Departament d'Economia de l'Empresa

Edifici B
08193 Bellaterra (Barcelona). Spain
Tel.: (3) 581 12 09
Fax: (3) 581 25 55
E-mail: ECEMPRESA@VOLCANO.UAB.ES

Universitat Autònoma de Barcelona

October 1996

Efficient Privatization Under Incomplete Contracts

Miguel A. García-Cestona
Vicente Salas-Fumás

Working Paper # 96/2

EFFICIENT PRIVATIZATION UNDER INCOMPLETE CONTRACTS

Miguel A. García-Cestona

Vicente Salas

Universitat Autònoma de Barcelona

Revised, August 1996

Abstract

We provide an assessment of different privatization strategies included in a recent Spanish law on public enterprises. We make use of incomplete contracts and allow for renegotiation between government and private investors. Allocating residual decision rights over the public assets into private hands becomes more efficient than the approach suggested in the Spanish law. The observed gap responds to two sources: government prefers public ownership to income raised through taxes, due to the distortionary nature of the tax system; and partial ownership and residual rights alter the government incentives to restrain investments on public assets, affecting the firm's market value.

Key words: privatization, incomplete contracts, efficiency, renegotiation.

Comments:
Dpto. Economía de la Empresa
Facultad de Económicas
08193 Bellaterra (Barcelona). SPAIN
Fax: (34) 3 581 25 55, Phone: (34) 3 581 21 47
e-mail: cestona@cc.uab.es

The authors want to thank Inés Macho, David Pérez Castrillo and Marco Da Rin for their suggestions and comments that helped to improve a previous version of this paper.

Introduction

From the view of the classical financial theory, the privatization issue reduces to the correct calculation of the optimal share value of companies undergoing a privatization process. To achieve this goal, however, modern financial theory has engaged in the study of how much influence a firm's financial structure can exert in determining the optimal allocation of the residual rights of control and, at the same time, how those rights affect the share value. In particular, the proportion of shares owned by an agent plays a determinant role at the time of deciding who will be entitled to the residual rights.

In a previous work, P. Aghion and P. Bolton (1992) focused on financial contracts from an incomplete contracts approach, being one of their main results the optimal allocation of residual rights among the agents in a contingent way. Unlike them, we do not cover the contingent allocation of residual rights but we explicitly consider two alternative scenarios and proceed to analyze the impact that a company's ownership structure exerts on its value and on the optimal privatizing strategy finally adopted. We also deal with the issue of separating control from stockholding, allowing the government to keep residual rights over certain assets even after its loss of the firm's control. These assumptions seem particularly appropriate for the case of companies that used to be public enterprises and are now subject to a privatization process.

During the last two years and in line with events occurred in other countries around the world, the Spanish Administration has put forward a specific answer to the problem of how to distribute decision-making rights between private investors and the government. This has been done for commercial companies, previously owned by the state, and whose activities may help to achieve social goals and pursue the general interest (social welfare). We particularly focus on a resolution visible in a Spanish Parliamentary Act known as *"Ley de régimen jurídico de enajenación de participaciones públicas en determinadas empresas"*, dated March 23rd 1995. It is our purpose in the present paper to perform an economic analysis of the mentioned act, in line with the general concern for finding efficient solutions to the issue of internal organization in corporate governance.

The aforementioned act specifically applies to public enterprises or firms where prior to privatization the state had a stockholding such that allowed the government to exert an effective control over company decisions. In this context, we could predict that the public administration would adopt decisions concerning the search of an efficient

weighing of private and public interests. The issue under our consideration arises when, due to the allocation of shares among private investors, the government starts losing its capability to control along with its condition of largest shareholder. Once control is transferred to the private shareholders, it can no longer be guaranteed that the general interest will still be respected and satisfied. The act puts forward a specific solution to the problem that implies, under certain scenarios, the transfer to the administration of all the authority concerning those matters affecting the general interest. At the time of describing the pertinent scenarios, the act refers in an explicit way to "the voluntary dissolution of the firm, its split or merger process; the alienation or the burdening, in any way and for any title, of the social assets or shares that can be determined to this effect". It is important to note that this transfer occurs independently of the government participation size as a company shareholder. The act also specifies the possible implementation of an "administrative license" system for certain decisions, like the ones mentioned above. Such implementation will be enforced if the company sells shares beyond 5 percent of its equity, or if the state-owned stockholding falls below 15 per cent. Presumably, those two figures are set by the legislator on the basis of the Public Administration's ability to exert effective control over the company. The administrative license pursues the protection of the general interest and this can be achieved with the same efficiency no matter the ownership distribution of the firm be, state-owned or private. In other words, the Spanish privatization regulator seems to believe the concession of the administrative license will not be affected by the size of government's participation in the company.

Our goal in this paper is to analyze under which assumptions becomes acceptable the hypothesis that different allocations of decision residual rights over those assets that affect the general interest from the government point of view, reach the same level of efficiency independently of the size of government's stockholding. If these assumptions turn to be very restrictive and therefore difficult to be satisfied in real practice, then the decision on the proportion of shares to be allocated among private investors should additionally take into consideration its effects and impact on the administration's future resolutions.

Along with the consequences of the Spanish Act on the efficiency of privatization decisions, the paper takes also into consideration distributive issues. In particular, we consider the effect that both, i) the allocation of decisions between private investors and the administrative authorities and ii) the ownership structure of the society, have over the firm's market value. Most of the time, private investors, working in the pursue of their own interest, cannot guarantee that the general interest will be taken into consideration

and therefore, the relation between private investors and government needs to be ruled through incomplete contracts and the corresponding allocation of decision residual rights. The chosen party will decide on all those issues not explicitly covered by the contract.

