Delegations In The Presence Of Foreign Competition

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Abstracts - Previous research examining mixed duopoly shows that the use of an incentive contract for the public firm increases welfare and that privatization reduces welfare. This paper is built from Barros (1995) model by investigating and deriving the optimal incentive contracts when the public domestic firm competes not with domestic private firm but instead with a private foreign firm. We show that by giving the public manager an incentive contract based on linear combination of welfare and profit, welfare increases. Indeed, for less weight on profit given that the private firm is foreign instead of domestic, the optimal delegation contract is actually lower than that in the traditional duopoly (Barros 1995). On the other hand, the effect of privatization in this case is more complex, it depends on marginal cost.

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I. Introduction

The mixed oligopolies literature has been used to examine the welfare consequences of strategic trade policies, privatization, open-door policies, and international acquisitions and location decisions (DeFraja and Delbono, 1989; Fjell and Pal, 1996; Pal and White, 1998; Matsushima and Matsumura, 2003; Dadpay and Heywood, 2006). A few previous studies integrate incentive contracts in mixed oligopoly and they deserve reconsideration. Barros (1995) examined a duopoly with a public firm and one private domestic firm. The public firm maximizes an incentive contract combining profit and sales although the results are unchanged if instead it maximizes a combination of profit and welfare. He draws two conclusions: the use of an incentive contract increases welfare and privatization of the public firm decreases welfare. We reproduce these conclusions for the duopoly by considering the public firm competes with a foreign private firm instead of domestic firm. We found out that incentive contract increases welfare even when the public firm competes with a foreign firm instead of domestic firm. More importantly, the optimal incentive contract (α) is lower than the one when the public firm competes with a domestic private firm. On the other hand, the effect of privatization on welfare is more complicated in this case than in the traditional mixed duopoly model (DeFraja and Delbono 1989). The effect of privatization depends on the marginal cost (k). This paper is motivated by the fact that in many actual cases,

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state-owned firms compete with foreign firms due to globalization and international integration. The next section describes the model and present equilibria. The third section compares social welfare with and without incentive contract for public firm managers; and privatization is also examined in this section. Section 4 draws conclusions.

II. Model and Equilibria

There exists one public firm indexed by 0 competing with one private foreign firm. Private owners maximize profit and public owners maximize welfare. Managers maximize the objective function as specified in their respective incentive contracts. All firms produce homogenous goods and share the quadratic cost function typically used in the literature $C(q) = F + .5kq^2$, where $k > 0$ is a constant. As we are ignoring entry issues, we set $F = 0$ without loss of generality.

Let q_0 be the output of the public firm and q_f be the output of the private foreign firm. A linear inverse demand curve, $P = a - q_0 - q_f$, gives consumer surplus as $CS = 1/2(q0 + qf)^2$.

The private foreign firm's profit is

$$\pi_f = q_f(a - q_0 - q_f) - 0.5\,kq_f^2$$

$$(1)$$

The public firm's profit is

$$\pi_0 = q_0(a - q_0 - q_f) - 0.5\,kq_0^2$$

$$(2)$$

Social welfare, the sum of consumer surplus and producer surplus, is the public owner's (the government's) objective function:

$$W = CS + \pi_0$$

$$(3)$$

The public owner offers its manager an incentive contract that is linear combination of welfare and the public firm's profit:

$$INC_0 = \alpha_0 W + (1 - \alpha_0)\pi_0$$

$$(4)$$

There are a total of three cases: (a) public firm maximizes welfare and private foreign firm maximizes its profit; (b) the public firm provides its manager with an incentive contract; (c) the public firm maximizes its profit

instead of welfare. Thus in each comparison we identify the change in social welfare that results from the public incentive contract.

The equilibrium for case a and c, without any strategic contracts, have only one stage; while for the remaining case (b), the structures of the games have two stages. The public owner and private firm owner play a game over the incentive proportions α_0 in stage one and the public and private firms play a Cournot game in quantity in stage two. Backward induction yields the subgame perfect Nash equilibrium in each case.

Equilibrium for Case a:

The optimal output for the public firm and foreign private firm are presented respectively:

$$q_0^* = \frac{a}{1+k} \tag{5}$$

$$q_f^* = ka/(2 + 3k + k^2) \tag{6}$$

The optimal welfare resulting from this case is presented as follows:

$$W^* = \frac{(k^3 + 6k^2 + 8k + 4)a^2}{2(2 + 3k + k^2)^2} \tag{7}$$

Equilibrium for Case b:

The equilibrium when only the public firm faces an incentive contract yields the following:

$$\alpha_f^* = \frac{(k+3)}{2k+3} \tag{8}$$

$$q_{0inc0}^* = \frac{3a}{4k+3} \tag{9}$$

$$q_{finc0}^* = \frac{2ka}{4k+3} \tag{10}$$

The optimal welfare resulting from case b is presented in equation (11):

$$W_{inc0}^* = a^2(k+3)/(4k+3) \tag{11}$$

Thus, in the next section, comparing (7) and (11) yields the welfare difference associated with the public incentive contract.

