The Negative Effects of Mergers and Acquisitions on the Value of Rivals

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Abstract

Average stock price reactions of industry rivals in horizontal U.S. mergers and acquisitions around deal announcements are robustly negative. This finding is in contrast to the results in the existing literature, which focuses on smaller samples of deals involving mostly publicly listed firms. Rivals' returns are more negative in growing and concentrated industries. Moreover, the negative rivals' stock price reactions are related to future decreases in operating performance, increased probability of bankruptcy and challenges by antitrust authorities, and increased probability of rivals' future acquisitions. Overall, these results suggest that M&As have strong competitive effects for the rivals of target companies.

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Introduction

Mergers and acquisitions (M&As) represent important events that generate substantial reallocations of economic activity among firms and over time (e.g., Maksimovic and Phillips, 2001). A long-standing literature, starting with Stigler's (1964) theory of oligopoly, argues that these reallocations can reshape industry structures, as they modify the extent and strength of competitive interactions among firms operating in the same markets, which could potentially affect consumers' welfare. Antitrust laws empower enforcement agencies (e.g., the Department of Justice (DoJ) or the Federal Trade Commission (FTC)) to follow and intervene in the M&A market. Their mandate is to prevent situations that "excessively" transfer welfare from consumers to firms, such as the buildup of dominant positions (e.g. the creation of firms with disproportionate market power) or the facilitation of collusive behaviors among fewer firms.[1]

Given the potential welfare and regulatory implications associated with M&As, a large literature has developed in economics and finance to study how reallocations of ownership through acquisitions modifies the nature of competitive interactions among firms (e.g., through changes in product prices, quantity, or quality), and whether the resulting changes in product market structures affect competitors' prospects and consumers' welfare. The objective of this paper is to provide novel insights on the competitive implications of M&As in the United States. To do so, we follow a long tradition in the literature starting with Eckbo (1983) and Stillman (1983) and rely on changes in rivals' stock prices to measure the adjustments in industries' competitive forces anticipated by stock market investors when M&A deals are announced.

While our objective and approach are not new (see, e.g., Eckbo, 1983; Stillman, 1983, and more recently Song and Walkling (2000) or Fee and Thomas (2004)), a re-examination of the implications of M&As for competitors is important for two reasons. First, there is mounting evidence

[1] Source: https://www.ftc.gov/enforcement/merger-review.

that the competitive structure of industries in the United States has considerably changed in the recent decades. Industries are becoming significantly more concentrated (see, e.g., Grullon, Larkin, and Michaely, 2016), and increasingly exhibit winner-take-all features in which a few "superstar" firms enjoy dominant positions (e.g., Autor, Dorn, Katz, Patterson, and Van Reenen, 2017; and De Loecker and Eeckhout, 2017). As these structural changes partly occur through M&As (e.g., Blonigen and Pierce, 2016), we can gain valuable insights on the real implications of M&A deals by studying the changes in rivals' stock market valuations around consolidating M&As.

Second, existing research studying the effects of M&As on rivals' stock prices typically focuses on transactions involving publicly-listed acquirers and targets. Yet, deals involving privately-owned companies (either as acquirers or targets) represent around 90% of all deals, and about half of the aggregate transaction value ($1.9tn in 2015 dollars). Moreover, the fraction of acquisitions of private companies has increased in the recent period, as young successful firms appear to sell out earlier to bigger firms (Maksimovic, Phillips, and Yang, 2013). In contrast to prior studies, our analysis comprises *all* economically relevant transactions (i.e., deals with a value above $10 million). Focusing on all transactions not only results in a much more representative sample of the American M&A market, but also delivers several key new insights.

Our sample includes 7,981 horizontal M&A transactions (i.e., transactions involving firms in the same 4-digit SIC industries) over the period 1990-2015. We observe changes in stock prices for 4,303 distinct publicly-listed rivals, amounting to 252,887 unique stock price reactions around deal announcements. Using standard event-study methodology, our central result is that rivals' stock prices respond *negatively* when a horizontal deal is announced in their industry, indicating that investors expects horizontal M&As to be detrimental for rivals' future prospects. The average (median) cumulative abnormal return (CAR) of rivals is -0.15% (-0.40%) over the period of ten days surrounding the announcements. Both mean and median CARs are statistically significant. Overall, this evidence is in line with negative wealth effects for rivals in recent high profile deals, such as the

acquisition of Whole Foods Market by Amazon for $13.7 billion announced on June 16, 2017. This deal announcement triggered very large declines in the stock prices of other retailers: -15.8% for Kroger, -6.6% for Wal-Mart, -10.3% for Target, and -8.2% for Costco.[2]

The negative stock price reaction of rivals is pervasive as we observe it for more than 52% of the deals in our sample. It is also highly robust as it holds with different methodologies to compute CARs (e.g., different risk adjustments, event windows, or estimation methods), across different thresholds for the size of M&A transactions (e.g., deals larger than $500 million), and across the majority of industries and years. We also obtain a negative average effect on rivals' stock prices when we aggregate rivals' CARs with value-weighted averages, using rivals' market capitalization or total assets to determine their economic importance. Thus, economically irrelevant rivals do not drive the stock price drops triggered by horizontal transactions. Although the average percent decrease in rivals' stock prices is modest (-0.15%), the total change of rivals' stock market capitalization induced by horizontal transactions amounts to an impressive cumulative loss of $2.77 trillion (in 2015 dollars) across all deals in our sample.

Our results stand in sharp contrast with existing findings and interpretations. Using smaller samples mostly restricted to deals among public acquirers and targets, prior research reports *positive* average rivals' CARs, and mainly entertains two potential explanations.[3] First, rivals' positive CARs could indicate that horizontal deals facilitate collusive behaviors and increase economic rents shared among remaining firms (e.g., Stigler, 1964). Second, the increase of rivals' stock prices could arise as announced transactions provide new "positive" information to investors, such as an increased probability of observing subsequent deals in the industry (e.g., Song and Walkling, 2000; and Cai,

[2] Source: https://www.ft.com/content/cfa16be2-52aa-11e7-a1f2-db19572361bb and https://www.ft.com/content/93047522-cc30-3e72-b932-0e499cb05071.

[3] For example, Eckbo (1983) uses 259 transactions, Song and Walkling (2000) use 141, Fee and Thomas (2004) use 554, and Shahrur (2005) uses 463. Another paper looking at rivals' stock market reactions is Bernile and Lyandres (2016) with 453 deals.

Song and Walkling, 2011) or undervalued opportunities for rivals (e.g., unrealized synergy gains). Existing evidence mainly supports the information hypothesis. Our findings do not contradict these earlier papers, as we do find positive rivals' CARs when we focus on transactions among public firms (11% of the sample). Our large-sample results indicate, however, that the "representative" horizontal transaction in the U.S. triggers a significant drop in rivals' stock prices.

We propose that the negative wealth effect experienced by rivals around horizontal deals is consistent with the long-standing idea that M&As enable firms to become "stronger" competitors (Bradley, Desai, and Kim, 1983). Under this "competition" hypothesis, the strategic combination of assets allows merging firms to realize synergies along various dimensions (e.g., through productivity gains, economies of scale, access to financing, or cost savings).[4] The newly-created entity can thus expand (or protect) market shares in a way that undermines the prospects of its product market rivals (e.g., through predatory pricing or the scaling of technology). Arguably, the average negative stock market reaction observed for rivals in our sample is broadly consistent with this hypothesis. Yet, average rivals' CARs likely capture the combined effects of non-mutually exclusive channels.[5]

To gain more insights on whether the negative wealth effect for rivals is consistent with the competition hypothesis, we analyze how the stock price reactions of rivals vary with their characteristics, as well as with acquirer and industry specificities. We provide a collection of results that, overall, support the competition hypothesis. We first show that, across all deals, rivals' CARs are about three times more negative (ranging between -0.7% and -1.2%) for the group of rivals that exhibit market-to-book ratios that are above the median of their industry-year. Thus, investors anticipate that horizontal acquisitions are significantly more harmful for rivals having higher growth potential. Remarkably, these results hold under various types of demanding fixed effects structures. For instance,

[4] See Betton, Eckbo, and Thorburn (2008) for the various sources of synergy gains in mergers and acquisitions.
[5] As put forth by Eckbo (1983), isolating the *marginal* impact of the competition hypothesis on the market value of rivals is infeasible.

they hold when we compare market reactions across rivals in a given industry (using industry-year fixed effects) or for a given deal (using deal fixed effects). They also hold when we include rivals' fixed effects, indicating that market reactions for a given firm vary as firms' growth profiles change over time. Second, rivals' CARs are also more negative for smaller firms, but statistical significance is lower compared to the differential market reactions witnessed for firms with high market-to-book ratios. Third, focusing on transactions with publicly listed acquirers, for which we have financial information, we report that horizontal acquisitions generate more negative stock price reactions for rivals when acquirers are larger and have higher market-to-book ratios. Fourth, exploiting variation in industry characteristics, we find that the value loss of high-growth rivals around horizontal acquisitions is larger in technology-intensive industries, such as industries with large R&D spending, or high-technology industries as classified by the National Science Foundation (NSF).

While consistent with a detrimental competitive effect for rivals, our findings could arguably reflect two alternative mechanisms. First, rivals' stock prices could decline around horizontal acquisitions if the acquisition of competitors makes their own acquisition less likely, thereby reducing the associated value premium. Second, investors' negative reaction could arise if acquirers possess private information about the quality of firms in their industry, and the announcement of an acquisition reveals negative information about the unpicked rivals. To disentangle these possible explanations from the competition effect, we provide several ancillary results. First, we show that the strong negative market reaction for rivals with higher growth potential is significantly larger in industries exhibiting higher levels of concentration, in which competitive effects are likely to be stronger. Relatedly, CARs of high-growth rivals are significantly more negative in industries in which the distributions of market shares or stock market capitalization are highly skewed, i.e., resembling winner-take-all markets with one dominant firm.

Second, we examine whether observed rivals' CARs at the time of deal announcements are related to future outcomes for rivals. The competition view predicts that rivals' value losses around

horizontal transactions arise because their competitive position weakens relative to the new entity that emerges from the transaction. This weakening should manifest itself in a deterioration of the prospects of rivals in the years following the transaction. In line with this argument, we document that in the years following the deal, the sales growth of rivals that exhibit negative CARs is significantly lower than the sales growth of peers that react positively to the deal announcement. Similarly, rivals displaying negative CARs are significantly more likely to go bankrupt over the next two years.

Third, using hand-collected data on deals that are challenged by the DoJ or the FTC, we further report that transactions that are later challenged on anti-competitive grounds trigger more negative stock market reactions for rivals at the time of their announcement. Consistent with the idea that regulators intervene to prevent anti-competitive transactions, the likelihood of their interference is larger when rivals' stock price reactions are more negative around deal announcements.

