Policy Consideration on Privatization in a Mixed Market

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Abstract

This paper considers a mixed market where the public firm competes with private firm and examines the welfare effect of the industrial policy reform in the process of privatization. In particular, focusing on the cost efficiency gap between two different organizations, we investigate how the fundamental efficiency trade-off in privatization policy will be changed under competition policy with or without foreign competitor. The analysis finds out that the sufficient cost efficiency gap improves welfare in post-privatization when proper competition policy is accompanied. Otherwise, industrial policy reform might not give a welfare-improving result. Several important economic and industrial policy implications on the issues of liberalization are also discussed.

keywords: industrial policy, foreign competitor, mixed market; privatization;
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1. Introduction

Public firm is one of the economic instruments utilized by the government to correct market failures and to reach an improvement in social welfare. Theoretically, the possibility of operating a publicly owned enterprise to achieve the public goals arises under the condition of imperfect competition in the industries or public goods provision. However, the poor economic and financial performances of many public firms and the cases of successful privatization in some developed countries have been used as arguments for the industrial policies of privatization and competition.[1]

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[1] Laffont and Tirole (1993), Viscusi, et al. (1995), Hart, et al. (1997), and Laffont and Martimort (2002) discussed the important regulatory policy issues of public firms. Wang and Xu (2007) extended their analysis into a three parties game among firms, government, and consumers.

In the economics literature there is conventional wisdom on the costs of state ownership. As provided in Lee and Hwang (2003), for example, the managers of a public firm may mismanage its assets in such a way that they cause (managerial) production inefficiencies. First, they may invest too little or too much, since they are not given the stocks options that would encourage them to take a long-term perspective: the absence of capital market monitoring. Thus, once investments are sunk, the government may use these investments for purposes they were not intended to serve. Second, a public firm is not subject to takeovers and its managers are therefore less concerned about losing their jobs: the absence of labor market monitoring. Third, a public firm is not subject to the discipline of the bankruptcy process because the government will always bail it out in case of difficulty: the soft budget constraint problem. Fourth, governments are subject to the pressure of interest groups to direct the behavior of a public firm so as to enhance the welfare of these groups: the principal-agent problem. The managers of public firms act to maximize political support and extend their job tenure. Thus, in order to make their work environment more pleasant, the managers may choose to minimize labor strife by providing higher wages. All these factors reduce managerial incentives taking care of efficient production, so that a public firm with greater managerial discretion acts more inefficiently than a private firm.

There have been also many empirical studies investigating the relative performance of public and private firms operating in a comparative environment. Parris, et al (1987) contains a complete collection of data illustrating the relative importance of private and public firms in various markets in some western European industries. Vickers and Yarrow (1988, 1991) and Megginson and Netter (2001) used empirical research to assess the effects of privatization as an industrial policy. They concluded that enterprises operating under public ownership will be less efficient than their private sector counterparts.

However, although other developing countries have followed the experience of policy reform in developed countries and moved on the path of liberalization policy such as privatization and competition, and although several governments have shown a tendency to require public firms to act as private firms and to try to maximize profit, there are still several instances of mixed market, which is characterized by the coexistence of profit maximizing and welfare maximizing firms. In fact, nowadays, the form of mixed economies where public firms interact with private firms can be observed quite often, especially in Asian, European, Latin American, and former communist transitional economies such as China and Russia. This indicates that the importance of the public firm in the mixed industry in every economy remains obvious despite a recent trend towards privatization.

One example is the television market, in which profit maximizing producers compete with the state network, which is financed by taxation and required to pursue some public goals of educational and cultural programs. Other example is the parcel division of the public post offices, which competes with private parcel delivery service in every country. For instance, even USA, there are examples of mixed market like package and overnight-delivery industries. Furthermore, competitions between private and public firms in network industries such as banking services, railways, electricity, natural gas, and telecommunications are also popular in the recent industrial economies except USA. In addition, private competitors in mixed market are not always domestic. For example, the government of New Zealand decided to found a state-owned public banking firm competing against private foreign firms. When the government of Brazil bargained with Roche, it used a public medical institution as a potential competitor in the medical market. Many mixed industries with foreign firms in the former communist countries including China and Russia are also observed in recent years.

Then, we can raise several important questions. For example, what are the differences in the ownership structures and their performances? What are the interactions between public ownership and private ownership? How is the performance of each ownership structure under the competition? Specifically, what conditions does privatization promote the welfare? Therefore, it is needed to examine the welfare effect of privatization policy under the competition, especially with or without foreign firms, and find the relevant economic and industrial policy implications to improve social welfare in post-privatization.

