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Privatization Incentives: A Wage Bargaining Approach

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Working Papers

Privatization Incentives – A Wage Bargaining Approach

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Privatization Incentives – A Wage Bargaining Approach*

Abstract

We analyze the incentives of a government to privatize a state owned firm. Assuming price cap regulation, a unionized labor market and wage bargaining the government's gains from privatization depend on two effects. While the government loses control over the firm's investment and employment decisions, the union's bargaining position can be weakened by privatization. Since price cap regulation tends to increase the wage under privatization, the government's incentives to privatize are low if the union's bargaining power is high. Considering different kinds of investments does not change this result qualitatively.

JEL Code: L32, L33, H32.

Keywords: Wage bargaining, regulation, privatization.

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1 Introduction

During the past decade economic policy in many countries focused on privatization of large, traditionally state owned firms. While empirical evidence suggests that privatization induces greater economic efficiency, this observation alone can hardly explain why governments rely on privatization as a policy instrument². With perfect information and perfect factor markets, a government giving up control over a firm's investment, employment and pricing decisions loses influence on potentially relevant economic measures. Any efficiency gains from privatization must hurt the government inasmuch it could have imitated the decisions of a private management. As Williamson (1985) asked, why would it not be possible for the state to mimic a capitalist firm and to intervene in a discretionary way only in cases when the government thinks this is necessary.

A part of the answer is certainly fiscally induced – the SOEs often neither yield a profit, nor do they meet the goal to increase social welfare in an adequate way. This is mainly due to the fact that the government cannot offer an incentive compatible contract to the managers – it has a commitment problem.³ Schmidt (1996) showed that even for a benevolent government privatization is advantageous as it enables it to credibly commit to a hard budget constraint, which removes the bailout disincentive.⁴

Beside such incomplete contracts approaches, there is another strand of literature that deals explicitly with the different incentives in public and private firms. Corneo (2001) for example analyzes two types of working incentives, which are differently treated in public and private firms. He differentiates between individual tasks, which are mainly promoted in private firms, and cooperative tasks, primarily promoted by a public firm.⁵ It is theoretically unclear, whether privatization entails productivity improvements (due to tougher work incentives) or deteriorations. The privatized firm may set incentives that divert too much effort away from the cooperative tasks. In such a case, the workforce in the private firm displays a lack of collegiality.

² For an extensive survey on empirical studies see Megginson/Netter (2001).

³ The possibility of discretionary intervention allows the government to extend the infrastructure beyond a profit-maximizing optimum and this might invalidate any incentive contract based on profit sharing.

⁴ See also Boerner (2004). Shirley and Xu (1998) find that the representative contracts used in state owned monopolies provide only weak incentives and thus lead to high inefficiencies.

⁵ The outcome of individual tasks can be assessed, albeit imperfectly. In a cooperative task it is almost impossible for the management to assess the contribution that one particular worker makes to the solution of the collective task. A particular feature of the latter is that workers derive some utility from social interaction with their colleagues when accomplishing a collective task.

Another strand of literature dealing with reasons for privatization comprehends political economy models as the one by Boycko et al. (1996), which suggest that privatization is an effective instrument to alleviate corruption and to foster restructuring. However, the question why a government can not implement the corresponding incentive mechanisms for state owned firms and why it actually may want to privatize is not explicitly addressed. Bias and Perotti (2002) analyze politically motivated privatization in a bipartisan environment. They argue that privatization combined with a broad distribution of shares may induce the median voter to shift her political preferences towards a right-wing government.⁶

In our paper we take a different approach and depart from the assumption of perfect factor markets by assuming that the labor force is unionized and that wages are determined by Nash-bargaining between either the government or a privatized firm and the union. Furthermore, allowing for a simple price cap regulation shows that the government can in fact benefit from privatization. Since privatization can lower the negotiated wage markup and since the government's privatization revenues are positively correlated with the firm's profits, the government can be better off with privatization.