Finally, we ask whether rivals' CARs are related to the probability to be involved in an M&A transaction in the coming years, either as a target or as an acquirer. Our results show that rivals that exhibit negative stock price reactions are not less likely to be acquired in the future, suggesting that investors do not react to information about the possibly lower probability of being a target in the future. We also find that rivals with negative CARs are more likely to become acquirers in the near future. This suggests that external growth can be their response to the threat of increased competition coming from the emergence of a bigger rival in their industry.

Overall, our analysis makes two contributions to the literature. First, our paper adds to the large literature on mergers and acquisitions, and specifically to the studies that focus on the valuation effects of M&As on rivals, customers, and suppliers (see Eckbo, 1983; Eckbo, 1985; Stillmann, 1983; Song and Walking, 2000; Fee and Thomas, 2004; Shahur, 2005, DeBodt and Roll, 2014; and Bernile and Lyandres, 2016). While this literature has documented positive valuation effects of M&As on rivals, we show by contrast that average rivals CARs are *negative*. Our results are based on a much larger sample of M&A deals that also includes private targets and acquirers. The findings advance the

literature on rival reactions by shedding new light on the wealth transfers and capital reallocations around M&As within industries. Our analysis also provides the first large scale evidence consistent with the competition hypothesis. Under this hypothesis, the market anticipates that M&As allow merging firms to realize synergies that have the potential to undermine the prospects of product market rivals, leading to negative market reactions of rivals to M&A announcements.

Second, our paper contributes to the recent debate about industries becoming more concentrated (Grullon, Larkin, and Michaely, 2016) and exhibiting winner-take-all features (see, e.g., Autor, Dorn, Katz, Patterson, and Van Reenen, 2017; and De Loecker and Eeckhout, 2017). Our results support this view by not only showing that rivals experience negative CARs around M&A announcements, but also by documenting that rivals have a higher likelihood of default and lower sales growth after a M&A deal in their industry. Moreover, deals with more negative rival CARs are more likely to be challenged by the regulator. Collectively, these results suggest that markets seem to anticipate the negative real effects of M&As on industry rivals that are associated with industries in which a few "superstar" firms enjoy a dominant position. In light of the recent evidence that M&As are associated with increases in average markups for firms involved in M&A transactions (Blonigen and Pierce, 2016), M&A deals may play an important role in the rise of market dominance of some firms, which has potentially important implications for welfare and antitrust regulation.

The rest of the paper proceeds as follows. Section 1 presents the data, sample, and variables. Section 2 discusses the main results. Section 3 concludes.

1. Data, sample and variables

a. Data sources and sample construction

The data on M&A transactions come from Thomson's SDC. Our sample covers U.S. domestic mergers and acquisitions between 1990 and 2015. We first collect all deals announced between 1990 and 2015

and completed by the end of 2015 from the Security Data Corporation's (SDC) Merger and Corporate Transactions database. We exclude all deals in the financial or utilities industries, and deals in which the target or the acquirer is a government agency. Following existing literature, we further exclude leveraged buyouts (LBO), spinoffs, recapitalizations, self-tender offers, exchange offers, repurchases, partial equity stake purchases, acquisitions of remaining interest, privatizations, buybacks, and non-controlling acquisitions (Erel, Liao, and Weisbach, 2012; Netter, Stegemoller, and Wintoki, 2011).

Because our focus is on how M&A transactions are related to industry concentration and competition, we focus on horizontal deals. Moreover, since we need transactions that have potential effects on these industry-level characteristics, we only keep M&A deals with a transaction value of at least USD 10 million. Additionally, we exclude a small number of deals with less than three rivals from our sample to ensure that some competition remains in the industry after the transaction. Our final sample includes 7,981 transactions. Table 1 describes how we get to this number of transactions after applying the filters above.

[Insert Table 1 here.]

Next, we identify rival firms, that is, firms operating in the same industry as the target. To do so, for each transaction, we obtain the 4-digit SIC code of the target from SDC. We call rivals all firms that are active in CRSP when the M&A transaction is announced and that have the same 4-digit SIC code as the target. We eliminate stocks that are not actively traded, i.e., stocks with fewer than 100 return observations in the estimation period (251 days to 21 days before the deal announcement) and stocks with missing returns between five days before and five days after the deal. These filters yield a sample of 4,303 unique rivals and 252,887 deal-rival observations. For rivals and for publicly listed acquirers and targets we collect daily stock prices and values of the value-weighted market index from CRSP. We complement this dataset with the SMB, HML, and MOM factors from Kenneth French's website.[6]

[6] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

We then merge the stock price data with firm-level accounting data from Compustat and use the data on fitted HHI from the Hoberg and Phillips database.[7] In addition, we use patent data from NBER and KPSS, and the National Science Foundation's classification for high-tech industries. We identify corporate bankruptcies using the UCLA-LoPucki Bankruptcy Research Database and obtain information on challenged deals from the websites of the Federal Trade Commission and the Department of Justice.

[Insert Table 2 here.]

In subsequent tests, we use variables that capture characteristics of the transaction, the rivals, and the parties involved in the transaction whenever they are publicly listed companies. All these variables are defined in the Appendix. All continuous variables are winsorized at the 1st and the 99th percentiles. Summary statistics of these variables appear in Table 2.

b. Rivals' Cumulative Abnormal Returns (CARs)

The main variable of interest is the stock price reaction of rivals when an acquisition is announced. We compute the abnormal returns for rivals for two windows of 6 days (-3 to +3) and 10 days (-5 to +5) around the announcement of the M&A transaction. Abnormal returns are the difference between realized returns and expected returns, calculated in two ways: First, we use a standard Capital Asset Pricing Model in which the market return is the return of the CRSP value-weighted index. Second, we use a four-factor model ("FF") in which we add to the previous model the three factors SMB, HML, and MOM. Our estimation period spans from 251 days to 21 days before the deal announcement. We cumulate the abnormal returns over the relevant window to obtain Cumulative Abnormal Returns (CARs). Similarly, we calculate the CARs of publicly listed acquirers and targets for the 10-day

[7] http://hobergphillips.usc.edu/industryconcen.htm.

window around deal announcements using the market model. We winsorize these variables at the 1st and the 99th percentiles.

2. Results

a. Rival CARs

Table 3 shows summary statistics for the stock price reactions of rival firms around deal announcements. For each window size and each asset pricing model, we present two sets of results: One in which the unit of observation is each rival in each M&A transaction (rival-deal level) and one with equally-weighted portfolios containing all the rivals of each target, in which the unit of observation is therefore the M&A transaction (deal level). The existing literature typically uses the latter method because it eliminates concerns of correlations across rival returns at the deal level. We also consider individual rival returns because our goal is to explore the determinants of individual rivals' reactions, and in particular the cross-sectional variation between rivals for the same deal. To take into account possible correlations of rivals' returns in this context, we obtain the mean rival CARs and the associated standard errors by running OLS regressions of rival CARs on a constant term and clustering standard errors at the deal level. For all returns, we also present medians and estimate their statistical significance using a sign test.

[Insert Table 3 here.]

In Table 3, the rivals' stock price reactions are negative on average. This result holds across the four specifications (two window sizes and two abnormal return specifications), although the magnitude of the CARs increases with the length of the time window, varying from -0.06% to -0.18%. The sign and magnitude of the CARs are similar for individual rivals and for portfolios. Table 3 also shows that rival CARs exhibit large standard deviations (between 9% and 12% for individual rivals' returns, and

between 3% and 5% for portfolios). However, all median CARs are statistically negative at standard confidence levels, as well as five out of the eight average CARs reported.

The CARs we estimate are small at the level of each individual rival firm. However, when we estimate the aggregate value for all rivals and for all M&A transactions by multiplying the CAR of each rival by its market capitalization (in 2015 US dollars), and then taking the sum across all observations in the sample, we obtain an impressive total value of about -$2.77tn. This corresponds to the value destroyed for rivals by M&A transactions. The goal of the subsequent tests is to explain this phenomenon.

Negative CARs of firms when one of their peers is acquired are in sharp contrast with the evidence from the existing literature. Papers in this literature consistently find positive stock price reactions of rivals around M&A announcements. These papers differ to varying degrees from ours in the sample period, the way they select M&As, the identification of rival firms, and the way they calculate returns.

[Insert Table 4 here.]

Table 4 presents summary information on sample period, sample construction, identification of M&A transactions and rivals, sample sizes, and the main results of four important papers in the existing literature on rivals' reactions: Eckbo (1983), Song and Walkling (2000), Fee and Thomas (2004) and Shahrur (2005). Eckbo (1983) uses a sample of 191 horizontal and 68 vertical mergers in the mining and manufacturing sectors in the 1936-1978 period, most of which involve publicly listed companies. Song and Walkling (2000) study 141 transactions between 1982 and 1991 in which targets are public companies. The sample in Fee and Thomas (2004) includes 554 horizontal transactions with publicly listed targets and acquirers in the 1980-1997 period. Finally, Shahrur (2005) uses a sample of 463 transactions between 1987 and 1999 and focuses on cases in which both the target and the acquirer are publicly listed companies. In other words, all four papers use samples that are much smaller than ours and consider mostly public firms. All four papers find positive average CARs of rivals, with

magnitudes between 0.2% and 2% depending on the paper and specification. There are only two subsamples in which they find negative rival CARs: When the deal is horizontal in Song and Walkling (2000), which represents only 11 M&As in their sample; and when the combined CAR of the target and acquirer is negative around the M&A announcement in Shahrur (2005).

Unlike these papers, we focus on a large sample of acquisitions and rivals, and we do not restrict the analysis to specific deal or firm characteristics. In fact, when we use the same sample restrictions as these papers, we also find that rival CARs are positive on average.

b. Explaining variations in rivals' CARs: Univariate tests

The summary statistics suggest that rival CARs vary a lot. In this section, we make a first attempt at explaining this variation in simple univariate tests. We split the sample by the public vs. private status of targets and acquirers involved in the transactions and by year (to detect potential time trends in rival returns).

[Insert Table 5 here.]

Panel A of Table 5 presents rival CARs (at the rival-deal level and at the deal level) and aggregate value created (destroyed) for several subgroups of observations. The first two lines provide statistics on rivals' CARs in deals with public vs. private acquirers. Both groups of deals are associated with negative average rivals' CARs, irrespective of the measure we consider. Transactions in which the target company is private are also associated with negative rival returns of similar magnitudes. In deals with public targets, which are the focus of most of the existing literature, the rival CARs are positive, albeit not significant at the rival-deal level.

Row 5 of the table focuses on the CARs in transactions with public acquirers and public targets. In these deals, the rivals' reaction has a significantly positive mean (+0.24% at the rival-deal level, +0.44% at the deal (portfolio) level). The results using medians are less clear: Median CARs are

significantly negative at the rival-deal level and significantly positive at the deal level. Other combinations of public vs. private status of acquirers and targets all lead to negative rival CARs. So the only subsample that is associated with positive rival CARs is the one existing papers in the M&A literature have focused on. This subsample represents a large part of the M&A market (11% of the number of transactions and 55% of the total transaction value), but other subsamples also represent substantial parts of M&A activity. Moreover, although deals with public targets and acquirers are associated with positive average CARs, they destroy value for rivals in aggregate, probably because in these deals, larger rivals tend to have lower returns.