In this paper, we review the liberalization policy of privatization in accordance with the competition policy, by focusing on the cost efficiency gap between private firm and public firm. We confine our analysis into the imperfect competition market, natural monopoly or duopoly market, where full competition policy is neither desirable nor attainable. In this case, it is needed to balance the industrial policy reform between privatization policy and limited competition policy. We examine the welfare effect of these industrial policies in a mixed duopoly market and point out the conventional efficiency trade-off in the policy implementation. In particular, we first model the mixed market in which public firm competes with domestic firms in the process of privatization and investigate how the welfare consequences in the efficiency trade-off will be changed because of the economic effect of competition policy. We then extend the analysis into the case that the government faces a foreign competitor, investigate the efficiency of the industrial policy, and compare the welfare consequences with domestic competitor. The analysis finds out that the sufficient cost efficiency gap improves welfare in post-privatization when proper competition policy is accompanied.

Otherwise, industrial policy reform might not give a welfare-improving result. Several important economic and industrial policy implications on the issues of liberalization policy including privatization and competition are also discussed. The final section gives concluding remarks.

2. The Basic Model of Monopoly Market

Consider a monopoly firm that faces an inverse demand function of $P(Q) = a - bQ$ and constant production cost of c. Then, the profit function for the monopolist and the consumer surplus are given by, respectively,

$$\pi = P(Q)Q - cQ, \tag{1}$$

$$CS = \int_0^Q P(v)dv - P(Q)Q. \tag{2}$$

Hence, the social welfare, which is defined as the simple sum of consumers' surplus and firm's profits, is given by

$$W = \int_0^Q P(v)dv - cQ. \tag{3}$$

We assume that the government (or the public firm as an agency) maximizes social welfare while the private firm focuses on profits in the following analysis. This implies that the monopolist will maximize social welfare in (3) when it takes the form of public enterprise in pre-privatization, while it will maximize its profit in (1) in post-privatization. That is, the welfare-maximizing output is determined at $P(Q) = c$ or $Q_0 = \dfrac{a-c}{b}$ with public firm, and profit-maximizing output is determined at determined at $P(Q) - bQ = c$ or $Q_1 = \dfrac{a-c}{2b}$ with privatized firm.

For the interior solutions and reasonable comparisons, we assume the cost difference between public and private firms as follows:

Assumption 1: $a - c_1 \geq a - c_0 \geq c_0 - c_1$,

where the cost of public firm is defined as c_0 and that of private firm is defined as c_1.

Then, we have $c_0 \geq c_1$. This assumption on cost efficiency gap between private firm and public firm implies that in the agency relationships the principal and the agent will incur positive monitoring costs, and in addition there will some divergence between the agent's decisions and those decisions, which would maximize the welfare of the

principal. That is, the public firm might incur self-interested and inefficient expenditures, such as pure waste in the form of goldplating, (accounting and managerial) cross-subsidies to the other businesses, excessive employee compensation, etc. Such `wasteful' expenditure can arise from political reasons, lack of manager's incentives to economize, or principal-agent problems in general.[2]

Therefore, the welfare effect of privatization depends on the efficiency gap between the public firm and private firm. If it is insignificant, however, the privatization policy under monopolistic market always decreases the welfare after all. Specifically, from (3), the welfare level of each case is as follows:

$$W_0 = \int_0^{Q_0} P(v)dv - c_0 Q_0 = \frac{(a-c_0)^2}{2b} \tag{4}$$

$$W_1 = \int_0^{Q_1} P(v)dv - c_1 Q_1 = \frac{(a-c_1)^2}{4b} \tag{5}$$

where W_0 denotes the welfare with public firm and W_1 denotes the welfare with privatized firm. Therefore, the welfare in post-privatization increases only if $2(a-c_0)^2 \leq (a-c_1)^2$ or $0.4142(a-c_0) \leq c_0 - c_1$. Otherwise, the welfare under privatization policy decreases.

On the other hand, if we consider the case where foreigners have the share of the privatized firm's profit with the portion of (1-s), then the welfare with privatized firm will be $W_1 - \pi_1 = (1-s)\frac{(a-c_1)^2}{4b}$, which is smaller than the welfare with privatized firm in (5). However, the following Proposition will still hold.

Proposition 1. (Fundamental Trade-Off in Privatization Policy) The welfare in post-privatization increases only if the cost efficiency gap between the public firm and private firm is sufficiently large.

Proposition 1 shows that the welfare change under privatization policy depends on the relative size of the cost efficiency gap between the public firm and private firm.[3]

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[2] In the regulatory economics literature, the managerial inefficiency is defined as ``waste'' and ``abuse'' in Sappington (1980), Laffont and Tirole (1993), and Laffont and Martimort (2002).