This approach is in a way similar to the one of Schmidt (1996), as it is concerned with the commitment problems a government may face in enforcing efficient investment and labor employment. Regardless this mutuality the commitment problem which we analyze is, in contrast to Schmidt who sets the focus on the incomplete contract problem, due to an imperfect labor market where wages have to be negotiated between the government and a union. Analyzing these relations more carefully it turns out that the union's bargaining power has a non monotone impact on the government's gains from privatization. Privatization tends to be especially worthwhile if the union's bargaining power is moderate rather than high. This is due to the fact that price cap regulation implies that a privatized firm can not reduce its output and that its labor demand is rather inelastic. Thus, with a high bargaining power of the union the difference between the negotiated wages with and without privatization tends to be small and privatization becomes a less attractive instrument for the government. Considering different investment opportunities to alter the firm's short run technology does not change this result qualitatively. Whether long run investments increase the firm's productivity or the elasticity of substitution between labor and capital, the gov-

⁶ Bortolotti and Pinotti (2003) provide some empirical evidence for these results. In Denmark, however, the largest privatization have been done by the center-left government of Poul N. Rasmussen (1993-2001), see Paldam and Chistoffersen (2004).

ernment's gains from privatization are highest if the union's bargaining power is moderate rather than high.

In the next section we set up the model. In section 3 we first analyze the wage bargaining with and without privatization. We then characterize the investment decisions under both regimes. Section 4 presents a numerical example which illustrates the different effects determining the government's incentives to privatize. A short conclusion is provided in section 5.

2 The Model

Our analysis is based on the following model with one firm producing just one good x . There are three production factors: labor l and two kinds of capital k and I . While l and k are variable factors, I represents investment determining the firm's short-run production technology. We will distinguish the cases in which I increases factor productivity and in which it mainly affects the elasticity of substitution between l and k . The production possibility set is strictly convex containing all $(x; l; k; I)$ satisfying

$$F(x, k, l, I) \leq 0, \text{ with: } F_x > 0 > F_l > F_k > F_I. \quad (1)$$

Consumer surplus CS , the firm's profits Π and the union's utility U are given by

$$CS(x) := \int_0^x p(\tilde{x}) d\tilde{x} - p(x)x \quad (2)$$

$$\Pi(x, l, k, I, \Delta, w, r) = p(x)x - (w + \Delta)l - r(k + I) \quad (3)$$

$$U(\Delta, l) = \Delta l \quad (4)$$

where $p(x)$ with $p'(x) < 0$ and $p''(x)x + 2p'(x) < 0$ denotes the inverse demand function, w and r are the (given) market prices for labor and capital and Δ denotes the wage markup to be determined in the wage bargain between either the government or the privatized firm and the union. The government's aim is to maximize the weighted sum of CS , Π and of a convex combination of U and the employment level l :⁷

$$W = CS + (1 + \mu)\Pi + \nu[\gamma l + (1 - \gamma)U] \quad (5)$$

$$\text{with: } 0 < \mu, \quad 0 < \nu < 1, \quad 0 \leq \gamma \leq 1 \quad (6)$$

⁷ For ease of exposition we omit the arguments of the functions where this does not lead to any confusion.

With $0 < \mu$ we implicitly assume that the government has to rely on distortionary taxation in order to finance other not explicitly modelled expenditures. Assuming $0 < \nu < 1$ and $0 \leq \gamma \leq 1$ allows us to capture some basic aspects from the political economy literature.⁸ $\nu > 0$ and $\gamma = 1$ imply that the government is also interested in a high employment level which may increase its re-election probability. The union's influence acting as an interest group can be modelled by assuming $\gamma < 1$.

Assuming that the firm is initially state owned, we analyze the following four stage game. In the first stage the government can decide whether or not to privatize the firm. If the firm remains state owned the government can control all subsequent decisions of the firm and gets the firm's profits. With privatization the government's (privatization) revenues are again determined by the firm's profits. However, we will assume that the government imposes a simple price cap regulation such that the privatized firm has to offer a quantity

$$x \geq \bar{x} := p^{-1}(\bar{p}) \quad (7)$$

where \bar{p} denotes the price cap. Instead of analyzing the optimal price cap we focus on the simpler case in which \bar{x} is such that the consumers can not be worse off under privatization. That is, we assume that \bar{x} is equal to the quantity offered if the firm remained state owned. While this assumption reduces the government's incentives to privatize the firm, it does not alter the strategic effects which price cap regulation has on the investment decisions and the wage bargaining under privatization. Investment I is chosen in the second stage. Wage bargaining between either the government or the privatized firm and the union takes place in the third stage. In both cases we focus on the Nash-solution, i.e., we assume that the wage markup is determined by

$$\Delta^s = \arg \max W^\alpha U^{1-\alpha} \text{ if the firm is state owned} \quad (8)$$

or

$$\Delta^p = \arg \max \Pi^\alpha U^{1-\alpha} \text{ if the firm is state owned} \quad (9)$$

where $1 - \alpha$ with $0 \leq \alpha \leq 1$ measures the union's bargaining power. In the final stage output x and the quantities of the inputs l and k are chosen. Without privatization x can be chosen accord-