These results allow us to shed new light on the interpretation of positive rivals' returns in the existing literature. Two interpretations are possible: First, by reducing the number of competitors, M&As reinforce the bargaining power of the firms remaining in the industry vis-à-vis customers and suppliers (the "collusion" effect). Second, knowing that M&As happen in waves, observing a transaction increases the probability of observing another transaction in the same industry in the near future, which increases the value of potential targets, i.e., rival firms (the "anticipation" effect). The existing literature (e.g., Song and Walkling, 2000) finds little support for the collusion hypothesis and more support for the anticipation hypothesis. The fact that, in our sample, rivals' reactions are positive on average only when the target is public is consistent with the anticipation view. Indeed, we know that merger waves of public and private firms do not coincide. In fact, merger waves are waves of acquisitions of public companies, while the frequency of acquisitions of private firms is quite stable over time (Maksimovic, Phillips and Yang, 2013). Thus, only when a target is public does its acquisition increase the probability of acquisition of its public rivals. The collusion effect, on the other hand, should be observable with both public and private targets. Therefore, our finding that rivals' CARs are positive only in deals with public targets provides support for the anticipation effect in this subsample of deals.

Panel B of Table 5 presents statistics on rival CARs by year (at the rival-deal level) between 1990 and 2015. This table shows no clear trend. Two years are characterized by large negative average rival CARs: 2000 (-1.18%) and 2014 (-1%), while some years exhibit positive average CARs. Overall, average rival CARs are significantly negative in seven years and significantly positive in seven years. Median CARs provide a slightly more consistent picture, as 20 of them are significantly negative while only two years exhibit significantly positive median rival CARs.

Panel C of Table 5 presents summary statistics on the ten industry-year pairs in which the average rival CARs (in portfolio returns) are the most negative in our sample period. In this panel, average rival CARs are always below -15% and driven by one transaction, not a series of transactions. Affected industries have a small number of rivals, suggesting that one large deal in industries that are already concentrated can have significant negative competitive effects on rivals of the target. The focus of the multivariate tests in the next section is to understand better these competitive effects.

Panel D of Table 5 shows the ten M&A transactions associated with the most negative rival CARs. These transactions are dispersed across different industries and they vary a lot in their effect on rival values. For example, the deal with the lowest average rival CARs (-31.1%) occurred in an industry with only three rivals, and led to a small aggregate value gain among these rivals. On the contrary, the second deal in the list affected 138 rivals and led to a large aggregate value loss (about $62bn).

c. Rival, deal and acquirer characteristics and rival returns

c.1. *Empirical setting and variables*

The descriptive statistics in the previous section show that for many subsamples of M&A transactions (and for the average transaction) rival returns are negative. Our objective in the rest of the paper is to use variations in rival CARs to shed light on the mechanism through which M&A transactions affect rivals. In the next table, we continue the exploration of the determinants of rival CARs in a multivariate

setting, asking which rival, acquirer and deal characteristics affect rival CARs. In this table, as well as in all subsequent tests, the measure of rival's stock return we use is the CAR over the period announcement date – 5 days to announcement date + 5 days, with expected returns calculated with a factor model using the value-weighted market index and the HML, SMB and MOM factors. We employ three different specifications that use different sets of fixed effects to absorb unobserved factors that are constant across groups of firms and may affect the value of listed firms when the acquisitions of one of their peers is announced. The first natural set of fixed effects we consider is at the level of the industry (4-digit SIC code) and the year. The competitive effects we are analyzing are likely to vary across industries and over time, and time variations are likely to differ across industries. Adding industry × year fixed effects allows us to control for differences between different industries over time. In these tests, the interpretation is within groups of firms in the same industry and the same year.

The next specification uses the same industry × year fixed effects and in addition rival fixed effects. Adding rival fixed effects allows us to absorb time-invariant firm-level characteristics that can explain the stock price reaction of a given firm in a series of transactions involving rivals of the firm in question. In these tests, the focus is on how variations of right-hand side variables around their mean for the rival firm affect stock price reactions of the rival firm.

Finally, we employ a third specification, in which we use deal fixed effects. Unlike the previous specification, which allows us to analyze how time-series changes at the firm level explain changes in stock price reactions of the firm, this specification compares, for each deal, the CARs of all the rivals of the acquired company as a function of their characteristics. The interpretation of these tests is how differences between rivals explain variations in their CARs around the announcement of the acquisition.

All the tests include rival characteristics, which are the focus of the analysis. We consider three characteristics: the market-to-book ratio of the rival, the size (total assets), and the cash-to-assets ratio,

all calculated at the end of the year ending before the acquisition considered. Specifications that use industry × year fixed effects and industry × year and rival fixed effects also include deal characteristics (these variables are absorbed by the fixed effects in the last specification in which we use deal fixed effects): the logarithm of the number of M&A transactions in the same 4-digit SIC code as the target of the acquisition in the year preceding it, and the logarithm of the total value of these deals. These two variables capture the intensity of the M&A market in the industry of the target in the year preceding the acquisition. We also control for the logarithm of the value of the transaction, and we include two indicator variables: the first is equal to one if the target is publicly listed, a characteristic associated with significantly higher rival CARs in the univariate tests discussed in the previous section. The second indicator variable captures the status of the acquirer (public or private).

Finally, we run two separate regressions in which we add three variables capturing the characteristics of the acquiring company in specifications that use industry × year fixed effects and industry × year and rival fixed effects (again, these characteristics are absorbed by deal fixed effects in the corresponding specification). The reason why we run separate regressions with these variables is that information on acquirers is missing whenever the acquirer is a private company, which is the case in about 40% of deals in the sample. The three acquirer characteristics we consider are the same as for rival firms: Market-to-book ratio, size and cash-to-assets. Since information on the acquirer is available only when the acquirer is a publicly traded firm, the *Public acquirer* dummy variable disappears in these tests.

For the rival and acquirer characteristics, we compute dummy variables whose values depend on whether the variable takes a high or low value relative to the median firm. For the rival characteristics, we sort rivals into above and below median for every deal. For the acquirer characteristics, we sort acquirers into above and below the median within the same 4-digit SIC code at the end of the year preceding the acquisition. The reason for using dummy variables instead of continuous variables is that when we interact these variables in subsequent tables, dummy variables simplify the interpretation

of the results. Moreover, indicator variables are less subject to non-linearities that can influence the results. In all tests, we calculate standard errors using clustering at the 4-digit SIC code level. Our results hold if we use clustering at the rival or at the deal level instead.

c.2. *Results*

Table 6 presents the results of the multivariate tests.

[Insert Table 6 here.]

The results are broadly consistent with the univariate analysis from the previous section. When the target is public, rivals experience positive CARs, between 0.4% and 0.5% on average, depending on the specification. However, the CARs are significantly negative when the M&A activity in the industry in the year preceding the current transaction was more intense, as the negative coefficient on *Log(value of deals)* suggests. This is consistent with Song and Walkling (2000) who show that the anticipation effect tends to decrease at the end of merger waves because it is already reflected in the stock prices of targets' peers. One concern could be that the average negative rival CARs are driven mostly by small transactions. These transactions might matter less for aggregate value creation than large transactions, which typically involve public targets and public acquirers that are associated with positive average rivals' reactions. We have seen earlier that the aggregate value loss for rivals is substantial over the entire sample period, which suggests that negative rival returns are not concentrated in small firms and small transactions of limited economy-wide interest. In line with this view, the coefficient on *Log(transaction value)* is consistently negative in all five specifications, although never statistically significant. If anything, the effect of M&As on the value of rivals is more negative for larger deals.

Some acquirer characteristics also affect rival CARs. When the acquirer has a larger value (a high market-to-book ratio) or is larger, the rival's CAR is significantly more negative, in line with the view

that negative competitive effects for rival firms are more pronounced when the acquirer has access to more financial resources or to a larger market, or operates in an industry with more growth opportunities.

Turning to rival characteristics, the market-to-book ratio of the rival is an important determinant in its CAR. The effect of having a high market-to-book ratio relative to firms in the same industry and year is associated with a strong negative CAR. The effect is large economically (between -0.7% and -1.1% depending on the specification) as well as statistically significant, with t-statistics larger than 6 in all specifications. This result suggests that the acquisition of a peer firm is much more detrimental to a firm with high growth opportunities. This is consistent with the argument that the competitive effects of acquisitions are more negative for firms in the early stages of their life cycle. In these stages, firms are more likely to be financially constrained at a time when investing to realize growth options is key for their future development.

Next, we explore this possibility in greater detail by asking whether the phenomena showed in previous tests are stronger in industries characterized with greater growth opportunities. We use four industry-level measures of growth opportunities. First, the research and development intensity of the industry, measured by the average R&D level in Compustat in the 4-digit SIC code industry. Second, we use the classification proposed by the National Science Foundation to identify high-technology industries. Third, we measure the growth opportunities of the industry using the average market-to-book ratio of firms in the industry. Fourth, we use the number of citations of all patents in the industry. For all these measures except high- vs. low-technology industries, we define high-growth opportunity industries as those above the median. The R&D intensity and the market-to-book ratio are calculated every year, so that a given industry can move from the high- to low-growth opportunity category from one year to the next.

[Insert Table 7 here.]

The results are reported in Table 7. In the first three columns of Panel A, the industry characteristic we consider is the industry-level R&D. In columns 4 to 6 of Panel A, we compare high- and low-tech industries. In Panel B of table 7, the measure of industry-level growth is industry-level market-to-book in columns 1 to 3, and patent citations in columns 4 to 6. In each test, a dummy variable equal to one for high-growth industries is interacted with all the variables used in the previous table. We use the same controls and fixed effects as in Table 6, but in tests with industry × year and rival fixed effects, we choose the specification that includes acquirer characteristics instead of a dummy equal to one if the acquirer is a public firm in the interest of space. Results are very similar if we choose the alternative specification. We only present coefficients for rival and acquirer characteristics, alone and interacted with the high-growth opportunity industry dummy variable.

