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Pre-emptive horizontal mergers: theory and evidence

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Pre-emptive horizontal mergers: theory and evidence

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Abstract

This paper proposes and tests an explanation as to why rational managers seeking to maximize shareholder value can pursue value-decreasing mergers. It can be optimal to overpay for a target firm and decrease shareholder value if the loss is less than in an alternative where the merger is undertaken by a product market rival. This paper presents a model based on synergies, market power and competition for merger targets. Consistent with the model the empirical results obtained here show a strong correlation between the returns of acquiring firms and close rivals around merger events.

Keywords: acquisitions, auction, event study, oligopoly, preemption

JEL classification numbers: G34, G14, D43, D44, L13

Kilpailutaktisten horisontaalisten fuusioiden teoreettista ja empiiristä tarkastelua

Suomen Pankin keskustelualoitteita 17/2007

Jozsef Molnar
Rahapolitiikka- ja tutkimusosasto

Tiivistelmä

Tutkimuksessa testataan, miksi yrityksen markkina-arvon maksimointiin pyrkivät rationaaliset yritysjohtajat voivat toteuttaa yrityksen arvoa alentavia fuusioita. Ylihinnan maksaminen kohdeyrityksestä markkina-arvon samalla alentuessa voi olla optimaalista, jos tappio on pienempi kuin siinä tapauksessa, että yrityskaupan toteuttaisi yksi kilpailijoista. Tutkimuksessa esitetään malli, joka pohjautuu synergioihin, markkinavoimaan ja kilpailuun kohdeyrityksistä. Mallin mukaisesti empiiriset tulokset osoittavat, että yrityskaupan toteuttavien ja kilpailijayritysten tuotot korreloivat voimakkaasti keskenään fuusioiden yhteydessä.

Avainsanat: yrityskaupat, huutokaupat, event study -menetelmä, oligopoli, kilpailu, ennalta ehkäiseminen

JEL-luokittelu: G34, G14, D43, D44, L13

Contents

1 Introduction

Extensive literature finds that mergers benefit the target firms' shareholders, while the acquiring firms at best do not lose.[1] Andrade, Mitchell and Stafford (2001) find that in 17.5 per cent of all M&A the acquiring firm had a less than –5 per cent announcement return. Moeller, Schlingemann and Stulz (2004) show that shareholders from small firms earn $9 billion from the acquisitions made during the period 1980–2001, whereas the shareholders from large firms lose $312 billion.

Negative announcement returns of large firms appear inconsistent with manager's rationality or profit maximization. Why do executives of acquiring firms often pay more for the target than what is justified by the target's market value? Why are mergers usually completed even if the acquiring firm's stock price drops at the announcement of the deal? Most of the existing theories consider these mergers inefficient and explain them by questioning the managers' rationality, the managers' commitment to value-maximization, or the efficiency of financial markets.[2] In contrast, also extensive literature finds that mergers actually raise productivity and cash flow.[3] Andrade et al (2001) show that the combined value of merged firms increased by a significant 1.8 per cent in a sample of acquisitions between 1973–1998. They find that operating margins also improved by a significant 1 per cent. Jovanovic and Rousseau (2002) and Jovanovic and Braguinsky (2004) proposed a model in which takeovers are the channels through which capital flows to better projects and better management. In their model, mergers are efficient but bidders' or even the joint bidder and target value can drop at the announcement. These models do not consider the effects of competition.

This paper proposes and tests a theory to explain bidders discount that also assumes rationality and shareholders' value maximization. The main intuition is that preemption can be optimal even if the acquiring firm has to overpay relative to the increase in the joint profits of the combined firms. By preempting the rival firm's bid, the acquiring firm avoids the larger profits loss, which could result from a rival merger. This preemption theory is based on synergies, market power and competition for targets in a horizontal merger market. In this model the merger is a rational response of value-maximizing managers to some market shocks. The shocks could include for instance technological innovation, deregulation, better management, negative demand or negative cost shocks that hit the bidders' product market.[4] These shocks creates synergies or cost savings and some merger becomes profitable. When several potential acquiring firms can achieve these large cost savings, they

[1] See surveys by Jensen and Ruback (1983) and Andrade, Mitchell and Stafford (2001).

[2] See the hubris theory by Roll (1986), agency theories by Jensen (1986), Shleifer and Vishny (1989), irrational financial markets theories by Shleifer and Vishny (2003), Rhodes-Kropf and Viswanathan (2004) and merger arbitrage by Mitchell, Pulvino and Stafford (2004).

[3] Maksimovic and Phillips (2001), and Harris et al (2002) find that mergers increases productivity.

[4] Mitchell and Mulherin (1996) find evidence consistent with major economic changes shaping the takeover and restructuring markets.

compete for the opportunity to merge if the available targets are limited.[5] The winning bidder becomes a lower cost producer and increases its product market share if the cost savings are large enough. If the merged firm increases its market share, rivals are worse off. Thus, it can be rational to launch a takeover attempt to preempt a rival takeover. Nevertheless, the merger itself may reduce the acquirer's value because of the high price paid for the target.

A merger is value-decreasing if the post-merger operating profit of the acquiring firm net of the price paid for the target is lower than the acquiring firm's pre-merger profit. Such a merger could be a consequence of a rational and value-maximizing decision in situations where the potential synergies of the rivals (with the same target) are similar and substantially large and there are no other ways to achieve these synergies. Consequently, the acquiring firm has to increase its bid to beat the rivals' potential offer and as a result, overpay for the target. Rivals are also worse off after the merger because their profit decreases due to the tougher competition in the product market. For the acquiring firm, pursuing the merger is the dominant strategy even if all bidders are worse off following this strategy. If the shock is not fully expected and its realization is revealed to the financial market through the merger activity, the reduced net profits after the merger would lead to a negative announcement return of the acquiring and rival firms.[6]

In the first part of the paper a simple two-stage model is presented to capture the intuition. Takeovers are modeled as auctions, where potential acquiring firms bid for an exogenously chosen target firm. Their bids depend on the synergies realized after the merger. After the merger, the resulting firms compete in the downstream product market. We focus on horizontal mergers, as for this type of mergers synergies seem to be larger and the identification of rivals easier.

The preemption model discussed above is tested in the second part of the paper. The model proposes that as a consequence of a preemptive merger, both the acquiring and the rivals firms' profit decreases. If synergies of mergers and potential merger would be observable then one could state the prediction of the preemption model in terms of them. Unfortunately, these are not observable in most of the cases. However, changes in future profits should have some implications for the stock prices which are observable. In an efficient stock market, an unexpected decrease in the current or expected net profits is immediately followed by a decrease in stock prices. Accordingly, if the acquiring firm's stock prices drops at the announcement of an unexpected preemptive merger, rivals' stock price should drop as well. This prediction is not a priori predicted by the earlier theories that tried to explain why bidder

[5] There is a literature on endogenously selected targets where any firm can be a target. See papers by Kamien and Zang (1990), Horn and Persson (2001) and Fridolfsson and Stennek (2005). Empirically, however antitrust regulation and credit market imperfections are good reasons why the set of target firms could be limited. Attenuating effects of input substitutions and imitation activities on the part of the rivals can limit the scope of overpaying.

[6] If the market attaches some probability to the possibility of the specific merger the observed abnormal returns would be smaller. However, the actual premium paid by the acquiror that carries the information about the realization of the shock is usually unknown until the announcement.

discounts occur.

In the empirical section of this paper four hypotheses are tested in an event study. We follow the literature by forming equally weighted portfolios of acquiring, target and rival firms (see Campbell et al, 1997).[7] Similarly to the findings of Andrade, Mitchell and Stafford (2001), the aggregate value of merging firms increases in our sample. This suggests that mergers are driven by synergies and create value on average. However, the acquiring firms very often (around 60 per cent of the sample) incur substantial losses.

The main prediction of the preemption theory is that one should observe negative cumulative abnormal returns for rivals around the announcement date when the acquiring firm loses value. To the best of my knowledge, this paper was the first (see Molnar, 2001) to find that when the acquiring firms' abnormal return is negative, the rivals in the sample have significant negative abnormal returns just as the preemption theory predicts. The average loss of rivals in the sample is less than the acquiring firms because some rivals had positive return at the announcement.

Song and Walkling (2000) show that predicted future takeover targets have larger abnormal return than other rivals. To find future takeover targets, this paper assumes that market expectations are correct and predicted targets become real targets. In our sample, approximately 20 per cent of the rivals actually became targets later. Similarly to Song and Walkling (2000), we find that future takeover targets have significantly higher abnormal return than other rivals. The finding are consistent with the preemption theory.

There is an extensive industrial organization literature on the effect of mergers on product market competition, ex post profits, and welfare gains. Salant, Switzer, and Reynolds (1983) show that bilateral mergers in Cournot markets with homogenous products and with symmetric firms producing at constant marginal cost cannot be profitable unless the merger creates a monopoly or large synergies. Most of the early papers study a static oligopoly model to examine the incentives to merge with either Cournot or Bertrand competition.[8] Farrell and Shapiro (1990) have shown that small mergers can be privately profitable in a static Cournot market only if they generate synergies. However, they restrict their analysis to cases where acquirers do not lose. According to the preemption theory, despite of the synergies and the privately profitable merger, acquiring firms could end up paying more for the target company than the increase in their profits in the post-merger market because of preemptive motives.

[7] In the empirical finance literature Eckbo (1983), Stillman (1983), Shahrur (2005), Fee and Thomas (2004) examine the rivals' stock price reaction at merger announcement. These papers were interested in the antitrust implication of the mergers and they do not consider the problem of bidder discounts.

[8] See papers by Deneckere and Davidson (1985), Perry and Porter (1985), Levin (1990).