⁸ See for example the probabilistic voting models discussed in Persson/Tabellini (2000).

ing to the government's objective function (5). With privatization the firm can only choose l and k – given that (7) is binding.

Solving the game by backward induction we analyze the government's incentives to privatize the firm by comparing the government's payoffs (5) with and without privatization.

3 Wages and Investments

We first analyze the last two stages of the game and determine the optimal solutions for x ; l and k for both the state owned and the privatized firm. Analyzing the wage bargaining reveals that price cap regulation tends to increase the markup under privatization. This result is more pronounced the higher the bargaining power of the union which also implies that the government's incentives to privatize the firm should be low if the union's bargaining power is high.

With respect to the investment decisions it turns out that both the state owned as well as the privatized firm will distort their investment according to its impact on the negotiated wage. The direction of these distortions is likely to be the same with and without privatization. Underinvestment tends to be optimal if investment is productivity enhancing. Overinvestment will occur if investment increases the elasticity of substitution between l and k .

3.1 Supply, Factor Demand and Wage Bargaining

We start by characterizing the solutions for the case in which the firm is state owned and in which it is privatized. Comparing the solutions allows us to discuss the government's incentives to privatize the firm.

State Owned Firm Using (1) and (5) the Lagrangian for government's optimization problem is given by

$$L^S = CS + (1 + \mu)\Pi + \nu[\gamma l + (1 - \gamma)U] + \lambda F \quad (10)$$

Evaluating the first order conditions with respect to k ; l and x shows that the solutions $l^s(x, \Delta, I)$, $k^s(x, \Delta, I)$ and $x^s(\Delta, I)$ satisfy $F(x^s(\Delta, I), l^s, k^s, I) = 0$ and⁹

⁹ Subscripts denote partial derivatives. We focus on interior solutions which are guaranteed as long as $F(x, l, k, I)$ satisfies the usual INADA conditions.

$$\frac{w + \Delta - \phi}{r} = \frac{F_l}{F_k} \text{ with } \phi := \frac{1}{1 + \mu} v[\gamma + (1 - \gamma)\Delta] > 0, \quad (11)$$

$$p(x^s) - c_x = -\frac{\mu}{1 + \mu} p'(x^s) x^s \text{ with } c_x := rk_x^s + (w + \Delta - \phi)l_x^s. \quad (12)$$

Equation (11) reveals that the government distorts its input decisions according to the weights it puts on labor and the union's utility. Equation (12) simply reflects the inverse elasticity rule based on the distorted input decisions and on $w + \Delta - \phi$ as the wage rate relevant for the government.

Turning to the third stage and using l^s , k^s and x^s let $\tilde{W}^s(\Delta, I)$ and $\tilde{U}^s(\Delta, I)$ denote the reduced objective functions of the government and the union, respectively. Using (8), employing the envelope theorem and evaluating the first order condition with respect to Δ implies that the negotiated wage markup $\Delta^s(I, \alpha)$ satisfies $\Delta^s(I, 1) = 0$ and

$$\frac{\alpha((1 + \mu) + v(1 - \gamma))}{\tilde{W}^s} = \frac{1 - \alpha}{\Delta^s l^s} \left[1 + \frac{\Delta^s}{l^s} \left(\frac{\partial l^s}{\partial \Delta^s} + \frac{\partial l^s}{\partial x^s} \frac{\partial x^s}{\partial \Delta^s} \right) \right] \quad (13)$$

for $0 \leq \alpha < 1$. With $\alpha = 1$ the union has no bargaining power which leads to the government's preferred markup equal to 0. With $0 < \alpha < 1$ the negotiated markup simply equates the weighted marginal loss of the government and the weighted marginal utility of the union. Note that the union's marginal utility depends inter alia on how the government's optimal supply x^s reacts to an increase of Δ^s . Using (11) and (12), simple comparative statics reveals $\partial x^s / \partial \Delta^s < 0$. Furthermore, $\partial x^s / \partial \Delta^s$ decreases c.p. with the elasticity of the demand, $x'(p)p / x(p)$. Therefore, the markup tends to be lower the more elastic the demand function.

