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**Working Paper**

## Privatization and Liberalization in Labour - Managed Industries: A Welfare Analysis

Quaderni - Working Paper DSE, No. 105

**Provided in Cooperation with:**

University of Bologna, Department of Economics

*Suggested Citation:* Delbono, Flavio (1991) : Privatization and Liberalization in Labour - Managed Industries: A Welfare Analysis, Quaderni - Working Paper DSE, No. 105, Alma Mater Studiorum - Università di Bologna, Dipartimento di Scienze Economiche (DSE), Bologna, <http://dx.doi.org/10.6092/unibo/amsacta/5259>

This Version is available at:

<http://hdl.handle.net/10419/158948>

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Privatization and Liberalization in Labour-Managed Industries:  
A Welfare Analysis

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Abstract

I consider the point of view of an economic reformer aiming at improving social welfare in a currently monopolized labour-managed industry. I show that giving some tiny weight to output (i.e., consumers' surplus) in the original maximand may result in an outcome socially superior to those resulting from (partial or complete) privatization and/or liberalization.

JEL Classification Numbers: 124, 612

(\*) I thank Gianluca Fiorentini, Silvana Malle, Carlo Scarpa, and especially Gianpaolo Rossini for stimulating conversations and comments on my view on these and related issues. The usual disclaimer applies.

## 1. Introduction

Most countries in Eastern Europe are still constrained by what Lipton and Sachs call "the Stalinist legacy", that is, by a socialist ownership structure. Although differences exist in the extent to which private enterprises have been permitted to operate, in these countries workers are typically employed in the so-called socialized sector, which includes both State-owned enterprises and cooperatives. For instance, in Poland, where a relatively large private sector has been allowed to operate, 71% of workers are employed in the socialized sector and 13% of these work in the cooperative sector.

In outlining the various phases of the process of transition, it is a widespread opinion that privatization should be a major step. However, even supporters of privatization do not conceal that such policies may encounter opposing forces and resistance. For example, Lipton and Sachs (1990, p. 128) have pointed out that:

"The complications of privatization begin with the fact that the ownership of the state enterprises in Poland (and the rest of Eastern Europe) is already politically contested. In many cases, workers wonder what the fuss is about, because of course they own the firms."

In looking for remedies, they go on to argue that:

"Unlike the British model of privatization, it is not urgent that 100 percent of the shares of an enterprise be sold or transferred. Some shares can remain with the Treasury. Several countries in Western Europe have shown that an acceptable level of efficiency and financial responsibility can be obtained in a mixed enterprise, part public and part private." (p. 129)

In this paper I shall take very seriously the last suggestion and try to show that privatization and liberalization can be not necessary to improve upon the status quo. Before proceeding further, it is of paramount

importance to underline that although privatization and liberalization are often intertwined in policy debates, they are logically quite distinct concepts. Following Vickers and Yarrow (1988, p. 45), privatization is the mere transfer of ownership to private (and profit-seeking) shareholders, whereas liberalization is the opening up of competitive forces, i.e., the breaking-up of monopolies.

I shall model the policy issue within a simple partial equilibrium approach, by considering a single industry initially monopolized by a Labour-Managed (LM, henceforth) company. Then, I shall envisage five policies which entail (partial or complete) privatization and/or liberalization. These policies materialize in the creation of different types of monopolistic or duopolistic arrangements. Finally, I shall also consider a solution which does not require privatization nor liberalization. This policy amounts to giving some small weight to output in the objective function of the original (LM) monopoly. I then perform a welfare comparison of the six regimes and show that the last one can be socially superior to all previous ones. This is shown under the assumption that privatization as such does not entail any technological improvement. However, I also prove that the result still holds as long as such an efficiency gain is not too large.

The model is presented in section 2; the policy regimes are then summarized (section 3) and compared (section 4). Section 5 contains some concluding remarks and outlines how to qualify the conclusions once the assumption on technology is modified.