According to our analysis, when the government holds a low percentage of a firm's equity, it will hardly internalize the impact of its decisions over the economic value of private assets and will, consequently, favor the general interest even if doing so the government damages the firm's interests. Of course, potential investors of the privatizing company, will anticipate this loss in share value caused by the exertion of decision rights over public assets and will deduct this effect, accordingly, from their price offer. Beyond the point where efficiency gains from the management of private assets (i.e., profits obtained through the incorporation of private shareholders into the firm's equity) are exhausted, any further privatization could damage the market value of the shares to be privatized.

We prove that a possible way of increasing the private investors' guarantee and, simultaneously, obtaining a higher price for these shares under privatization exists. Such alternative would require two components: a) the allocation to private investors of the residual decision rights over those assets related to the general interest, and b) a governing structure which enables renegotiation between private investors and the administration as an alternative way of taking into account the general interest. According to our results, if these two elements are present efficiency gains linked to this corporate governance option do exist.

The remaining text is organized as follows. In Section I we outline a simple framework where the impact of privatization on the share value and level of efficiency may be evaluated. Section II compares the consequences of two different settings: first, we consider the case where the government controls the residual decision rights on public assets; later we analyze an alternative approach where the private investors hold the residual rights. Welfare comparisons are also conducted. Some final comments and possible extensions conclude the study.

I. BASIC MODEL

We will consider a firm with two kinds of assets, "private" and "public", denoted by P and A respectively. The "private" assets, P, include all those resources and/or actions which generate monetary incomes **wholly appropriated by the investors** who provided the necessary funds. Assets of type A, on the contrary, include those resources and/or decisions which generate "public profits", that is, profits that cannot be appropriated by the private investors. The firm's private value, or market value, is represented by V, while B denotes the social value of public assets. Furthermore, B is an increasing and concave function of A,

$$B = B(A),\ B'_A > 0 \text{ and } B''_{AA} < 0 \qquad (1)$$

If the value V was only determined by those allocation decisions concerning P, then the firm could be split into two, one administering the private assets, type P, while the other firm could decide on the type A assets. We assume this is not the case and, further, V is a joint function of both P and A where

$$V = V(P, A) \qquad (2)$$

$$\text{where } V'_P > 0,\ V'_A < 0,\ V''_{AP} < 0 \text{ and } V \text{ concave.}$$

The market value of the firm increases with the volume of private assets while decreases with larger investments in public assets whose positive effects cannot be captured by the private investors. (Alternatively, similar results can be obtained if we consider a separate function, $V = V_1(P) + V_2(A)$ without affecting its essence. This would allow us to determine the optimal value P, independently of the decision on A and restrict our attention to this last variable, which we will assume to be continuous for explanatory reasons.)

Under these assumptions, the firm generates a total wealth

$$W(A) = V(P,\ A) + B(A), \qquad (3)$$

a value which includes the capitalized income coming from the private investors and the incomes that measure the monetary value of those assets relevant for the general interest.

We will also assume the presence of a "benevolent government", that is, the administration makes decisions to maximize the social welfare, W.

For our purposes, we could illustrate equation (3) in the following way. Type-A assets may include the decision of closing down a productive plant which generates economic

losses. That is, if the plant is closed, V increases compared to the current situation. However the plant also fulfills a social interest contributing, for instance, to a more balanced territorial development. This is captured by a positive $B(A)$ in this scenario. If this company was fully privatized the owners would choose a level of assets A that maximizes $V = V(P, A)$ and, as the previous discussion pointed out, it would be in their interest to close down the plant. On the contrary, a state-owned firm would choose the value A that maximizes $W(A)$ and its decision on whether this particular plant should be eliminated or not would be taken by comparing the corresponding effects of such a choice on $B(A)$ and $V(P, A)$.

For our purposes, the most interesting scenario appears when a fraction α of the firm's equity is privatized and the government, even though it loses control, keeps trying to preserve the general interest. Thus, due to privatization, the government must transfer all the decisions concerning P to the new owner, the private shareholders, **while keeping** for itself the residual decision rights over A when certain circumstances require a decision to be adopted. Under this framework two key questions arise: i) does this governing solution affect the ex-ante market value and efficiency of those companies to be privatized? and ii) what additional privatization alternatives could be suggested in order to increase efficiency?

In the analysis that follows, we write down both questions in the terms of our model before trying to provide an answer.

1) Impact over the share value.- The suggested scenario considers the sale of a fraction α of the firm's equity through the stock market. We can calculate the share value, assuming the government keeps for itself the residual rights on A when future contingencies develop and a decision concerning those public assets must be taken.

Under ideal conditions (i.e., in the absence of any transaction cost), after placing a fraction α of the equity among private shareholders, the government's objective function becomes

$$W^G(A;\alpha) = (1-\alpha)[V(P, A)] + B(A) + \alpha[V(P, A)] = \quad (4)$$
$$= V(P, A) + B(A) = W(A)$$

The government undertakes the maximization of the total welfare as its objective function and chooses the level of A accordingly. Total welfare is the result of adding up

the "public" wealth, $(1-\alpha)[V(P, A)]+B(A)$, and the wealth going into private hands, $\alpha[V(P, A)]$. The terms pondered by α canceled out and we end up with the same objective function, *W (A),* we get in a scenario where the government owns all the shares. The decision on A is independent of α and, therefore, the selling value of the shares **is not related** to the privatization strategy followed.

However, the assumption that the government maximizes an objective function which weighs equally government's "profits" and the private investors' wealth has been often questioned in the economic literature. For example, Laffont and Tirole (1993) put forward an alternative objective function where a benevolent government does not remain indifferent between its "own" monetary incomes and those incomes going to private investors. In fact, it values more its direct income. These authors justify such asymmetry through the distortionary nature of the tax-collecting system: in order to being able to raise a monetary unit of income through taxes, society must incur in an opportunity cost equal to $(1+\lambda)$ monetary units, with $\lambda>0$.[1] Furthermore, this shadow cost of public funds is likely to be larger the less efficient the tax collecting system be.