Privatized Firm Assuming that the price cap regulation is binding and maximizing (3) with respect to l and k , the firm's input decisions $l^p(\bar{x}, \Delta, I)$ and $k^p(\bar{x}, \Delta, I)$ satisfy

$$\frac{w + \Delta}{r} = \frac{F_l}{F_k}, \text{ and } F(\bar{x}, l^p, k^p, I) = 0 \quad (14)$$

As usual, (14) indicates that price cap regulation does not distort the firm's input decisions. Employing l^p and k^p , let $\tilde{\Pi}^p(\Delta, I)$ and $\tilde{U}^p(\Delta, I)$ denote the firm's reduced profit function and the union's reduced utility function. Using (9), the envelope theorem implies that the wage markup $\Delta^p(I, \alpha)$ which is negotiated between the privatized firm and the union satisfies $\Delta^p(I, 1) = 0$ and

$$\frac{\alpha}{\tilde{\Pi}^p} = \frac{1-\alpha}{\Delta^p l^p} \left[1 + \frac{\Delta^p}{l^p} \frac{\partial l^p}{\partial \Delta^p} \right] \quad (15)$$

for $0 \leq \alpha < 1$.

Comparison Assuming that the investment I is given, holding Δ constant und using $\bar{x} = x^s$, (11) and (14) show that—from the government's perspective – the privatized firm employs too little labor. Thus, the government will privatize the firm only if privatization induces higher profits and thus lower wage markups (recall that $\Delta^s(I, 1) = \Delta^p(I, 1) = 0$). With $\alpha > 0$, (13) and (15) indicate that the difference $\Delta^s(I, \alpha) - \Delta^p(I, \alpha)$ depends on two main effects. First, the RHS of (13) is lower than the RHS of (15) as long as

$$\frac{\tilde{\Pi}^p}{\tilde{W}^s} < \frac{1}{(1+\mu) + \nu(1-\gamma)} < 1 \quad (16)$$

That is, the more the government weighs the union's utility, i.e., the lower γ , and the higher the consumer surplus, the more the markup tends to decrease with privatization. On the other hand, price cap regulation generally leads to an increase of $\Delta^p(I, \alpha)$. Since the privatized firm is not allowed to reduce its output, $l^p(\Delta, \cdot)$ is c.p. less elastic than $l^s(\Delta, \cdot)$. Furthermore, with (13) and (15) this effect is more important the higher the bargaining power of the union, i.e., the lower α . Focusing on the polar case of $\alpha = 0$ define $\Theta := \frac{\partial l^s}{\partial x^s} \frac{\partial x^s}{\partial \Delta^s}$ and let $l^c(\Delta^c(\theta))$, $k^c(\Delta^c(\theta))$ and $\Delta^c(\theta)$ satisfy the following equations

$$\frac{w + \Delta^c - (1-\theta)\phi}{r} = \frac{F_l}{F_k}, \quad F(\bar{x}, l^c, k^c, I) = 0 \quad (17)$$

$$l^c + \Delta^c (l^c)' + (1 - \theta)\Theta = 0 \quad (18)$$

With θ increasing from 0 to 1 the comparative statics of l^c , k^c and Δ^c mirror the comparison between l^s , k^s and $\Delta^s(\cdot, 0)$ and l^p , k^p and $\Delta^p(\cdot, 0)$ (see (11), (14) and (13), (15)). Differentiating (18) with respect to θ and taking into account that $\Delta^c(\theta)$ maximizes the union's utility we get

$$\Delta^c' > 0 \Leftrightarrow \Theta < \frac{\phi}{\phi(1 - \theta) + \Delta^c} \left[\Delta^c l^{c''} - \frac{l^c}{\Delta^c} \right]. \quad (19)$$

Using $\Theta < 0$ and $\phi = \nu / (1 - \mu) [\gamma + (1 - \gamma)\Delta^s] > 0$ (see (11)), (19) shows that privatization leads to an increase in the markup if Θ and ν are low enough: The lower Θ the more elastic is the government's labor demand compared to the labor demand of the privatized firm; the lower ν the less the government weights employment and/or the union's utility. Both effects imply that the government's option to reduce output and thus employment induces a lower markup if the firm remains state owned.