[3] De Fraja and Delbono (1989) considered an increasing cost function and shown that there is a trade-off in privatization and nationalization. Furthermore, De Fraja (1991) considered the X-inefficiency in the less-production case and also shown that there is a trade-off in the process of privatization.

Notice that the welfare will always decrease if $c_0 = c_1$, where there is no cost efficiency gap between public firm and private firm. Therefore, there is a trade-off in privatization policy in monopoly market.

3. Duopoly Market Competition with Domestic Ownership

In recent years, in developing areas, such as Asian, European, and Latin American countries, the government activated both privatization and competition policies at the same time. This composes the mixed market where the public firm competes with private firms. We then analyze the industrial policy on the mixed market where a public firm competes with private firms.

For the purpose of comparison, we assume that both firms produce goods that are perfect substitutes and thus, they face a same market demand function of $P(Q) = a - bQ$ But, two firms have different, constant production cost of c_0 for public firm and c_1 for private firm. Then, the profit function and the welfare function are the same as in (1) and (3), with the modifications of $Q = q_i + q_e$ where q_i is incumbent output, q_0 if it is public firm or q_1 if it is privatized firm, and q_e is privately managed entrant firm. We also assume that the incumbent competes against the entrant, which has a constant production cost of c_1, with Cournot-type output competition.

3-1. Mixed Duopoly Market

We first consider the mixed duopoly case where the government employs a simple competition policy only and thus, the public firm (incumbent) maximizes the welfare in (3), while the private firm (entrant) maximizes its own profit. Then, the equilibrium outputs are $q_{0c} = \dfrac{(a - c_0) - (c_0 - c_1)}{b}$ and $q_{0e} = \dfrac{c_0 - c_1}{b}$. Then, total market output is $Q_{0c} = q_{0c} + q_{0e} = \dfrac{a - c_0}{b}$, which is the same as the nationalized monopoly output, Q_0.

That is, public firm still sets its price at its marginal cost, c_0. It represents that the

market price is the same with the nationalized monopoly case (public firm). However, the output level of incumbent will be reduced. This substitution effect of output change will cause the welfare change. Finally, the welfare level in competition policy is as follows:

$$W_{0c} = \int_0^{Q_{0c}} P(v)dv - c_0 q_{0c} - c_1 q_{0e} = \frac{(a-c_0)^2 + 2(c_0 - c_1)^2}{2b} \tag{6}$$

Notice that the welfare level in a mixed market with the competition policy is greater than that of nationalized public firm, i.e., $W_{0c} > W_0$. This indicates that the competition policy will increase the welfare because the output of inefficient incumbent will be replaced with that of efficient entrant.

However, if we consider the case where foreigners have the share of the private domestic firm's profit or/and privatized domestic firm's profit, the result will depend on the foreigner's portion of share on domestic firms.

3-2. Pure Duopoly Market

We next consider the pure duopoly case where the government employs both competition and privatization policies together, where the privatized firm (incumbent) and private firm (entrant) maximize its own profit, respectively. Then, the equilibrium outputs are $q_{1c} = q_{1e} = \frac{(a-c_1)}{3b}$ and total market output is $Q_{1c} = q_{1c} + q_{1e} = \frac{2(a-c_1)}{3b}$.

Finally, the welfare level in the combined policy of competition and privatization is as follows:

$$W_{1c} = \int_0^{Q_{1c}} P(v)dv - c_1 q_{1c} - c_1 q_{1e} = \frac{4(a-c_1)^2}{9b} \tag{7}$$

A few remarks are in order. First, as usual, the output level of incumbent in a pure duopoly is smaller than that in the privatized monopoly case, but total output level in a pure duopoly is greater than that in the privatized monopoly, Q_1. It represents that the market price will be lower in the pure duopoly case. Therefore, the welfare level in a pure duopoly is greater than that of privatized monopoly, i.e., $W_{1c} > W_1$. Again, this implies that the competition policy will increase the welfare because of competitive pressure of the entrant.

Second, total output level in a pure duopoly is greater than that in the nationalized monopoly (public firm) when $a - c_0 \leq 2(c_0 - c_1)$. Thus, if the cost efficiency gap is

large, the pure duopoly will increase total output. Notice that this is a sufficient condition for privatization policy to increase the welfare. Therefore, the welfare comparison between pure duopoly and nationalized monopoly depends on the relative size of the cost efficiency gap between the public firm and private firm. In particular, the welfare of pure duopoly is greater than that of nationalized monopoly only if

$9(a-c_0)^2 \leq 8(a-c_1)^2$. Otherwise, the combined policy of privatization and competition

will worsen the welfare.

