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PRIVATIZATION AND CAPITALIST AND LABOR-MANAGED FIRMS: A NUMERICAL EXAMPLE

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ABSTRACT: In recent years, the theoretical analysis of privatization has been studied by many economists. However, they have not considered labor-managed firms. Therefore, this paper examines the following five duopoly regimes: state-owned and capitalist firms, capitalist firms, state-owned and labor-managed firms, labor-managed firms, and capitalist and labor-managed firms. The paper then compares the equilibrium outcomes of the five market regimes.

KEYWORDS: Privatization, State-owned firm, Capitalist firm, Labor-managed firm

JEL classification: C72, D21, H42, L33

Introduction

The effects of privatization are often studied in the context of mixed market models where state-owned welfare-maximizing public firms interact with profit-maximizing capitalist firms (see, for example, Gronberg and Hwang (1992), White

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(1996), Anderson, de Palma, and Thisse (1997), Matsumura (1998), Pal and White (1998), Sasaki and Wen (2003), Bárcena-Ruiz and Garzón (2005), Bosi, Girmens, and Guillard (2005), Chang (2005), Chao and Yu (2006), Han and Ogawa (2008), and Roy chowdhury (2009). However, studies on privatization do not include labor-managed firms.

The oldest surviving labor-managed firms in the United Kingdom and Italy appeared in the nineteenth century (Bonin, Jones, and Putterman, 1993). After the Second World War, the right to manage the firm in the former Yugoslavia was, within the limits determined by law, in the hands of its employees (Furubotn and Pejovich, 1970). The labor-managed firm in all Western European countries grew significantly between the early 1970s and the early 1980s, for example, from 4,370 firms in 1970 to 11,203 in 1982 in Italy and from 522 to 933 firms in France over the same period. Furthermore, in the United Kingdom the number of labor-managed firms rose by almost 1,000% and employment by 133% between 1976 and 1981 (Estrin, 1985). In the United States, the most prominent examples of labor-managed firms are in the plywood industry in the Pacific Northwest where they have been in existence since 1921, and during the 1950s, they contributed as much as 25 percent of the industry's total output (Bonin, Jones, and Putterman, 1993). In China, the market-oriented economic reform has given much greater autonomy to state and collective enterprises' managers to make production, investment and marketing decisions. Meng and Perkins (1998) find that the state and the collective sectors behave more like labor-managed firms in that they try to maximize income per worker rather than profit, whereas private-sector firms are profit maximizers.

The pioneering work on a theoretical model of a labor-managed firm was done by Ward (1958).¹ Since then, many economists have modified or extended the Ward model, such as Stewart (1991, 1992), Okuguchi (1993), Futagami and Okamura (1996), Neary and Ulph (1997), Lambertini and Rossini (1998), Lambertini (2001), Ireland (2003), Okuguchi and Szidarovszky (2007), and Ohnishi (2011).

We examine five regimes: state-owned and capitalist firms, capitalist firms, state-owned and labor-managed firms, labor-managed firms, and capitalist and labor-managed firms. In each regime, a quantity-setting game constructed and solved. We then compare the equilibrium outcomes of the five regimes.

¹ See Ireland and Law (1982), Stephan (1982), Bonin and Putterman (1987), and Putterman (2008) for excellent surveys of labor-managed firms.

The Basic Model

We consider a quantity-setting model with a homogeneous product. There is no possibility of entry or exit. The inverse demand function is given by

$$p = 300 - 2Q, \quad (1)$$

where p is price per unit and Q is the total output. The cost function is given by $c = 0.5q^2 - f$. We assume that $f = 200$. The profit function is given by

$$\pi = (300 - 2Q)q - 0.5q^2 - 200. \quad (2)$$

The capitalist firm chooses q so as to maximize (2).

Social welfare is given by

$$W = CS + PS, \quad (3)$$

where $CS = Q^2$ represents consumer surplus and PS producer surplus. The objective of the state-owned firm is to maximize (3).

Furthermore, profit per worker is given by

$$\phi = \frac{(300 - 2Q)q - 0.5q^2 - 200}{l}, \quad (4)$$

where l represents the quantity of labor used. We consider the following production function:

$$q = l^{1/2}. \quad (5)$$

From (4) and (5), we have

$$\phi = \frac{(300 - 2Q)q - 0.5q^2 - 200}{q^2}. \quad (6)$$

The objective of the labor-managed firm is to maximize (6). We consider the following five duopoly regimes: state-owned and capitalist firms, capitalist firms,

state-owned and labor-managed firms, labor-managed firms, and capitalist and labor-managed firms.

Results of the five Regimes

In this section, we present the equilibrium outcomes for each of the five market regimes.

State-owned and capitalist firms (SC)

In this subsection, we consider mixed duopoly competition with a state-owned firm and a capitalist firm. The state-owned and capitalist firms simultaneously and independently choose outputs. We present the Cournot equilibrium values of outputs, the price, profits, consumer surplus, producer surplus, and social welfare, obtained by maximizing (2) and (3) simultaneously. In the remainder of this paper, the superscripts denote the market regimes. In addition, the subscripts S and C denote the state-owned and capitalist firms, respectively.

$$\begin{aligned} q_s^{SC} &\approx 81.818, & q_c^{SC} &\approx 27.273, & p^{SC} &\approx 81.818, \\ \pi_s^{SC} &\approx 3,147.107, & \pi_c^{SC} &\approx 1,659.504, \\ CS^{SC} &\approx 11,900.826, & PS^{SC} &\approx 4,806.612, \\ W^{SC} &\approx 16,707.438. \end{aligned}$$

Note that the output and profit of the state-owned firm exceed those of the capitalist firm. Also note that consumer surplus exceeds producer surplus.