## 2. The model

I consider an industry in which two identical plants (indexed by  $i = 1, 2$ ) produce a homogeneous good with the following technology:

$$(1) \quad q_i = (l_i)^{1/2} \quad i = 1, 2$$

where  $q_i$  ( $l_i$ ) denotes the quantity of output of (the quantity of homogeneous labour employed in) plant  $i$ . Normalizing to one the money wage, the short-run cost function is:

$$(2) \quad c(q_i) = \begin{array}{ll} 0 & \text{if } q_i = 0 \\ q_i^2 + F & \text{if } q_i > 0 \end{array}$$

where  $F$  is a positive fixed cost.

The market demand function is assumed to be linear:

$$(3) \quad p = a - Q$$

where  $Q = q_1 + q_2$  is total output,  $p$  is market price, and  $a$  is a parameter greater than unity.

I am interested in comparing social welfare in different market organizations. As usual in partial equilibrium analysis, I define social welfare as the sum of consumers' and producers' surpluses. Then, social welfare ( $W$ ), gross of fixed costs, is nothing but:

$$(4) \quad 2F + W = aQ - Q^2/2 - q_1^2 - q_2^2$$

I bestow the status of lemma on the following fact, which will greatly simplify the welfare comparisons performed in next section:

**Lemma:** If  $q_1 = q_2$ , then  $dW/dQ > 0$  if and only if  $Q < a/2$ .

Indeed, by (2), total variable costs when  $q_1 = q_2$  can be expressed as  $Q^2/2$ . As (4) reduces then to  $2F + W = aQ - Q^2$ , the result immediately follows.

Suppose now that the industry is initially monopolized by a LM company. Then, the status quo is a situation in which the following objective function is maximized:

$$(5) \quad V_{LM} = (pQ - 2F)/(1_1 + 1_2)$$

Straightforward algebra dictates that the optimum level of output in the status-quo is:

$$(6) \quad Q^*_{LM} = \begin{array}{ll} 4F/a & \text{if } a^2 \geq 10F \\ 0 & \text{otherwise} \end{array}$$

Clearly,  $q^*_1 = q^*_2 = 2F/a$ . Notice that each plant produces, in equilibrium, in the region of increasing returns to scale <sup>(1)</sup>.

### 3. Industrial settings

I now examine some industrial settings that can be created by means of public interventions aimed at improving social welfare upon the status-quo. In particular, I shall focus on the effects of (partial or complete) privatization and/or liberalization. To enlighten the consequences of these changes in the market organization, I retain the assumption that technology is still described by (2). I am aware of the criticisms one can address to this procedure. I simply defend it on the ground that I am interested in the effects of altering market structure as summarized by the degree of rivalry and the goals of decision-makers in the industry. If these changes entail also changes in technological efficiency, then my conclusions will

need to be revised accordingly, as I will outline in the last section.

Let us now turn to the examination of some regimes that policy makers can design: I shall discuss six, requiring in all cases that the sustainability condition (average cost not greater than price) be met.

#### CP (Complete Privatization)

In this case the industry is completely monopolized by a profit-maximizer. Hence, its optimal output will be:

$$(7) \quad Q_{CP} = \begin{cases} a/3 & \text{if } a^2 \geq 12F \\ 0 & \text{otherwise} \end{cases}$$

#### CPL (Complete Privatization and Liberalization)

The simplest setting which we can properly refer to as one where both complete privatization and liberalization have taken place is a non-cooperative duopoly formed by two profit-seeking firms. In the unique (interior and symmetric) Cournot-Nash Equilibrium (CNE) we have:

$$(8) \quad Q_{CPL} = \begin{cases} 2a/5 & \text{if } a^2 \geq 25F/2 \\ 0 & \text{otherwise} \end{cases}$$

#### PPL (Partial Privatization and Liberalization)

In this case the original monopoly is split and only one plant is privatized and managed by a profit-maximizer, whereas the other plant is still LM. Then, this is an instance of mixed duopoly; if  $a^2 > 128F/9$  there exists a unique (interior and asymmetric (2)) CNE in which:

$$(9) \quad Q_{PPL} = [3(9a^2+32F)^{1/2} - 7a]/8$$

#### L (Liberalization)

This is the case in which the ownership structure in the industry is not altered, but competition is introduced by splitting the monopoly and creating a non-cooperative duopoly formed by two LM companies. In the unique (interior and symmetric) CNE total output is:

$$(10) \quad Q_L = a - (a^2 - 8F)^{1/2}$$

provided that  $a^2 \geq 25F/2$ .