Summarizing the analysis, privatization and price cap regulation leads to an efficient factor allocation which c.p. hurts the government. The effects on the (negotiated) wage markup are less clear cut. On the one hand privatization tends to reduce the markup since privatization decreases the relative weight which the union's marginal utility has in the wage bargaining. On the other hand, the imposed price cap regulation strengthens the union's bargaining position. This effect is more important the higher the union's bargaining power and the more the government is willing to decrease output and thus employment if the markup increases.

3.2 Investments

Turning to the second stage of the game we again start by characterizing the investment decision if the firm remains state owned. We then analyze the investment of a privatized firm. Investment is distorted in both cases as the government as well as the privatized firm anticipate the effects of their investments on the negotiated wage markups.

State Owned Firm Employing (10), substituting l^s , k^s , x^s and Δ^s and using the envelope theorem, the optimal investment $I^s(\alpha)$ of a state owned firm is implicitly determined by

$$\frac{dL^s}{dI} = -(1+\mu)(r+\Delta_I^s l^s) + \nu(1-\gamma)\Delta_I^s l^s + \lambda F_I = 0 \quad (20)$$

$$\Leftrightarrow 1 + \frac{1+\mu-\nu(1-\gamma)}{r(1+\mu)} \Delta_I^s l^s = \frac{F_I}{F_k} \quad (21)$$

where (21) follows from the optimality condition for k^s . Therefore, we get

$$\text{sign } \Delta_I^s = \text{sign} \left[\frac{F_I}{F_k} - 1 \right] \text{ for } I = I^s \quad (22)$$

which immediately implies that investment is inefficiently low (high) if $\Delta_I^s > 0$ ($\Delta_I^s < 0$) holds.

Comparative statics of (13) with respect to I reveals (assuming $0 < \alpha < 1$ and evaluating Δ_I^s at I^s)

$$\text{sign } \Delta_I^s = \text{sign} \left[\Delta_I^s l^s \frac{d}{dI} \frac{dl^s}{d\Delta^s} - \frac{dl^s}{d\Delta^s} - \frac{dl^s}{dI} \left(l^s + 2\Delta^s \frac{dl^s}{d\Delta^s} \right) \right] \quad (23)$$

$$\text{with: } \frac{dl^s}{d\Delta^s} := \frac{\partial l^s}{\partial \Delta^s} + \frac{\partial l^s}{\partial x^s} \frac{\partial x^s}{\partial \Delta^s}, \quad \frac{dl^s}{dI} := \frac{\partial l^s}{\partial I} + \frac{\partial l^s}{\partial x^s} \frac{\partial x^s}{\partial I}$$

Ignoring the second order effects, i.e., the first term on the RHS of (23), the sign of Δ_I^s is determined by the sign of the second term on the RHS. Considering first the last term, i.e., $l^s + 2\Delta^s \frac{dl^s}{d\Delta^s}$, and using (13) shows that this term is negative if the bargaining power of the union is high, i.e., if the negotiated markup is close to the union's optimal markup. The sign of $\frac{dl^s}{dI}$ depends on the effects which I has on the firm's technology. With I mainly affecting the marginal rate of substitution between l and k , $\frac{dl^s}{dI}$ is negative while $\frac{\partial x^s}{\partial I}$ and thus $\frac{\partial l^s}{\partial x^s} \frac{\partial x^s}{\partial I}$ tend to be rather small. Combining these observations implies that the government has an incentive to overinvest, i.e., to choose I such that $0 > F_I > F_k$, if the union's bargaining power is relatively high and if investments mainly increase its possibility to substitute labor by variable capital. Underin-

vestment is more likely to be optimal if the union's bargaining power is low and if investment is productivity enhancing such that the optimal labor employment would decrease.