Capitalist firms (C)

In the preceding subsection, the state-owned firm chooses output to maximize social welfare (3), and in this subsection, it is privatized and therefore maximizes its own profit (2). Two capitalist firms simultaneously and independently choose outputs. The Cournot equilibrium values can be obtained as follows:

$$\begin{aligned} q_c^C &\approx 42.857, & p^C &\approx 128.571, \\ \pi_c^C &\approx 4,391.837, \\ CS^C &\approx 7,346.939, & PS^C &= 8,783.673, \\ W^C &\approx 16,130.612. \end{aligned}$$

It is seen that producer surplus exceeds consumer surplus.

State-owned and labor-managed firms (SL)

This subsection is mixed duopoly competition with a state-owned firm and a labor-managed firm. We present the Cournot equilibrium values of outputs, the price, profits, profit per worker, consumer surplus, producer surplus, and social welfare, obtained by maximizing (3) and (6) simultaneously. The subscript L denotes the labor-managed firm.

$$\begin{aligned} q_s^{SL} &\approx 97.462, & q_L^{SL} &\approx 3.807, & p^{SL} &\approx 97.462, \\ \pi_s^{SL} &\approx 4,549.435, & \pi_L^{SL} &\approx 163.771, & \phi_L^{SL} &\approx 28.888, \\ CS^{SL} &\approx 10,255.395, & PS^{SL} &\approx 4,713.206, \\ W^{SL} &\approx 14,968.602. \end{aligned}$$

Note that the output and profit of the state-owned firm are far and away higher than those of the labor-managed firm. Also note that consumer surplus exceeds producer surplus.

Labor-managed firms (L)

In the preceding subsection, the state-owned firm chooses output to maximize (3), and in this subsection, it becomes a labor-managed firm and therefore maximizes (6). Two capitalist firms simultaneously and independently choose outputs. The Cournot equilibrium values can be obtained as follows:

$$\begin{aligned} q_L^L &\approx 1.345, & p^L &\approx 294.618, \\ \pi_L^L &\approx 195.475, & \phi_L^L &\approx 107.991, \\ CS^L &\approx 7.240, & PS^L &\approx 390.949, \\ W^L &\approx 398.190. \end{aligned}$$

Note that each labor-managed firm's output, consumer surplus and social welfare are extremely low.

Capitalist and labor-managed firms (CL)

This subsection is mixed duopoly competition with a capitalist firm and a labor-managed firm. The Cournot equilibrium values of outputs, the price, profits, profit per worker, consumer surplus, producer surplus, and social welfare can be calculated as follows:

$$\begin{aligned}
 q_C^{CL} &\approx 59.120, & q_L^{CL} &\approx 2.201, & p^{CL} &\approx 177.359, \\
 \pi_C^{CL} &\approx 8,537.854, & \pi_L^{CL} &\approx 187.892, & \phi_L^{CL} &\approx 38.796, \\
 CS^{CL} &\approx 3,760.194, & PS^{CL} &\approx 8,725.746, \\
 W^{CL} &\approx 12,485.940.
 \end{aligned}$$

Note that the output and profit of the capitalist firm are far and away higher than those of the labor-managed firm.

Comparisons

In this section, we compare the equilibrium outcomes of the five market regimes. The main result of this study is described by the following proposition.

Proposition 1:

In the equilibrium outcomes of the five duopoly regimes,

- (i) $Q^L < Q^{CL} < Q^C < Q^{SL} < Q^{SC}$,
- (ii) $p^{SC} < p^{SL} < p^C < p^{CL} < p^L$,
- (iii) $CS^L < CS^{CL} < CS^C < CS^{SL} < CS^{SC}$,
- (iv) $PS^L < PS^{SL} < PS^{SC} < PS^{CL} < PS^C$, and
- (v) $W^L < W^{CL} < W^{SL} < W^C < W^{SC}$.

This result is particularly surprising, because the behavior of the labor-managed firm increases price and decreases consumer surplus, producer surplus, and social welfare. Meng and Perkins (1998) find that in China, the state and the collective sectors behave like labor-managed firms in their wage determination. Proposition 1 indicates that the behavior of the labor-managed firm is bad for social welfare.

Conclusion

We have examined five duopoly regimes: state-owned and capitalist firms, capitalist firms, state-owned and labor-managed firms, labor-managed firms, and capitalist and labor-managed firms. We have compared the equilibrium outcomes of the five market regimes. We have shown that the behavior of the labor-managed firm increases price and decreases consumer surplus, producer surplus, and social welfare.

We have not considered the possibility of entry. It is thought that if there is the possibility of entry, then the charging of high prices by labor-managed firms

encourages market entry by other firms, and as a result social welfare is improved. However, it can be said that the behavior of the labor-managed firm is bad for social welfare in markets which there are barriers to entry such as licenses and legal restrictions on how many incumbents can be in the market.

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