Finally, total output level in a pure duopoly is greater than that in a mixed duopoly

under simple competition policy when $a-c_0 \leq 2(c_0-c_1)$. Thus, if the cost efficiency

gap is large, the pure duopoly will increase total output. In that case, the output level of efficient private incumbent in a pure duopoly is greater than that of inefficient public incumbent in a mixed duopoly. Notice that this is also a sufficient condition for privatization policy to increase the welfare. Therefore, the welfare comparison between pure duopoly and mixed duopoly also depends on the relative size of the cost efficiency gap between the public firm and private firm. In particular, the welfare of pure duopoly is greater than that of mixed duopoly only if

$(c_0-c_1)^2 \leq \dfrac{8(a-c_1)^2 - 9(a-c_0)^2}{18}$. Otherwise, combined with competition policy,

privatization policy will worsen the welfare.

In sum, we can summarize the findings. First, if $9(a-c_0)^2 > 8(a-c_1)^2$ or

$c_0 - c_1 \leq 0.0607(a-c_0)$, we have the following orders in terms of welfare:

$W_{0c} > W_0 > W_{1c} > W_1$. It indicates that if the cost efficiency gap between the public firm

and private firm is small, simple competition policy will be the first-best than any other policies which accompanies privatization policy. That is, privatization policy is

harmful to the society. Notice that this result includes the case of $c_0 = c_1$, where there

is no efficiency gap between public firm and private firm.

Second, if $9(a-c_0)^2 < 8(a-c_1)^2$, i.e., the cost efficiency gap between the public

firm and private firm is not so small, W_{1c} is the greatest welfare level among four

alternatives if $(c_0-c_1)^2 \leq \dfrac{8(a-c_1)^2 - 9(a-c_0)^2}{18}$, while W_{0c} is otherwise. Therefore, the

first-best policy will be simple competition policy or combined policy of competition and privatization, depending on the relative cost efficiency gap between the public firm and private firm.[4]

Proposition 2. The welfare in post-competition policy will be the highest if the cost efficiency gap between the public firm and private firm is relatively small. However, if the cost efficiency gap between the public firm and private firm is relatively large, putting privatization policy into competition policy will increase the welfare.

Proposition 2 in a duopoly market gives the same economics insights of Proposition 1 in a monopoly market, that is, privatization is socially beneficial only when the cost efficiency gap between two firms is large. Therefore, privatization policy will not always give a welfare-improving result. The only benefit of a duopoly market is that there exists the welfare-increasing effect of competition policy. Therefore, the government should improve the competitiveness of the market in privatizing the public firms. For improving the competitiveness of the market, it is important to consider not only the degree of competition in the market, but also the characteristics of the market. For example, if the market is characterized by its nature of natural monopoly, because of sunk and fixed cost, it is not beneficial to introduce the entrants into the market in many cases.

4. Duopoly Market Competition with Foreign Ownership

We now extend the analysis into the competition situation with a foreign firm.[5] Specifically, we consider the case where the government can choose privatization policy on nationalized public firm and/or competition policy to invite new foreign entrant into the domestic monopoly market.

Again, for the interior solutions and reasonable comparisons, we assume the linear demand and constant production cost, and cost difference between domestic firm and foreign private firm is as follows:

Assumption 2: $a - c_2 \geq a - c_1$

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[4] However, if the competition policy is not available because of political or technological reasons, the second-best policy should be determined based on Proposition 1.

[5] Several research including Pal and White (1998) and Matsumura (2003) allowed foreign firms into the analysis in the economics literature.

where the cost of foreign private firm is defined as c_2. Then, we have $c_1 \geq c_2$. This assumption on cost efficiency gap between domestic and foreign private firms implies that the foreign firm might have technological and managerial advantages in production. This suggests that combined policy with competition with a foreign firm and privatization on the public firm will yield a spill-over effect in the market through leaning on technological and managerial skill, so called neighboring effect in learning from its neighbor. Finally, the firms compete with the Cournot-type pattern.