Privatized Firm With privatization, the same calculations as above reveal that the firm's optimal investment $I^p(\alpha)$ is given by

$$1 + \frac{1}{r} \Delta_I^p I^p - \frac{F_l}{F_k} = 0 \Rightarrow \text{sign } \Delta_I^p = \text{sign} \left[\frac{F_l}{F_k} - 1 \right] \text{ for } I = I^p \quad (24)$$

Comparing (24) and (22) shows that the privatized firm has basically the same strategic incentives to distort investment as the government. Similarly, considering the sign of Δ_I^p I comparative statics with respect to I leads to (assuming $0 < \alpha < 1$ and focusing on $I = I^p$)

$$\text{sign } \Delta_I^p = \text{sign} \left[\Delta^p I^p \frac{d}{dI} \frac{\partial I^p}{\partial \Delta^p} - \frac{\partial I^p}{\partial I} \left(I^p + 2\Delta^p \frac{\partial I^p}{\partial \Delta^p} \right) \right]. \quad (25)$$

Again, the higher the union's bargaining power and the more investment allows to substitute labor by capital the more the privatized firm will tend to over invest. Underinvestment is likely to be optimal, if investment is productivity enhancing.

These results show that the strategic incentives to distort investment are the same with and without privatization. Therefore, government's gains from privatization will mainly be determined by its bargaining power and by its objective function, i.e., by its weights on profits, employment and on the union's utility. Whether investment is productivity enhancing or primarily affecting the substitutability of l and k should not alter the government's incentives for privatization.

4 A Numerical Example

In order to illustrate the above results and to analyze the government's privatization decision more carefully, we now analyze a simple example. The inverse demand function is given by

$$p(x) = 2 - x \text{ with: } 0 \leq x \leq 2 \quad (26)$$

With respect to the firm's production technology we consider the following two cases:

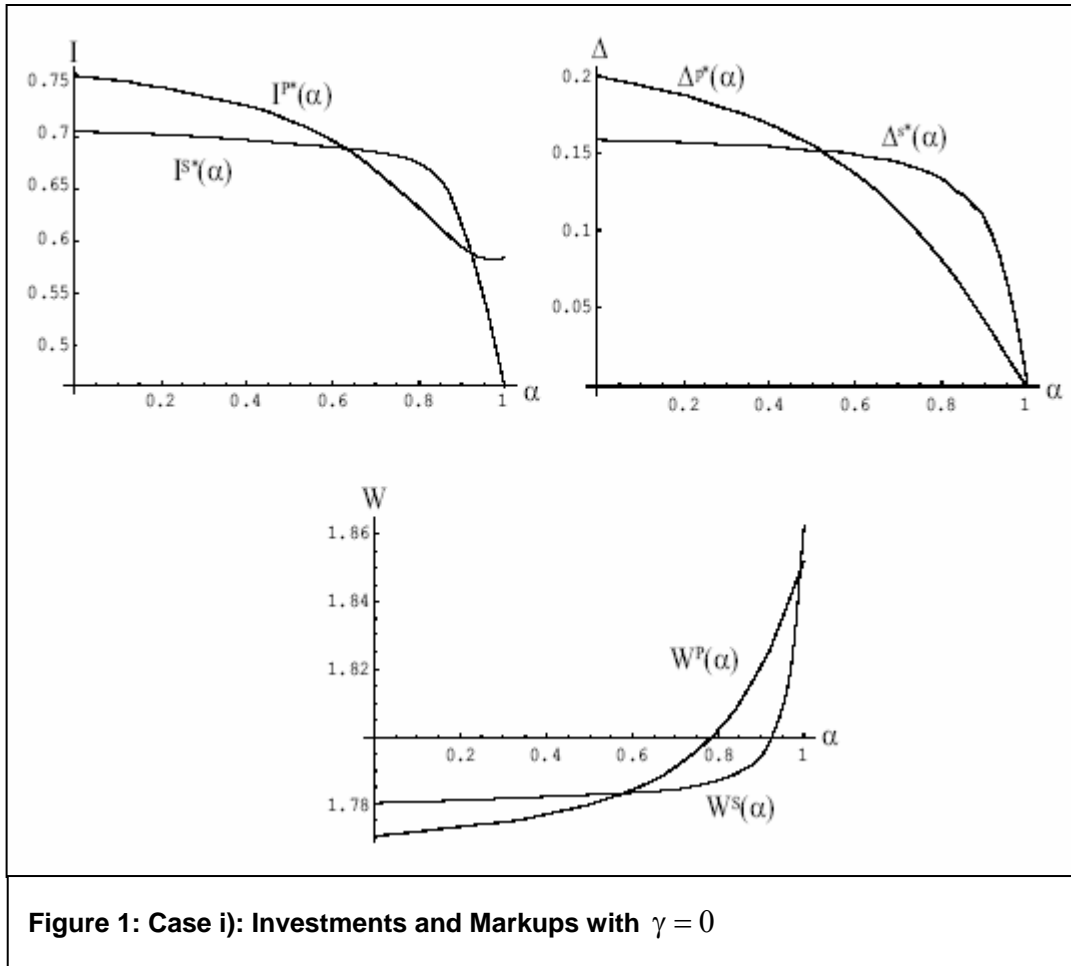
$$i) \quad x = I^{\frac{1}{2}} [I^{0.5} + k^{0.5}]^2 \quad (27)$$

