal ex-ante probability q where (weak) overinvestments can be generated under private governance. Conversely, underinvestments are unavoidable for any $q < \underline{q}^P$.

We obtain

$$\underline{q}^P \equiv \frac{S(y^{FB})}{S(y^{FB}) + [\Pi(y^{FB}) - \delta]/2}. \tag{25}$$

Note that $\underline{q}^P \in (0,1)$. Finally, we must check whether the manager still overinvests at the interval's lower boundary, $\Delta w = P_B$, which also is an impediment to efficiency. Inserting this wage differential into (18) and solving for the threshold value $\bar{q}^P$, we obtain (note that $\bar{q}^P > \underline{q}^P$)

$$\bar{q}^P \equiv \min\{\frac{S(y^{FB}) + \delta}{S(y^{FB}) + [\Pi(y^{FB}) - \delta]/2};\ 1\}. \tag{26}$$

These computations allow us to state the following proposition.

Proposition 3. *Private ownership implements efficient investments and a first-best outcome for any q from the nonempty interval $[\underline{q}^P, \bar{q}^P]$ where $\underline{q}^P \in (0,1)$ and $\bar{q}^P \in (\underline{q}^P, 1]$. Specifically, efficiency is attained for any $q \geq \underline{q}^P$ whenever $\Pi(y^{FB}) < 3\delta$.*

Proposition 3 shows that private ownership may implement efficient investments in our extended scenario with viable basic technology. Our result demonstrates that the efficiency ranges of public and private governance are complementary. Under privatization, efficiency is always unattainable if q is small. This result is very intuitive: as has been shown in Section 2, the parties face a standard moral hazard problem when the basic technology is never viable, and efficient investments can be implemented by a principal whose objective function reflects welfare goals. Conversely, a private owner cannot credibly commit to pay a salary in excess of her gross-of-wages profit from the innovative technology. At the highest credible wage level that is not renegotiated, $\Delta w = P_I$, the manager's investment incentives are still suboptimal.

Under economic conditions where it is welfare-efficient to keep the firm in business even if no innovative production technology is invented and implemented, this outcome changes drastically for the following reason. An increase in q decreases the first-best investment level because consumer surplus and variable profits are realized even if no innovation takes place. Likewise, the equilibrium effort under any ownership structure decreases for wages in the relevant intervals $\Delta w \in (G_B, G_I]$ (public ownership) and $\Delta w \in (P_B, P_I]$ (private ownership), respectively. This reduction in equilibrium investments, however, falls short of the reduction in the first-best effort since the manager accrues only half of total surplus when ongoing production under the basic technology is efficient. While the government may now be unable to prevent an overshooting of investments, the same investment-enhancing effect (relative to the first best) pushes a

private manager's equilibrium effort towards the first best benchmark, and the welfare properties of either governance structure may be reversed. Proposition 3 shows that, if $\Pi(y^{FB}) < 3\delta \;\Leftrightarrow\; \bar{q}^P < 1$ after privatization, overinvestments do never arise under the lowest wage from the interval $\Delta w \in (P_B, P_I]$. Then, private ownership implements a first-best outcome for any $q \geq \underline{q}^P$, i.e., for any (large) q where an initial contract can prevent underinvestments. If consumer surplus becomes more important, the threshold probabilities $\underline{q}^P$ and $\bar{q}^P$ increase: in the limit where $S(y^{FB})$ converges to infinity, private governance triggers efficiency if and only if $q = 1$. This limit case nicely illustrates the complementary nature of public and private governance, because under public governance a first best requires that $q = 0$ if $S(\cdot) \to \infty$.

We found that the intrinsically harder budget constraint of a private owner may allow for a first best in situations where public governance is not able to reach the efficiency frontier. The mechanism at work in our model, though, is very different from that identified in the informal literature on soft budget constraints because we assumed that, even without government intervention, the privatized firm remains in operation whenever this is ex-post efficient. Therefore, it may be interesting to briefly consider a modified setup that is closer to the usual idea of soft budget constraints. To do so, suppose now that $\Pi(y^{FB}) < \delta$ so that even renegotiation cannot hinder P to shut down the firm if T_I is not invented. Suppose further that the government can commit not to bail out a bankrupt private firm.[18] Then, the private manager obtains only his redundancy payment w_0 when innovation fails; his equilibrium effort increases and $\underline{q}^P, \bar{q}^P$ decrease so that, as under public ownership, efficient investments can be attained only if q is relatively small. Hence, it is unclear whether privatization gives rise to larger equilibrium incentives than public governance as has been argued in the relevant literature [for a survey, see Maskin (1999)]. As a result, privatization in combination with a non-intervention commitment by the government will in general not be a remedy to overcome inefficiencies that arise under public governance, in particular when the welfare-diminishing effect of ex-post inefficient outcomes are taken into account.