4-1. Mixed Duopoly Market with a Foreign Firm

We first consider the case of mixed duopoly market where the government employs a simple competition policy with foreign firm. Then, the public firm maximizes the following welfare:

$$W_{0c}{}^f = \int_0^{Q_{0c}{}^f} P(v)dv - c_0 q_{0c}{}^f - c_2 q_{0e}{}^f - (P(Q_{0c}{}^f)q_{0e}{}^f - c_2 q_{0e}{}^f) \qquad .$$

$$= \int_0^{Q_{0c}{}^f} P(v)dv - c_0 q_{0c}{}^f - P(Q_{0c}{}^f)q_{0e}{}^f \qquad (7)$$

Notice that the profit of foreign firm, $P(Q_{0c}{}^f)q_{0e}{}^f - c_2 q_{0e}{}^f$, should not be included in the domestic welfare, which is the objective function of the public firm. Then, the equilibrium outputs and total output are $q_{0c}{}^f = \dfrac{(a - c_0) - (c_0 - c_2)}{b}$, $q_{0e}{}^f = \dfrac{c_0 - c_2}{b}$, and $Q_{0c}{}^f = \dfrac{a - c_0}{b}$. Therefore, compared with the nationalized monopoly, the market price is the same, but the output level of public firm will be more reduced. Finally, the welfare level in competition policy with foreign firm is $W_{0c}{}^f = \dfrac{(a - c_0)^2}{2b}$. Notice that the welfare level in a mixed duopoly market with foreign firm is the same with that of nationalized public firm, i.e., $W_{0c}{}^f = W_0$, and thus it is smaller than the mixed duopoly market with domestic firm. This is so because the output of inefficient incumbent will be replaced with that of efficient foreign entrant, which is not considered into the welfare. This implies that the competition policy with foreign firm will not be necessary to increase the welfare.

However, if we consider the case where domestic people have the share of the foreign firm's profit, the result will depend on the foreigner's portion of share on the foreign firm.

4-2. Pure Duopoly Market with a Foreign Firm

We next consider the case of pure duopoly market where the government employs both competition policy with a foreign firm and privatization policy on public firm together. Then, both privatized domestic firm and private foreign firm maximize its own profit, respectively. Then, under the assumption of equal production cost in post-privatization, the equilibrium outputs are $q_{1c}{}^f = q_{1e}{}^f = \dfrac{(a - c_2)}{3b}$ and total market output is $Q_{1c}{}^f = \dfrac{2(a - c_2)}{3b}$. Finally, the welfare level in the combined policy of competition and privatization is as follows:

$$W_{1c}{}^f = \int_0^{Q_{1c}{}^f} P(v)dv - c_2 q_{1c}{}^f - c_2 q_{1e}{}^f - (P(Q_{1c}{}^f)q_{1e}{}^f - c_2 q_{1e}{}^f) \tag{8}$$

Thus, the welfare level in post-privatization and competition with foreign firm is $W_{1c}{}^f = \dfrac{3(a - c_2)^2}{9b}$.

A few remarks are in order. First, as usual, the welfare level in a combined policy is greater than that of privatized monopoly firm, i.e., $W_{1c}{}^f > W_1$ because of competition effect.

Second, the welfare comparison between pure duopoly and nationalized monopoly depends on the relative size of the cost efficiency gap between the public firm and private firm. Notice that the welfare level of nationalized monopoly is the same with that of mixed duopoly, i.e., $W_{0c}{}^f = W_0$. In particular, the welfare of pure duopoly is greater than that of mixed duopoly if $3(a - c_0)^2 \leq 2(a - c_2)^2$. Otherwise, the combined policy of privatization and competition with foreign firm will worsen the welfare. Therefore, the competition policy with foreign firm will increase the welfare only if the cost efficiency gap between public firm and private firm is sufficiently large.

In sum, we can summarize the findings as follows. First, if $3(a - c_0)^2 > 2(a - c_2)^2$, we have the following orders in terms of welfare: $W_{0c}{}^f = W_0 > W_{1c}{}^f > W_1$. It indicates that if the cost efficiency gap between the public firm and private foreign firm is not sufficiently large, neither privatization policy nor competition policy increase the

welfare. Notice that this result includes the case of $c_0 = c_2$, where there is no efficiency gap between public firm and foreign firm.

Second, if $3(a-c_0)^2 < 2(a-c_2)^2$, i.e., the cost efficiency gap between the public firm and private foreign firm is sufficiently high, $W_{1c}{}^f$ is the greatest welfare level among four alternatives. Therefore, the first-best policy will be combined policy of competition with foreign firm and privatization on the domestic public firm.

Proposition 3. Assume that the competitor is a private foreign firm. Then, neither competition policy nor privatization policy increase the welfare if the cost efficiency gap between the public firm and private foreign firm is small. However, if the cost efficiency gap is large, the welfare in post-combined policy of competition and privatization will be the highest.