A number of papers are closely related to the current paper. The idea that externalities impact auctions and could result in 'overpayment' is known (Jehiel, Moldovanu and Stachetti, 1996, Jehiel and Moldovanu, 2001), but the application of this idea to explain bidders discount in mergers was novel (see Molnar, 2001).[9] Fridolfsson and Stennek (2005), independently, develop a bargaining model with endogenous targets where the merger is expected and only the identity of the winner is unknown. The intuition is similar to the model in this paper. The firms will compete not to be left out from the merger. Their model explains how mergers can reduce profits and raise share prices. Their model assign all the bargaining power to the acquiring firm so targets receive their reservation values and buyers take the whole surplus. The empirical literature finds that most often the opposite happens. On average the target takes all the surplus.[10] In my paper, the target has all the bargaining power. In several cases this might be a more realistic assumption. Due to antitrust laws and credit market imperfection the set of potential targets is limited so the potential acquirers have to compete for the targets. In a follow-up paper, Akdogu (2003a) considers a reduced form model with exogenous targets and extends the model of the current paper to study a situation where multiple targets are available sequentially. If multiple targets are available, the preemption motives are attenuated by the possibility of imitation. In an empirical paper, Akdogu (2003b) finds empirical evidence for preemption in the telecom industry. She shows that the non-merging competitors of the acquirors earn significant negative returns at the announcement of their rivals' acquisitions and that the firms that choose to restructure through making acquisitions perform better than their unmerging counterparts during this time. These findings seem to be valid in a cross-industry study of this paper as well. Brito (2003) proposes a model where preemption occurs even without synergies. In a spatial competition model, if the number of mergers is limited it can be rational to preempt rival mergers because outsiders do not benefit equally. Brito's model, however, is not able to explain why acquiring firms' value decreases.

This paper is organized as follows. Section 2 presents a case study to motivate our analysis. In section 3, a theoretical model is presented with symmetric firms. In section 4, an event study is conducted to test the predictions of the preemption model. Section 5 concludes.

2 Case study

The events surrounding United Airlines takeover attempt of US Airways fit very well this paper's theory of preemptive mergers. On the 23rd of May 2000, United, the largest airline, announced a $4.3 billion bid in cash for US Airways,

[9] Norbäck and Persson (2004) consider an auction with externalities model and apply it to privatization and foreign competition. In Fishman (1988), preemption happens in the bidding phase through a jump bid. None of these papers explain bidders discount.

[10] See for a survey Andrade et al (2001).

the sixth-largest carrier on the domestic market.[11] The parent company of United, UAL Corp. agreed to pay $60 a share, a 130 per cent premium over the market price.

The merger of United and US Airways seemed like a perfect match with large synergies. United is primarily an east-west airline, while US Airways primarily flies north-south routes. The newly merged company would have nearly twice as many flights as its nearest competitors. According to industry analysts and especially to the managers of UAL, the acquisition of US Airways was a logical step for UAL. 'The US Airways route system fits very nicely with the United Airlines system.' 'If this deal goes through, it would turn the airline industry on its head.' James E Goodwin, chairman and chief executive officer of UAL Corporation, said 'As the first carrier with a strong presence across the US, United will be positioned to provide a competitive challenge in new areas. We have the financial strength and unencumbered assets to continue to grow the company.... In short, United and US Airways together will create a more efficient global airline network that can improve the quality of service for its customers.'[12]

On the day after the announcement, US Airways stock increased 86 per cent while UAL shares fell by nearly 12 per cent. The loss to UAL was approximately $400 million on that particular day.

Why did this happen? Although the proposed merger was likely to create cost savings and improve efficiency, the premium that UAL offered to pay for US Airways was simply much larger than justified by synergies expected by the markets. Then why did United enter into such a deal?

The preemption model suggests that UAL was rational to overpay for US Airways relative to the increase in the joint profits of the combined airlines. The loss in shareholders value compared to the pre-merger situation was less than the alternative if the merger was undertaken by one of the rivals, American or Delta.

Preemption theory suggests that as the acquiring firm's stock price falls, the rivals' stock prices should fall as well. In the case of the United-US Airways merger, the stock prices of UAL's two largest competitors – American (AMR Corp.) and Delta Airlines – dropped by 7.85 per cent and 6.79 per cent respectively. Meanwhile, less successful competitors' shares soared. These companies were expected to be potential targets and benefit from future takeovers. American West increased by 18.4 per cent, Alaska Air by 5 per cent, TWA by 12.5 per cent, Northwest by 20 per cent, Continental by 7 per cent. The NYSE value-weighted index increased by 0.9 per cent.

According to analysts, the merger offer would have sparked a bidding war for US Airways or a takeover attempt of other carriers. 'As United's closest competitor, this directly impacts American but it's a difficult deal to replicate.'[13] The value of the smaller airlines increased, as investors tried to guess which airline might see the next offer. One analyst predicted that the winner probably would pay more than $60 a share, while the loser would be left

[11] See CNN. (http://cnnfn.com/2000/05/24/deals/united)

[12] Source: http://biz.yahoo.com/prnews/000524/il_united_.html

[13] Source: CNN. http://money.cnn.com/2000/05/24/deals/united_merger

with a weaker position. 'I see this as a lose-lose situation', he said.[14] Analysts said that American Airline's reaction ultimately depended on whether the airline believed the United-US Airways merger would go through. According to analysts, possible scenarios included American buying Northwest, Continental or America West.[15]

3 Model

Consider first, the simplest and most extreme case to show that value-decreasing mergers could happen even with complete information[16] and rational, value-maximizing managers. Consider three symmetric, quantity-setting[17] firms that produce a homogenous product.[18] The game unfolds in two stages. At the first stage, firms 1 and 2 can place bids to purchase firm 3 in a sealed bid second price auction. Assume that the bidders know the valuations of each other. Firm 3 can accept one of the bids or decline them both. In the second stage, the market opens and firms choose the optimal output. Equilibrium prices, quantities, and profits depend upon whether or not a merger has occurred. Subgame-perfect Nash equilibrium is used as a solution concept. Thus, the analysis is conducted backward from the last stage to the first.

First, the payoffs of each firm are derived before and after the merger. Let P and Q denote respectively the price and quantity in the market. Suppose demand is given by a linear demand function, $P = a - Q$, where a is a positive constant. Assume if no mergers occur, each firm has a constant marginal cost $c \in [0, a)$ and no fixed costs. The subscript N (for no merger) will be used to denote outcomes in the market if no merger occurs. Let q_N denote the output per firm and π_N denote the profit per firm. These can be calculated as

$$q_N = \frac{(a-c)}{4} \tag{3.1}$$

$$\pi_N = \frac{(a-c)^2}{16} \tag{3.2}$$

If either firm 1 or firm 2 merges with firm 3 the marginal cost of the merged firm drops by $s \in [0, c)$ represents the level of cost synergies that result from the

[14] See CNN. (http://cnnfn.com/2000/05/24/deals/united)

[15] The Department of Justice finally blocked the proposed United-US Airways mergers.

[16] Incomplete information could make the bidding strategies more complicated but our main intuition still remains valid. See papers by Jehiel and Moldovanu (2000) and Molnar and Virag (2002) for further discussion of auctions with externalities under incomplete information.

[17] The calculations and results are qualitatively similar in case of product-differentiated Bertrand competition as well. The results are available upon request from the author.

[18] For the preemption theory the merger does not have to be horizontal (within the same industry). The only requirement is that it has to result in large enough synergies for the merged firm (and potentially for the rivals too) to make the product-market rivals worse off after the merger. So the theory works also in case of technology transfer.

merger. The other firm would continue to have cost c. Synergies are treated as exogenous in the model. Merger could be induced either by new synergies emerging from technological innovations, deregulation or negative demand and cost shocks that decrease the profitability benchmarks.

Subscript w (for winner) is used to denote the value of the merged firm and subscript l (for loser) is used to denote the value of the other firm in the resulting market equilibrium after a merger occurs. Let q_w (q_l) and π_w (π_l) denote, the output and profit of the merged (non-merged) firm if a merger occurs. Their values can be derived

$$\pi_w(s) = \begin{cases} \frac{(a-c+2s)^2}{9} & \text{if} \quad s \leq a-c \\ \frac{(a-c+s)^2}{4} & \text{otherwise} \end{cases} \tag{3.3}$$

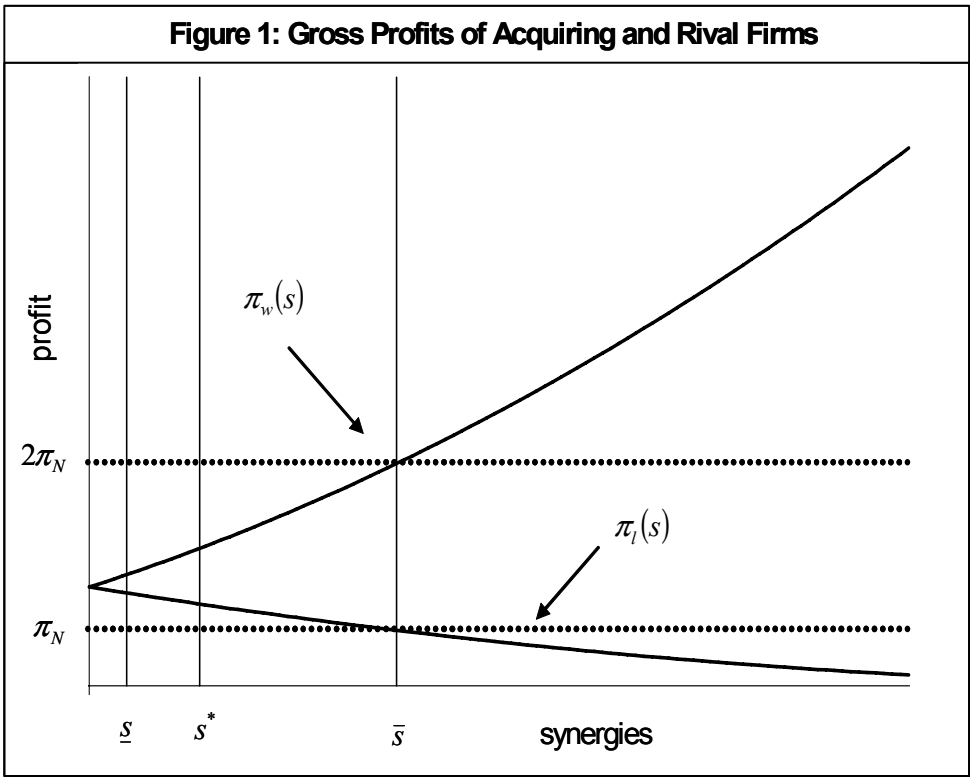
$$\pi_l(s) = \begin{cases} \frac{(a-c-s)^2}{9} & \text{if} \quad s \leq a-c \\ 0 & \text{otherwise} \end{cases} \tag{3.4}$$

When $s \leq a-c$, the cost advantage of the merged firm is small enough that both firms survive in the resulting equilibrium. In contrast, when $s \geq a-c$, the cost advantage of the merged firm is so large that the non-merged firm exits the market in equilibrium.