#### PP (Partial Privatization)

By this I mean a market which is still monopolized, but the maximand gives now some explicit weight (measured by the parameter  $\alpha$ ,  $0 < \alpha < 1$ ) to profits. Let us assume that the payoff of this "mixed" monopolist is a weighted average of the two controllers' payoffs. Then, the maximand is

$$(11) \quad V_{PP} = \alpha V_P + (1-\alpha)V_{LM}$$

where  $V_P$  is the maximand yielding (7), and  $V_{LM}$  is given by (5). Obviously enough, the level of  $Q$  solving (11) - denoted  $Q^{*PP}$  - will lie in the interval  $(Q^{*LM}, Q^{*P})$ .

#### PN (Partial Nationalization)

Finally, I consider the case in which the monopolistic structure persists, but the original maximand is altered to give some weight (measured by the parameter  $\beta$ ,  $0 < \beta < 1$ ) to consumers' interest. To be more precise, let us suppose that the payoff to be maximized is now a weighted average of  $V_{LM}$  and the payoff of a public-like controller (i.e., an agent that would maximize the sum consumers' and producers' surpluses):

$$(12) \quad V_{PN} = \beta W + (1-\beta)V_{LM}$$



where  $W$  is obtained by (4). Using (2) and (3), we can easily ascertain that the FOC for a maximum requires:

$$(13) \quad \beta(a - 2Q_{PN}) + [2(1 - \beta)(4F - aQ_{PN})]/Q_{PN}^2 = 0$$

Notice that  $a^2 \geq 16F$  is an (overly strong) sufficient condition for the solution to (13) to be sustainable (2) for any  $\beta$ .

Now,  $Q_{PN}^*$  varies from  $Q_{LM}^*$  to  $a/2$  as  $\beta$  goes from zero to one (4). However, it is apparent from (13) that  $Q_{PN}^*$  does not vary smoothly with  $\beta$ . Actually, in some regions of the parameters  $a$  and  $F$  it happens that the output of the mixed nonopoly ( $Q_{PN}^*$ ) tends to the socially optimal level even if  $\beta$  is very close to zero. To see this, I take a small sample of the numerical simulations reported in Delbono and Rossini (1991). For instance, with  $a = 100$  and  $\beta = 0.01$ ,

$F =$	0.1	1	8	50	200
$Q_{LM}^* =$	0.004	0.04	0.32	2	8
$Q_{PN}^* =$	45.142	45.146	45.185	49.649	49.693

Then, a 1% nationalization yields an output which is much closer to  $a/2 = 50$  than to  $Q_{LM}^* = 4F/a$ . I do not comment on this rather bizarre behaviour of equation (13) - the interested reader may refer to Delbono and Rossini (1991) for an interpretation of this fact - and I turn to a comparison of the six regimes presented above.

#### 4. Welfare comparisons

First of all, notice that in all equilibria in which  $q^*_1 = q^*_2$  (i.e., in all regimes, including the status quo, but PPL),  $Q^* < a/2$ , so that the Lemma allows us to compare the aggregate levels of output to rank the corresponding levels of social welfare. Of course, in comparing the different scenarios, one has to bear in mind that they are sustainable in different regions of the parameters  $a$  and  $F$ . Thus, I restrict the attention to that region of parameters in which all regimes are sustainable and comparisons then make sense. By " $x$  socially superior to  $y$ " I shall mean " $W^*_x > W^*_y$ ".

**Claim 1:** All six regimes are socially superior to the status quo.

This is a relatively well-known result in view of the endemic under-production featuring LM monopolies.

**Claim 2:** CPL is socially superior to PPL.

This comparison - which cannot be performed by comparing (8) and (9) as PPL yields an asymmetric equilibrium - shows that liberalization is more effective if coupled with complete privatization than with a partial one.

**Claim 3:** L is never socially superior to PPL, but it can be socially superior to CP.

This tells us that in presence of rivalry, both partial and complete privatization yield a better outcome than simply allowing the LM companies to compete (regime L). However, the latter scenario is to be preferred to the situation in which a profit maximizer monopolizes the industry (regime CP) as long as  $25/2 \leq a^2/F < 72/5$ . In a sense, the same logics governing the rank between the LM monopoly and the profit-maximizing monopoly (CP) - the latter being socially superior to the former - seems to extend also to

the rank between duopolies.