Case c: Privatization

In this case, the public firm maximizes its profit instead of social welfare. The equilibrium yields:

$$q_{fpr}^* = \frac{a(1+k)}{(3+2k)} \tag{12}$$

$$q_{0pr}^* = \frac{a}{(3+2k)} \tag{13}$$

$$W_{pr}^* = \frac{a^2(6+5k+k^2)}{2(3+2k)^2} \tag{14}$$

III. COMPARISON

This section draws comparisons across the equilibria derived above.

1. The effect of incentive contract on social welfare:

First, we compare *case (a)* with *case(b)*. The government is able to set an objective function for the public firm other than simply maximizing welfare. This ability actually results in a higher eventual welfare. The fundamental proposition follows from comparing a public firm that maximizes welfare with one that maximizes incentive contract.

PROPOSITION 1: In a mixed duopoly in which public firm competes with a foreign profit maximizing firm, the public firm can always improve welfare by using an incentive contract.

PROOF: Subtracting (7) from (11) respectively yields:

$$W^* - W_{inc0}^* = -\frac{a^2k^2(5k^2 + 4k + 1. + k^3)}{(2 + 3k + k^2)^2(4k+3)} < 0$$

Next, we compare the optimal extent of incentive contract when the public firm competes with foreign firm with the one when the public firm competes with a domestic private firm. We found out that the less the weight or the emphasis on profit given that the private firm is foreign and not domestic, the optimal extent of delegation actually exceeds that of the case of Barros (1995) only when the marginal cost is lower than value one.

PROPOSITION 2: When a public firm competes with a foreign firm, the optimal extent of delegation exceeds that of the case when a public firm competes with a domestic firm but only when the marginal cost is lower than value one.
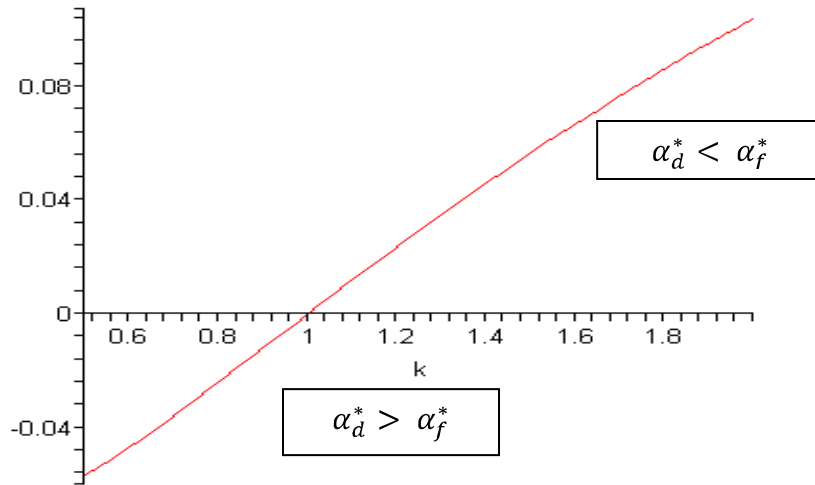
PROOF:

The optimal extend of delegation for the traditional mixed duopoly is as follows (Barros 1995):

$$\alpha_d^* = \frac{(k^2 + 2k + 1)}{(k^2 + 3k + 1)} \tag{15}$$

Subtracting (9) from (16) yields:

$$\alpha_d^* - \alpha_f^* = \frac{k(k^2 + k - 2)}{(k^2 + 3k + 1)(2k+3)} = 0 \; when \; k = 1$$

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Figure 1 : Shows the change of the optimal extent of delegation resulting from the cases when the public firm competes with a foreign firm and when it competes with a domestic private firm.

The figure above shows that:

- $k<1$, $\alpha_d^* < \alpha_f^*$
- $k=1$, $\alpha_d^* = \alpha_f^*$;
- $k>1$, $\alpha_d^* > \alpha_f^*$.

2. The effect of privatization on welfare:

Next, we determine the effect of privatization on welfare when a public firm competes with a foreign private firm. I found out that when the public firm competes with a foreign firm instead domestic one, the effect of privatization on welfare in undetermined, it depends on the marginal cost; which is in contrast with the traditional mixed duopoly in which DeFraja and Delbono (1989) showed that privatization increases welfare.

PROPOSITION 3: In mixed duopoly in which the public firm competes with a foreign private firm, privatization may increase social welfare but only if the marginal cost is sufficiently high; otherwise, if the marginal cost is low (less than k*) avoiding privatization is the optimal.