For ease of exposition, assume that the bidding process is a second-price sealed-bid auction. In the case of two bidders, the second-price sealed-bids auction is always strategically equivalent to the ascending auction. The auction hypothesis is justified in large, public takeovers. According to the New Palgrave dictionary of Law and Economics (1998): 'Under Delaware law (the predominant corporate law in the US), when a potential acquirer makes a serious bid for a target, the target's board of directors is required to act as would 'auctioneers charged with getting the best price for the stock-holders at a sale of the company." Legislators assume that takeover auctions are similar to the classic English auction, which is efficient and generates high revenues. However, takeover auctions differ from the classic English auction in several aspects. This paper will concentrate on one aspect, the effect of the competition that follows the auction.

3.1 Analysis of pre-merger and post-merger gross profits

It will be useful to begin by studying the post-merger profit functions, $\pi_w(s)$ and $\pi_l(s)$. For simplicity, assume synergies are not too high ($s \leq a-c$) to rule out monopolized post-merger market. With monopolized post-merger market the analysis would be the similar but in reality these mergers would be probably blocked by the antitrust agencies. Figure 1 illustrates these functions. Recall that π_N is the profit that a firm will earn in the three-firm Cournot equilibrium. The values of π_N and $2\pi_N$ are marked on the vertical axis since these are relevant comparison points for various calculations. These are equal to, respectively, $\frac{(a-c)^2}{16}$ and $\frac{(a-c)^2}{8}$.



Lemma 3.1 *The incentives of firm* 1 *and firm* 2 *to bid for firm* 3 *will be affected by the size of synergies* (s)*. There are three qualitatively different cases. For small synergies* ($s \leq \underline{s}$)*, the merger of firms* 1 *or* 2 *with firm* 3 *will reduce the joint profit of the merged firms. Therefore there is no incentive for either of the firms to bid. When* $\underline{s} \leq s \leq s^*$*, a merger would increase the joint profit of the merged firms but it would increase the profit of the non-merging firm even more. Although both firms* 1 *and* 2 *are willing to acquire firm* 3*, they both have incentive to wait for their rival to acquire firm* 3*. For large synergies* ($s \geq s^*$)*, the merged firms' joint profits increase more than the non-merging firm. Therefore, both firm* 1 *and firm* 2 *would prefer to purchase firm* 3*.*

Proof. Over the range $[0, (a-c)]$, $\pi_w(s)$ is an increasing quadratic function that takes values between $\frac{(a-c)^2}{9}$ and $(a-c)^2$. Since $\pi_w(s)$ is less than $2\pi_N$ at $s = 0$ and greater than $2\pi_N$ at $s = (a-c)$, there is a unique value of s between these two values such that $\pi_w(s) = 2\pi_N$. Let $\underline{s}$ denote this value. From (2) and (3), $\underline{s}$ is equal to $\underline{s} = \left(\frac{3\sqrt{2}-4}{8}\right)(a-c)$.

Now consider $\pi_l(s)$. From (4), $\pi_l(s)$ is a decreasing quadratic function over the interval $[0, (a-c)]$ that begins at the value $\frac{(a-c)^2}{9}$ and ends at the value 0. Since $\pi_l(s)$ is greater than π_N at $s = 0$ and less than π_N at $s = (a-c)$, there is a unique value of s between these two values such that $\pi_l(s) = \pi_N$. Let $\overline{s}$ denote this value. From (2) and (4), $\overline{s}$ is equal to $\frac{(a-c)}{4}$. Note that $\overline{s}$ is greater than $\underline{s}$. Figure 1 is drawn to reflect this fact.

To interpret Figure 1, consider first the case where there are no cost synergies from the merger so that $s = 0$. In this case, the effect of the merger

is simply to turn a three-firm symmetric oligopoly into a two-firms symmetric duopoly. The profit per firm goes up. However, the joint profits of the two merged firms are lower and the profit of the non-merged firm will be higher as Salant et al (1983) showed. As the level of cost synergies, s, begins to grow, another effect comes into play. After the merger, the merged firm becomes more efficient because of the synergies. This will increase the merged firm's profit but decrease the rival firm's profit. For small synergies ($s < \underline{s}$), a merger decreases the joint profit of the merging firms and increases the profit of the rival firm. At $\underline{s}$, the effect of s is large enough so that the profit of the merged firms' is exactly equal to the joint profits of the two firms if no merger occurs. At $\underline{s}$, the rival firm is still better off if the merger occurs. In this case, the free rider problem described first by Stigler (1950) arises.

Figure 1 also shows that at $\underline{s}$, the rival firm earns positive profit due to the reduction in market output. As s grows above $\underline{s}$, the gain of the merged firms increases and the gain of the non-merged firm decreases. At $\overline{s}$, the unmerged firm's gain is zero. Therefore, there must be a unique value of s between $\underline{s}$ and $\overline{s}$, denoted s^*, such that the joint gain of the merged firms is precisely equal to the gain of the non-merged firm. The value of s^* is determined implicitly by $\pi_w(s) - 2\pi_N = \pi_l(s) - \pi_N$. Substitution of (2)–(4) into this equality and reorganization yields that s^* is equal to $s^* = \left(\sqrt{\frac{19}{16}} - 1\right)(a - c)$. ■

3.2 Equilibrium of the bidding stage

To find the optimal bid, suppose firms 1 and 2 submit bids for firm 3 through a sealed-bid second price auction. Both firms can submit bids. If at least one bid exceeds the reservation price, the highest bidder wins the target firm and pays the second highest bid. If the bidders submit equal bids, the seller randomizes and each firm can purchase the target with equal probability. The target firm's board and managers are constrained in their ability to set a reserve price, because it is their legal duty to maximize the revenue to target shareholders. Here, for simplicity, assume that the target cannot commit to any reserve price higher than its stand-alone profit. As we will see, if the synergies are large enough ($s > s*$) and symmetric then the target can extract the entire surplus from the competing bidders even without a reserve price.[19]

If firm i wins the auction, its payoff will be the profit of the more efficient merged firm ($\pi_w(s)$) net of the price it has to pay for the takeover of the target. If firm i loses the auction, its payoff will be ($\pi_l(s)$). If synergies for the acquiring firm are high enough ($s > \overline{s}$), $\pi_l(s)$ is lower than the pre-merger profit.

The weakly dominant strategy is to bid the true value in second price auctions. Firm i's maximum willingness to pay for the target depends on the size of s. If $s < \underline{s}$, the merger is unprofitable so the optimal bid is zero. If $\underline{s} < s < s^*$, the merger is profitable but even more so for the rival. The

[19] Inderst and Wey (2004) consider a case when the target can commit to a higher reserve price. If synergies small ($\underline{s} \leq s \leq s^*$) or large but asymmetric the optimal reserve price could help the target to extract more of the surplus.

maximum bid will equal the reservation price and firms will mix between a zero bid and bidding the reserve price. If $s^* < s$, the merged firm benefits more from mergers than the non-merging rival. In this case, the maximum amount that firm i will be willing to pay is the profit in the case of winning the auction minus the profit if it loses. As s increases, the profit of the non-merging firm decreases. The maximum amount that either firm will be willing to bid is increasing in s. If $\overline{s} < s$, the profit of the non-merging firm is smaller then its original profit. Lemma 2 describes the pure strategy equilibria:

Lemma 3.2 *There are two weakly dominant, asymmetric pure strategy bidding equilibria. If* $s \in [0,\underline{s}]$ *, no merger will take place in equilibrium. If* $s \in [\underline{s}, s^*]$*, firm 1 will always bid the reservation price and firm 2 will bid zero, or vice versa in the other equilibrium. If* $s \in [s^*, c]$*, both firms will bid* $\pi_w(s) - \pi_l(s)$ *in every equilibrium.*

Proof. Assume that firm j follows the above described bidding strategy. First consider the case when $s > s^*$. Bidding $\pi_w(s) - \pi_l(s)$ is a weakly dominant strategy. Any bid higher than this has a chance of winning the auction and paying a higher price than the value of the merger for the bidder. Any bid lower than this has a chance of foregoing profitable takeover opportunities.

If $\underline{s} < s < s^*$ and firm j bids at or above the reserve price, then firm i's best response is to bid zero, since the losing bidder is better off. Given that firm i's bid is zero, firm j cannot do any better than bid the reservation price and go through with the takeover.

If $s < \underline{s}$, firms will not bid, since if they win they would be worse off than in the pre-merger situation. ■

Lemma 3 describes the weakly dominant symmetric mixed strategy equilibrium.

Lemma 3.3 *The only weakly dominant, symmetric equilibrium is a mixed strategy equilibrium. The equilibrium symmetric bidding strategies are similar to the asymmetric case if* $s^* < s$ *and if* $s < \underline{s}$*. Within the region* $\underline{s} < s < s^*$ *the bidders are mixing between bidding* 0 *or* π_N *with probability* $x(s)$ *and* $1 - x(s)$ *respectively. The equilibrium bidding strategies are:*

$$b_i(s) = \begin{cases} \pi_w(s) - \pi_l(s) & \text{if} \quad s^* < s \\ \begin{bmatrix} \pi_N & : & [1 - x(s)] \\ 0 & : & [x(s)] \end{bmatrix} & \text{if} \quad \underline{s} < s < s^* \\ 0 & \text{if} \quad s < \underline{s} \end{cases}$$

where $x(s) = \frac{\pi_N - (\pi_w(s) - \pi_l(s))}{\pi_w(s) + \pi_l(s) - 3\pi_N}$.