If we accept the previous reasoning, the new government's objective function becomes,

$$W^G = (1+\lambda)(1-\alpha)[V(P, A)]+B(A)+\alpha\,[V(P, A)]$$
$$=\left(1+\lambda(1-\alpha)\right)[V(P, A)]+B(A) \qquad \textbf{(5)}$$

That is to say, the government maintains its concern over both sources of wealth, public and private, but now it weighs them differently. W^G depends on the values of λ and α and, consequently, the decision on public and private assets, *A and P,* will be influenced by these two variables (the opportunity cost and the degree of privatization).

In fact the necessary condition for an optimal interior solution of W^G with respect to A becomes,

$$\left(1+\lambda(1-\alpha)\right)V_A^{'}+B_A^{'}=0 \qquad \textbf{(6)}$$

$$\left(1+\lambda(1-\alpha)\right)V_P^{'}=0 \qquad \textbf{(7)}$$

We also proceed to conduct a comparative-statistic analysis of these equations,

Lemma 1: *the investment on public assets, denoted by A, grows with the privatized equity percentage, α, and decreases with λ, the parameter that expresses the shadow*

---

[1]Laffont and Tirole (1993) refer to other empirical studies before mentioning a value of $\lambda = 0,3$ as a reasonable mean estimate for the United States economy. We think it is quite unreasonable to consider a lower value of λ for the Spanish economy.

price for government funds. The opposite is true for the investment in private assets, P. Thus,

$$\frac{\partial A}{\partial \alpha} > 0, \quad \frac{\partial A}{\partial \lambda} < 0 \tag{8}$$

$$\frac{\partial P}{\partial \alpha} < 0, \quad \frac{\partial P}{\partial \lambda} > 0 \tag{9}$$

Proof: shown in appendix A.

The interpretation is quite straightforward: the lower the government participation in the firm's equity, the smaller the negative (positive) effect that public (private) investment exert on its objective function while, at the same time, the relative weight assigned to the social value of the public assets increases, encouraging the government to raise the amount of public investment and lowers the private investment. On the other hand, higher levels of λ, due for example to imperfections and inefficiencies of the tax-collecting system, will make more costly for the government to give up those direct monetary incomes in exchange for larger investments in public assets to meet general interest. Consequently, higher levels of λ will reduce the amount of public investment and favors higher investments in private assets.

Our interest focus on the impact that both, the proportion of equity assigned to private shareholders, α, and the imperfections of the tax-system, λ, have on the value of the shares. Thus, we proceed to derive V with respect to the parameters λ and α, bearing in mind lemma 1,

$$V_{\alpha}^{'} = V_{A}^{'} \frac{\partial A}{\partial \alpha} + V_{P}^{'} \frac{\partial P}{\partial \alpha} < 0 \tag{10}$$

$$V_{\lambda}^{'} = V_{A}^{'} \frac{\partial A}{\partial \lambda} + V_{P}^{'} \frac{\partial P}{\partial \lambda} > 0 \tag{11}$$

Proposition 1: The market value of the firm **decreases with α and increases with λ.** That is to say, private investors will offer a lower (higher) price for shares of privatizing firm the larger (smaller) the privatizing equity's percentage be and the lower (higher) the opportunity cost. This is so because potential buyers can anticipate the government's incentives to satisfy the general interest through direct public investment instead of finding other resources through direct ownership in firms.

2) Efficient privatization.- We have just shown that the choices of A and P are quite affected by the percentage of privatized equity. This rises the following question: what is the privatization level that maximizes efficiency in this second-order optimal scenario imposed by a value of λ different from zero? It is obvious that if we maintain the same assumptions as in the previous section the value of α that maximizes W^G is $\alpha = 0$. That is to say, the efficient solution would imply that the government keeps all the firm's equity under its control. However, privatization is usually justified on the grounds of significant improvements on efficiency obtained through the private management of assets. To capture this, we assume that V is also an increasing function of α, at least up to a certain value. Thus,

$$V = V(P, A, \alpha), \quad and \quad V_\alpha' > 0$$

For this approach, the government's new objective function becomes

$$W^G = \big(1+\lambda(1-\alpha)\big)\, V(P, A, \alpha) + B(A), \qquad \textbf{(12)}$$

a function which now depends on α and A, both variables under government's control, and the variable P, that remains under private investors' control. The first-best solution will be one that chooses, **simultaneously**, the values of α, P and A in a way that maximizes W^G. That is to say, it chooses a privatization degree and investments on public and private assets which satisfy the following first-order conditions,

$$\big(1+\lambda(1-\alpha)\big)\, V_\alpha' - \lambda\big[V(P, A, \alpha)\big] = \gamma V_\alpha' - \lambda V = 0 \qquad \textbf{(13)}$$

$$\big(1+\lambda(1-\alpha)\big)\, V_A' + B_A' = \gamma V_A' + B_A' = 0 \qquad \textbf{(14)}$$

$$\big(1+\lambda(1-\alpha)\big)\, V_P' = \gamma V_P' = 0 \qquad \textbf{(15)}$$

where $\gamma = 1+\lambda(1-\alpha)$. We further assume the concavity of the objective function. As it can be checked, the value α that maximizes W^G depends on A which at the same time depends on α. Therefore, at the time of deciding on the percentage of shares to go private, the efficient privatization strategy demands from the government to bear in mind also those decisions concerning investments on public assets.

Equation (13) indicates that, at the optimum, the marginal profit of privatizing one more share equals its marginal cost. With our notation, a higher value of the private assets, $\big(1+\lambda(1-\alpha)\big)V_\alpha'$, will be compensated with a higher government opportunity costs, $\lambda\big[V(P, A, \alpha)\big]$. On the other hand and according to (14), the volume of public

investments that maximizes W^G is the value A, that equals the marginal loss in market value, $(1+\lambda(1-\alpha))V_A^{'}$, and the marginal profit of increasing the public interest, $B_A^{'}$. Similarly, the volume of private investment, P, increases until the marginal profit becomes zero, its marginal cost.