Proposition 3 is different with Proposition 2 in that competition policy with foreign firm might not be socially beneficial if cost efficiency gap is small. That is, competition policy will not always give a welfare-improving result. Therefore, very careful attention on the industrial policy in the process of privatization and competition should be taken into consideration. In particular, under the competition with foreign firm, the government should improve the cost efficiency of the public firm before privatizing the public firms. For example, the incentive mechanism to reduce the X-inefficiency from the principle-agent relationship, such as moral hazard problem, could be beneficial to improve the cost efficiency of the public firm.

5. Discussions on Policy Implications

Since 1980s, industrial policy reform of privatization and competition in the transitional economy, from planned economy into market economy, is a remarkable historic event of institutional evolution. In particular, there is a stark contrast between the economic performance of the Russian-style and the Chinese-style industrial policies. That is, Chinese-style gradualism succeeded to the extent that the original governance remained, while the Russian-style radical reforms lead to governance failure. We have also observed that the governments in developing countries, such as African, Asian, European, and Latin American countries, have activated or have planned to activate liberalization policy of privatization and competition in mixed markets.

In principle, the most important policy aspect of privatization for the government is to induce the public firm to achieve cost efficiency by reducing its managerial inefficiency. This implies that the policy makers tend to believe that an inefficient production cost level of the privatized public firm would be decreasing, and finally, will be equal to the cost level of the independent private firm in post-privatization. Therefore, what we have learned from the above analysis is that the welfare implications of industrial policy reform depend primarily upon the relative cost efficiency between private firm and public firm.

However, in comparing the trade-off in privatization policy, there are many other important policy aspects that we have abstracted from for reasons of tractability and simplicity. We then present and discuss some industrial policy-relevant implications in the economics literature, which include the issues of competition pattern, industrial structure, agency problems and political incentives, and partial ownership.

5-1. Competition Patterns and Product Quality

We have confined our analysis into the simple duopoly market with homogeneous product. However, most industries produce a large number of similar but not identical products using the different ways of production. It is needed to examine the effect of the degree of product differentiation on the welfare change in post-privatization and competition. Matsushima and Matsumura (2003), for example, investigated a mixed market with differentiated products and shown that 'herd behavior' by private firms occur where private firms adopt very similar strategies within the market but those strategies are completely different from those of public firm.

In addition, the welfare consequences of a privatization policy depend on the competition patterns of between the firms. In particular, we can also consider the different competition patterns in the duopoly market, such as Bertrand competition or Stackelberg leadership competition. As shown in Vives (1990) in a product differentiated market, the symmetry between Cournot-type quantity competition and Bertrand-type price competition can be established with the duality argument. However, in general, the competition patterns of Cournot or Stackelberg depend on the strategic economic environments among firms. In the economics literature, therefore, many studies have considered the order of play in a game and compared the results of Cournot and Stackelberg.[6] De Fraja and Delbono (1989, 1990), for example, show that if the public firm is able to act as a leader to induce Stackelberg competition in a mixed market, it is possible to increase its social welfare. However, the sequential entry with

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[6] On this point, see De Fraja and Delbono (1989, 1990), and Vives (1999), among others.

or without entry regulation should be also examined. As far as concerned on entry regulation, the effect of fixed cost on entry decision will be important under the endogenous market structure.

Furthermore, as addressed by Hart et al. (1997) and Wang and Xu (2007), there might be a trade-off in efficiency between cost and quality, i.e., attempts to lower cost will jeopardize quality. In general, public firm has insufficient incentive to lower cost while private firm has an incentive in cost reduction. However, there might be a loss in product quality due to cost reduction under private ownership, which will be fully absorbed by the society. Therefore, a comparison between efficiency of public firm and private firm is in essence a cost and benefit analysis for various incentives in multi-dimensions.[7]

5-2. Vertical Structure and Network Industry

Most industries producing differentiated products are vertically concentrated, where the upstream firm vertically inter-related with the downstream firms. Then, from the different policy perspective on vertical structure, if the public firm is not only related with the upstream firms but also with downstream firms, the industrial policies on the market structure of networked industry and on the strategic behaviors of bottlenecked firm are also important. Lee (2006), for instance, have examined the welfare consequences of privatization in vertical structure and pointed out the importance of the degree of competition and open access policy in the welfare trade-off.