$$ii) \quad x = [(1-\kappa)I^{0.5} + (1-\kappa)k^{0.5}]^2 \text{ with: } \kappa := \frac{I}{1+I}. \quad (28)$$

In case *i)* I increases the productivity of l and k but does not affect the marginal rate of substitution between l and k . In case *ii)* investment decreases the elasticity of substitution $\eta_{lk} = -(1-\kappa)/(1-\kappa)(1/k)^{0.5}$. In both cases we focus on the effects of a varying $\alpha \in [0,1]$ while holding the other parameters constant, i.e., we assume $r = w = \mu = v = 0.1$ and $\gamma = 0.5$.

Solving the example shows that the government will privatize only if α is relatively large (but strictly smaller than 1). These results hold for both cases *i)* and *ii)* which confirms that the union's bargaining power has a non-monotone impact on the government's gains from privatization and that different kinds of investments do not change this observation qualitatively.

To see this more clearly, consider first case *i)*. Figure 1 shows the graphs for the optimal investments $I^i(\alpha)$ with $i = s, p$, the implied wage markups $\Delta^i(\alpha)$ and the government's utility with and without privatization $W^i(\alpha)$.



Analyzing I^s ; I^p and Δ^s and Δ^p note first that investment is productivity enhancing which implies that the optimal investments of the state owned and the privatized firm increase c.p. with the corresponding wage markups. However, since $\alpha=1$ leads to $\Delta^s(1)=\Delta^p(1)$ and since the government puts more weight on labor we get $I^s(1)<I^p(1)$. Considering $\alpha<1$ we obtain $\Delta_I^i > 0$ for $I=I^*(\alpha)$ and $\widetilde{W}^s(\alpha) > \widetilde{\Pi}^p(\alpha)$. Thus, while both the state owned and the privatized firm underinvest, lowering α (starting with $\alpha=1$) implies that the optimal investment and the induced markup increase faster if the firm remains state owned. With relative low values of α the effect of $\widetilde{W}^s - \widetilde{\Pi}^p > 0$ on $\Delta^s - \Delta^p$ vanishes whereas the government's option to reduce output becomes relatively more important. Both effects lead to $I^s < I^p$ and $\Delta^s < \Delta^p$. Employing these results and calculating the government's utility with and without privatization shows that the government will gain from privatization only if $0.57 < \alpha < 0.99$.¹⁰

