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The merger paradox in a mixed oligopoly

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ABSTRACT

This paper examines the set of surplus maximizing mergers in a model of mixed oligopoly. The presence of a welfare maximizing public firm reduces the set of mergers for which two private firms can profitably merge. When a public firm and private firm merge, the changes in welfare and profit depend on the resulting extent of private ownership in the newly merged firm. When the government sets that share to maximize post merger welfare as assumed in the privatization literature, the merger paradox will often remain and the merger will not take place. Yet, we show there always exists scope for mergers that increase profit and increase (if not maximize) welfare. Interestingly, these mergers often include complete privatization.

1. Introduction

The rapid progress of deregulation in developed countries and of transition in developing countries has resulted in increased emphasis on economic models of mixed oligopolies.[1] These oligopolies are characterized by the presence of a public firm competing against private firms and exist in a wide variety of utility, financial, transportation and even industrial markets. The original interest of economists in studying such markets was to examine the potential for "regulation by participation". This term was meant to suggest that a public firm operating to maximize welfare might change the behavior of private firms that would otherwise exploit market power. We study two under-recognized aspects of this regulation that involve mergers. First, we explore the influence that the public firm has on the potential for merger among competing private firms. Second, we explore the consequences of a public firm that partially privatizes by selling a share of its assets to a rival private firm.

Specifically, our first research question is whether the presence of a public firm in markets with convex costs makes mergers by private firms more or less likely. This question has actual policy analogues that command attention. Thus, at the end of 2001 two private Greek airlines, Aegean and Cronus, announced their merger. The merger formed the largest, but not the only, private sector carrier in Greece. Yet, the Greek market remained mixed as the major airline Olympia retained public ownership. ECA (2004) provides a series of descriptions of European airline mergers and the antitrust stances taken by the respective governments. While important distinctions exist between airline markets within and between countries (Dadpay and Heywood, 2006), the point remains that many of the mergers involved private firms in markets with at least one partially or fully owned public carrier. In Canada, extensive provincial ownership of telephone service, financial services, utilities and energy companies, combined with recent private firm mergers in these sectors raise similar issues.

Mergers in private oligopolies have long been recognized to suffer from the merger paradox, the realization that merging rivals need to command an extremely large share of the pre-merger market for a merger to be profitable. Thus,

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[1] Indeed, a check of EconLit reveals three-dozen articles presenting mixed oligopoly models in the last decade. Among other issues, these articles have examined the result of privatization on welfare (Barcena-Ruiz and Garzon, 2005; Pal and White, 1998), the role of subsidization (Pal and White, 1998; Fjell and Heywood, 2004), issues of timing (Pal, 1998; Armel, 2004) and issues of strategic location (Matsushima and Matsumura, 2003; Li, 2006) but only one paper examines mergers. That paper (Barcena-Ruiz and Garzon, 2003) undertakes a limited examination as described later in this introduction.

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Salant et al. (1983) show that no two-firm merger will be profitable for private Cournot–Nash competitors as long as there exists at least one excluded rival. This emerges because the reduction in quantity by the merged firm designed to exploit market power causes the excluded rivals to respond by increasing their output, thereby reducing any price increase. Perry and Porter (1985) provide a well-known resolution showing that any two-firm merger can be profitable given a sufficiently steep marginal cost curve.[2] Indeed, Heywood and McGinty (2007) provide a generalization by fully characterizing the required slope of the marginal cost curve for mergers of any given share of the pre-merger market.

The role of convexity (upward sloping marginal cost curves) in resolving the merger paradox is of interest for mixed oligopoly models as they also typically assume convex (typically quadratic) production costs. Without convexity, the problem of regulation by participation reduces to a truism as the public firm facing the same linear or declining costs as private firms simply produces the competitive quantity (DeFraja and Delbono, 1990). Unexplored is whether the presence of the public firm makes merger between private firms more or less likely.