Once again, it is interesting to know the comparative-static analysis of the optimal values of α, P and A with respect to changes in λ.

Lemma 2: *Both, the efficient level of privatization and the volume of public assets respond inversely to changes in the parameter λ while the opposite is true for the level of private investment.*

$$\frac{\partial \alpha}{\partial \lambda} < 0, \quad \frac{\partial A}{\partial \lambda} < 0 \text{ and } \frac{\partial P}{\partial \lambda} > 0. \qquad \textbf{(16)}$$

Proof: shown in appendix B.

As we mentioned earlier, a lower level of λ may be interpreted as a decrease in the cost of using a tax-collecting device. Therefore, the relative benefits of raising public incomes directly through state-owned companies are now reduced favoring the sale of public enterprises and encouraging the government to invest more in public assets. Meanwhile, private investors will invest less because they anticipate the change in government incentives and behavior. The negative sign in the variation of α caused by positive variations of λ indicates that, when the cost of taxing diminishes, we should always observe an increase in the proportion of shares placed among private investors. This result also conforms to the empirical observation that **improvements in the tax-collecting system of a country go hand in hand with a bigger demand for privatization of public firms** in that same country.

The negative relationship between A and λ observed in the model is a natural consequence of our technical assumptions, concerning the choice of a welfare function. λ ponders the value of the private profits, V, but not the social profit value, $B(A)$. This causes that, in the presence of higher values of λ, the optimal value of A, logically, diminishes.

3) Graphical Analysis

Figures 1 and 2 provide a graphical interpretation of the problem. In the vertical axis we represent the market value of the firm while the investment in public assets goes into the horizontal axis. According with our assumptions, the market value decreases with higher investments in public assets and, therefore, it is a decreasing, and concave, function of A. We denote by A^* the optimal choice of public investment when the firm is a public

enterprise and the benevolent government has all the equity and maximizes total welfare. In figure 1, this optimal value is determined by the tangency of two curves: the welfare level and the market value. More public assets would increase the social benefits but would diminish the market value and a compromise must be achieved.

Once a privatization process has been launched, we must consider a new line for the market value, below the original one. Figure 2 shows the solution for a given external ownership, α. Potential investors foresee the modified objective function and anticipate the higher expenses in social assets, $A^*(\alpha)$, offering now lower prices for those shares.

II. PRIVATIZATION STRATEGIES.-

In the previous section we have pointed out the existing interrelation between the amount of shares that will be placed in the hands of private investors and the level of investment on public assets. Now we focus on the privatization process itself, where the government take a decision first on the proportion of equity to be sold, α, and later, when needed, further decisions must be taken concerning public assets, A. The theory of incomplete contracts offers us a general framework to define the most adequate strategy. According to this approach, the government is unable to foresee (or to negotiate ex-ante with the private investors) all the possible contingencies and decisions affecting the public assets at the time in which α and the share price are announced.[2] Instead of trying to anticipate all the possible hazards that surround the decision on A, the parts wait until some of the contingencies actually occur and behave as we establish in the model.

In what follows, we bring in the assumption that, once a decision on A is adopted, private investors and government are still in a position to renegotiate and make counteroffers to each other, in such a manner that the most efficient solution may always be reached. On these lines, the aforementioned Spanish establishes that, if an agreement is not reached through the renegotiation process the government will unilaterally take a decision on A. Nevertheless, it is not unreasonable to consider the case where private investors be able to unilaterally adopt a decision on those public assets affecting the firm in the event of a broken negotiation (the location of a productive plant in our example). So, it may prove of interest to compare the final outcome under both regimes and this is what we do next.

A) Case 1: The government is entitled with the residual decision rights over A.

[2]We usually invoke the existence of transaction costs to justify this impossibility.

The sequence of events is now the following:

i) The government notifies α and the share price of the firm.

ii) After the privatization some unforeseen contingency occurs and a decision on A must be taken. Private investors apply for the corresponding government license.

iii) Both sides, government and private investors, negotiate the decision on A bearing in mind that **if an agreement fails to be reached, the government will decide** on the level of public investment.

In order to make predictions about the final outcome caused by the previously described setting, we need to establish first the expected result of the negotiation process in the terms of our model. To that end, we consider the Nash-bargaining model (1950) as our reference point. Each side gets a compensation that includes two parts: the first one corresponds to the payments realized at the negotiation breaking point (or threat point), while the second component captures a player's share in the incremental gains derived from an agreement. These additional rents come from leaving the threat point to implement the efficient solution and they will be proportional to each player's bargaining power.

As pointed earlier, if no agreement is reached the government decides on A and solves

$$\underset{A}{Max}\ \gamma V(P, A, \alpha) + B(A)$$

Thus, the welfare level at this threat point becomes

$$W(A^G) = \gamma\, V(P, A^G, \alpha) + B(A^G) \qquad \textbf{(17)}$$

where $A^G = A^G(\alpha)$ denotes the level of investment in public assets optimally chosen by the government in order to maximize its own interest. That is to say, A^G is the value of public assets which maximizes W^G, for a given value α. Note that this objective function is also the expression of total welfare, given the "benevolent-type" assumption.