For example, it might be sometimes technologically and/or politically inefficient to divide the vertical market into two separating markets. That is, if high-technology can be applied to the integration between the different services through co-utilizing facilities and human resources, then it will be efficient to integrate two markets vertically since technological economies or/and dynamic investments can be realized. Furthermore, politically it might lead to large wasteful social costs to separate the historical public firm into different firms if the government can not lead the market. Therefore, on the matter of integration or separation, it is necessary to check if there are technological or political linkages between two markets and to consider how the regulatory agency is able to treat these problems without large social costs by using privatization policy on public firm. Therefore, Sappington and Stiglitz (1987) argue that privatization affects the transactions costs of government intervention in enterprise

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[7] As addressed in Hart et al. (1997), even thought privatization reduced cost, the deterioration of service quality and abuse of prisoners became common after the privatization in America.

decision-making. This is so because privatization does not entail the transfer of all decision-making authorities to the privatized firm.

As a matter of fact, the Korean government announced plans to privatize its electricity power utility (Korea Electric Power Corporation), which was a government-invested monopolist that supplied electric power in Korea. During 2001, the Korean electric power industry underwent major changes as its power generation unit was separated into six subsidiaries and the Korea Power Exchange was inaugurated. In addition, the power generation subsidiaries are supposed to be privatized and it is preparing separate power distribution units. But there still remain many debates between the government and employees. Therefore, it is expected that there are ongoing social costs in the privatization process of separation and competition.

Finally, when government activates privatization policy, there is a concern about market foreclosure in which the profit-maximizing, privatized integrated firm may have an incentive to discriminate the downstream competitors. Therefore, in the process of privatization policy in the vertically networked industry, the regulatory agency needs to construct an appropriate anti-competition regulation for the privatized firm. In reality, even post-privatization, the government keeps the regulatory power to control the strategic behavior of privatized firm by organizing independent regulatory institutions, such as OFTEL in UK and FTC in Korea.

5-3. Agency Problems and Political Incentives

In the analysis, we have assumed that the objective function of the public firm is defined as the social welfare in (3), and that of private firm as the profit in (1). This comes from the assumption that the public firm maximizes the objective of the government and the managers of private firm maximize the objective of the owners.

However, these assumptions on public firm and private firm should be reexamined from the viewpoint of agency relationship. For the case of public firm, there are two fundamental assumptions in such discussions. First, the objective of government is to maximize the social welfare, i.e., the assumption of benevolent government. Second, the government has complete information and absolute authority to control the public firm, i.e., the assumption of no agency problem.

However, as a matter of fact, there is a discrepancy between the reality and these assumptions. Especially, the objective of government should be based on the captured incentive under the political environments. Levy (1987) suggests that organizational inefficiency and waste may arise if managers of a public firm receive conflicting instructions, particularly if they may be exacerbated by a change of government following general election. He also pointed out that the notion that the government is

the principal and the public firm is the agent might be misleading since the government is not a single organization. That is, the government acts through a variety of ministers, legislators and civil servants, who are themselves agents of the general public. It indicates that their goals are rarely stated explicitly and trade offs among them are not agreed. Thus, different agents give the public firm conflicting parallel commands, i.e., multilevel principal-agent relationship.[8] For example, Cook and Fabella (2002) considered the model in which the state-owned enterprise maximizes an unspecified objective function, and examined the theoretical treatment of the welfare and political economy dimensions of the choice between public ownership and privatization.

On the other hand, due to incomplete information or costly monitoring and incomplete contract, the objective of public firm will differ from that of government. Then, the theoretical treatment of the ownership effects deduced from the property rights and principal-agent perspectives should be considered to examine the efficacy of the incentive system that is designed to maximize the efforts of the agents. De Fraja (1991), for example, used agency theory to model managerial effort and to analyze the X-inefficiency of the public firm.

Similarly, private firm confronts the same agency problem in the decision making process, even though it might be less serious than the agency problem in managing public firm. As a seminal paper, Jensen and Meckling (1976) investigated the nature of the agency costs to develop a theory of ownership structure in a private firm, and showed the Pareto optimality of their existence. Hence, based on the principal-agent theory, we need to incorporate the existence of information asymmetry to examine the non-profit-maximizing strategies of private firm.

In sum, the incentive mechanism design is more important than the choice of ownership structures, which is related with residual rights of control. Thus, we need to make a multidimensional comparison between the efficiency of public firm and private firm from the perspective of incentives. In particular, public firm ought to adopt more explicit competitive (performance-based) incentive mechanism in order to increase managerial efficiency, while private firm sould be induced to use implicit cooperative incentive mechanism in order to decrease managerial distortions.

5-4. Partial Ownership and Governance Structure

On the path of privatization, the government may be able to manage the activities of the privatized firm by controlling its portion of shares. In other words, there is a

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[8] For more discussion, see the articles in the editorial book by Jones (1982) and the summary in De Fraja (1991).

possibility that full privatization, where the government sells all its shares in a public enterprise, is not fulfilled at once. Thus, the government might determine the degree of privatization instead of the extreme full privatization.

