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Merger performance under uncertain efficiency gains[☆]

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ABSTRACT

In view of the uncertainty over the ability of merging firms to achieve efficiency gains, we model the post-merger situation as a Cournot oligopoly wherein the outsiders face uncertainty about the merged entity's final cost. At the Bayesian equilibrium, a bilateral merger is profitable provided the non-merged firms sufficiently believe that the merger will generate large enough efficiency gains, *even if ex post none actually materialize*. The effects of the merger on market performance are shown to follow similar threshold rules. The findings are broadly consistent with stylized facts. An extensive welfare analysis is conducted, bringing out the key role of efficiency gains and the different implications of consumer and social welfare standards.

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1. Introduction

Mergers and acquisitions constitute a major feature of the economic landscape of most industrialized countries. To provide an idea of the resources involved, over the period 1981–1998, there were nearly 70,000 merger announcements worldwide, each worth at least 1 million U.S. dollars, of which nearly 45,000 were actually implemented. The average deal was valued at 220 million (base year 1995) U.S. dollars (Gugler et al., 2003, henceforth GMYZ). Mergers have been an important source of increase in market concentration, particularly outside the U.S. (Schmalensee, 1989). An extensive empirical and theoretical literature has explored the motives behind mergers and their impact on business activity. While both approaches have yielded useful insights, allowing industrial economists to reach a consensus on some aspects of merger performance, important discrepancies exist between key theoretical findings and stylized facts from empirical and event studies.

By their very nature, mergers pose a complex conceptual challenge, wherein structure and conduct are inextricably intertwined. The pioneering work of Salant, Switzer and Reynolds (1983), henceforth SSR, showed that in the context of a symmetric Cournot oligopoly with linear demand and costs, for a merger to be profitable, it should comprise a pre-merger market share of at least 80%. This result forms the so-called "merger paradox". Allowing the merging firms to exploit production synergies in some way, thereby lowering their post-merger costs, leads to a wider scope for profitable mergers (Perry and Porter, 1985; Farrell and Shapiro, 1990; McAfee and Williams, 1992). A similar result holds under sufficiently concave demand (Fauli-Oller, 1997). By contrast, postulating Bertrand competition with differentiated products, Deneckere and Davidson (1985) establish that every merger would be profitable.[1]

While some degree of controversy, mostly of a quantitative sort, persists, the empirical literature has delineated some important stylized facts. On the key issue of profitability, in the largest cross-national study to date, GMYZ reports that nearly 60% of all horizontal mergers were profitable, with this proportion being higher in services than in manufacturing. As for sales (or revenues), it is essentially the other way around, with nearly 60% of merged firms experiencing a drop in sales. A similar negative effect is also reported for the post-

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[1] The Bertrand paradigm has been widely used in numerical simulation of the effects of mergers: See e.g. Werden and Froeb (1994).

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merger market shares of the merged firms (Mueller, 1985). On the other hand, two other broad-based studies concluded that the profitability of acquired firms declined after the merger for U.K. firms (Meeks, 1977) and for U.S. firms (Ravenscraft and Scherer, 1987).[2] The overall conclusion one can draw from this rather mixed picture is that while horizontal mergers have a limited negative impact on sales and market share, they do not appear to have, on average, a clear-cut effect on profitability.

It is widely held that mergers typically lead to price increases.[3] For example, Kim and Singal (1993) find a 10% increase for airline mergers.[4] Regarding the effects on share prices, initially the target firm's shareholders earn a substantial premium of about 30% on the merger while those of the acquirer tend to have more variable fortunes, with an average on the low side (Mueller, 1985). For the merged firm, the overall initial effect is a substantial rise in share value, which however turns into a subsequent fall in value a few years after the merger. For firms outside a merger, the evidence does not seem conclusive for recent times, but Banerjee and Eckard (1998) report significant losses of about 10% for the merger wave at the turn of the 19th century in the United States.

As to the crucial issue of whether mergers generate efficiency gains, the evidence is not direct as such gains are difficult to estimate, but rather deductive.[5] While many studies, including Ravenscraft and Scherer (1987), report little support for a positive relationship, GMYZ concludes that 29% of all mergers engendered efficiency gains, as suggested by observed increases in both profits and sales. Naturally, it is very difficult to disentangle the efficiency gain and the market power effects due to a merger. On the other hand, there appears to be a consensus reached on the basis of case studies and casual observation that while some mergers were successful in securing substantial efficiency gains,[6] there is great variability on this issue.

In view of the lack of congruence between theoretical and empirical findings,[7] the primary challenge of theoretical work on mergers is to come up with alternative models of merger behavior that would close this gap. This paper constitutes an attempt in this direction within the framework of static analysis. The novel ingredient is that all the firms in the industry face uncertainty as to the efficiency gains, in terms of variable costs, that the merged firm could achieve. The efficiency gains may correspond, for example, to the claim made by the merging firms to the antitrust agency, possibly appropriately discounted by the rival firms, or to a past average achieved by comparable mergers in related industries. Pre-merger competition is modelled as a standard Cournot oligopoly with identical firms while short-run post-merger competition involves a Bayesian Cournot model, with the merged firm alone being informed about its true cost. As simplifying assumptions, we take demand and costs to be linear, and the uncertainty to be binomial.

