The endogenous objective function of a partially privatized firm: A Nash bargaining approach[☆]

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A B S T R A C T

We establish a model wherein a private firm competes with a partially privatized firm whose objective function is endogenously determined through bargaining between owners—the welfare-maximizing government and dividend-maximizing private shareholders. Many existing works on partial privatization have assumed that privatization increases the weight of profits in the partially privatized firm's objective, whereas it decreases the weight of welfare. However, our bargaining approach shows that this result can be reversed.

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1. Introduction

In this paper, we demonstrate how a firm's objective function is determined when each owner's interests are different. In particular, we use a "mixed duopoly" model, where a profit-maximizing private firm competes with a partially privatized firm. The privatized firm has two types of owners: private shareholders and the government. The private shareholders usually expect the firm to maximize profits Π_0, whereas the government expects maximization of social welfare W. This implies that the owners have contradictory interests, and thus, it is not easy for them to set the privatized firm's objective function. Against this backdrop, our paper aims to explain the role of bargaining in the process of setting the objective function.

Since the 1980s, many public firms have been privatized and the private sector has fully or partially owned such firms.[1] DeFraja and Delbono (1989) examine the effect of privatization of a public firm on social welfare. They show that in some situations, privatization of public firms can enhance social welfare, even if privatization involves no improvement in production efficiency and it only changes the firm's objective and behavior. This result is extended to partial privatization by Matsumura (1998). A partially privatized firm is a mixed joint stock company owned by profit-maximizing private shareholders and the welfare-maximizing public sector (or the government). In his model, a partially privatized firm is assumed to maximize $\alpha W + (1 - \alpha)\Pi_0$, $\alpha \in [0,1]$, the weighted average of the owners' interests. It is also assumed that the weights increase with the corresponding owner's shareholding ratio (i.e., α is an increasing function of the public sector's shareholding ratio). In other words, if an owner increases his shareholding in the firm, his concerns become more important for the firm. Matsumura (1998)

[1] Such privatized firms are present in a wide range of industries, such as airlines, gas, electricity, telecommunications, banking, and education. In October 2007, the Japanese government established four corporations in the country—Japan Post Network Corporation, Japan Post Service Corporation, Japan Bank Corporation, and Japan Post Insurance Corporation. Furthermore, these four corporations were made subsidiaries of Japan Post Holdings Corporation (JP). By 2017, the Japanese government intends to sell two-thirds of its shares in JP. Thus, Japan Post will become a typical partially privatized firm.

shows that partial privatization is always a more effective means of achieving high social welfare, as compared to both full nationalization and full privatization.

These works can also be analyzed from the viewpoint of the objective a player should pursue in strategic environments. It is already known in several contexts that a player who complies with some behavioral principle distinct from his own objective may possibly receive better returns, than when he acts to maximize the real objective.[2] However, a player who recognizes that changing his objective is beneficial for him also faces a problem—how to credibly report the change in the objective or utility function to his rivals. As Schelling (1980) indicates, a useful way to credibly change the objective is for the player to lose power, or for that power to be restricted, in a legal manner. Thus, privatization and partial privatization are credible means to change the objective of a public firm, because the rivals believe that the firm would now be concerned with the interests of both owners and would operate in a manner that harmonizes their contradicting interests.

The problem discussed here is related to how two parties in a partially privatized firm agree on an objective for the firm. In the growing literature on mixed oligopoly, Matsumura (1998)'s model and its variants are intensively used to analyze the market outcome in various conditions, without considering how a partially privatized firm makes decisions.[3] Furthermore, in Matsumura (1998), it is assumed that the owner who has a larger shareholding in the firm strongly reflects his objective in the partially privatized firm's behavior. However, it can so happen that the majority shareholder may not pretend to reflect his objective in the partially privatized firm's objective, because as explained in the previous paragraph, a player's pursuit of a different objective can prove to be beneficial to his true objective. One example is the Bank of Iwate, whose largest stockholder is Iwate prefecture, and which is representative of partially privatized firms in Japan. In 2006, the bank made their midterm business plan, under which great importance was attached to profits and the introduction of a highly advanced management system (the 124th general meeting of shareholders, June 24, 2006). This shows that even when enterprises whose largest shareholder is the government act like profit-maximizing firms, the government may not oppose their action. To study such behavior of owners, in this paper, we provide a model where the objective of a partially privatized firm is endogenously determined through bargaining between the two sectors. Further, we examine the validity of the assumption adopted by Matsumura (1998). We also consider the welfare implications of the endogenously determined objective model.