The tests reported in Table 7 show large differences in rival reactions between high- and low-growth opportunity industries. In all regressions, the coefficient on *High MB rival* is still negative but smaller in magnitude compared to Table 6. The interaction of this variable with the indicator variable capturing industry-level growth opportunities (*High R&D*, *High Tech*, *High MBInd*, and *High Patents*) is significantly negative statistically and economically in all specifications, except in the last column of Table 7, Panel B. Thus, the acquisition of peers hurts firms with high growth opportunities on average, and even more so in industries that grow faster. In the same vein, the coefficient on *High cash rival* alone is always positive and statistically significant in about half of the specifications. Its interaction with the growth industry dummy is always negative and statistically significant in about half of the specifications. This indicates that the disappearance of a rival is good news for cash-rich firms in low-growth industries. In growing industries, however, cash becomes less valuable after horizontal mergers, in line with the view that acquisitions tend to weaken the competitive position of rivals and their ability to realize their growth opportunities.

d. Exploring alternative mechanisms

d.1. *Competition vs. alternative mechanisms*

The results in previous sections are consistent with a competitive effect that is more detrimental to firms with high growth opportunities, in particular when they operate in industries that are themselves growing at a fast pace. However, two alternative mechanisms could explain these results. First, targets' rivals may suffer from a "negative anticipation effect" if the acquisition of their competitor makes their own acquisition less likely, thereby reducing the associated value premium. This phenomenon can coexist with a positive anticipation effect, the two phenomena dominating in different circumstances. For example, a positive anticipation effect could be strong at the start of merger waves, leading to positive rival stock price reactions, while the negative anticipation effect could dominate towards the end of merger waves. Second, our results may also be driven by a "negative information" channel: an acquirer that owns private information about the quality of firms in the industry chooses to acquire the target and not its rivals, which reveals negative information about the rivals. As this negative information is impounded into stock prices, rival CARs are negative.

The goal of the subsequent tests is to disentangle these effects, and in particular to test whether the competitive effect plays an important role in our finding that rival CARs are negative on average. To do so, we run two series of tests. First, we ask whether rival CARs are more negative around transactions that occur in industries that are already highly concentrated, and in which competitive effects are likely to be stronger. Second, we ask whether observed rival CARs (positive or negative) are related to future observed real effects. For example, the competition view predicts that when rival CARs are negative, the sales growth of the rivals should decline in the years following the deal on average. Similarly, negative rival CARs should be associated with an increased probability of bankruptcy. If rival CARs reflect competitive effects, they should also be correlated with the probability for the acquisition to be challenged by antitrust authorities. The negative anticipation view

predicts that negative rival CARs are associated with a lower probability of becoming a target in the following years. The next tables provide tests of these hypotheses.

d.2. *Conditioning on industry concentration*

Perhaps the most direct way to test if the negative average rival CARs we observe reflect increased competition following mergers is to ask whether this result is stronger in industries in which competition is higher. In the previous tests, we find that some rival characteristics (market-to-book in particular) are associated with more negative CARs on average. We test if these effects are stronger in industries that are more concentrated. We use four measures of industry concentration. CR1 is the sales of the firm with the largest market share in the industry (defined at the 4-digit SIC code level), divided by total sales in the industry. The Fitted HHI is obtained from the Hoberg and Phillips data library and combines Compustat data with Herfindahl data from the U.S. Commerce Department and employee data from the Bureau of Labor Statistics. As such, this HHI covers private and public firms, varies through time, and is not restricted to manufacturing firms. We also use two measures of skewness, one based of sales, and the other based on equity market value, for firms in the industry. For each measure, we consider Compustat firms only and annual measures. Every year, we split the sample in two subsamples based on whether the industry is in the highest decile across all industries in a given year, and we use these as conditioning variables. We use this split in order to gain a balanced sample on the rival-deal level. For each concentration measure, we propose three tests with different fixed effects, namely, deal-level fixed effects, industry × year fixed effects, and industry × year and rival fixed effects, to continue to capture industry, year, and also deal and rival-level unobservables that could explain stock price reactions.[8]

[8] We include acquirer controls in all specifications, instead of the dummy variable for public acquirers, which we use in some of our previous specifications. Doing so reduces sample size, but it does not change any of our conclusions.

[Insert Table 8 here.]

Table 8 presents the results. In Panel A, we consider two measures of industry concentration (CR1 in columns 1 to 3, fitted HHI in columns 4 to 6). In Panel B, we consider the two other measures (market share skewness in columns 1 to 3 and equity value skewness in columns 4 to 6). In all these specifications, high market-to-book firms, which exhibit more negative CARs around M&A announcements in their industries, react even more strongly when they operate in more concentrated industries. Firms above their industry-year median market-to-book ratio lose at least an extra 20bp around deal announcements in concentrated industries. The only exception is when we use the fitted HHI measure (in Panel A of Table 8, columns 4 to 6). In these tests, the coefficient on the interaction between the high-concentration dummy variable and high market-to-book ratio is positive in one test, negative in the other two, but never statistically significant, perhaps because this measure restricts the sample to deals between 1990 and 2005.

d.3. *Real effects: Rival CARs and future growth*

The competition view also predicts that CARs are negative around deal announcements because the competitive position of rivals weakens relative to the new entity that emerges from the M&A transaction. This weakening should manifest itself in a deterioration of the sales growth prospects of rivals in the years following the transaction. To explore this possibility, we split the sample of rivals according to whether the CAR around the deal announcement is positive or negative and create a dummy variable equal to one for rivals with negative CARs. Then we regress sales growth between three years pre- and post-transaction on this dummy variable interacted with event time dummies. The regressions also include year and firm fixed effects. An important concern in this type of regressions is that the same rival can be subject to several consecutive deals in a few months or years. In this case, the time windows considered overlap and the period *before* a deal is the period *after* another deal,

which adds noise to the results. In the first test, we solve this problem partially by focusing on industries with at least two consecutive years without any M&A transaction to better identify the before and after period. In the second test, we do not impose any such filter, which increases the noise of the estimation but also the power of the test.

[Insert Figure 1 here.]

The figure plots the coefficients of the regression on the interaction terms between the negative CARs and event time dummies, as well as the 95% confidence intervals. Panel A reports the results of the more restrictive test and Panel B reports the coefficients from the less restrictive test. The two panels lead to a similar conclusion. In the years following the deal, the sales growth of rivals that exhibit negative CARs is significantly lower than the sales growth of their peers that react positively to the deal announcement. For instance, in Panel A, the point estimate of the interaction term in year 1 is -0.099, suggesting that one year after the deal, the sales growth of firms with negative CARs is 9.9 percentage points lower compared to firms with positive CARs. The difference in sales growth between the two groups is significant at the 5% level between years 1 and 3 in Panel A, and marginally significant in year 0. It is marginally significant in years 1 and 2 and statistically significant at the 5% level in years 0 and 3 in the figure of Panel B. This phenomenon occurs only after date 0. In the period preceding the deal (between years -3 and -1), the sales growth of firms with positive and negative CARs not statistically different from each other. This parallel trend before the deal suggests that the deal causes the differential evolution of sales growth observed in the years that follow the M&A transaction.

d.4. *Real effects: Rival CARs and bankruptcy*

A natural consequence of the lower sales growth of rivals with negative CARs is that they could be more likely to go bankrupt in the years following the deal than other rivals with positive CARs. We

test this hypothesis in the next table, in which we use a specification similar to that of the previous tables. The dependent variable is the rival's CAR around the deal announcement. We include the same list of control variables as in tables 6 to 8, and we add a dummy variable equal to one if the firm goes bankrupt in the next year or in the next two years. We use bankruptcy data from the Lopucki database, which collects data on all bankruptcies in the U.S. We also include the same three types of fixed effects as in the previous tables. For brevity, we only report the coefficients on the bankruptcy dummies. In running these tests, we do not assume that there is a causal relation between the bankruptcy of the firm and the CARs around the announcement of the transaction. Instead, our goal is to estimate whether the two events are correlated, while controlling for other factors that we know affect rival CARs.

[Insert Table 9 here.]

Table 9 presents the results. In Panel A, we consider all rivals in all deals. In Panel B, we aggregate observations annually for each rival and modify the fixed effects used in the specifications accordingly (we replace the deal fixed effects specification with a specification that includes year fixed effects). The results are consistent with negative rival CARs reflecting increased competition after the transaction. In Panel A, the sign on the bankruptcy dummies is consistently negative and significant at conventional statistical levels. A more negative CAR is associated with a higher probability of bankruptcy. Overall, the tests in Panel B are less significant statistically, but the year-level aggregation reduces the power of the tests. More precisely, the results are insignificant when considering the probability of going bankrupt in the year following the M&A transaction, but the coefficient on the dummy variable equal to one for firms going bankrupt in the two years following the transaction are significantly positive at the 5% level in two of the three specifications. Consistent with the competition view, this indicates that firms with negative average stock price reactions to M&A announcements (dummy variable equal to one) in a given year are more likely to go bankrupt in the next two years.

We must be careful in attributing this result and the previous result on sales growth to competition only. The "negative anticipation" view, which posits that rival reactions reflect information about the

state of the M&A market in the industry at the time of the deal, is inconsistent with such real effects. However, the "negative information" view is consistent with these results. Thus, a possibility is that the negative information about the rival revealed by the acquirers' decision to choose the target and not the rival materializes a few years later through lower operating performance of the rival and reflects the low intrinsic value of the rival, even in the absence of increased competition.

d.5. *Real effects: Rival CARs and antitrust actions*

The next series of regressions test a prediction that is specific to the competition channel. One indication that an M&A transaction is likely to affect competition is when it is challenged by antitrust authorities. Finding that such challenges are consistently associated with negative rival CARs would provide strong evidence in support of the view that the negative CARs reflect increased competition for rivals. To explore this possibility, we collect data from the Department of Justice and the Federal Trade Commission. These agencies review merger cases from an antitrust perspective and make the data publicly available. We collect these data and classify deals according to whether a deal is challenged or not. We run similar regressions as in the previous test at the deal level rather than the deal-rival level because a challenge is a deal-level decision. The dependent variable is therefore the CAR(-5,5) of the portfolio of rivals. We include deal controls in all specifications, acquirer controls in two of them, and we add the usual fixed effects (except for deal fixed effects, because of the focus on the deal level). We also add to the usual list of independent variables a dummy variable equal to one if the deal is challenged by antitrust authorities. Again, we are interested in the correlation between rival CARs when the transaction is announced and the future reaction of antitrust authorities. Table 10 presents the results.

[Insert Table 10 here.]

The coefficient on the *Challenged deal* dummy is negative in all four specifications. The effects are economically large: Rival CARs are 1.1% to 1.5% lower on average around the announcement of deals that will be challenged later. Three of the four specifications yield statistical significance at the 10% level or better, only one of the four coefficients being statistically insignificant at usual levels. This can be due to the limited power of the tests coming from the very small number of challenges (55 in the entire sample).

d.6. *Real effects: Rival CARs and the probability of takeover*

Next, we ask whether rival CARs are associated with the probability of being involved in mergers in the years following the M&A transaction. This is at the heart of the "anticipation" and "negative anticipation" views, which predict that a positive (negative) CAR in reaction to a deal announcement reflects an increased (decreased) probability of being a target in the near future. Also, firms facing increased competition could react by becoming acquirers themselves to counteract the negative effect of the emergence of a larger competitor.

In the next tables, we study the correlation between CARs around deal announcements and the probability to be involved in an M&A transaction in the near future, as a target or as an acquirer. We start again from the specification employed in previous tables and add dummy variables capturing the rival's involvement in M&A transactions as a target or as an acquirer, in the year or the two years that follow the transaction.