For a given privatization percentage and denoting by $(1-\beta)$ the private investors' bargaining power (thus β expresses the exogenous government's bargaining power), we can write down the private investors' anticipated wealth in this setting as follows,

$$R_I^G = \alpha\left[V(P, A^G, \alpha) + (1-\beta)\left(W(P, A^*, \alpha) - W(A^G)\right)\right] \qquad \textbf{(18)}$$

where R_j^i stands for the revenues that agent j (government or private investor) can obtain in the i-scenario. $i=G$ *or* I means the government or the private investors hold the residual rights respectively. The first expression $V(P, A^G, \alpha)$ indicates the firm's

market value under the assumption that the negotiation failed and the government implemented its threat and chose A. The second term in the equation, $(1-\beta)\left(W(P, A^*,\alpha) - W(A^G)\right)$, denotes the participation of the investors in the incremental gain generated through the renegotiation and goes to increase the firm's profits. Under the current scenario the government chooses A to maximize the total welfare and, therefore, $\left(W(P, A^*,\alpha) - W(A^G)\right) = 0$ and the private investors' wealth can be rewritten as

$$R_I^G = \alpha V(P, A^G, \alpha) \qquad \textbf{(19)}$$

At the same time, the government obtains a level of revenues, R_G^G, where

$$R_G^G = (1+\lambda)(1-\alpha) V(P, A^G, \alpha) + B(A^G) \qquad \textbf{(20)}$$

and already includes the value of the public assets for the event of a negotiation failure where the negotiating sides do not reach any agreement, $B(A^G)$.

Thus, for this scenario the objective function used by the, remember, benevolent government to decide about the percentage of equity to be privatized is the total welfare function W^G, where

$$\begin{aligned} W^G &= R_I^G + R_G^G = \gamma V(P, A^G, \alpha) + B(A^G) \\ &= \gamma V(P, A^*, \alpha) + B(A^*) = W(P, A^*, \alpha) \end{aligned} \qquad \textbf{(21)}$$

It is straightforward to check that the problem of maximizing W^G in terms of α, taking into account the process previously described to obtain $A^G(\alpha)$, leads us to the same efficient levels of α and A, obtained through the simultaneous optimization of the two variables (equations (13) and (14)). Therefore stages i), ii) and iii) of the previously mentioned process make up an operative way of reaching the efficient solution when the government holds the residual decision rights.

B) Case 2: <u>Residual decision rights in private investors' hands.</u>

Here, the strategy is similar to the previous case up to stage iii) where, if an agreement fails to be reached, **the private investors will unilaterally decide on** A. Private investors would then maximize their wealth at the breaking point. That is, they would choose the amount of A that solves,

$$\underset{A}{Max}\ \alpha\left[V(P, A, \alpha)\right]$$

and we denote this value by A^I, where $A^I = A^I(\alpha)$. The resulting total welfare for this setting becomes,

$$W(A^I) = \gamma V(P, A^I, \alpha) + B(A^I) \qquad \textbf{(22)}$$

With these results, we proceed to repeat the previous outline for the renegotiation process. Under this choice of public assets, the wealth levels for private investors and the government are, respectively,

$$R_I^I = \alpha \left[V(P, A^I, \alpha) + (1-\beta) \left(W(P, A^*, \alpha) - W(A^I) \right) \right] \quad (23)$$

$$R_G^I = (1+\lambda)(1-\alpha) \left[V(P, A^I, \alpha) + (1-\beta) \left(W(P, A^*, \alpha) - W(A^I) \right) \right] + (1+\lambda)\beta \left(W(P, A^*, \alpha) - W(A^I) \right) + B(A^I) \quad (24)$$

Finally, we can get the total welfare generated for this case, W^I, where

$$W^I = R_I^I + R_G^I = \gamma V(P, A^I, \alpha) + (\gamma + \lambda\alpha\beta)\left(W(P, A^*, \alpha) - W(A^I) \right) + B(A^I) \quad (25)$$

And making use of equation (22) total welfare may be expressed as

$$W^I = W(A^I) + \left(1 + \lambda(1-\alpha) + \lambda\alpha\beta\right) \left(W(P, A^*, \alpha) - W(A^I) \right) \quad (26),$$

or

$$W^I = W(P, A^*, \alpha) + \left(\lambda(1-\alpha) + \lambda\alpha\beta \right) \left(W(P, A^*, \alpha) - W(A^I) \right) \quad (27)$$

and we proceed to compare the resulting levels of welfare from the different settings,

$$\begin{aligned} W^I - W^G &= \left(\lambda(1-\alpha) + \lambda\alpha\beta \right) \left(W(P, A^*, \alpha) - W(A^I) \right) \\ &= \lambda\left(1 - \alpha(1-\beta)\right) \left(W(P, A^*, \alpha) - W(A^I) \right) \end{aligned} \quad (28)$$

Proposition 2: *The transfer of residual rights to private investors may help to increase welfare in a variety of circumstances. In particular, as long as there is some distortions from the tax-collecting system, such transfer will always increase welfare unless the firm has been completely privatized and, simultaneously, the government has lost all its bargaining power.*

Proof: directly from equation (28).

The first condition, $\lambda > 0$, has been justified on the grounds of differences in the shadow price of money for the government and the private individuals. If there were no such differences, the transfer of residual decision rights to the government or the private investors would be indifferent from a welfare point of view (equations (21) and (27) would be identical). A second condition to help the welfare growth with the transfer of residual rights to private investors is $\left(1 - \alpha(1-\beta)\right) > 0$. That is, unless $\alpha = 1$ and $\beta = 0$ **simultaneously** this condition is always satisfied. Condition $\beta > 0$ means that the government can exert some bargaining power in order to obtain a share of the incremental profit generated through the renegotiation apart from those gains already included in the firm's value. A value $\beta = 0$ means, therefore, that all the incremental

profits that the renegotiation furnishes go to increases in the firm's market value, from which the government would only obtain a portion equal to its participation in the firm's. Finally, the value of α is set to maximize W^G; if the optimal value α turns to be one, then the allocation of the totality of shares among private investors will achieve the highest efficiency. In any event, α is a decision variable whose value can never be fixed beforehand.