**Claim 4:** PN can be socially superior to CPL.

Notice that PN does not involve privatization nor liberalization. Moreover, and I wish to stress this, Claim 4 can be true also for very small degrees of "public-like behaviour". To see this, observe that for  $a = 100$  and  $F$  in the interval  $[0.1, 200]$ , the minimum value of  $\beta$  for  $Q^{*PN}$  to be greater than  $Q^{*CPL}$  is 0.0065! In fact, for this value of  $\beta$ ,  $Q^{*PN} = 40.83$ , whereas  $Q^{*CPL} = 40$ .

It is worth noting that this "epidemic" effect operates also within the regime labelled PP. Indeed, also the FOC resulting from the maximization of (11) with respect to  $Q_{PP}$  exhibits a behaviour similar to the pattern of (13). In other words,  $Q^{*PP}$  can be very close to its upper bound ( $a/3$ ) even if the weight of the profit-maximizing ingredient of  $V_{PP}$  (i.e.,  $\alpha$ ) is very close to zero <sup>5</sup>.

## 5. Concluding remarks

In this paper I have presented a simple welfare comparison between market organizations designed to improve upon a status quo represented by a labour managed monopoly. We have seen the effects of various industrial policies entailing (partial or complete) privatization and/or liberalization. Moreover, I have shown that a small change in the original maximand (of the LM company) to give some weight to output may result in an outcome superior to those resulting from previous policies.

All comparisons have been performed under the assumption that the technology available to different decision-makers is the same. Let us then sketch how the above conclusions would be affected by the assumption that

profit maximization entails a technological improvement in the form of a reduction in variable costs. For sake of simplicity, let us assume that production by profit-maximizing agents takes place under the following cost function:

$$(2') \quad c(q_i) = F + \theta q_i^2 \quad 0 < \theta < 1$$

Under (2'), in the sustainable region of the parameters, we have:

$$(7') \quad Q'_{CP} = a/(2 + \theta)$$

and

$$(8') \quad Q'_{CPL} = 2a/(3+2\theta)$$

Hence, it is easy to check that  $Q^{*PN}$  may still be socially superior to both  $Q'_{CP}$  and  $Q'_{CPL}$ , provided  $\theta$  is not too small. For example, when  $a = 100$ ,  $F = 1$ , and  $\beta = 0.01$ ,  $Q^{*PN} = 45.14$  which is greater than  $Q'_{CP}$  if  $\theta > 0.21$  and is greater than  $Q'_{CPL}$  if  $\theta > 0.71$ .

To conclude, a tiny weight to consumers' interests (and workers-owners are also consumers!) may be a solution socially better than any mixture privatization and liberalization even when profit-maximization is married with a superior technology. I have not tackled the distributional issues associated with the different regimes, but one may expect that policy reforms as the one stylized through PN may also rely upon a higher political support than the one encountered by massive and sudden processes of privatization and liberalization.

## Footnotes

(1) I stress this because, as convincingly shown by Cremer and Cremer (1990), market power, labour management and decreasing returns to scale are incompatible. In our model, (2) yields an U-shaped average cost curve that is minimized at  $q_1 = \sqrt{F}$ . The solution given by (6) and the other relevant cases considered through the paper ensure that the equilibrium level of output (per plant) is lower than  $\sqrt{F}$ .

(2) The output of the LM plant is  $[(9a^2+32F)^{1/2} - 3a]/2$  which is lower than  $[5a - (9a^2+32F)^{1/2}]/8$ , the output of the plant managed by the profit-seeking company.

(3) The condition  $a^2 \geq 16F$  ensures that the output chosen by a social welfare maximizer does not entail any loss for the public firm.

(4) Clearly,  $a/2$  is the output level that would be chosen by a social planner whose FOC dictates marginal cost pricing.

(5) In Delbono and Rossini (1990) the case labelled PP is contrasted with a mixed duopoly formed by a LM firm and a social welfare maximizing firm.

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