Proof. Assume that firm j follows the above bidding strategy. We show that in this case firm i has no incentive to deviate from this strategy.

First consider the case where $s > s^*$, then $\pi_w(s) - \pi_l(s) > \pi_N$. Then bidding $\pi_w(s) - \pi_l(s)$ is a weakly dominant strategy.

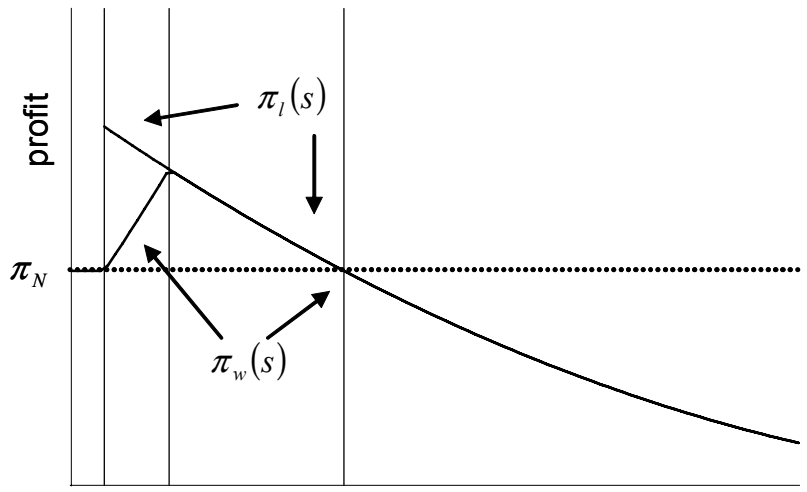
If $\underline{s} < s < s^*$, the mixed strategy equilibrium is bidding π_N with probability $x(s)$. This probability makes firm i indifferent between bidding π_N or any lower

amount.[20] Bidding any higher amount is unprofitable because firm i would be better off if its rival wins ($\pi_l(s) > \pi_w(s) - \pi_N$). Bidding strictly zero might lead to no takeover to happen, which means that firm i would forgo some profit opportunity ($\pi_w(s) > 2\pi_N$).

If $s < s^*$, firm i is better off not winning, so it will bid zero. ■

Figure 2 illustrates the values of the firms after the merger. The losing firm's net value is $\pi_l(s)$. The winning firm's net value is its post-merger profit minus the price it pays for the target, $(\pi_w(s) - \max(\pi_w(s) - \pi_l(s), \pi_N))$.

Figure 2: Net Profits of Acquiring and Rival Firms



If synergies are small ($s < \underline{s}$), no merger occurs and the net profits of the firms are the same as in the original situation, (π_N). If $\underline{s} \leq s \leq \overline{s}$ and merger occurs, the net value of the 'losing' firm (denoted with solid line in Figure 2), is higher than the pre-merger profit and decreases as the synergy increases. If synergies are large ($s > \overline{s}$), the 'losing' firm's value after the merger is lower than before. The net value of the 'winner' is increasing with the size of the synergy if $\underline{s} \leq s \leq s^*$. If $s > s^*$, the net profit of the 'winning' firm is decreasing in s and, for identical synergies, it is going to be equal to the net profit of the 'losing' firm. The reason for this is that in order to win the auction, the 'winner' has to bid up to the value of the 'losing' firm, which is the same as the value of the 'winner'. If $s > \overline{s}$, both the 'winner' and the 'losing' firms end up worse off than they were before the merger.

Proposition 3.4 *Rational value-decreasing mergers occur if firm i wins the auction, and preempts its rival, but the post-merger profit of firm i minus the price paid for the target is lower than the original profit. This can happen if synergies are large* ($\overline{s} < s$).

[20] The mixed strategy of firm j (bidding 0 with probability x and bidding π_N with probability 1-x) has to make firm i indifferent between bidding 0 or π_N and vice versa: $\left(x + \frac{1-x}{2}\right)(\pi_w(s) - \pi_N) + \frac{1-x}{2}\pi_l(s) = x\pi_N + (1-x)\pi_l(s)$.

Proof. Value-decreasing mergers mean, by definition, that the difference between the profit of the firm after the merger and the price paid for the target firm is lower than the original value of the firm, $(\pi_w(s) - \max(\pi_w(s) - \pi_l(s), \pi_N) < \pi_N)$. This condition simplifies to $\pi_l(s) < \pi_N$ when $s^* < s$ (otherwise $\pi_w(s)$ would be always greater than $2\pi_N$ if the merger occurs). As previously established, this condition holds if $\overline{s} < s$. ■

Corollary 3.5 *If rational value-decreasing mergers take place, the value of the rival will also decrease.*

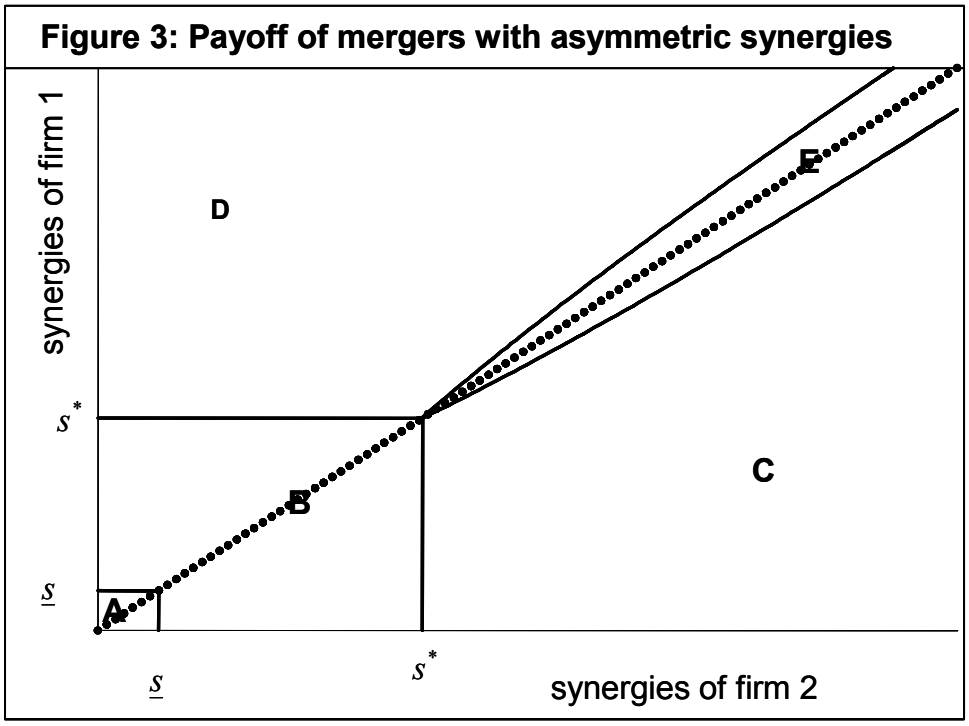
If the synergies and the firms are initially identical, their post-merger payoffs will be identical also if $s > s^*$.

It is easy to extend Proposition 3.4 for the stock market valuations. The stock-market value of the firms should be equal to their expected discounted cash-flow under that under the efficient markets/rational expectations hypothesis. Assume zero discount rate without loss of generalization. In this case, if the shock is unexpected then the initial stock price value should be equal to the initial profit π_N. If a large shock $(\overline{s} < s)$.occurs and the market learns about it through the merger activity the stock price should adjust to $\pi_l(s)$ for both the acquiring and the rival firms.

If the shock was initially expected and only the realization is revealed through the merger activity then the initial stock price value would be $E(\pi_l(s))$ and the stock price should adjust to $\pi_l(s)$ for both the acquiring and the rival firms. Depending on the distribution of the potential values of the shock, the announcement return $(\pi_l(s) - E(\pi_l(s)))$ could be positive or negative. However, in either case if the firms are identical initially the sign of their announcement return will be identical as well.

3.3 Discussion

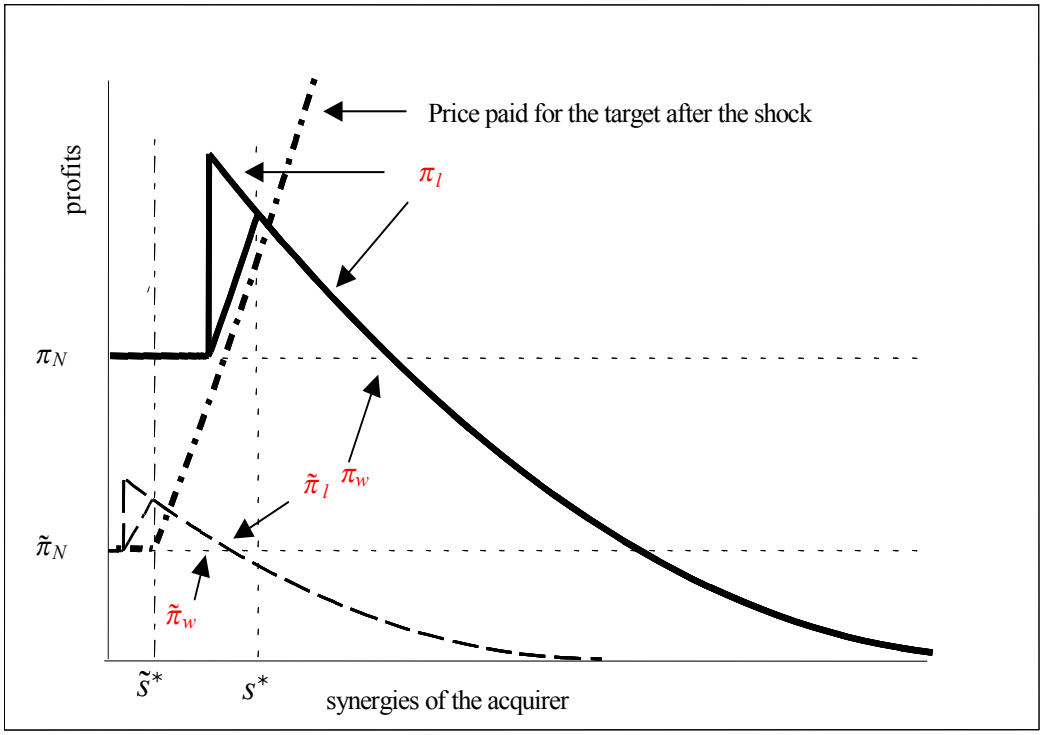
There are several possible extensions of the model presented in the previous section. An earlier version of this paper considered the case where synergies are not identical. In this case, preemptive mergers occur only if the size of the potential synergies are similar among the potential acquirers and the bidding is competitive. Figure 3 illustrates when preemptive mergers can happen.