[Insert Table 11 here.]

Table 11, Panels A and B present the results on the probability of being a target in the future. In Panel A, all rival-deal observations are considered. In Panel B they are aggregated at the rival-year level. Only two tests out of 12 are consistent with the anticipation view: In two deal-level tests (Panel A),

rival CARs are positively correlated with the probability of being a target in the next two years. In other tests, coefficients are insignificant economically and statistically.

Panels C and D of Table 11 present the results on the probability of being an acquirer in the future. In seven out of 12 specifications, the coefficients on the probability of being an acquirer is positive and significant. Servaes and Tamayo (2014) find that following takeovers in their industry, rival firms react to the increased takeover threat by cutting investment, reducing free cash-flows and increasing leverage and takeover defences. However, they look at a sample of hostile takeovers. In their sample, the average stock price reaction of rivals around the announcement of the deal is positive. The authors interpret this result as evidence that the increased takeover threat has disciplining effects on management. Our evidence shows that rivals with negative stock price reactions are more likely to become acquirers themselves in the years following the deal. Perhaps for these rival firms, acquisitions are a way to increase their size so as to react better to the increased competition following the M&A.

3. Conclusion

This paper explores the effect of horizontal M&A transactions on the value of publicly listed rivals. We estimate this effect by calculating stock rice reactions of rivals in the 11-day window centered at the announcement of M&A transactions. Unlike previous research on this topic, we find that, on average, rival CARs are negative. The effect is small at the level of rivals (-0.15%), but it is large in aggregate ($2.77 trillion).

We propose an explanation for the negative average rivals' CARs that is based on increased competition in the industry. The acquisition of a target allows the combined company to have better access to financing, product markets, and to realize synergies, which will weaken the future prospects of rivals. Collectively, our evidence supports this interpretation of the results. Rivals' CARs are significantly more negative for rivals with high market-to-book ratios. Moreover, rivals with negative

CARs around M&A deal announcements experience significantly lower sales growth, have a higher probability of going bankrupt, and the deal has a higher likelihood to be challenged by antitrust authorities.

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Appendix: Definition of Variables

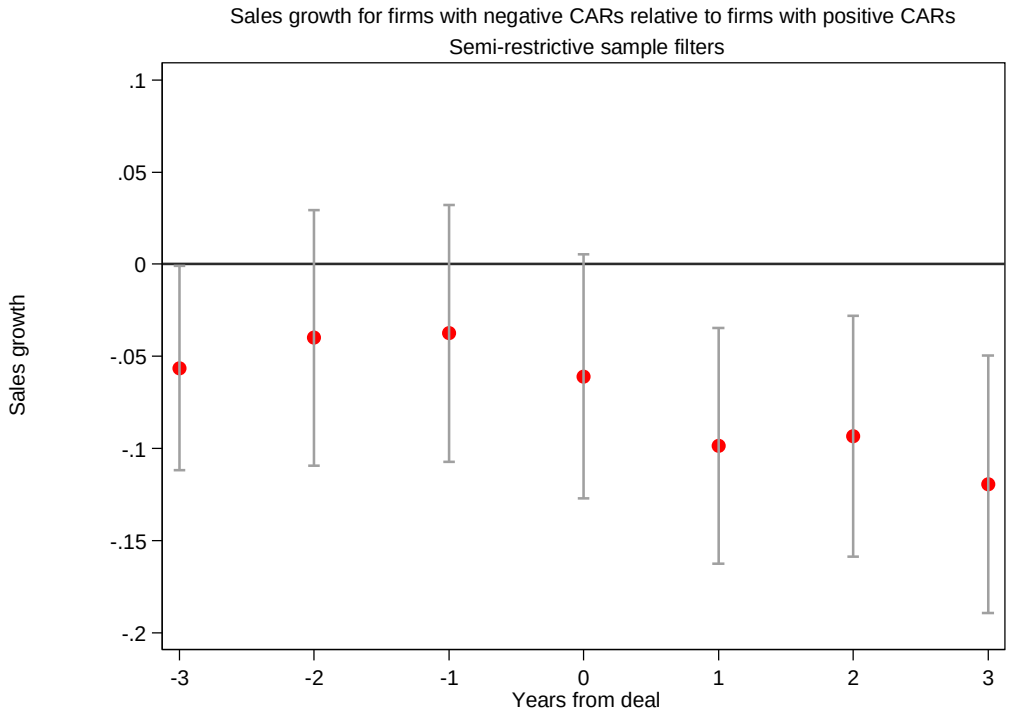
Variable	Definition	Data Source
Challenged deal dummy	A dummy variable equal to one if the deal is challenged either by the Federal Trade Commission or the Department of Justice	Federal Trade Commission / Department of Justice
High cash acquirer	A dummy variable equal to one if the acquirer cash-to-assets ratio is above the median acquirer cash-to-assets ratio in a given industry in a given year	Compustat / SDC
High cash rival	A dummy equal to one for all rivals whose cash-to-assets ratio is above the median rival cash-to-assets ratio for a given deal	Compustat / SDC
High CR1	A dummy equal to one for all rivals that belong to an industry that is in the highest three quartiles in the distribution of the market share of the largest firm	Compustat
High equity value skewness	A dummy equal to one for all rivals that belong to an industry that is in the highest decile of the equity value skewness distribution of all CRSP firms	CRSP
High equity value skewness 2 year delta	A dummy equal to one for all rivals that belong to an industry that is above the median of the distribution of the 2 year change in equity value skewness	CRSP
High equity value skewness 5 year delta	A dummy equal to one for all rivals that belong to an industry that is above the median of the distribution of the 5 year change in equity value skewness	CRSP
High fitted HHI	A dummy equal to one for all rivals that do not belong to an industry that is not in the lowest decile of the fitted HHI distribution	Hoberg and Phillips database
High market share skewness	A dummy equal to one for all rivals that belong to an industry that is in the highest decile of the market share skewness distribution of all Compustat firms	Compustat
High market share skewness 2 year delta	A dummy equal to one for all rivals that belong to industries that are above the median of the distribution of the 2 year change in market share skewness	Compustat
High market share skewness 5 year delta	A dummy equal to one for all rivals that belong to industries that are above the median of the distribution of the 5 year change in market share skewness	Compustat

High MB acquirer	A dummy variable equal to one if the acquirer market-to-book ratio is above the median acquirer market-to-book ratio in a given industry in a given year	Compustat / SDC
High MB industry	A dummy equal to one for all 4-digit SIC industries whose market-to-book ratio is above the median market-to-book ratio in a given year	Compustat
High patents	A dummy equal to one for all 4-digit SIC industries whose patent citations scaled by the number of firms in the industry is above the median scaled patent citations in a given year	NBER/KPSS
High R&D	A dummy equal to one for all 4-digit SIC industries whose R&D-to-assets ratio is above the median R&D-to-assets ratio in a given year	Compustat
High tech	Dummy equal to one if the target is in one of the following 3-digit SIC industries: 281-289, 291, 348, 351, 353, 355-357, 361, 362, 365-367, 371, 372, 376, 381, 384, 386, 737, 871, 873, 874	National Science Foundation
Large size acquirer	A dummy variable equal to one if the acquirer logarithm of total assets is above the median acquirer logarithm of total assets in a given industry in a given year	Compustat / SDC
Large size rival	A dummy equal to one for all rivals whose logarithm of total assets is above the median rival logarithm of total assets for a given deal	Compustat / SDC
Log(number of deals)	Logarithm of the number of deals during the last year relative to the deal	SDC
Log(transaction value)	Logarithm of the deal value	SDC
Log(value of deals)	Logarithm of the total transaction value of all deals during the last year relative to the deal	SDC
Public acquirer	A dummy variable equal to one if the acquirer is in CRSP during the acquisition year	CRSP
Public target	A dummy variable equal to one if the target is in CRSP during the acquisition year	CRSP
Rival bankruptcy within the next year	A dummy equal to one if the rival declares bankruptcy within the next year after the current deal	UCLA – LoPucki Bankruptcy Research Database

Rival bankruptcy within the next two years	A dummy equal to one if the rival declares bankruptcy within the next two years after the current deal	UCLA – LoPucki Bankruptcy Research Database
Rival becomes a target within the next year	A dummy equal to one if the rival is a target of a deal that takes place within one year from the current deal	SDC
Rival becomes a target within the next two years	A dummy equal to one if the rival is a target of a deal that takes place within the next two years from the current deal	SDC
Rival becomes an acquirer within the next year	A dummy equal to one if the rival becomes an acquirer within one year from the current deal	SDC
Rival becomes an acquirer within the next two years	A dummy equal to one if the rival becomes an acquirer within the next two years from the current deal	SDC

Figure 1: Sales growth for rivals with negative and positive CARs
This figure shows the sales growth for rivals with negative CARs relative to firms with positive CARs in event time around M&As in their industry. Specifically, the figure reports the coefficients of a regression of sales growth on event time dummies interacted with a dummy equal to one when CARs are negative and zero otherwise. The regressions include year and firm fixed effects, and standard errors are clustered at the firm-level. Both figures are based on our sample of rival-years. In the first graph, we focus on industries with at least two consecutive years without deal to better identify the before and after period. In the second graph, we do not impose any such filter.

Panel A: Sales growth around M&A deals for industries with at least two consecutive years without deal



Panel B: Sales growth around M&A deals for all industries and years

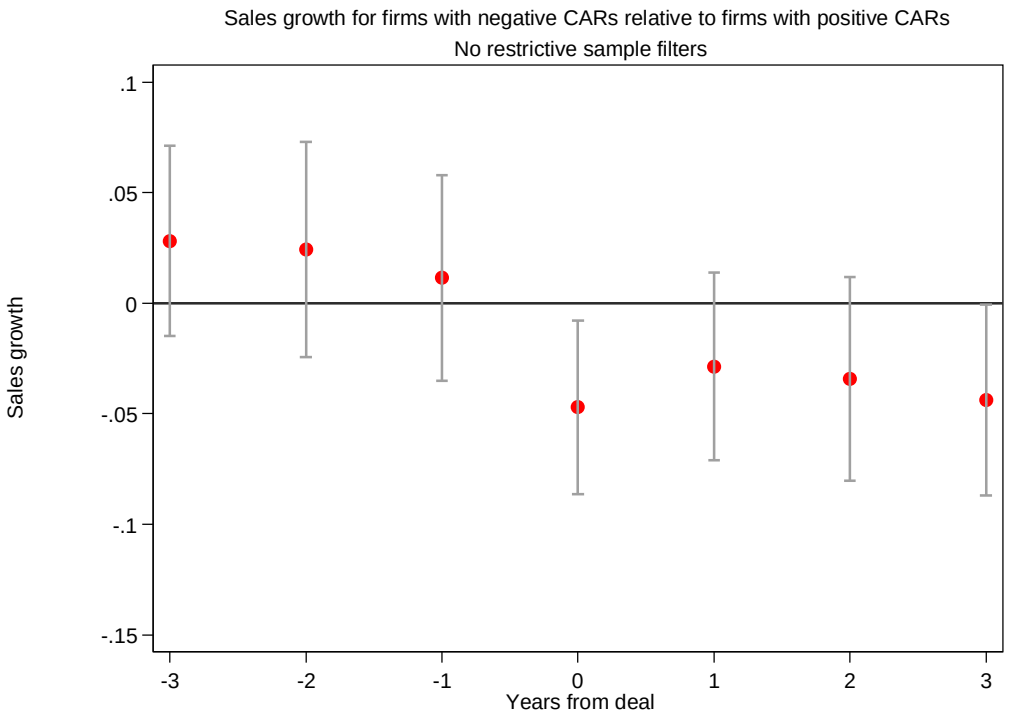


Table 1: Sample selection
This table presents the sample selection. The average transaction value is reported in 2009 million US dollars using the BEA price deflator.