[18] Otherwise, the qualitative conclusions are the same as in our model.

4 Discussion and Concluding Remarks

The results of our paper suggest that privatization can be the optimal governance structure even when the government is purely benevolent. If no viable standard technology exists, privatization cannot enhance welfare. However, in the possibly more realistic scenario where the firm remains in business when the innovative technology does not become available, this result may be reversed. For example, suppose that

$$S(y^{FB}) + \Pi(y^{FB}) > 3\delta > \Pi(y^{FB}).$$

According to our previous findings, public governance then attains a first-best outcome for any $q < q^G < 1$, while inefficient investments prevail otherwise. Private governance leads to efficiency for any $q \geq \underline{q}^P$. Finally, if consumer surplus is relatively large and thus $q^G < \underline{q}^P$, either regime is inefficient for values $q \in (q^G, \underline{q}^P)$. For these intermediate parameters, the government at date 0 chooses the ownership structure which leads to an investment level that is as close as possible to e^{FB}. It is easy to check that this second-best governance structure is private ownership and a wage contract (slightly above) $\Delta w = P_B$ (which minimizes overinvestments), or public governance in combination with an optimal wage differential Δw equal to G_B(which minimizes underinvestments). These implications are in line with empirical evidence and show that underinvestment under public governance can be explained even when the government is rational and signs efficient salary contracts with its management. If consumer surplus is very large relative to net profits, we have $q^G \to 0$ while $\underline{q}^P, \bar{q}^P \to 1$. Thus, the first-best can only be attained when q is close to one of the extreme values, and in a broad intermediate range the optimal governance structure trades off overinvestments that arise under private governance, and underinvestments when the firm remains public.

Taken together, our results allow for a relatively clearcut interpretation. At least in industries where consumer surplus is high, privatization can be beneficial when the firm does not act under a severe threat to shut down production (i.e., if q is high). Likewise, the more important consumer surplus, the smaller is the boundary level of q and the harder it becomes to implement a first-best outcome under public governance. As obvious cases in question, consider utilities like garbage collection or water and electricity supply, or services like telecommunication and postal services. In fact, many of those formerly public enterprises have been privatized in most European countries over the last decade [see, for example, Martin and Parker (1997)].

It is also interesting to highlight some features of the present model which distinguish it from the previous theoretical literature on the benefits of privatization. First, since ex-post efficient decisions are taken under either governance structure, the government has no incentive to interfere into the operations of the privatized firm. This is particularly important because arguments in favor of privatization frequently rest on the assumption that the government does not intervene ex post, even when this retention is suboptimal. For concreteness, the above mentioned soft-budget constraint argument starts from the idea that privatization generates a serious incentive for managerial effort because private owners go bankrupt when profits become negative. Private managers face a higher layoff probability when shirking and, so the story goes, therefore invest in cost-reducing production technologies. In contrast, a welfare-maximizing government avoids a shutdown even in case of negative profits, and thus reduces the pressure on public managers to invest. Plausible as it seems, however, this line of reasoning has its flaws, because it requires the government to exhibit a sequentially irrational behavior. Specifically, the government must commit not to bail out out a bankrupt private firm ex post. This commitment is not credible because an intervention improves welfare at the ex-post stage after investments have been exerted.[19] If non-credible commitment is impossible, however, a rational private manager anticipates a government intervention and therefore faces the same negligible shutdown threat as his public counterpart. As a consequence, private and public managers are subject to the same "soft budget constraint". In the present paper, we considered a situation where - even without government intervention - ex-post efficiency is attained under either governance structure (recall that the government regulates the private firm efficiently); thus, the government has no reason to intervene for allocative reasons at any point in time. It also has no other motive to enter renegotiations between private owner and manager because, under the proposed privatization procedure, these renegotiations do not affect the public purse. In one word, our paper provides an argument in favor of privatization without relying upon strong commitment assumptions. This finding is not only of theoretical importance: empirical evidence suggests that government interventions (often rationalized by job securing motives) frequently arise when private firms go bankrupt.

Second, our approach is not based on differences in bargaining behavior between both

[19]Segal (1998) shows that privatization enhances investments and can therefore be optimal when the private firm is not regulated ex post and thus able to accrue monopoly profits. In his model with complete information, this government behavior is not sequentially rational.

types of principal. Rather, it is the difference in the set of situations where bargaining (renegotiation) actually occurs that drives the results. At certain wage levels, the government is still willing to accept a viable basic technology at the initial terms of contract. In contrast, the private owner credibly refuses to continue operation under this technology which renders renegotiation necessary. These differences in actual renegotiation under either regime, in turn, induce different equilibrium wages and thus trigger different optimal investment responses by the manager.

