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Effects of upstream and downstream mergers on supply chain profitability

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ABSTRACT

This paper studies the implications of upstream and/or downstream horizontal mergers on suppliers, retailers and consumers, in a bilateral oligopolistic system. We especially focus on market power and operational synergy benefits that such mergers engender. Starting with a benchmark pre-merger scenario in which firms compete on prices at each level, we find that the above two consequences individually almost have *opposite* effects on the merging and non-merging firms' optimal decisions/profits after a merger. Furthermore, even though the effects of upstream and downstream mergers are different, the vertical supply chain partners will always try to reduce their losses if the market power effect dominates, but will take actions that improve their profits if the synergy effect is stronger. The above results are robust enough to hold even when taking into account intra-brand competition among retailers.

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1. Introduction

Mergers and acquisitions continue to show remarkable resilience in both deal values and volumes even after the financial crisis of 2008. Many of the largest transactions in this context occur between companies in the same industry (i.e., horizontal mergers). Examples include those between Kraft and Heinz (49 billion dollars) in the food industry, Staples and Office Depot (6 billion dollars) in the retail sector dealing with office supplies, Comcast Corp and Time Warner Cable Inc (70 billion dollars) in the cable-TV and high-speed broadband sector, Actavis and Allergan (66 billion dollars) in the pharmaceutical industry, and Halliburton and Baker Hughes (35 billion dollars) in the energy industry (Burrows, 2014). Note that some of the above mergers occur in the consumer-facing downstream part of the supply chain (e.g., Staples and Office Depot) and others take place in more upstream levels (e.g., Kraft and Heinz or Actavis and Allergan).

While there might be a number of motivations behind mergers, the two most important ones are the expected post-merger market power and/or operational synergy benefits (Gale Encyclopedia of E-Commerce, 2002). From the perspective of merging firms, managers usually expect improvements in market share and productive efficiency, irrespective of the level at which the merg-

ers happen (Fee & Thomas, 2004). For example, both Staples+Office Depot and Kraft+Heinz mergers touted the expected cost reduction through supply chain synergies (Martyn, 2015), while the merger between Greencore Group and Northern Foods improved their market power vis-a-vis downstream retailers (Flynn, 2010). Interestingly, non-merging firms – either competitors or partners – in the supply chain are also affected by a merger. Their strategic responses are then crucial to the success/failure of a merger. For example, after purchasing the consumer online service of CompuServe Corp., America Online Inc (AOL) boosted its subscriber base to over 10 million, which allowed it to lower prices to better compete with its upstart competitors (Gale Encyclopedia of E-Commerce, 2002), and there are speculations about how competing manufacturers (e.g., Kellogg or PepsiCo) and downstream retailers (e.g., Wal-Mart) would respond to Kraft+Heinz merger (DiChristopher, 2015). However, it is worthwhile to point out that, horizontal mergers do not always improve efficiency. For example, Quaker Oats (the producer of Gatorade) failed to realize post-merger synergy after acquiring Snapple in 1994. The merger actually resulted in a loss of 1.4 billion dollars in 27 months. Sears Holding suffered from a revenue loss of more than 10 percent in the four years after its merger with Kmart, while during the same time period, Wal-Mart's sales rose almost 31 percent and Target's more than 24 percent (Clifford, 2010).

Motivated by the above examples, we aim to address the following questions in this paper:

- How do non-merging chain partners and competitors respond to a horizontal merger?

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- What are the effects of an upstream versus a downstream horizontal merger on all relevant firms' (merging and non-merging) decisions and profits?
- Under what conditions, if any, does a merger have an adverse effect on supply chain partners and final consumers?

To address the above issues, we use a bilateral oligopoly supply chain framework. In our model, it is not only the merging firms that will adjust their decisions after a horizontal merger, upstream or downstream non-merging supply chain partners/competitors will also respond strategically to the change in market structure. Therefore, the overall profitability impact of mergers on the firms or consumers is not straightforward. In alignment with our previous discussion, we study the two primary effects created by a horizontal merger: increased market power and operational synergy.

As regards market power, in the context of supply chains, there are two kinds of such power that can accrue from mergers – buying power and selling power. Although researchers have extensively examined the effect of upstream horizontal mergers on selling power vis-à-vis customers, conflicting conclusions have been drawn (Bhattacharyya & Nain, 2011). Regarding the effect of downstream horizontal mergers on buying power, Fee and Thomas (2004) and Shahrur (2005) find empirical evidence that such mergers exert price pressure on upstream suppliers and adversely affect their performance. We complement these studies by showing that increased selling and/or buying power due to mergers (due to upstream and downstream merger, respectively) *adversely* affects the performance of dependent supply chain partner, but *positively* affects the firms in non-merging competing supply chain.