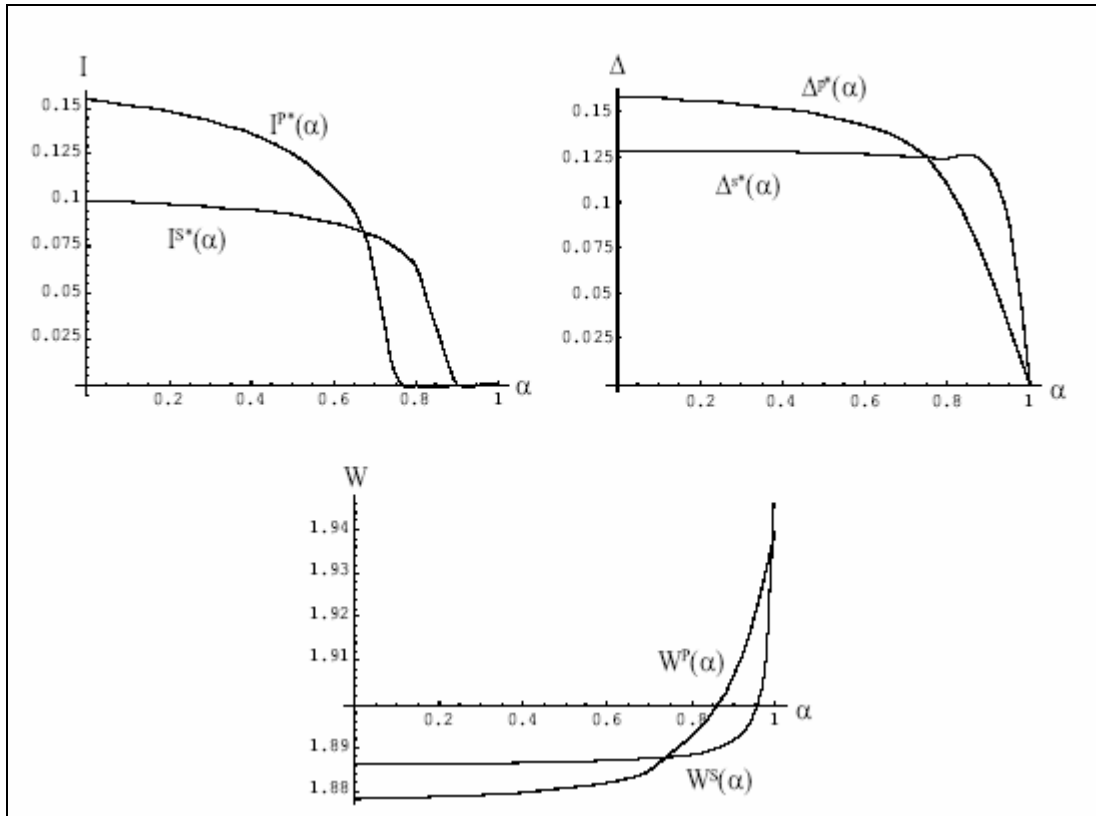


Figure 1: Case ii): Investments and Government's utility with $\gamma = 0$

⁸ Obviously, with $\alpha = 1$ the government will never privatize the firm.

In case *ii*) we get the same qualitative results with respect to the government's gains from privatization. Using (28) shows that investment serves as an instrument to reduce the markup by increasing the elasticity of substitution between l and k . While both the state owned and the privatized firm overinvest, Figure 2 shows that with high values of α the higher markup without privatization also induces higher investment if the firm remains state owned.¹¹

For low values of α the same arguments as in case *i*) imply that the markup and thus investment is higher if the firm is privatized. Evaluating the government's utility reveals that privatization is worthwhile only for low values of α , i.e, for $\alpha \in [0.73, 0.99]$, which confirms that the government's incentives for privatization are qualitatively the same as in case *i*) in which productivity enhancing investment was considered.

5 Conclusions

Analyzing a government's gains from privatization we focused on the potential impact of an imperfect labor market. In a model with a unionized labor force and wage bargaining we showed that privatization combined with price cap regulation can in fact be a worthwhile policy measure for the government. Privatization alters the union's bargaining position and can lead to lower wages. Anticipating this effect the government's revenues from privatization are higher than the firm's profits if the firm remains state owned. However, since this positive effect is not monotonically correlated with the union's bargaining power, the government's incentives to privatize the firm turns out to be especially high if the union's bargaining power is rather low (but positive). The analyzed example shows that a government can indeed suffer from privatization if its own bargaining power is low.

These results do not depend on the investment opportunities of the firm. They are rather due to the assumption that a privatized firm is constrained by price cap regulation. While price cap regulation implies an efficient factor allocation, it also reduces the elasticity of the (privatized) firm's labor demand which tends to increase the wage markup under privatization. Thus, regulating the firm's prices in order to ensure high output entails the negative drawback of improving the union's bargaining position. Alternative regulatory schemes such as rate of return regulation may alter this trade off and price cap regulation may not be the optimal regulation if unionized

¹¹ With $\Delta = 0$ the efficient investment is 0.

labor markets are considered. The government's incentives for privatization, however, would only increase if properly adapted regulatory schemes were used.

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