Selection criteria	Number of deals	Average transaction value ($m)
Deals announced between 1990 and 2015 and effective as of 2015	184,150	280.72
Excluding deals in the financial and utilities industries	113,889	271.68
Excluding privatizations	113,347	270.59
Excluding acquisitions of remaining interest, certain assets, self-tenders, exchange offers	109,904	272.18
Excluding LBOs and MBOs	109,743	272.32
Excluding deals involving government agencies	109,451	272.67
Excluding buybacks and recapitalizations	106,408	257.39
Excluding minority acquisitions	103,964	261.40
Excluding acquisitions with missing sic code	103,778	261.57
Excluding non-horizontal deals with less than three rivals	30,665	360.72
Excluding deals without transaction value or a transaction value below USD 10m	7,981	515.71

Table 2: Summary statistics
This table presents summary statistics on the main variables used in the test. All the variables are defined in Appendix A.

Variable	N	Mean	Median	S.D.	p10	p90
Log(number of deals)	7,981	3.865	3.871	1.288	2.079	5.900
Log(value of deals)	7,981	7.857	8.153	2.222	4.840	10.454
Log(transaction value)	7,981	4.406	4.121	1.507	2.690	6.444
Public acquirer	7,981	0.651	1.000	0.477	0.000	1.000
Public target	7,981	0.123	0.000	0.329	0.000	1.000
Rival characteristics						
Log(total assets)	23,839	6.008	5.989	2.168	3.179	8.905
Market-to-book ratio	23,815	2.135	1.563	1.712	0.944	3.951
Cash-to-asset ratio	23,656	0.148	0.079	0.179	0.008	0.395
Public acquirer characteristics						
Log(total assets)	4,806	6.768	6.697	1.712	4.626	9.123
Market-to-book ratio	4,803	2.303	1.700	1.806	1.049	4.196
Cash-to-asset ratio	4,764	0.112	0.061	0.130	0.005	0.286
Public target characteristics						
Log(total assets)	229	5.885	5.697	2.129	3.074	8.829
Market-to-book ratio	221	2.480	1.681	2.024	1.091	5.162
Cash-to-asset ratio	220	0.130	0.066	0.156	0.007	0.378

Table 3: Rival CARs

This table presents summary statistics on stock price reactions of competitors of the target around takeover announcements between 1990 and 2015. We use four measures of rival's Cumulative Abnormal Returns (CARs; in %). The measures vary in the length of the window over which the stock price reaction is calculated (announcement date – 3 days to announcement date + 3 days in the first two lines, announcement date – 5 days to announcement date + 5 days in the last two lines) and in the market model used to estimate predicted returns (the CAPM in lines 1 and 3, a factor model using the value-weighted market index and the HML, SMB and MOM factors in lines 2 and 4). Each measure is presented separately for all rivals and for portfolios including all rivals in each deal. *, **, and *** indicate that the mean and median are statistically different from 0 at the 10%, 5%, and 1% level, respectively. The mean at the rival level is the constant of an OLS regression with no explanatory variables and significance is calculated clustering standard errors at the deal level. The significance of medians is obtained with a sign test.

CARs	Unit of observation	N	Mean	Median	S.D.	p10	p90
CAR (-3,3)	Rival-deal	252,887	-0.057	-0.357***	9.201	-9.903	9.800
	Deal	7,981	-0.067	-0.100**	3.784	-4.260	4.059
CAR(-3,3) FF	Rival-deal	252,887	-0.106**	-0.339***	9.170	-9.948	9.694
	Deal	7,981	-0.124***	-0.118***	3.481	-3.929	3.710
CAR (-5,5)	Rival-deal	252,887	-0.096	-0.429***	11.607	-12.646	12.453
	Deal	7,981	-0.107*	-0.130***	4.924	-5.650	5.345
CAR(-5,5) FF	Rival-deal	252,887	-0.148***	-0.397***	11.548	-12.731	12.322
	Deal	7,981	-0.181***	-0.227***	4.476	-5.034	4.741

Table 4: Rival reactions in past studies
This table presents information about the sample construction, methodology and results in a few selected papers analyzing stock price reactions of rivals around M&A announcements

Study	Sample period	Data source	Deal type	Target / Bidder selection	Rival selection	Sample size	Window for CARs	Results
Eckbo (1983)	1963-1978	Federal Trade Commission report	Large horizontal and vertical deals with at least the bidder or the target and one rival in CRSP	Manufacturing and mining sectors	Same SIC 4 as the target	333 deals	Various window sizes	Positive CARs for targets, slightly positive CARs for bidders. Rival CARs positive, between 0.2% and 2% depending on subsamples and specifications.
Song and Walkling (2000)	1982-1991	W.T. Grimm's Mergerstat Review + target listed in Value Line	All types	One of the companies is domestic, no regulated industries	Same Value Line industry as the target	141 deals, 2,459 rivals	[-1;0] and [-5;+5]	Target CARs = 17%, Rival CARs is small but significant (0.35% to 0.56% depending on window length). In horizontal deals, positive mean / negative median return.
Fee and Thomas (2004)	1980-1997	SDC	Announced horizontal mergers (at least one segment with common 4-digit SIC code) / announced	Domestic, public firms, outside the financial or regulated sectors	At least one segment in common with the bidder and the target (same 4-digit SIC code)	554 deals (391 eventually completed)	[-1;+1]	Combined CAR = 3.06% (+19% for targets, -0.58% for bidders) Rival CAR = +0.54% (single-segment rivals), +0.24% (all rivals)
Shahrur (2005)	1987-1999	SDC	Horizontal deals (same 4-digit SIC code)	Domestic, public firms, successful deals only with ownership going from below 15% to above 15%	Single-segment firms in CRSP and Compustat with same 4-digit SIC code	463 deals (including 325 mergers, 111 tender offers)	[-1;0] and [-2;+2]	Combined CAR = 2.25% (+15% for targets, -0.61% for bidders). Rival CARs = 0.39% in the [-2 day; +2 day] window. Positive when combined CAR is positive, negative when it is negative.

Table 5: Rival CARs by subsamples of deals and by year

Panel A shows mean and median rival CARs (in %) for different subsamples of deals and for rivals alone and portfolios of rivals in takeovers announced between 1990 and 2015. Rival CARs are calculated over the period announcement date – 5 days to announcement date + 5 days. Expected returns are calculated with a factor model using the value-weighted market index and the HML, SMB and MOM factors. Each measure is presented separately for all rivals and for portfolios including all rivals in each deal. The mean at the rival level is the constant of an OLS regression with no explanatory variables and significance is calculated clustering standard errors at the deal level. The significance of medians is obtained with a sign test. The last column presents aggregate value gains, calculated as the sum of the rival CAR times the market value 5 days before the announcement of the deal across all rivals of the target and expressed in trillions of 2015 US$. Panel B shows mean and median rival CARs by year (the unit of observation is rival firms). Panel C shows the ten industry-years with the most negative average value-weighted rival portfolio CAR. Panel D shows the ten deals with the most negative value-weighted rival portfolio CAR. *, **, and *** indicate that the mean and median are statistically different from 0 at the 10%, 5%, and 1% level, respectively.

Panel A: Rival CARs(-5,5) by subsamples

Deal characteristics	Unit of observation	N	Mean	Median	Aggregate dollar value (in $tn)
Public acquirer	Rival-deal	167,247	-0.183***	-0.447***	-1.98
	Deal	5,199	-0.152**	-0.162**	
Private acquirer	Rival-deal	85,640	-0.080	-0.312***	-0.80
	Deal	2,782	-0.075	-0.167*	
Public target	Rival-deal	33,214	0.157	-0.278***	-0.49
	Deal	983	0.348**	0.262**	
Private target	Rival-deal	219,673	-0.194***	-0.413***	-2.29
	Deal	6,998	-0.191***	-0.198***	
Public acquirer – public target	Rival-deal	28,150	0.242*	-0.251***	-0.29
	Deal	854	0.437***	0.302**	
Public acquirer – private target	Rival-deal	139,097	-0.269***	-0.483***	-1.68
	Deal	4,345	-0.268***	-0.241***	
Private acquirer – public target	Rival-deal	5,064	-0.317	-0.387***	-0.19
	Deal	129	-0.243	-0.463	
Private acquirer – private target	Rival-deal	80,576	-0.065	-0.307***	-0.61
	Deal	2,653	-0.066	-0.162*	

Panel B: Rival CARs(-5,5) by year

Year	Number of deal-rival	Number of deals	Mean	Median
1990	3,580	101	-0.785	-1.361***
1991	4,062	132	-0.426	-0.804***
1992	3,916	167	0.593*	0.144
1993	5,774	235	-0.397	-0.683***
1994	6,765	309	-0.201	-0.376***
1995	6,975	339	0.124	-0.264***
1996	9,257	451	0.600***	0.254***
1997	11,937	549	-0.417**	-0.601***
1998	9,028	521	-0.755**	-0.833***
1999	9,007	523	0.260*	-0.261*
2000	9,219	504	-1.175***	-1.356***
2001	13,451	313	-0.175	-0.667***
2002	11,953	278	0.290	0.000
2003	12,420	315	-0.171	-0.801***
2004	12,896	327	-0.804***	-0.720***
2005	16,066	375	-0.028	-0.167***
2006	14,063	359	-0.223	-0.420***
2007	14,515	337	-0.391**	-0.385***
2008	11,064	255	0.273**	0.182
2009	9,497	197	0.778*	-0.324***
2010	10,089	237	0.030	-0.251***
2011	9,959	248	-0.744**	-0.931***
2012	10,785	257	-0.012	-0.219***
2013	9,458	232	0.570***	0.083
2014	11,475	263	-1.000***	-0.709***
2015	5,676	157	1.027***	0.398***

Panel C: Industry-years with most negative average equal-weighted rival portfolio CAR(-5,5)