As it was shown in Molnar (2001), for given demand and cost parameters, the potential synergies fully determine the post-merger payoffs of the acquiring and non-acquiring firms. The acquiring firm is always the firm with the largest synergies. In Figure 3, below the 45 degree line, the acquirer is always firm 1 and above it is always firm 2. In area A, no mergers happen. In area B, mergers are profitable and increase the rival's payoff as well. In areas C and D, the acquirer's payoff increases but the rival's payoff falls. Finally, in area E, where the acquiring firms' potential synergies with the target are sufficiently similar, each firm's payoffs falls.

Synergies can be interpreted not only as random technological innovation but also as exogenously given gains from the lower capacity, etc. In this case, demand or cost shocks can change the benchmark values (ie s^*) and make a previously unprofitable merger profitable. Assume that in the initial situation, firms are symmetric and the synergies are lower than the markup where mergers occur with probability one ($s < s^*$). If a demand shock occurs and the demand decreases, the value of the benchmark decreases as well ($\tilde{s}^* < s^*$) and there could be situations where the under the new circumstances the probability of merger becomes one ($i.e.$ $\tilde{s}^* < s < s^*$) .Figure 4 illustrates a situation like this.

Figure 4: Net Profits of Acquiring and Rival Firms After a Demand Shock



The original net profits of rival and acquiring firm before the demand shock depicted by the thick solid lines on the top. The new net profit lines after the demand shock depicted by the dashed lines on the bottom. If the original synergies where anywhere between $[\,\tilde{s}^*, s^*]$, in the original case a merger could not occurred (in the mixed strategy equilibrium both player could have played the no merger strategy) while after the demand shock the merger benefits the acquiring firm more ($\tilde{s}^* < s$) so the merger would occur for sure. The target could still get some premium over its original profit (π_N) but both the acquiring and the rival firm will lose and even the joint profit could go down relative to the original situation. If the demand shock was unexpected and the merger occurred relatively quickly before the market could observed the demand shock the stock prices of both the acquiring and rival firms would drop.

One can consider other extensions such as a price-competition with differentiated products, sequential bidding model, repeated interaction or higher number of firms with endogenous mergers. Neither of these extensions change the main predictions. In a Bertrand competition, mergers are beneficial even in case of the smallest synergies so the preemption effect is larger. With sequential bidding and endogenous mergers merging is still a dominant strategy. If the game is infinitely repeated several other no merger equilibria exist but merging is still an equilibrium. If the game is infinitely repeated one can consider a model similar to the collusion model in Rotemberg-Saloner (1986). In the proposed model, colluding means no merger when synergies are too large and symmetric. This could break down (assuming that side payments and enforcing contract are not possible) at the end of high demand periods when synergies are large or in cases of negative cost shocks. Such a

modification of our base model would predict merger waves just like the model presented in Rhodes-Kropf and Viswanathan (2002).

The extension to other oligopoly models is quite straightforward. The above predictions hold in every case when the merger's synergies make the rivals worse off. Incomplete information about the synergies of the rivals or of their own would make the model only more realistic but the prediction would not change qualitatively.

4 Empirical tests

4.1 Testable implications of the preemption theory

The previous sections showed that under some circumstances, profit-maximizing managers pursue value-decreasing mergers to avoid bigger losses. This subsection discusses the effect of these mergers on the stock prices of the acquirer and of the rival firms to motivate the empirical tests.

In the model, the pre-merger profits of the firms were compared to the post-merger profits. If large cost synergies existed the post-merger net profits could be lower than the pre-merger ones. If synergies of mergers and potential merger would be observable then one could state the prediction of the preemption model in terms of them. Unfortunately, these are not observable in most of the cases. However, under some assumptions changes in future profits should have some implications for the stock prices which are observable.

Generally, mergers can convey several types of information and not all of these are always unexpected. First, there is news that mergers can happen in the industry. In the model a merger attempt became rational if high synergies emerged (eg technological innovations, deregulation) or if the benchmarks were lowered (through negative demand and cost shocks). Second, there is news concerning the identity of the merging parties and the price paid. Third, mergers can signal future mergers, and cause revisions in the value of all firms in the industry.

In the empirical test, it is assumed that even if the market expects that some shock can occur, the realization of the shock is observed first by the managers of the firms. Before the market could observe the realization the managers can react to the shocks and pursue takeovers. The market learns about the realization of the shock through the takeover activity. For purposes of generating predictions to test the preemption theory, this paper assumes that all of this information is incorporated into stock prices in a short time period around the day of the announcement.

Under the efficient markets/rational expectations hypothesis, stock prices reflect the combined effect of all changes in the firms' expected future cash flows. The cumulative abnormal stock returns measure the revisions of expectations of future performance. Merger related changes in product or factor prices change the expectation of future performance and so those changes should change the valuation to the bidder, target and rival firms competing

in the same markets. Therefore the implications of the preemption theory are stated in terms of the observed cumulative abnormal returns of the related firms at the announcement date. Before formulating hypotheses based on this theory, it is useful to state two implications of the standard neoclassical merger theory.

Hypothesis 1. *(Due to the standard assumptions of value maximization and rationality of managers): The combined value of the acquiring firm with the target firm increases at the announcement of the merger.*

This hypothesis follows from standard assumptions, in particular from the value-maximizing behavior of the managers. Takeovers should be treated similarly to any other investment decision. Thus there should be a positive gain from the acquisition. This gain can be the result of either increased market power, collusion or the prevalence of efficiencies.

The distribution of the gain however is a different question. It depends on the competitiveness of the takeover market. According to the collusion and the usual efficiency theories, the acquiring firm should at least break even, regardless of the level of competition. Negative abnormal returns are considered in the literature as evidence of behavior not consistent with value maximization by the management of acquiring firms. The simple preemption model presented in this paper predicts that the combined value of the firms should increase at the announcement of the merger. However, if we consider that submitting a bid could reveal negative news about the industry (cost or demand shocks), preemption can also result in a decrease in the aggregate value of the merging companies. Moreover, the short run effect of merger arbitrage, described by Mitchell, Pulvino and Stafford (2002) can explain half of the negative abnormal return of the acquirers in stock acquisition. If one consider the effect of short run merger arbitrage, the acquiring firms' abnormal return would be less negative, and the combined value of the acquiring and target firms would increase more as well.

Hypothesis 2. *(Due to the standard assumptions): The value of the acquiring firm on average does not decrease at the announcement of the merger. The alternative theories (hubris, agency and preemption theories) postulate that acquiring firm may suffer substantial losses.*

The preemption theory, along with the efficiency theories, assumes value-maximizing behavior of the acquiring mangers but accounts also for the externalities created by the merger to the rivals. Because of these external effects, competition for the target firms is more fierce, and acquiring firms can sometimes "overpay" rationally. But since those external effects resulted from efficiencies, rivals firms should also be worse off after the takeover takes place. If the acquiring firm's stock price increases at the announcement this could be either because the merger has large and asymmetric synergies (no other competitor firm could realize the same synergies, so they could not bid up the price of the target either) or because the merger increased the market concentration and the possibility of collusion. In the first case, the rival firms' profitability and stock price would be diminished by the appearance of a more efficient merged firm. In the second case, the rival firms would benefit from the more concentrated market and higher prices.

Hypothesis 3. *(Due to preemption theory): If the value of the acquiring firm decreases, then the value of the rival firms should decrease as well.*

The model described in this paper is a one shot game. More interesting cases would include the possibility of future mergers. Mergers can also signal future takeovers and future targets. Given that targets usually benefit from takeovers, the expectations of a rival firm being a future target can offset the negative effect of the current merger. *Hypothesis* 3 should hold only for rivals not expected to be future targets. If the motive of the merger is to increase market concentration instead of realizing synergies, smaller (more likely takeover targets) firms would not benefit as much as bigger firms (less likely takeover targets). So when the acquiring firms stock price increases after the merger we would not expect future takeover targets to have significantly larger abnormal return than other rivals.

Hypothesis 4**.** *The acquisition probability hypothesis predicts that if the acquiring firm's value decreases, then the observed abnormal return of the rivals should be related to the expectation of the rival being a future target. If the acquiring firm's value increases this link should be less significant.*

Table 1 contains a summary of the predictions of each model.

Table 1: Summary of Predictions of the Theories

	Return for acquirers	Return for rivals
Collusion	positive	positive
Efficiencies	positive	negative
Efficiencies with "acquisition probability"	positive	positive for future targets
Hubris and Agency	negative	positive or no effect
Inefficient markets	negative	no effect
Merger arbitrage	negative	no effect
Preemption	if positive if negative	either negative
Preemption with "acquisition probability"	if negative	positive for future targets

4.2 Data

The data used to develop the acquisition sample is obtained from the Security Data Corporation (SDC) database, the Center for Research in Security Prices (CRSP) database, and Compustat. We focused on mergers where both the acquirer and the target are publicly traded US firms. The preliminary sample included all mergers and acquisitions announced between 1985–2001 where both the target and the acquiring firms were listed on either the New York (NYSE), American (AMEX) or Nasdaq Stock Exchange and have stock returns for the estimation period on the CRSP tapes. The objective is to consider takeovers that could result in significant amount of synergies. Large horizontal (within industry) mergers are expected to have higher level of synergies. Accordingly, only large horizontal mergers were considered. Mergers where the target and acquiring firms' primary four-digit SIC codes (reported by SDC) are identical are classified as horizontal mergers. In addition, the acquisition must have been accomplished in one transaction where 100 per cent of the shares

were acquired and the result was a 100 per cent ownership of the target and the deal value had to be more then 100 million dollar. Acquisitions involving regulated firms such as banks, utilities and railroads were excluded.