As a final summary, we want to say that there are reasonable a priori conditions under which the efficiency level obtained through a privatization process is rather sensitive to the decision of allocating the residual rights concerning public assets to the private investors or to the government.

Conclusion.-

The theory of incomplete contracts has proved as a very helpful tool for a better understanding of the economic implications of the company's ownership structure. This paper applies the mentioned theory to the assessment of the different privatizing strategies contained in an act that the Spanish Parliament has recently approved. Our conclusion is twofold. On one hand, the decision concerning the percentage of shares to be allocated among private investors **is not** independent of the decision on those assets containing the general interest that the government tries to protect. On the other hand, the efficiency of a privatizing strategy, when renegotiation between government and private investors is allowed, is not indifferent to whom becomes the owner of the residual decision rights over the public assets. In particular, the solution consisting in the allocation of residual decision rights to private investors turns out to be more efficient than an alternative setting where the government holds those rights. An efficiency gap does exist and can be explained, first, by the fact that shares can be sold to private investors to a higher price when these own the decision residual rights and, second, by the lower value that tax incomes have for the government compared to the income raised through the privatization process.

Notes.-

1.- The bases of the theory appear in Williamson (1985) and Grossman and Hart (1986). Laffont and Tirole have also applied this (1993, chap. 17) to the efficiency evaluation of different regulatory processes, although their approach to the privatization issue is rather different from ours. Specifically these authors make a special point of the problems raised by the existence of multiple principals (government and private investors) monitoring the regulated company's manager, whereas we model the contract between government and private investors on how to decide on saving the general interest.

Appendix A

To carry out the comparative-statistic analysis we start from the two first-order conditions,

$$(1+\lambda(1-\alpha))\, V_A^{'}+B_A^{'} = \gamma V_A^{'}+B_A^{'} = 0 \qquad \text{(A.1)}$$

$$(1+\lambda(1-\alpha))\; V_P^{'}=\gamma V_P^{'} = 0 \qquad \text{(A.2)}$$

using $\gamma=(1+\lambda(1-\alpha))$. If we derive now with respect to parameter λ, we obtain the following matrix relationship

$$\begin{bmatrix} \gamma V_{AA}^{''}+B_{AA}^{''} & \gamma V_{AP}^{''} \\ \gamma V_{AP}^{''} & \gamma V_{PP}^{''} \end{bmatrix} \begin{bmatrix} \frac{\partial A}{\partial \lambda} \\ \frac{\partial P}{\partial \lambda} \end{bmatrix} = \begin{bmatrix} -(1-\alpha)\, V_A^{'} \\ -(1-\alpha)\, V_P^{'} \end{bmatrix} \qquad \text{(A.3)}$$

We denote by D the first matrix on the left-hand side and by E the one on the right-hand side. Furthermore, $|D_i|$ stands for the determinant resulting from replacing column i by the vector E.

Due to our assumptions on V, it is straightforward to check that

$$|D| = \gamma V_{PP}^{''}\left[\gamma V_{AA}^{''}+B_{AA}^{''}\right]-(\gamma V_{AP}^{''})^2 > 0 \qquad \text{(A.4)}$$

$$|D_1| = (1-\alpha)\,\gamma\left[V_P^{'} V_{AP}^{''}+V_A^{'} V_{PP}^{''}\right] < 0 \qquad \text{(A.5)}$$

$$|D_2| = (1-\alpha)\left[\gamma V_A^{'} V_{AP}^{''}-V_P^{'}(\gamma V_{AA}^{''}+B_{AA}^{''})\right] > 0 \qquad \text{(A.6)}$$

Thus,

$$\frac{\partial A}{\partial \lambda}=\frac{|D_1|}{|D|}<0 \;\textit{and}\; \frac{\partial P}{\partial \lambda}=\frac{|D_2|}{|D|}>0. \qquad \text{(A.7)}$$

Similarly for the exogenous variable α,

$$\begin{bmatrix} \gamma V_{AA}^{''}+B_{AA}^{''} & \gamma V_{AP}^{''} \\ \gamma V_{AP}^{''} & \gamma V_{PP}^{''} \end{bmatrix} \begin{bmatrix} \frac{\partial A}{\partial \alpha} \\ \frac{\partial P}{\partial \alpha} \end{bmatrix} = \begin{bmatrix} \lambda V_A^{'} \\ \lambda V_P^{'} \end{bmatrix} \qquad \text{(A.8)}$$

We use now the notation $|F|$ and $|G|$ for the corresponding determinants and, as before, we proceed to determine the relevant signs:

$$|F| = |D| > 0 \tag{A.9}$$

$$|F_1| = \lambda\gamma\left[V_A^{'} V_{PP}^{''} - V_P^{'} V_{AP}^{''}\right] > 0 \tag{A.10}$$

$$|F_2| = \lambda\left[V_P^{'}(\gamma V_{AA}^{''} + B_{AA}^{''}) - \gamma V_A^{'} V_{AP}^{''}\right] < 0 \tag{A.11}$$

Therefore,

$$\frac{\partial A}{\partial \alpha} = \frac{|F_1|}{|F|} > 0 \text{ and } \frac{\partial P}{\partial \alpha} = \frac{|F_2|}{|F|} < 0. \tag{A.12}$$

Appendix B

The government's objective function is now

$$W = \gamma V + B \tag{B.1}$$

where $V = V(A, P, \alpha)$ and $B = B(A)$

and the following first-order conditions

$$\frac{\partial W}{\partial A} = \gamma V_A^{'} + B_A^{'} = 0 \tag{B.2}$$

$$\frac{\partial W}{\partial P} = \gamma V_P^{'} = 0 \tag{B.3}$$

$$\frac{\partial W}{\partial \alpha} = \gamma V_\alpha^{'} - \lambda V = 0 \tag{B.4}$$

We proceed now to analyze the comparative-static properties of this model on the basis of these first order conditions, obtaining the following matrix equation.