Lee (2006), for example, pointed out the efficiency gap under the vertical network structure and showed that the welfare change in post-privatization depends on the efficiency gap. In the public economics literature, De Fraja and Delbono (1989) and De Fraja (1991) examined the efficiency of full privatization in an oligopoly market. In addition, Matsumura (1998) and Lee and Hwang (2003) considered the possibility of partial privatization in a mixed model and showed that it is optimal for the government to sell some but not all of its shares in public firm when there exist production-efficiency effects of partial privatization. Finally, Matsumura and Shimizu (2007) extended the analysis into the case of sequential privatization waves and examined its welfare consequences.

[Table 1] The degree of liberalization in EU electricity market

Full Liberalization (100%)	Partial Liberalization (60-90%)
Austria, Denmark, Finland, Germany, Ireland, Netherlands, Norway, Portugal, Spain, UK	Belgium, France, Greece, Italy, Luxembourg

As we have seen in [Table 1], these partial privatization processes are very popular in other countries. In the Korean electric power industry, for instance, its power generation unit was separated into six subsidiaries and the Korea Power Exchange was inaugurated, as mentioned in the previous discussion. In this privatization process, the power generation subsidiaries have been privatized successively and it is preparing separate power distribution units in a sooner year.

However, when we consider the case of foreigners' ownership on the domestic privatized firms, the welfare consequences might be complicated. As we examined, one simple way of analyzing this case is to incorporate the governance degree of partial ownership in the weighted welfare function in the analysis. But, as a matter of fact, the relative portion of share for ownership might not be real matter for the control of public firm. As we observed in the privatization process of the U.K. and New Zealand, a scheduled governmental privatization contracts such as "special share" can be used. Even if there were so, we might need to investigate the internal governance structure of the privatized firm, because the privatized firm might suffer from a conflict of interests between regulators and interest groups.

Therefore, the privatization should be reexamined on the base of "before," "in," and "after" to get the general conclusion on the government control rights over the

firm. To determine the relative mix between public firm and private firm, we must take account of the subtle interactions among the firms. In this case, the role of "Non-Profit Organization (NPO)," a mixed form of organization between public and private organizations, could be examined. In the U.S.A, for example, NPO plays a great part in the social economic life, including medicare and education services.

6. Concluding Remarks

This paper considered a mixed market with different production costs between two different organizations, and examined the welfare effect of the industrial policy reform in the process of privatization. The main result of the simple analysis is that the presence of relative cost efficiency gap between public firm and private firm may be the key factor to determine the improvement in the overall welfare of the industry. On the issue of privatization and competition with a foreign firm, the analysis highlights how it may be counter-productive in terms of welfare level, depending upon the relative cost efficiency gap. Far from privatization improving welfare and reducing waste expenditure, it may also yield the opposite results of a reduction in domestic production, which comes from substitution under the imperfect competition with foreign firms. Therefore, it is not necessarily the case that the improvement in the efficiency of public firm through industrial policy of privatization and competition will have a beneficial effect, as long as the cost efficiency gap is not sufficiently large.

However, in practice, there exists a series of industrial policy implications for privatization, which is especially important to north-eastern Asian countries including China and Korea. First, even though the cost efficiency gap between domestic public firm and foreign private firm is small, privatization policy with foreign competitors might be beneficial to the society from the perspective of competition. Therefore, mixed market with competing foreign firms might be efficient than a monopolized public firm if the market can be sustainable with the competition in the long-run.

Second, the competing domestic firm can adopt advanced skills from the competing foreign firm in a long-term dynamic competition. This is the case where there is a strong spill-over effect in the process of market competition, such as learning and training on managerial and technological skills by competition. Therefore, under the competition with foreign firms, full privatization or fully authorized private firm might not be socially beneficial in the long-term relationship. In this case, a scheduled governmental privatization contracts should be organized, for example as like the experiences in the U.K. and New Zealand. However, if the market is sufficiently competitive, this problem of ownership structure will not matter in industrial policy, but the problem of fair competition will matter.

Finally, it is important to take other advantage of public firm in the real economy. For the success of industrial policy, the informational requirement is very serious for the government to implement the proper policy. In particular, these requirements amount to knowledge of the cost of private firms. It is usually the case that the private firm has no incentive to reveal truthfully the information they possess. Therefore, mechanism design under incomplete contract should be constructed. In designing an incentive compatible mechanism in a process of privatization and competition, the public firm might be an approximation for the features of the market in which it operates because public ownership can provide more information than is obtainable in a private firm.

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