Concerning operational synergy, merging firms could benefit from it and achieve cost efficiency in multiple ways, such as by reducing production, transaction or fixed costs through economies of scale or scope, learning from their partners' management expertise, improving production techniques or increasing managerial efficiency (see Trautwein 1990, Farrell & Shapiro 1990, Kim & Singal 1993). In a bilateral supply chain system, we find that while the merging firms and their supply chain partners *benefit* from synergies and become more profitable after an upstream and/or a downstream merger, the firms in non-merging competing supply chains actually *suffer a loss* in profitability following the merger.

The market power and operational synergy effects of mergers are not only (almost diametrically) opposite for the merging and non-merging supply chains, they are also so from the perspective of the consumers and social welfare. Specifically, when mergers provide market power they are harmful for both, but are desirable when mergers provide synergy benefits. Note that the seminal paper by Deneckere and Davidson (1985) state that in price-setting games, a merger allows merging firms to absorb a negative externality and elicits a spiral of responses from non-merging rival firms, and both these forces are beneficial to the merging firms. By taking into account the reactions of partners in the supply chain as well as the non-merging competitors, we are able to demonstrate that the effects are more nuanced and differs significantly depending on the particular benefit provided by a merger. The above behavior makes the overall effects of a merger somewhat ambiguous; it depends on which of the two effects dominate¹. Interestingly, we can show that non-merging firms always prefer an upstream merger, while consumers and the society prefer a downstream one.

Although our above results are based on bilateral supply chains where the suppliers and buyers have exclusive vertical relations, we also explore the robustness of our results by relaxing this assumption

in an extended model that incorporates intra-brand competition (i.e., a downstream firm can procure from multiple upstream ones). Although in this case the competition among downstream firms becomes more intense and results in lower prices for consumers, we find that the effects of post-merger market power and synergies are consistent with those in our base model, suggesting that our results are relatively robust.

2. Literature review

Horizontal mergers have been the focus of research in economics, strategy and finance for decades. Surprisingly, such mergers have received very little attention in the operations management literature. Researchers in the operations and supply chain management areas are usually more interested in the role of cooperation among competing agents. Although a few papers address the effects of a merger in a supply chain context, such as Fumagalli and Motta (2001), Inderst and Shaffer (2007), and Cho (2013), they either consider a duopoly model or a single product setting. To the best of our knowledge, this paper is the first to analyze the effect of horizontal mergers at both upstream and downstream levels using the Bertrand oligopoly model in a supply chain environment. In this section, we review three streams of literature relevant to our work – classic one-level Cournot and Bertrand horizontal merger models, horizontal mergers in bilateral supply chain models and coalitions in supply chains.

In the economics field, much research has been carried out on the effects of horizontal mergers in the merging industry, mainly focusing on price, quantity, profits and consumer welfare. The seminal work of Williamson (1968) demonstrates that in the cases where there are efficiency and market power consequences, the existence of economies of scale is important for the Antitrust Division of Department of Justice to consider before deciding to challenge a merger. More recently, Salant, Switzer, and Reynolds (1983) show that in the context of a symmetric Cournot oligopoly with linear demand and costs, mergers are not profitable unless more than 80 percent of the firms collude. Subsequently, Perry and Porter (1985) reveal that the incentive to merge depends upon a complex resolution of two forces: first, a merger results in a price increase; and second, the output of the merged firm declines relative to that of its competitors before the merger. The price increase resulting from a merger benefits all firms in the merging firms' industry. This can often be sufficient to compensate for the output reduction of the merged firm and increase profits. Similarly, Farrell and Shapiro (1990) and McAfee and Williams (1992) also use Cournot models to analyze the welfare effects of horizontal mergers.

Taking a different perspective, Deneckere and Davidson (1985) were the first to study the effects of mergers using the Bertrand model, in which firms compete on price by selling differentiated products that are imperfectly substitutable. They show that mergers of any size are beneficial, and increasingly profitable in the sense that large mergers yield higher profits than smaller ones. This is in contrast to the finding that mergers tend to be disadvantageous in Cournot quantity-setting models. A similar result is obtained for the logit demand model by Werden and Froeb (1994). Moreover, Werden (1996) studies the effect of merger-induced cost efficiency. He introduces a practical way to compute the exact marginal cost reduction that assures an enhancement of consumer welfare from a differentiated product merger. Froeb, Tschantz, and Werden (2005) suggest that both the price effects of mergers and the pass-through reduction in marginal cost to consumers depend on the curvature of demand.

While most studies investigate the effects of mergers on the merging industry, only a few have studied the effects of mergers on the upstream or downstream industry. Focusing on the contract between upstream suppliers and downstream retailers, Horn and Wolinsky (1988) show that when downstream firms compete with substitutable products, a monopoly supplier is more profitable than two

¹ Several empirical studies indeed support this. For example, Kim and Singal (1993) find empirical evidence from airline industry that mergers may lead to more efficient operations, but on the whole, increased market power dominates efficiency gains, making the consumers worse off.

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