Year	Number of deals	Number of rivals	Mean	SIC Code	Aggregate dollar value (in $bn)
2008	1	3	-0.311	7996	0.13
2012	1	9	-0.214	8299	-0.02
2009	1	3	-0.198	5172	-0.002
1998	1	3	-0.193	7514	-0.54
2000	1	6	-0.188	5912	-2.96
2010	1	4	-0.165	1094	-0.06
2001	1	7	-0.155	3949	-0.07
2009	1	7	-0.154	1382	-0.06
2002	1	3	-0.153	3317	-0.004
2003	1	4	-0.151	3531	-0.66

Panel D: Deals with the most negative equal-weighted rival portfolio CAR(-5,5)

Year	Number of rivals	Mean	SIC Code	Target Name	Acquiror Name	Aggregate dollar value (in $bn)
2008	3	-0.311	7996	Phoenix Waterworld Safari	Harvest Family Ent-AZ LLC	0.13
2014	138	-0.285	1311	WPX Energy Inc-Oil & Gas –Asts	Southwestern Enegery Co	-62.26
1999	6	-0.240	7375	Infolocity Inc	IAT Resources Corp	-13.9
2000	17	-0.232	1381	Pioneer Drilling Co Inc	South Texas Drilling & Exp Inc	-9.38
2000	8	-0.228	7375	Reuters Group-Comms Assets	Equant NV-Communications Asset	-42.36
1999	4	-0.223	7948	Golden Gate Fields	MI Entertainment Corp	-0.84
2000	4	-0.222	3674	Demeter Technologies Inc	Finisar Corp	-6.08
2000	26	-0.222	3674	Spectrian Corp-UltraRF	Cree Inc	-6.08
2011	10	-0.220	1221	White Oak Resources LLC	Alliance Resources Partners LP	-4.91
2012	9	-0.214	8299	Princeton Review-Education	TPR Education LLC	-0.02

Table 6: Explaining rival CARs with deal, acquirer and rival characteristics
This table reports OLS regressions of rival CARs (in %) on deal, acquirer and rival characteristics for deals completed between 1990 and 2015. The dependent variable is the CAR(-5,5), calculated over the period announcement date – 5 days to announcement date + 5 days. Expected returns are calculated with a factor model using the value-weighted market index and the HML, SMB and MOM factors. All independent variables are described in the Appendix. The five columns present regressions with different fixed effect specifications. I × Y indicates Industry × Year fixed effects (in columns 1 and 4). Columns 2 and 5 also include rival fixed effects (indicated with an "R"). In column 3, regressions include deal fixed effects only. Standard errors are adjusted for heteroscedasticity and clustered at the four-digit SIC industry level. ***, **, and * designate significance at the 1%, 5%, and 10% level, respectively.

Dependent variable	CAR(-5,5)				
Fixed effects	I × Y	I×Y and R	Deal	I × Y	I×Y and R
	(1)	(2)	(3)	(4)	(5)
High MB rival	-0.696***	-1.053***	-0.693***	-0.695***	-1.115***
	(0.064)	(0.167)	(0.064)	(0.046)	(0.155)
Large size rival	0.079*	-0.185	0.084*	0.144**	-0.155
	(0.046)	(0.169)	(0.046)	(0.058)	(0.243)
High cash rival	0.028	0.025	0.033	-0.013	-0.058
	(0.045)	(0.114)	(0.045)	(0.056)	(0.126)
High MB acquirer				-0.180**	-0.181**
				(0.078)	(0.081)
Large size acquirer				-0.283***	-0.280***
				(0.087)	(0.090)
High cash acquirer				0.083	0.081
				(0.303)	(0.308)
Log(Number of deals)	-0.521	-0.556		0.565	0.530
	(0.518)	(0.510)		(0.632)	(0.633)
Log(value of deals)	-0.447***	-0.441***		-0.664***	-0.647***
	(0.156)	(0.158)		(0.166)	(0.167)
Log(transaction value)	-0.056	-0.056		-0.045	-0.044
	(0.077)	(0.077)		(0.106)	(0.107)
Public target	0.429***	0.433***		0.506***	0.507***
	(0.071)	(0.071)		(0.117)	(0.119)
Public acquirer	-0.052	-0.051			
	(0.143)	(0.145)			
Observations	248,114	247,593	248,063	147,322	146,758
Adjusted R2	0.01	0.02	0.07	0.01	0.02

Table 7: Rival CARs and industry characteristics

This table reports OLS regressions of rival CARs (in %) on deal, acquirer and rival characteristics for deals completed between 1990 and 2015. The dependent variable is the CAR(-5,5), calculated over the period announcement date – 5 days to announcement date + 5 days. Expected returns are calculated with a factor model using the value-weighted market index and the HML, SMB and MOM factors. All independent variables are described in the Appendix. Panel A shows coefficients on interactions with a high R&D dummy variable (in columns 1 to 3) and a high-tech industry dummy variable (in columns 4 to 6). Panel B shows a high market-to-book industry dummy and a high patent citation dummy. Deal characteristic variables are the same as in Table 6, but coefficients on these variables are not reported. Columns (2), (3), (5), and (6) include acquirer control variables, namely a high market-to-book, large size, and high cash acquirer dummy as well as the corresponding interactions. In each panel, the six columns present regressions with acquirer and rival variables, and different fixed effect specifications. I × Y indicates Industry × Year fixed effects (in columns (2), (3), (5), and (6)). Column (3) and (6) also include rival fixed effects (indicated with an "R"). In column (1) and (4), regressions include deal fixed effects only. Standard errors are adjusted for heteroscedasticity and clustered at the four-digit SIC industry level. ***, **, and * designate significance at the 1%, 5%, and 10% level, respectively.

Panel A: R&D intensive and high-tech industries

Dependent variable	CAR(-5,5)					
Fixed effects	Deal	IxY	IxY and R	Deal	IxY	IxY and R
γ		High R&D			High Tech	
	(1)	(2)	(3)	(4)	(5)	(6)
High MB rival	-0.302***	-0.208**	-0.394***	-0.562***	-0.562***	-0.756***
	(0.035)	(0.097)	(0.149)	(0.021)	(0.045)	(0.068)
Large size rival	0.141**	0.195	0.490**	0.105	0.148**	-0.185**
	(0.055)	(0.120)	(0.239)	(0.072)	(0.064)	(0.085)
High cash rival	0.060	0.001	0.624***	0.089*	0.080	0.220***
	(0.050)	(0.095)	(0.177)	(0.050)	(0.059)	(0.057)
γ x High MB rival	-0.496***	-0.559***	-0.853***	-0.263***	-0.216***	-0.608***
	(0.068)	(0.113)	(0.142)	(0.100)	(0.071)	(0.141)
γ x Large size rival	-0.066	-0.054	-0.655*	-0.046	-0.007	0.098
	(0.064)	(0.135)	(0.388)	(0.091)	(0.108)	(0.353)
γ x High cash rival	-0.027	-0.012	-0.737***	-0.098	-0.146	-0.448**
	(0.078)	(0.088)	(0.176)	(0.077)	(0.103)	(0.182)
Acquirer controls	No	Yes	Yes	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x Acquirer controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x Controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	248,063	147,322	146,569	248,063	147,322	146,714
Adjusted R2	0.07	0.01	0.02	0.07	0.01	0.02

Panel B: High MB industries and high number of patent citation industries

Dependent variable	CAR(-5,5)					
Fixed effects	Deal	IxY	IxY and R	Deal	IxY	IxY and R
γ		High MBInd			High Patent Citations	
	(1)	(2)	(3)	(4)	(5)	(6)
High MB rival	-0.419***	-0.512***	-0.520***	-0.505***	-0.260**	-1.156***
	(0.049)	(0.063)	(0.112)	(0.090)	(0.117)	(0.347)
Large size rival	0.285***	0.305***	0.153	0.211	-0.032	-0.447
	(0.088)	(0.097)	(0.103)	(0.149)	(0.167)	(0.351)
High cash rival	0.105	0.169	0.338***	0.108	0.156	0.369**
	(0.074)	(0.108)	(0.107)	(0.154)	(0.198)	(0.174)
γ x High MB rival	-0.361***	-0.221***	-0.754***	-0.206*	-0.463***	0.045
	(0.081)	(0.080)	(0.130)	(0.116)	(0.128)	(0.383)
γ x Large size rival	-0.264**	-0.194	-0.341	-0.144	0.181	0.297
	(0.116)	(0.124)	(0.326)	(0.158)	(0.178)	(0.436)
γ x High cash rival	-0.086	-0.215*	-0.435***	-0.083	-0.179	-0.447**
	(0.071)	(0.114)	(0.137)	(0.162)	(0.207)	(0.222)
Acquirer controls	No	Yes	Yes	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x Acquirer controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x Controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	248,063	147,322	146,334	247,839	147,208	146,622
Adjusted R2	0.07	0.01	0.02	0.07	0.01	0.02

Table 8: Rival CARs and industry concentration

This table reports OLS regressions of rival CARs (in %) on deal, acquirer and rival characteristics for deals completed between 1990 and 2015. The dependent variable is the CAR(-5,5), calculated over the period announcement date – 5 days to announcement date + 5 days. Expected returns are calculated with a factor model using the value-weighted market index and the HML, SMB and MOM factors. Panel A shows coefficients on interactions with a high market share of the largest firm in the 4-digit SIC industry dummy variable (in columns 1 to 3) and a high fitted HHI dummy variable from the Hoberg and Phillips data library (in columns 4 to 6). These columns only includes deals between 1990 and 2005 due to data availability. Panel B shows coefficients on interactions with a high market share skewness dummy variable (in columns 1 to 3) and a high equity value skewness dummy variable (in columns 4 to 6). All independent variables are described in the Appendix. Deal characteristic variables are the same as in Table 6, but coefficients on these variables are not reported. Columns 2, 3, 5 and 6 include acquirer control variables, namely a high market-to-book, large size, and high cash acquirer dummy as well as the corresponding interactions. In each panel, the six columns present regressions with rival variables, and different fixed effect specifications. I × Y indicates Industry × Year fixed effects (in columns 2, 3, 5 and 6). Columns 3 and 6 also includes rival fixed effects (indicated with an "R"). In columns 1 and 4, regressions include deal fixed effects only. Standard errors are adjusted for heteroscedasticity and clustered by the four-digit SIC industry. ***, **, and * designate significance at the 1%, 5%, and 10% level, respectively.