PROOF:

Subtracting equation (7) from (14) yields:

$$W_{pr}^* - W_0^* = \frac{a^2(-12 - 28k - 24k^2 + 13k^4 + 7k^5 + k^6)}{2(2k+3)^2(2+3k+k^2)^2}$$

Figure 2 : shows the effect of privatization on welfare. As this figure demonstrates, the change in welfare can be negative, zero and positive, depending on values of k
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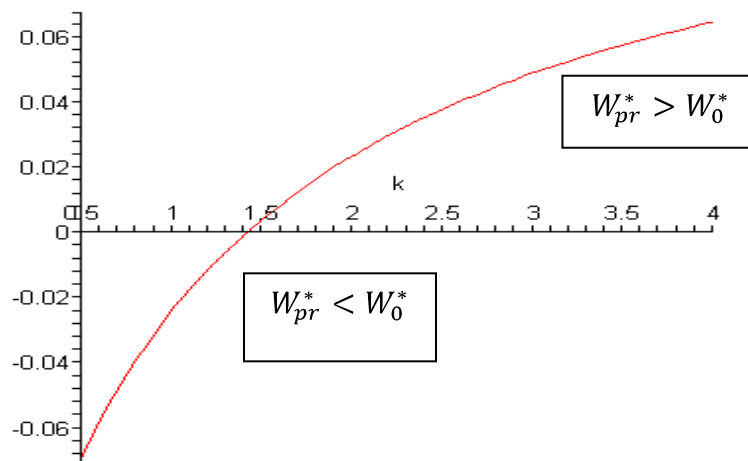
We conclude that, at higher k, it is optimal for the public firm to maximize profit instead of social welfare.

3. Privatization versus delegation:

In this section, we compare the optimal welfare when a public firm maximizes its profit with the one when it provides its manager an incentive contract.
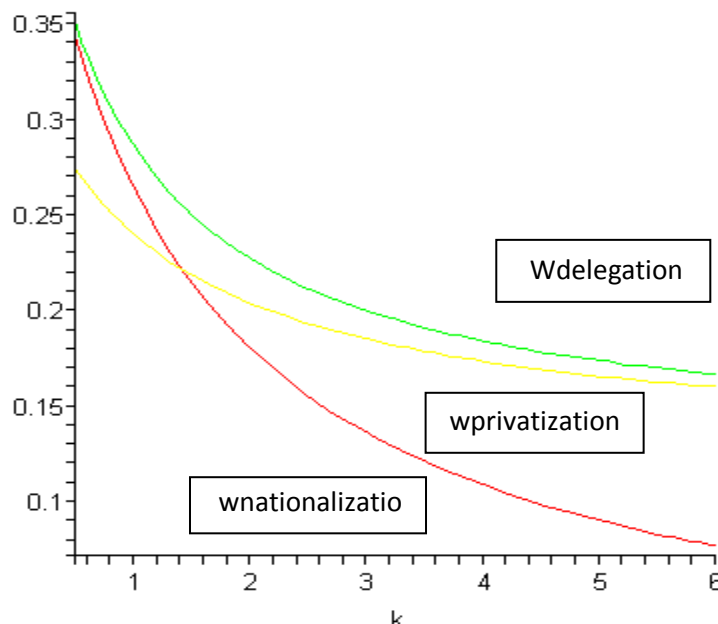
PROPOSITION 4: *In Mixed duopoly in which a public firm competes with a foreign private firm, privatization decreases welfare and delegation improves it.*

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Figure 4 : Represents the three optimal welfares resulting from the three cases presented above

Green curve refers to w_{inc0}^*, the red curve is the w_0^* and the yellow curve represents w_{pri}^*.

We conclude that the optimal welfare with incentive contract is superior to both privatization and nationalization.

IV.   CONCLUSION

Previous work from duopoly examining public managerial incentive contracts reached unambiguous conclusions. Such contracts always improve welfare and privatization decreases welfare. This paper investigates the optimal extent of delegation when a public firm competes with a foreign private firm instead of domestic private firm. A series of important conclusions emerge. First, when only the public firm has the possibility of an incentive contract, the contract continues to increase welfare. Second, the extent of optimal delegation when a public firm competes with a domestic private firm exceeds that one resulting from the case when a public firm competes with a foreign private firm instead. Third, the effect of privatization on social welfare depends on the specifics of the market structure and the cost function.

PROOF:

Subtracting equations (14) from (11) yields:

$$W_{inc0}^* - W_{pri}^* = \frac{(k^2 + 6k + 9)a^2}{(4k + 3)(2k + 3)^2} > 0$$

V.   ACKNOWLEDGEMENTS

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