$$\begin{pmatrix} \gamma V_{\alpha\alpha}^{''} - 2\lambda V_\alpha^{'} & \gamma V_{A\alpha}^{''} - \lambda V_A^{'} & \gamma V_{P\alpha}^{''} - \lambda V_P^{'} \\ \gamma V_{A\alpha}^{''} - \lambda V_A^{'} & \gamma V_{AA}^{''} + B_{AA}^{''} & \gamma V_{AP}^{''} \\ \gamma V_{P\alpha}^{''} - \lambda V_P^{'} & \gamma V_{AP}^{''} & \gamma V_{PP}^{''} \end{pmatrix} \begin{pmatrix} \frac{\partial \alpha}{\partial \lambda} \\ \frac{\partial A}{\partial \lambda} \\ \frac{\partial P}{\partial \lambda} \end{pmatrix} = \begin{pmatrix} V - (1-\alpha) V_\alpha^{'} \\ -(1-\alpha) V_A^{'} \\ -(1-\alpha) V_P^{'} \end{pmatrix}$$

We denote by S the first matrix on the left-hand side and by T the vector on the right-hand side. Furthermore $|S_i|$ stands for the determinant resulting from replacing column i by the vector T. And we obtain

$$|S| < 0, \text{ by concavity of function } W \tag{B.5}$$

$$|S_1| > 0, |S_2| > 0 \text{ and } |S_3| < 0 \tag{B.6}$$

We obtain these signs from the corresponding determinants and using, as sufficient conditions

$$V''_{A\alpha} = \frac{\partial V'_A}{\partial \alpha} > 0 \text{ and } V''_{P\alpha} = \frac{\partial V'_P}{\partial \alpha} < 0 \qquad \text{(B.7)}$$

That is, the marginal effects of public and private investments on the market value decrease with the degree of privatization.

Therefore, the corresponding signs of the comparative statics are:

$$\frac{\partial \alpha}{\partial \lambda} = \frac{|S_1|}{|S|} < 0, \quad \frac{\partial A}{\partial \lambda} = \frac{|S_2|}{|S|} < 0 \text{ and } \frac{\partial P}{\partial \lambda} = \frac{|S_3|}{|S|} > 0. \qquad \text{(B.8)}$$

References

AGHION, P. and P. BOLTON (1992): "An Incomplete Contracts Approach to Financial Contracting", *Review of Economic Studies*, 59, pp. 473-494.

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

LAFFONT, J. and J. TIROLE (1993): *A Theory of Incentives in Procurement and Regulation*. The MIT Press, chap. 17.

NASH, J. (1950): "The Bargaining Problem", *Econometrica*, 18, pp. 155-162.

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

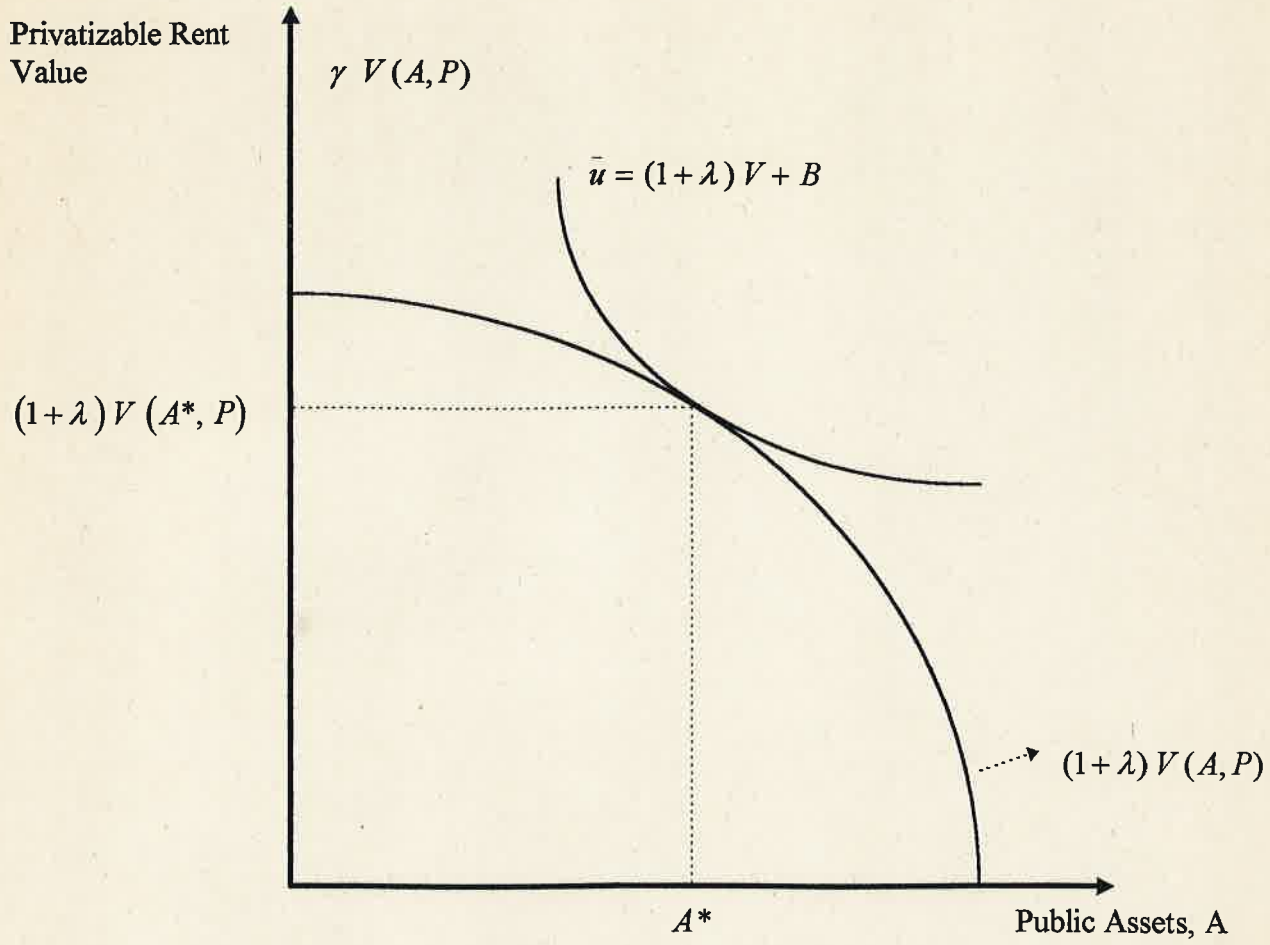
Privatizable Rent Value
$\gamma\ V(A,P)$
$\bar{u} = (1+\lambda)V + B$
$(1+\lambda)V(A^*, P)$
$(1+\lambda)V(A,P)$
A^*
Public Assets, A