Finally, governance structures in our present model differ only in the objective function of the respective owner of the firm. This approach is in contrast to some of the leading models on privatization, which suppose that either informational structures or contractual possibilities vary among regimes: Schmidt (1996a,b) also assumes a benevolent government, but he supposes that privatization leads to asymmetric information between government and firm which now has superior knowledge on its production costs. Hart, Shleifer and Vishny (1997) implicitly assume that a public manager cannot be made the residual claimant for the firm's cost savings (while a private manager-owner can).

Although these assumptions are well motivated from an empirical point of view, we believe that the interplay between governance structures and economic performance becomes most transparent when the analysis allows for regime-independent environments. Admittedly, our results have been attained in a very simple and stylized setting which ignores many important considerations that arise in reality. Still, the paper may be a valuable first attempt to show that a transition to private governance can be efficient even if a rational government pursues welfare goals, and privatization changes only the objective function of the firm's owner without affecting the economic environment.

References

Aghion, P. and J. Tirole (1994), "The Management of Innovation", *Quarterly Journal of Economics*: 109: 1185-1209.

Bös, D. (1991), *Privatization: A Theoretical Treatment*, Oxford: Oxford University Press.

Bös, D. and C. Lülfesmann (1998), "Holdups, Quality Choice, and the Achilles' Heel in Government Contracting", Discussion Paper A-481, University of Bonn.

Boycko, M., A. Shleifer and R.W. Vishny (1996), "A Theory of Privatisation", *Economic Journal* , 106: 309-319.

Coase, R.H. (1937), "The Nature of the Firm", *Economica*, 4: 386-405.

Dixit, A.K. (1996), *The Making of Economic Policy*, Cambridge, Massachusetts: MIT Press.

Grossman, S.J. and O. Hart (1986),: "The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration", *Journal of Political Economy*, 94: 691-719.

Hart, O. (1995), *Firms, Contracts, and Financial Structure*, Oxford: Oxford University Press.

Hart, O. and B. Holmström (1987), "The Theory of Contracts", in: Truman Bewley, ed.: *Advances in Economic Theory, Fifth World Congress*, Cambridge: Cambridge University Press.

Hart, O. and J. Moore (1999), "Foundations for Incomplete Contracts", *Review of Economic Studies*, 66: 115-138.

Hart, O., Shleifer, A. and R.W. Vishny (1997), "The Proper Scope of Government: Theory and an Application to Prisons", *Quarterly Journal of Economics*, 112: 1127-1161.

Holmström, B. and J. Tirole (1989), "The Theory of the Firm", in: Schmalensee, R. and R.D. Willig, eds.: *Handbook of Industrial Organization*, Vol.1, Amsterdam:

North Holland.

Kornai, J. (1986), "The Soft Budget Constraint", *Kyklos*, 39: 3-30.

Laffont, J.-J. and J. Tirole (1993), *A Theory of Incentives in Procurement and Regulation*, Cambridge, Massachusetts: MIT Presss.

MacLeod, B. and J.M. Malcomson (1993), "Investments, Hold-Up, and the Form of Market Contract", *American Economic Review*, 83: 811-837.

Malcomson, J.M. (1997), "Contracts, Hold-Up, and Labor Markets", *Journal of Economic Literature*, 35: 1916-1957.

Martin, S. and D. Parker (1997), *The Impact of Privatisation - Ownership and Corporate Performance in the UK*, Routledge: London, New York.

Maskin, E. (1999), "Recent Theoretical Work on the Soft Budget Constraint", *American Economic Review*, 89: 421-425.

Megginson, W.-L., Nash, R.-C. and M. van Randenborgh (1994), "The Financial and Operating Performance of Newly Privatized Firms: An International Empirical Analysis", *Journal of Finance*, 49: 403- 452.

Schmidt, K. (1996a), "Incomplete Contracts and Privatization", *European Economic Review*, 40: 569-579.

Schmidt, K. (1996b), "The Costs and Benefits of Privatization: An Incomplete Contracts Approach", *Journal of Law, Economics and Organisation*, 12: 1-24.

Segal, I. (1998), "Monopoly and Soft Budget Constraint", *RAND Journal of Economics*, 29: 596-609.

Segal, I. (1999), "Complexity and Renegotiations: A Foundation for Incomplete Contracts", *Review of Economic Studies*, 66: 57-82.

Shapiro, K. and R. Willig (1990), "Economic Rationales for the Scope of Privatization", in: E.N. Suleiman, and J.Waterbury (eds.), *The Political Economy of Public Sector Reform and Privatization*, Boulder, Colorado: Westview Press.

Shleifer, A. (1998), "State versus Private Ownership", *Journal of Economic Perspectives*, 12: 133-150.

Tirole, J. (1994), "The Internal Organization of Government", *Oxford Economic Papers*, 46: 1 - 29.

Vickers, J. and G. Yarrow (1988), *Privatization: An Economic Analysis*, London and Cambridge: MIT Press.

Williamson, O.E. (1985), *The Economic Institutions of Capitalism*, New York: The Free Press.

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