The rivals were also identified by the primary four-digit SIC codes from CRSP.[21] All rivals must have been listed on either the New York (NYSE), American (AMEX) or Nasdaq Stock Exchange. The final sample contains 135 mergers with overall 6989 rival firms. These are all very big mergers, which significantly changed the landscape of their industry. The sample is smaller than the population mainly because of the requirement that both the target and the acquiring firms' and at least one rival firm's stock return should be available for the analysis. The average number of rivals for each merger is 51.77. Table 2 lists the number of horizontal acquisitions in the sample by year.

Table 2: Horizontal mergers and rivals in the sample by year (1985-2001)

Year of the merger	Number of mergers	Number of rivals	Average number of rivals
1985	1	1	1
1987	2	66	33
1989	1	3	3
1993	1	3	3
1994	2	14	7
1995	10	319	31.9
1996	8	141	17.62
1997	17	1170	68.82
1998	26	1389	68.83
1999	26	1168	44.92
2000	26	2006	77.15
2001	15	709	47.27
Total	135	6989	51.77

The cumulative abnormal return of the acquiring, target, and rival firms are derived using standard event study methodology (see eg Eckbo (1983) and Stillman (1983)). First, the benchmark return is estimated using the market model.

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \epsilon_{i,t}$$

where $R_{i,t}$ is the actual return on security i on day t, $R_{m,t}$ is the return on the market portfolio, and $\epsilon_{i,t}$ is the zero mean disturbance term. In this study the CRSP equal-weighted[22] market index is used to proxy for the market return.

As it is standard in the literature, ordinary least squares estimation is conducted for each security in the sample, using 170 daily returns observation from day –230 to day –60 prior to the merger announcement. Under general conditions, ordinary least squares is a consistent estimation procedure for the market model parameters. Using the estimated parameters of the market

[21] Kahle and Walkling (1996) finds that there are substantial differences between SIC codes designated by Compustat and CRSP. We have found that differences exist between SDC and the other two as well. The rivals were matched to the CRSP SIC code of the acquiring firm.

[22] Results are qualitatively the same with using the value-weighted CRSP index.

model, abnormal returns were estimated in four event windows, $(-20, +20)$, $(-10, +10)$, $(-5, +5)$ and $(-1, +1)$ around the announcement date. The announcement date is the first date when the merger was publicly announced according to the SDC database. For testing for the significance of the cumulative abnormal returns a test statistic described in Campbell, Lo and McKinlay (1997) were used

$$J_2 = (\frac{L_1 - 4}{N(L_1 - 2)})^{1/2} \sum_{i=1}^{N} \frac{\widehat{CAR_i}(\tau_1, \tau_2)}{\widehat{\sigma}_i(\tau_1, \tau_2)}$$

where L_1 is the size of the estimation window, N is the sample size, $\widehat{CAR_i}(\tau_1, \tau_2)$ is the cumulative abnormal returns of each firms, and $\widehat{\sigma}_i(\tau_1, \tau_2)$ is the estimated variance.

To test our hypotheses, we need to control for the expectations of a rival being a future target. Song and Walkling (2000) have found that the cross-sectional variation of rival abnormal returns in the event window is systematically related to variables associated with the probability of acquisition. Similarly to their findings, in our sample, target firms are significantly smaller than the other firms in the industry (Table 3.) They haven't found any of the above differences to be significant between initial industry targets and those rivals that become targets themselves within one year. The firms market values and book value to market value ratios were used as controls for the expectations of being a future target. All financial data were collected from Compustat using values from the fiscal year before the acquisition attempt on the initial target firm. Table 3 contains the summary statistics of the variables for the acquiring, target and rival firms.

Table 3: Summary Statistics of CompuStat Variables

	Sample Size	Total Asset ($ million)	Sales ($ million)	Market Value ($ million)
Acquiring firms	135	4961.06	4454.45	17617.4
		(698.44)	(665.54)	(5424.22)
Target firms	135	1003.83	1139.06	1125.17
		(237.15)	(352.73)	(235.73)
Rival firms	6989	1532.26	1070.54	3460.39
		(93.29)	(75.28)	(241.61)
Rivals became target	1591	1017.93	623.97	1177.79
		(194.19)	(81.55)	(115.09)
Rivals didn't become target	5398	1683.85	1202.15	4133.85
		(106.29)	(94.38)	(310.23)

The brackets contain the standard deviations.

In our sample, 22.8 per cent of the rivals became targets later and were delisted according to the CRSP. The results of Song and Walkling (2000) were reproduced but the explained variance of the data was still quite low. Because of that, a dummy variable for 'future target' was included in the cross-sectional regressions, which (assuming that the market is on average correctly predicting

future mergers) has value one if the rival was delisted due to a merger and zero otherwise. Since our sample contains very recent acquisitions, truncation is a problem. In the most recent cases the market predicted mergers may still not have materialized.

Some rivals may not be affected by the merger by the same extent as others. To separate between the rivals, besides size and book-to-market value, we considered a dummy variable, 'state', with a value of 1 if the rival firm was from the same state (reported by SDC) as the acquiring firm. In many cases these firms' markets overlap in a larger extent than non-state rival. To have a more efficient competitor next door could be a bad news and cause a negative abnormal return at the announcement.

4.3 Univariate results

Table 4, Panel A shows the cumulative daily average abnormal returns to the acquiring, target and rival firms over 41, 21, 11, and 3 day periods, –20 through +20, –10 through +10, –5 through +5 and –1 through +1, relative to the event day of the first press announcement of the acquisition (reported by SDC). In cases of the rivals, to check the robustness of the results, we compute adjusted cumulative abnormal returns, which exclude the ten highest and the ten lowest abnormal returns.

Table 4: Cumulative Average Abnormal Returns for All Cases

Panel A reports average and median cumulative abnormal returns (CAAR and CMAR) of acquiring, target and rival firms in percentage. The sample consist of 135 acquiring and target firms in horizontal takeovers and 6989 rival firms during 1985-2001. The takeovers were identified by the acquiring and target firms' 4 digit SIC codes from the SDC Merger Database. The rivals were collected from CRSP Database also by their 4 digit SIC codes. Abnormal returns were estimated using the market model with the CRSP equal-weighted index as a proxy for market portfolio in four different event windows. "J2" is a normally distributed test statistic. Negative is the percentage of negative abnormal return. Adj. CAAR in case of the rivals excludes the ten highest and lowest CAAR. Panel B reports the value-weighted aggregate of the CAAR and CMAR of target and acquiring firms. Symbols ***, **, * indicate significance at 1, 5, 10 levels, respectively.

Panel A: Cumulative Average and Median Abnormal Returns

		N	(-20,20)	(-10,10)	(-5,5)	(-1,1)
Acquirers	CAAR	135	-3.78**	-3.95***	-3.93***	-3.2***
	J2		(-2.22)	(-3.08)	(-5.15)	(-7.07)
	CMAR		-3.5	-5.43	-3.63	-2.68
	Negative		57.78	61.48	65.93	66.67
Targets	CAAR	135	28.54***	26.58***	23.55***	21.57***
	J2		(17.19)	(22.21)	(27.4)	(47.15)
	CMAR		24.94	23.43	21.77	20.3
	Negative		6.67	5.93	8.89	9.63
Rivals	CAAR	6989	-0.47***	-0.6***	0.16	0.21*
	J2		(-2.7)	(-3.19)	(-1.51)	(1.91)
	Median		-1.68	-0.83	-0.7	-0.29
	Negative		52.67	52.07	52.5	52.17
	Adj. CAAR	6969	-2.44	-1.53	-0.38	0.09

Panel B: Value-Weighted Aggregate CAAR and CMAR of the Merging Firms

		N	(-20,20)	(-10,10)	(-5,5)	(-1,1)
Value-weighted CAAR of merging firms	CAAR	134[1]	2.61*	1.88*	1.02	0.71*
	J2		(1.705)	(1.723)	(1.292)	(1.725)
	CMAR		1.78	2.03	1.86	1.25
	Negative		46.00	45.00	41.00	44.00

1. One case is lost due to the missing market value of target firm.

The mean and median return to acquirers is significantly negative in every event window (Table 4, Panel A).[23] In contrast, stockholders of the target realize on average an abnormal return of 22–29 per cent, and these numbers are probably understated. Expectations and insider trading can cause an earlier price run-up. The announcement day return could also not incorporate all the potential change of valuations caused by the news. Institutional traders (large hedge or pension funds) who recognize their price impact can delay or slice up their demand to avoid sudden price increases. This is consistent with the fact that as the event window expands, the returns to target firms increase. Targets benefit more if the acquiring firm has a positive return. This is not in contrast with the predictions of preemption theory. Preemption suggest that targets are better off and acquirer are worse off if synergies are larger but only if there are other potential acquirers with similar synergies. If synergies are asymmetric, targets can extract only a smaller share of total gain but this could be still large if synergies are large. While there is little doubt on average that the target firms' stockholders benefit from mergers, the effect on rival firms is ambiguous. Over the shorter time period, rivals have a small and slightly significant positive abnormal return, but as the time period increases, the cumulative average abnormal return becomes negative. The median abnormal returns, however, are negative in every event window and 52 per cent of the rivals had negative return in every event window.

Table 4, Panel B shows the average aggregate abnormal change in the market value of the acquiring and target firms.[24] The combined value of the merging firms increases by 1–3 per cent in all examined time periods around the announcement date although it is significant only at the 10 per cent level.[25] This evidence shows that these mergers created synergies at least on average. *Hypothesis* 1 cannot be rejected. However, 41–46 per cent of the mergers have negative aggregate gain. This evidence suggest that some fraction of mergers may be driven by agency problems, hubris, or market inefficiency. Preemptive mergers can also decrease the total value of the firms if the takeover reveals a bad news about the future prospects of the whole industry (in the framework of the model, it could be a negative demand or cost shock). Merger arbitrage can also make the acquiring firms' abnormal return more negative in the short run.