To explore how a partially privatized firm makes decisions, or how two parties determine the objective of the firm, we consider a two-stage game described as follows. In the first stage, the public and private sectors discuss the management policy of the firm that is well represented by the parameter $\alpha \in [0,1]$. This parameter indicates the weight attached to the management policy by the two sectors. In the process of reaching an agreement through bargaining, this information becomes public. Then, in the next stage, the privatized firm competes with the other private firms in a Cournot fashion. On the other hand, if the two sectors in the partially privatized firm fail to reach an agreement

through negotiation, they play the defund game to decide whether to continue operating the firm or defund and liquidate it. When both sectors are in favor of continuation of the firm, the majority party asserts total control over the firm by resorting to a shareholder meeting. Thereafter, the firm acts to maximize the majority's objective. However, when one of them chooses to defund the firm, funds are returned to each party in proportion to its shareholding ratio; and each party can use these funds to invest in other opportunities.

We first conduct a comparative statics of the agreed value of α with respect to the share $s \in (0,1)$ of the public sector. We find that this crucially depends on the outcome of the defund game. Specifically, when continuation of the firm is chosen in the defund game, an increment of s does not affect the agreed value of the weight of the public sector, α^*. On the other hand, when it is decided to defund the firm, the effect of an infinitesimal increment in s on α^* depends on the difference between the rates of return on public and private investments. If the former rate is higher than the latter, the weight of social welfare in the privatized firm's objective function becomes greater as the government's shareholding increases; if the former rate is lower than the latter, the result is reversed. Thus, our endogenously determined objective model indicates that it might be difficult to support Matsumura's assumption. Furthermore, we obtain different implications pertaining to the effectiveness of privatization or partial privatization from DeFraja and Delbono (1989) and Matsumura (1998). We find that not privatizing the firm is the optimal choice for a government that is concerned with social welfare, when the marginal cost of the public firm is higher than that of the private firm but not substantially so, and the outcome of the defund game is liquidation of the firm.

To conclude the introduction, we note a few characteristics of our approach that are closely related to the existing literature. First, we analyze a bargaining situation in the first stage by using a cooperative game framework similar to that employed by Aoki (1980, 1982) to analyze modern corporations as coalitions of several stakeholders. We use the Nash solution for the first-stage game. Second, we do not characterize the partially privatized firm as one that chooses its output with the objective of maximizing the Nash product of the two parties, given the output of the other private firm. Instead, we adopt a two-stage game where in the first stage, the two parties determine the objective of the partially privatized firm, because it is difficult to imagine that the owners of the firm determine the daily output. This is one of the critical differences between our model and that of De Donder and Roemer's (2009). Their model also considers endogenous determination of the objectives of a firm in which related stakeholders have different interests.[4] Third, we assume that the majority party cooperatively bargains with the minority to determine the firm's objective, as long as there is a scope for mutual benefit through bargaining, even though the majority party can always resort to the general shareholders' meeting to control the firm. Therefore, resorting to the general shareholders' meeting is one of the possible threats posed by the majority party in order to obtain a better outcome from negotiations. Finally, we do not consider the problem of delegation, because if we introduce delegation, it becomes difficult for us to directly compare the result from our research to those from existing works such as DeFraja and Delbono (1989), Matsumura (1998), and other studies in this field (for research considering delegation in a mixed oligopoly, see White, 2001).

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[2] For instance, Crawford and Varian (1979) and Sobel (1981) show that in the Nash bargaining problem, distorting the player's utility function might benefit the player. In the context of strategic delegation, it is known that hiring an agent who participates in the game on behalf of the real player gives the player (called the principal) a first mover or other advantage over the opponents (for example, Fershtman, 1985; Fershtman and Judd, 1987; Fershtman et al., 1991; Sklivas, 1987; Vickers, 1985). However, when a contract between the principal and the agent cannot be observed by the opponents, using such delegation does not change the equilibrium outcome from the one when the principal himself plays the game (Katz, 1991).

[3] For some representative works, Matsumura and Kanda (2005) show that when firms are allowed to enter the market freely, full nationalization is desirable from the viewpoint of social welfare. Further, some research studies the relationship between partial privatization and other policies. Chao and Yu (2006) show that the partial privatization policy is substitutable for import tariff as a trade policy.

[4] De Donder and Roemer (2009) consider a vertically differentiated market where two firms simultaneously choose the quality and price of the good, and firms are controlled by both a profit-motivated and a revenue-motivated agent. To analyze this market, they define a new equilibrium concept, Firm Unanimity Nash Equilibrium that corresponds to the Nash equilibrium between two firms, when there is efficient bargaining between the profit-motivated and the revenue-motivated agent. With some assumptions on the profit and revenue function of the firms, the Firm Unanimity Nash Equilibrium becomes the one where each firm maximizes the weighted Nash product of profit and revenue, given the other firm's strategic variables. Furthermore, they also consider a case where the government participates in one firm.