Our second research question explores merger between a private firm and the public firm. Recognizing that the public firm will presumably merge only when welfare increases and the private firm will merge only when profit increases, we examine the extent to which such mergers are themselves subject to the merger paradox. Again, such mergers also have important policy analogues. In airlines, the partially publicly owned SAS purchased its private rival Braathens. In China, the government has actively sought mergers between its state owned enterprises and private firms (China Daily, 2003). The European automobile industry also provides examples. Volkswagen's acquisition of the publicly owned Spanish firm SEAT and Renault's acquisition of Dacia represent combinations of public and private firms. To date the only examination of such mergers in a mixed market is that by Barcena-Ruiz and Garzon (2003). They study a duopoly with differentiated products and imagine a merger in which the private firm receives an exogenously given degree of ownership in the previously public firm.[3] They emphasize that merger is more likely when the two firms' goods are poor substitutes. They do not consider the more traditional market with many firms producing identical products, nor do they focus on the incentive issues associated with the merger paradox.

Importantly, theory indicates that a government should partially privatize a public firm. Specifically, if the government sells a welfare-maximizing share of the public firm, welfare with the resulting mixed ownership firm exceeds that of a fully public firm that chooses quantity to maximize welfare (Matsumura, 1998; Matsumura and Kanda, 2005). It seems sensible that potential purchasers of the privatized portion of the assets would include the private firms already competing in the market. Yet, to the best of our knowledge, no one has explored the implications of the merger paradox for such a merger.

In what follows, we isolate the equilibrium in a traditional mixed oligopoly model and then identify the new equilibrium that emerges if two private firms merge. We isolate the profit earned by merger and the marginal cost slope needed to achieve positive profit. We show that the required convexity is greater than that which emerges in an otherwise identical merger but without the presence of the public firm. The merger paradox is more restrictive. We follow this demonstration with an examination of the merger between the public and a private firm. When the private ownership share is chosen by the government to maximize post-merger welfare, welfare unambiguously increases. Yet, we show the wide variety of circumstances in which the merger paradox continues to exist as the welfare-maximizing share does not yield increased profit to private shareholders.

2. Merger between private firms

We imagine an industry of n firms as Cournot–Nash competitors in a market with a linear demand curve: $P = a - Q$, where $Q = \sum_{i=1}^{n} q_i$. One public firm produces quantity q_1 and $n-1$ private firms produce the remaining output. All firms share the same convex cost schedule: $C_i = f + (1/2)kq_i^2$ generating linear marginal cost curves with slope k. We consider a merger of two private firms resulting in $n-2$ post merger private firms. We take the original number of firms n to be exogenous which allows us to ignore the fixed cost and set $f = 0$ in the cost schedules. Indeed, as Perry and Porter (1985) make clear, adopting a positive fixed cost does not change in any way the incentives for merger because the merged firm would retain the fixed costs from each of its constituent parts.

The $n-1$ initial private firms each maximize their individual profits, $\pi_i = Pq_i - C_i$, while the public firm maximizes social welfare, the sum of consumer surplus and the profits of all n firms (including that of the public firm), $W = \frac{1}{2}Q^2 + \sum_{i=1}^{n} \pi_i$. The resulting equilibrium mimics those in the literature:

$$\begin{aligned} q_1 &= \frac{a(1+k)}{k^2+kn+k+1} \\ q_i &= \frac{ak}{k^2+kn+k+1} \quad \forall i = 2 \text{ to } n. \\ P &= \frac{ak(1+k)}{k^2+kn+k+1}. \end{aligned} \tag{1}$$

[2] Other attempts to resolve the paradox include examining issues of leadership (Daughety, 1990; Huck et al., 2001), differentiated products (Reitzes and Levy, 1995; Rothschild et al., 2000) and merged firms that sequence output decisions across plants (Huck et al., 2004; Creane and Davidson, 2004).

[3] Such circumstances can be distinguished from the selling off of government assets to a rival (such as the controversial sale of Canada's de Havilland to Boeing in 1984) but where the public retains no share of ownership in the merged firm.