Figure 1

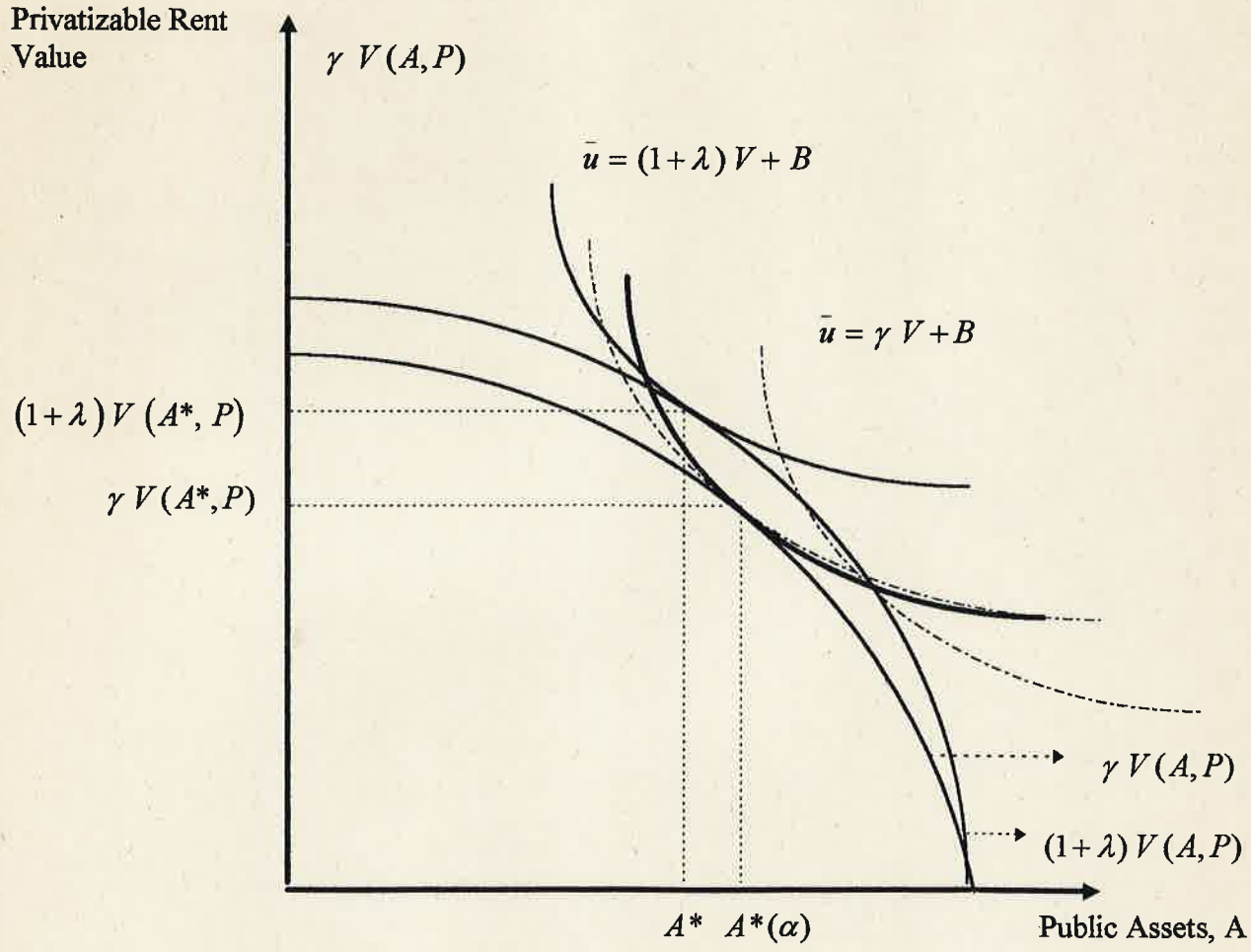
Privatizable Rent Value
$\gamma V(A,P)$
$\bar{u} = (1+\lambda)V + B$
$\bar{u} = \gamma V + B$
$(1+\lambda)V(A^*, P)$
$\gamma V(A^*,P)$
$\gamma V(A,P)$
$(1+\lambda)V(A,P)$
A^* $A^*(\alpha)$
Public Assets, A

Figure 2

Working Papers

Issues:

95/1 Productividad del trabajo, eficiencia e hipótesis de convergencia en la industria textil-confección europea
Jordi López Sintas

95/2 El tamaño de la empresa y la remuneración de los máximos directivos
Pedro Ortín Ángel

95/3 Multiple-Sourcing and Specific Investments
Miguel A. García-Cestona

96/1 La estructura interna de puestos y salarios en la jerarquía empresarial
Pedro Ortín Ángel

96/2 Efficient Privatization Under Incomplete Contracts
Miguel A. García-Cestona
Vicente Salas-Fumás