Hypothesis 2 is rejected. Acquiring firms' cumulative average abnormal return is a significant –3–4 per cent. In more than half of the cases, the shareholders of the acquiring firms suffer losses. This fact contradicts the usual value-maximizing theories, but is in accord with the agency, hubris, market inefficiency, merger arbitrage and preemption theories and also consistent with the findings of the empirical literature. The significant and large positive abnormal performance of the target firms in response to the merger

[23] Moeller, Schlingemann and Stulz (2004) found similar returns for large firms acquiring public targets. (See their table 4.)

[24] The average aggregate abnormal change in the market value of the acquiring and target firms is calculated as the value-weighted sum of the abnormal returns of target and acquiring firms.

[25] These results are consistent with other findings in the literature. See Andrande, Mitchell and Stafford (2001). Hou, Olson and Robinson (2000) also find that synergies are positive using a long run approach.

announcement indicates that the announcement comes at least partially as a surprise.

Hypothesis 3 cannot be rejected. From Table 5, Panel *A* it is apparent that following value-decreasing horizontal mergers, non-merged firms are systematically earning negative abnormal returns. This is consistent with the prediction of the preemption theory but inconsistent with the predictions of the agency and hubris theories. Results from Tables 4 and 5, are inconsistent with the hypothesis that the rivals' excess returns are the same regardless of the acquiring firm's return, at every significance level for every event window. The hypothesis that the rivals' mean abnormal return are the same, regardless of the acquiring firms' abnormal return, can be rejected at a 1 per cent significance level.

The average value loss of the acquiring firms is \$238.29 million while the rivals lose \$29.12 million dollars over the $(-10, +10)$ time period around the announcement.[26]

One can object that it is possible that these firms are affected by the same unpredicted shock unrelated to the merger announcement. However, an overall industry shock would have harmed the less efficient, smaller firms in the industry more than the larger firms so the patterns of abnormal returns would be considerably different. Furthermore, to see if there were other shocks related to the industry on the announcement day the *Wall Street Journal Index* has been searched. We did not find any other major news than the merger related to the industry in either case.

Hypothesis 4 cannot be rejected. While on average the results in Table 5, Panel *A* support *hypothesis* 3, in more than 45 per cent of the cases rivals actually benefit from takeovers when the acquiring firms suffer losses. This fact again does not necessarily mean the failure of preemption theory in those cases. Song and Walkling (2000) find that 50–60 per cent of the rivals earn positive abnormal returns.[27] Their explanation is that the rivals earn abnormal returns because of the increased probability that they will be targets themselves. They show that rivals that become targets in subsequent years are significantly smaller and earn significantly larger abnormal returns at the initial acquisition announcement than other rivals. Table 5, Panel *A* shows the cumulative average abnormal returns of rival firms if the rival becomes a target later, and if it does not. Similarly to Song and Walkling's results, Table 5, Panel *A* indicates that the market forms expectations about the identity of future targets based on the current takeover. Rivals that subsequently become targets when the acquiring firm had negative abnormal return at the announcement enjoy significant positive return over the period of $(-20, +20)$, $(-10, +10)$ and $(-5, +5)$ and rivals that don't become future target suffer a significant loss in every event window.

[26]The value of the firms before the merger calculated as a product of the shares out-standing (from Compustat) and the stock price 30 days before the announcement.

[27]Their sample consisted of 141 unexpected, both horizontal and non-horizontal acquisitions and 2459 rival firms over the 1982–1991 period. They report that the abnormal returns to a portfolio of rivals average a significant 0.35 percent for the announcement period (–1,0) and a significant 0.56 percent over the expanded (–5,+5) event window. They have found that the higher the return for the target the lower for the rivals. They didn't examine the effect of the acquiring firms' return on the rivals' returns.

Table 5: Cumulative Average Abnormal Returns Partitioned by the Acquiring Firm's Return

This table reports average and median cumulative abnormal returns (CAAR and CMAR) of acquiring, target and rival firms in the subsample where the acquiring firms had negative (positive) returns in each of the (21,11,3) event windows in percentage. "J2" is a normally distributed test statistic. Negative is the percentage of negative abnormal returns. Adj. CAAR in case of the rivals excludes the ten highest and lowest CAAR.
Symbols ***, **, * indicate significance at 1, 5, 10 levels, respectively.

Panel A: Cumulative Average Abnormal Returns when the Acquiring Firm has Negative CAAR

		N	(-20,20)	(-10,10)	(-5,5)	(-1,1)
Acquirers	CAAR	60	-14.58***	-14.12***	-11.17***	-8.54***
	J2		(-5.84)	(-7.93)	(-9.42)	(-13.66)
	Median		-11.83	-11.69	-10.42	-7.83
	Negative		88.33	100	100	100
Targets	CAAR	60	23.07***	21.41***	20.32***	19.08***
	J2		(9.8)	(12.82)	(16.62)	(28.67)
	Median		18.76	18.6	14.48	19.34
	Negative		11.67	11.67	11.67	13.33
Rivals	CAAR	3392	-1.02***	-1.53***	-0.36***	-0.31***
	J2		(-4.29)	(-5.53)	(-3.03)	(-2.97)
	Median		-2.20	-1.60	-1.21	-0.84
	Negative		53.83	53.83	53.51	55.45
	Adj. CAAR	3372	-3.27	-2.71	-1.04	-0.42
Rivals that didn't become targets later	CAAR	2656	-2.65***	-2.69***	-1.07***	-0.53***
	J2		(-6.1)	(-7.25)	(-4.97)	(-4.02)
	Median		-3.22	-2.52	-1.90	-0.97
	Negative		55.35	55.46	55.61	56.21
	Adj. CAAR	2636	-4.98	-3.89	-1.80	-0.65
Rivals that became targets later	CAAR	736	4.86***	2.66***	2.20***	0.49
	J2		(2.39)	(1.98)	(2.93)	(1.24)
	Median		0.81	0.83	1.47	-0.45
	Negative		48.37	47.96	45.92	52.72
	Adj. CAAR	716	2.61	1.30	1.59	0.24

Panel B: Cumulative Average Abnormal Returns when the Acquiring Firm has Positive CAAR

		N	(-20,20)	(-10,10)	(-5,5)	(-1,1)
Acquirers	CAAR	23	16.74***	13.59***	8.88***	5.45***
	J2		(4.48)	(4.89)	(4.6)	(5.33)
	Median		10.33	10.70	6.77	2.72
	Negative		4.35	0	0	0
Targets	CAAR	23	29.98***	29.86***	26.78***	22.65***
	J2		(7.79)	(10.85)	(13.7)	(23.01)
	Median		29.26	29.15	26.60	22.33
	Negative		4.35	4.35	4.35	8.70
Rivals	CAAR	824	5.69***	3.85***	1.92***	0.92***
	J2		(3.03)	(3.99)	(3.55)	(4.13)
	Median		1.93	1.67	0.79	0.05
	Negative		46.12	45.02	47.33	49.03
	Adj. CAAR	804	3.6	2.92	1.59	0.72
Rivals that didn't become targets later	CAAR	589	3.80***	3.47***	1.89***	1.03***
	J2		(2.66)	(3.86)	(3.27)	(3.24)
	Median		1.79	1.71	0.86	-0.02
	Negative		46.35	45.33	46.52	50.08
	Adj. CAAR	569	3.57	3.11	1.65	0.82
Rivals that became targets later	CAAR	235	10.42	4.80	1.97	0.66**
	J2		(1.46)	(1.36)	(1.46)	(2.6)
	Median		2.36	1.65	0.47	1.01
	Negative		45.53	44.26	49.36	46.38
	Adj. CAAR	215	3.36	2.20	0.88	0.23

Table 5, Panel B, cannot reject the collusion hypothesis for the case of value-increasing mergers[28]. When the average of the acquiring firm's cumulative abnormal returns at the announcement is positive, rivals's enjoy a significant, positive abnormal return of 1–6 per cent. Both rivals who did not become targets and rivals who did become targets have positive return at the announcement. These results indicate that when acquiring firm's stock prices increases at the announcement of the merger, the anticompetitive motive of the mergers is stronger than the efficiency. When the mergers' motive is efficiency,

[28]For the collusion hypothesis see Eckbo (1983, 1985).

probably these efficiencies in most of the cases are not unique and the merger is contested by other rivals to the point that the acquiring firm has to 'overpay' for the target.

Table 6 and Table 7 displays the abnormal returns of acquiring and target firms by size (market value) quartiles and the returns of rivals by deciles. Large (compared to the acquiring firms) rival companies' abnormal return are on the same scale (–10–12 per cent) as acquiring firms' in case of value-decreasing mergers.

All of the results presented above indicates that the preemption theory can explain the observed data patterns.

Table 6: Cumulative Average Abnormal Returns of Acquiring and Target Firms sorted by Size

This table reports average and median cumulative abnormal returns in the (-10,+10) event window of acquiring and target firms sorted by the size of the firms in percentage. The firms are sorted into quartiles, increasing from Q1 to Q4, by market value. The market values of the firms are measured by the previous fiscal year ending stock prices and shares outstanding. "n" is the sample size in each quartile. MV is the average market value within the quartile in millions of $. Negative is the percentage of negative abnormal returns. Symbols ***, **, * indicate significance at 1%, 5%, 10% levels, respectively.

	Acquiring firms				Target firms			
group	n	MV (million $)	mean CAAR (median)	negative	n	MV (million $)	mean CAAR (median)	negative
Q1	34	518.51	-0.13 (-3.84)	55.88	34	103.11	29.91*** -29.13	2.94
Q2	34	2172.19	-5.57*** (-5.17)	61.76	34	246.71	29.57*** -23.46	2.94
Q3	33	5053.98	-5.57 (-7.73)	66.67	33	579.43	22.94*** -20.71	15.15
Q4	34	62355.4	-4.59** (-4.76)	61.76	34	3525.33	23.80*** -20.08	2.94
	Acquiring firms with negative returns				**Target firms of acquirers with negative return**			
group	n	MV (million $)	mean (median)	negative	n	MV (million $)	mean (median)	negative
Q1	21	597.92	-12.72*** (-11.50)	100	21	128.16	28.77*** -28.66	0
Q2	21	2394.69	-14.41*** (-11.93)	100	21	297.9	20.52*** -20.18	9.52
Q3	20	5122.46	-12.14*** (-11.10)	100	20	655.47	18.83*** -16.44	20.00
Q4	21	65367.25	-12.12*** (-8.63)	100	21	3277.54	24.97*** -23.42	4.76

Table 7: Cumulative Average Abnormal Returns of Rival Firms sorted by Size

This table reports average and median cumulative abnormal returns of rival firms in the (-10,+10) event window, sorted by size of the firms in percentage. Size is measured by the market value of the firm a month before the merger. The market value is increasing from group 1 to group 10. Rivals who became targets were found from the CRSP delisted files. Negative is the percentage of negative abnormal returns. "n" is the sample size. Symbols ***, **, * indicate significance at 1%, 5%, 10% levels, respectively.