Panel A: High CR1 and high fitted HHI

Dependent variable	CAR(-5,5)					
Fixed effects	Deal	IxY	IxY and R	Deal	IxY	IxY and R
γ		High CR1			High fitted HHI	
	(1)	(2)	(3)	(4)	(5)	(6)
High MB rival	-0.640***	-0.589***	-0.981***	-0.809***	-0.794***	-1.174***
	(0.108)	(0.088)	(0.196)	(0.070)	(0.052)	(0.175)
Large size rival	0.056	0.072	0.102	0.181***	0.155**	-0.119
	(0.055)	(0.071)	(0.197)	(0.044)	(0.060)	(0.319)
High cash rival	0.021	-0.044	0.011	0.073	-0.011	-0.160
	(0.031)	(0.056)	(0.161)	(0.068)	(0.063)	(0.112)
γ x High MB rival	-0.174	-0.333***	-0.463***	0.017	-0.082	-0.338
	(0.140)	(0.106)	(0.164)	(0.217)	(0.257)	(0.500)
γ x Large size rival	0.109	0.220**	-0.901***	-0.292*	-0.110	-0.403
	(0.086)	(0.111)	(0.174)	(0.156)	(0.147)	(0.520)
γ x High cash rival	0.051	0.104	-0.095	-0.132	-0.063	-0.344
	(0.096)	(0.095)	(0.226)	(0.125)	(0.131)	(0.249)
Acquirer controls	No	Yes	Yes	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x Acquirer controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x Controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	246,796	146,686	145,873	142,870	93,270	92,727
Adjusted R2	0.07	0.01	0.02	0.06	0.01	0.02

Panel B: High market share skewness and high equity value skewness

Dependent variable	CAR(-5,5)					
Fixed effects	Deal	IxY	IxY and R	Deal	IxY	IxY and R
γ	High MS skew			High EV skew		
	(1)	(2)	(3)	(4)	(5)	(6)
High MB rival	-0.490***	-0.429***	-0.720***	-0.525***	-0.538***	-0.837***
	(0.061)	(0.096)	(0.172)	(0.075)	(0.100)	(0.191)
Large size rival	-0.201**	-0.173	0.073	-0.045	0.051	-0.209
	(0.082)	(0.110)	(0.291)	(0.105)	(0.131)	(0.287)
High cash rival	-0.055	-0.096	-0.056	0.068	0.042	0.243
	(0.098)	(0.116)	(0.206)	(0.093)	(0.129)	(0.203)
γ x High MB rival	-0.277***	-0.342***	-0.508***	-0.226**	-0.207**	-0.395**
	(0.096)	(0.096)	(0.178)	(0.094)	(0.102)	(0.199)
γ x Large size rival	0.395***	0.398***	-0.202	0.178	0.114	0.077
	(0.078)	(0.111)	(0.323)	(0.135)	(0.212)	(0.269)
γ x High cash rival	0.132	0.114	0.019	-0.040	-0.065	-0.331*
	(0.134)	(0.142)	(0.195)	(0.125)	(0.133)	(0.191)
Acquirer controls	No	Yes	Yes	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x Acquirer controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x Controls	Yes	Yes	Yes	Yes	Yes	Yes
γ x FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	246,796	146,686	145,976	246,796	146,686	145,990
Adjusted R2	0.07	0.01	0.02	0.07	0.01	0.02

Table 9: Rival CARs and bankruptcies

This table reports OLS regressions of rival CARs (in %) on deal, acquirer and rival characteristics for deals completed between 1990 and 2015. The dependent variable is the CAR(-5,5), calculated over the period announcement date – 5 days to announcement date + 5 days. Expected returns are calculated with a factor model using the value-weighted market index and the HML, SMB and MOM factors. The independent variable of interest is a dummy variable that indicates whether the rival declares bankruptcy within a certain horizon from the current deal. All independent variables are described in the Appendix. Deal characteristic variables are the same as in Table 6, but coefficients on these variables are not reported. In panel A, columns (2), (3), (5), and (6) include acquirer control variables, namely a high market-to-book, large size, and high cash acquirer dummy. I × Y indicates Industry × Year fixed effects (in columns (2), (3), (5), and (6)). Column (3) and (6) also include rival fixed effects (indicated with an "R"). In column (1) and (4), regressions include deal fixed effects only. Panel B is a rival-year panel with the dependent variable being a dummy equal to one if the average rival CAR is negative across all deals done in the year. Control variables in these regressions include the logarithm of firm size, market-to-book, cash-to-assets, the logarithm of the average transaction value, the logarithm of the average number of deals, and the logarithm of the average value of deals. Standard errors are adjusted for heteroscedasticity and clustered by the four-digit SIC industry. ***, **, and * designate significance at the 1%, 5%, and 10% level, respectively.

Panel A: Rival-deal level

Dependent variable	CAR(-5,5)					
Fixed effects	Deal	IxY	IxY and R	Deal	IxY	IxY and R
	(1)	(2)	(3)	(4)	(5)	(6)
Rival bankruptcy within the next year	-1.966***	-2.756***	-2.323**			
	(0.392)	(0.880)	(1.027)			
Rival bankruptcy within the next two years				-1.144***	-1.878***	-1.779***
				(0.351)	(0.422)	(0.588)
Acquirer Controls	No	Yes	Yes	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	242,402	144,716	144,161	231,087	139,260	138,717
Adjusted R2	0.07	0.01	0.02	0.07	0.01	0.02

Panel B: Rival-year level

Dependent variable	Dummy for negative average CAR(-5,5)					
Fixed effects	Y	IxY	IxY and R	Y	IxY	IxY and R
	(1)	(2)	(3)	(4)	(5)	(6)
Rival bankruptcy within the next year	0.035	0.018	-0.079			
	(0.073)	(0.065)	(0.082)			
Rival bankruptcy within the next two years				0.078**	0.093**	0.092
				(0.039)	(0.042)	(0.065)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18,588	18,328	17,393	17,774	17,522	16,637
Adjusted R2	0.01	0.07	0.07	0.01	0.06	0.07

Table 10: Rival CARs and challenges

This table reports OLS regressions of rival CARs (in %) on deal, acquirer and rival characteristics for deals completed between 1990 and 2015. The dependent variable is the CAR(-5,5), calculated over the period announcement date – 5 days to announcement date + 5 days. Expected returns are calculated with a factor model using the value-weighted market index and the HML, SMB and MOM factors. The independent variable of interest is a dummy variable that indicates whether the deal is challenged either by the Department of Justice or the Federal Trade Commission. Columns 3 and 4 include acquirer control variables, namely a high market-to-book, large size, and high cash acquirer dummy. Other control variables in these regressions include the logarithm of firm size, market-to-book, cash-to-assets, the logarithm of the average transaction value, the logarithm of the average number of deals, and the logarithm of the average value of deals. Columns 1 and 3 include year fixed effects and columns 2 and 4 include industry-year fixed effects. Standard errors are adjusted for heteroscedasticity and clustered by the four-digit SIC industry. ***, **, and * designate significance at the 1%, 5%, and 10% level, respectively.

Dependent variable	CAR(-5,5)			
Fixed effects	Y	IxY	Y	IxY
	(1)	(2)	(3)	(4)
Challenged deal dummy	-1.305**	-1.233*	-1.500**	-1.078
	(0.556)	(0.684)	(0.655)	(0.810)
Acquirer Controls	No	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes
Observations	7,981	7,144	4,368	3,643
Adjusted R2	0.01	0.10	0.02	0.08

Table 11: Rival CARs and acquisitions

This table reports OLS regressions of rival CARs (in %) on deal, acquirer and rival characteristics for deals completed between 1990 and 2015. The dependent variable is the CAR(-5,5), calculated over the period announcement date – 5 days to announcement date + 5 days. Expected returns are calculated with a factor model using the value-weighted market index and the HML, SMB and MOM factors. The independent variable of interest is a dummy variable that indicates whether the rival is a target or an acquirer within a certain horizon from the current deal. All independent variables are described in the Appendix. Deal characteristic variables are the same as in Table 4, but coefficients on these variables are not reported. In panels A and C, columns (2), (3), (5), and (6) include acquirer control variables, namely a high market-to-book, large size, and high cash acquirer dummy. I × Y indicates Industry × Year fixed effects (in columns (2), (3), (5), and (6)). Column (3) and (6) also include rival fixed effects (indicated with an "R"). In column (1) and (4), regressions include deal fixed effects only. Panels B and D are rival-year panels with the dependent variable being a dummy equal to one if the average rival CAR is negative that year. Control variables in these regressions include the logarithm of firm size, market-to-book, cash-to-assets, the logarithm of the average transaction value, the logarithm of the average number of deals, and the logarithm of the average value of deals. Standard errors are adjusted for heteroscedasticity and clustered by the four-digit SIC industry. ***, **, and * designate significance at the 1%, 5%, and 10% level, respectively.

Panel A: Rival-deal level - Target

Dependent variable	CAR(-5,5)					
Fixed effects	Deal	IxY	IxY and R	Deal	IxY	IxY and R
	(1)	(2)	(3)	(4)	(5)	(6)
Rival becomes a target within the next year	-0.169	-0.093	-0.657			
	(0.410)	(0.452)	(0.788)			
Rival becomes a target within the next two years				0.479***	0.372**	0.003
				(0.161)	(0.151)	(0.289)
Acquirer Controls	No	Yes	Yes	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	242,402	144,716	144,161	231,087	139,260	138,717
Adjusted R2	0.07	0.01	0.02	0.07	0.01	0.02

Panel B: Rival-year level - Target

Dependent variable	Dummy for negative average CAR(-5,5)					
Fixed effects	Y	IxY	IxY and R	Y	IxY	IxY and R
	(1)	(2)	(3)	(4)	(5)	(6)
Rival becomes a target within the next year	0.036	0.013	0.098			
	(0.054)	(0.053)	(0.065)			
Rival becomes a target within the next two years				0.004	0.005	0.059
				(0.031)	(0.029)	(0.046)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18,588	18,328	17,393	17,774	17,522	16,637
Adjusted R2	0.01	0.07	0.07	0.01	0.07	0.07

Panel C: Rival-deal level - Acquirer

Dependent variable	CAR(-5,5)					
Fixed effects	Deal	IxY	IxY and R	Deal	IxY	IxY and R
	(1)	(2)	(3)	(4)	(5)	(6)
Rival becomes an acquirer within the next year	0.111***	0.117	0.117**			
	(0.042)	(0.071)	(0.055)			
Rival becomes an acquirer within the next two years				0.077***	0.099**	0.077
				(0.027)	(0.039)	(0.071)
Acquirer Controls	No	Yes	Yes	No	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	242,402	144,716	144,161	231,087	139,260	138,717
Adjusted R2	0.07	0.01	0.02	0.07	0.01	0.02

Panel D: Rival-year level - Acquirer

Dependent variable	Dummy for negative average CAR(-5,5)					
Fixed effects	Y	IxY	IxY and R	Y	IxY	IxY and R
	(1)	(2)	(3)	(4)	(5)	(6)
Rival becomes an acquirer within the next year	0.029*	0.027*	0.035*			
	(0.015)	(0.016)	(0.018)			
Rival becomes an acquirer within the next two years				0.010	0.014	0.018
				(0.011)	(0.011)	(0.015)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	18,588	18,328	17,393	17,774	17,522	16,637
Adjusted R2	0.01	0.07	0.07	0.01	0.06	0.07