This simple formulation seems appropriate in view of the stylized facts on mergers. Indeed, for the merger to obtain antitrust approval in most countries, the candidate firms have to convincingly document scope for significant efficiency gains, via the exploitation of organizational and production synergies. In most cases, the approval of a merger presumes that the antitrust authority has been swayed by the firms' claims of lurking efficiency gains. Likewise, the initial surge in share prices provides some support for the presumption that the merger is likely to lead to strong efficiency gains, as an increase in market power alone would be unlikely to yield the concomitant increase in expected profits. Another point is that the firms in the industry frequently react with apprehension to a merger announcement by two of their rivals. These typical facts lend credence to the postulate that all concerned parties generally hold beliefs about the prospect of efficiency gains that are naturally captured by a Bayesian model. Indeed, the revised Section 4 of the Horizontal Merger Guidelines issued by the U.S. Department of Justice and the Federal Trade Commission in 1997 states that "efficiencies are difficult to verify and quantify, in part because much of the information relating to efficiencies is uniquely in the possession of the merging firms. Moreover, efficiencies projected reasonably and in good faith by the merging firms may not be realized".[8] Further discussion in support of our Bayesian setting is given in Section 5.2.

Recent studies have also proposed settings where uncertainty plays a key role. Chone and Linnemer (2008) analyse a very general model with multi-product firms and uncertainty over efficiency gains of the merged firms. In contrast to the present paper, this uncertainty fully resolves before post-merger market competition takes place, but nonetheless affects the ex ante social welfare of the merger for antitrust authorities, and hence their approval decision. Depending on the nature of competition and on the demand specification, social welfare may be convex (e.g. for linear demand) or concave in these gains, so that uncertainty may enhance or lower the approval chances. In a setting with uncertainty over demand or costs, Banal-Estanol (2007) shows that there are added incentives for mergers arising from merged firms sharing their private signals.[9]

One of our main results states that if the non-merged firms believe with a sufficiently high probability that the merged firm will experience a high enough efficiency gain, the merger will be profitable, even if one takes the worst-case scenario for the merged firm, wherein it ends up not experiencing any efficiency gain at all. Similar threshold rules are shown to govern the effects of a merger on the merged firm's and outsiders' outputs as well as on industry price, using worst case, best case and expected term scenarios.

In all theoretical models with complete information and no efficiency gains, whether based on Cournot or on Bertrand competition, mergers always exert a positive externality on non-merged firms. In a Bayesian formulation, the nature of this externality also follows a threshold rule depending on the same pair of parameter values, so that it may well be negative. Similar remarks may be made about market shares and sales. The set of possible outcomes following a merger is substantially expanded, with one or both the merged firm and the outsiders, or neither of them, being possible beneficiaries.

For both consumer surplus and social welfare, the worst-case benchmark yields a negative effect of mergers while the two benchmarks lead to thresholds depending again on the belief and the efficiency gain levels. The threshold rule associated with the ex ante and best case benchmarks confirms the central role played by

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[2] There are many other studies on this central point, and the results are quite mixed. In particular, specific studies involving OECD countries have produced divergent results (Mueller, 1980).

[3] Interestingly, while the Cournot and Bertrand models yield strongly divergent conclusions on the profitability of mergers, they nonetheless do agree in their prediction that mergers increase prices.

[4] There are surprisingly few studies to this effect, particularly in view of the prominence of consumer surplus as a key criterion in the antitrust review process for mergers in the U.S. and elsewhere.

[5] That mergers often result in savings on fixed costs, via inefficient plant shutdowns, personnel consolidation and R&D expenses, is a well-accepted proposition. Mergers also arguably require substantial one-time transaction costs to be implemented. We follow the literature in ignoring these effects.

[6] For instance, a case study in Scherer et al. (1975) reports a 40% increase in output per worker. Other success stories may be found in Fisher and Lande (1983). Using a structural model, Pesendorfer (2003) finds positive evidence for mergers in the paper industry.

[7] Observe that with the above stylized fact on profitability, the conclusions reached under the Cournot and the Bertrand approaches to mergers are equally far off the mark, in opposite directions.

[8] Fisher and Lande (1983) assert that "efficiencies still are enormously difficult to predict on a case-by-case basis…". Likewise, according to FTC chairman Robert Pitofsky, the efficiencies defense is "easy to assert and sometimes difficult to disprove" (Quoted in J. Kattan (1994), Efficiencies and merger analysis, *Antitrust Law Journal*, 62, 513). One is tempted to add that if all the federal agencies empowered to ascertain the prospects of efficiency gains admit to the complexity of the task, the rival firms and outside analysts of the industry will typically find it beyond hope. As a consequence, these outsiders have no option after the merger other than to engage in Bayesian behavior.

[9] Other recent studies include Banal-Estanol et. al. (2008) and Mialon (2008), who investigate the effects of internal reorganization by a merged entity and Spector (2003), who consider the effects of mergers when allowing for entry into the industry.

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