	Rivals					Rivals who became targets					Rivals who did not become targets				
group	n	MV	median	mean	negative	n	MV	median	mean	negative	n	MV	median	mean	negative
1	699	31.36	-0.04	5.76***	50.07	159	34.8	3.43	6.87***	42.77	540	30.41	-0.90	6.00***	51.11
2	699	66.16	-0.68	1.10*	51.50	159	66.24	0.30	1.84	47.80	540	66.07	-1.50	0.22	53.70
3	699	111.82	-0.30	-1.36	50.50	159	107.71	2.05	1.39	47.17	539	113.49	-1.07	-1.9	51.58
4	699	178.04	0.56	2.49	48.21	159	153.98	2.88	9.59**	43.40	540	187.96	0.45	0.84	48.70
5	699	271.06	0.02	1.55	49.93	160	218.06	-1.28	-1.73	53.13	540	301.43	-1.06	-1.88	52.22
6	698	428.11	-1.42	-0.44	53.15	159	298.66	3.75	11.09***	40.88	540	485.57	-3.66	-3.40***	57.96
7	699	695.24	-1.29	-1.37**	53.22	159	457.22	1.25	5.83*	45.91	540	803.14	-1.28	-2.83*	52.78
8	699	1175.68	-0.99	-1.52*	52.07	159	689.8	-0.62	3.34	50.94	539	1385.63	-1.95	-1.89**	53.43
9	699	2664.16	-1.18	-5.48***	53.51	159	1308.98	0.63	-0.04	49.06	540	3251.28	-0.69	-5.60***	52.59
10	699	28865.15	-2.78	-6.75***	58.51	159	8419.72	-2.09	-0.042**	55.35	540	34556.56	-3.16	-7.36***	59.63
	Rivals return when the acquiring firm had negative return					**Rivals' return who became targets later when the acquiring firm has negative return**					**Rivals' return who did not become targets when the acquiring firm had negative return**				
group	n	MV	median	mean	negative	n	MV	median	mean	negative	n	MV	median	mean	negative
1	452	31.45	-0.32	7.00***	50.88	92	35.01	3.62	8.17***	43.48	360	30.59	-0.44	7.49**	50.83
2	451	66.51	-1.43	-0.00001	53.22	92	67.17	-0.95	0.50	52.17	359	66.28	-2.25	-0.92	55.43
3	452	111.25	-1.13	-0.025	52.88	93	107.97	2.07	2.47	45.16	360	112.63	-2.22	-3.52*	55.56
4	452	178.34	-1.32	1.15*	53.32	92	152.48	1.77	11.94	47.83	359	188.66	-1.42	-0.72**	52.92
5	452	274.3	-1.39	0.0015	53.98	92	213.47	-2.57	-4.46	56.52	360	303.89	-3.20	-4.36***	54.72
6	451	434.29	-1.72	-2.34***	56.10	92	293.93	3.22	14.39***	46.74	359	484.08	-5.84	-4.96***	63.23
7	452	707.85	-3.12	-3.15***	56.19	92	459.1	1.20	2.33	44.57	360	803.7	-4.75	-6.49***	57.78
8	452	1226.35	-3.03	-3.99***	56.42	93	707.78	0.91	8.49	46.24	359	1429.67	-3.36	-3.73***	57.66
9	451	2885.89	-4.24	-10.31***	61.64	92	1377.11	-1.59	-2.89	53.26	360	3458.63	-4.18	-10.87***	62.50
10	452	30405.6	-6.28	-10.91***	68.58	92	10706.76	-2.76	-7.50***	61.96	359	35209.44	-6.31	-11.77***	69.36

4.4 Cross-sectional regression results

This subsection reports the cross sectional results in detail. In Table 8 we regress announcement period abnormal returns of the rivals in the $(-5, +5)$ event window on acquiring, target and rival firms' characteristics. The observations of rivals' returns are independent across mergers, but not necessarily independent within a merger. Because of this reason, the standard errors from OLS estimation are understated. A mixed linear model was estimated (by SAS Proc Mixed) by using a method of restricted maximum likelihood.[29] The regression for the negative subsample is performing better (have lower Akaike's and Schwarz's information criteria score) than the regressions for the whole and for the positive subsample.

Table 8: Cross-sectional regression results

This table reports estimated regression coefficients. The dependent variable is the rivals' CAAR in the (-5,+5) event window. T-statistics are given in parentheses. "Future target" is a dummy variable with value 1 if the rival become target later, rival's market value is the market value one month before the acquisition, "r-t book to market" the rivals' and the targets' book-to-market value, "stock" is a dummy with value 1 if the merger was an all-stock merger, "time" is a dummy variable with value 1 if the merger happened after 1999, "nriv" is the number of rivals, "state" is a dummy variable with value 1 if the rival is from the same state as the acquirer.
Symbols ***, **, * indicate significance at 1%, 5%, 10% levels, respectively.

	Whole sample	When acquirers' return negative	When acquirers' return positive	When acquirers' return negative	When acquirers' return positive
constant	0.063	0.0797	-0.0431	0.0452	-0.0467
	(1.32)	(1.29)	(-0.95)	(0.85)	(-0.97)
future target	0.0204***	0.0162**	0.026*	0.0141**	0.0259*
	(2.97)	(2.35)	(1.89)	(2.15)	(1.86)
rival's market value	-0.0072	-0.0196***	0.0105*	-0.0183**	0.0105*
	(-0.94)	(-2.60)	(1.78)	(-2.45)	(1.82)
r-t book to market	0.002**	0.0032***	0.0002	0.0039***	0.0002
	(1.95)	(2.61)	(0.44)	(3.27)	(0.34)
stock	-0.0025	-0.008	0.0128	0.0033	0.0129
	(-0.16)	(-0.34)	(1.45)	(0.14)	(1.46)
time	-0.0066*	-0.0084*	0.0029	-0.0052	0.0032
	(-1.86)	(-1.92)	(0.82)	(-1.40)	(0.84)
number of rivals	0.0001**	0.0001**	0.00	0.0001*	0.00
	(2.37)	(2.07)	(0.19)	(1.96)	(0.24)
state	-0.0241**	-0.0318**	-0.0109	-0.0316**	-0.0108
	(-2.29)	(-2.28)	(-0.88)	(-2.45)	(-0.88)
acquirer's caar				0.1654**	-0.0121
				(2.18)	(-0.33)
Number of obs.	6989	4532	2431	4532	2431
AIC (smaller is better)	-155.6	-612.0	433.9	-621.7	437.8
BIC (smaller is better)	-152.7	-609.6	440.1	-619.2	439.6

As shown in Table 8, the estimated coefficients of the dummy for being a future target are positive and significant. They are more significant if the acquiring firm had a negative abnormal return at the announcement just as the preemption theory predicts (*Hypothesis* 3). Rival firms who became target later have significantly higher returns than the ones that did not (*Hypothesis* 4). There are big differences between the positive and the negative part of the sample. In the subsample where acquiring firms had negative returns most of the variables are significant but not in the positive part. The reason of this could be that while in the subsample with negative returns the efficiency seems to be the main driving force of acquisitions, in the positive subsample it could be either efficiencies or collusion. Clearly, these two motives have opposite implications for the rivals' returns and possibly cancel out each other in the sample. The effect of the market value of the rival is negative and the relative

[29] See SAS/STAT User's Guide, page 2661. http://support.sas.com/documentation/onlinedoc/91pdf

book-to-market value of the rival to the target has positive signs as predicted by the 'acquisition probability' hypothesis. (Firms with lower market value and higher book-to-market values are more likely takeover targets.) All-stock offers do not significantly change the return of the rivals. The time dummy is negative although not very significant. After 1999, the average of the rivals' return is generally more negative. The effect of number of rivals are small but significant in the negative subsample. The larger number of competitors could be a sign that other possible investment opportunities are present that can attenuate the preemption effect. The state dummy is significant in the overall and the negative subsample and has a negative sign. It seems that when the acquiring firm has a positive return being in the same state does not effect rivals' return. These findings are generally consistent with the preemption theory.

5 Conclusion

This paper gives an explanation for the apparent acquiring firms' value destroying of mergers keeping the assumptions of managers' rationality and value-maximization. The preemptive motive gives a strong reason for why value-decreasing mergers occur. If large cost savings can be achieved through a merger by several potential acquiring firms, these firms will compete for the opportunity to merge with the target. The winning firm who acquires the target could become a lower cost producer, improve its position and gain market share from its product market rivals. Intuitively, if a firm fears that one of its rivals will gain large cost savings or efficiencies from taking over some target, then it can be rational for this firm to preempt this merger with a takeover attempt of its own. By preempting the rival firm's bid, the acquiring firm avoids the larger loss of profits it would have suffered had its rival been successful, but its post-merger profit could still decrease relative to its pre-merger profit. This preemption can be optimal even if it requires the first firm to overpay relative to the increase in the joint profits of the combined firms. In this case, preemption decreases the net profits of both the rival and the merged firm

Empirical tests of this prediction are presented in the second part of this paper. Four hypotheses follow from the preemption theory. The profit-maximizing and the rationality hypotheses cannot be rejected on average but in several cases they seem to be false. These cases that cannot be explained by the simple value-maximizing theories fit into the preemption theory. Rivals had negative abnormal returns on average when the acquirer had as well, at the announcement of the merger. After accounting for expectations about future acquisitions, preemption theory can also explain why some rivals' stock price increased when the acquiring firm lost.

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