Winning by Losing:

Evidence on Overbidding in Mergers

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Abstract

Do shareholders of acquiring companies profit from acquisitions, or do acquiring CEOs overbid and destroy shareholder value? Answering this question is difficult since the hypothetical counterfactual is hard to determine. We exploit merger contests to address the identification issue. In those cases where, ex ante, at least two bidders had a significant chance at winning the contest, the post-merger performance of the loser allows calculating the counterfactual performance of the winner without the merger. In a novel data set of merger contests since 1985, we find that the returns of bidders are closely aligned before the merger contest, but diverge afterwards. In the sample where the loser had a significant chance to win, winners underperform losers by 48 percent over the following three years. Our results also imply that announcement returns fail to provide an informative estimate of the causal effect of mergers in our sample. Existing measures of long-run abnormal returns tend to underestimate the negative return implications.

Keywords: Mergers; Acquisitions; Misvaluation; Counterfactual

JEL classification: G34; G14; D03

1 Introduction

Do acquiring companies profit from acquisitions, or do acquirors overbid and destroy shareholder value? The large payments and negative announcement effects observed for a large set of acquisitions have attracted considerable attention to these questions. Moeller, Schlingemann, and Stulz (2005) calculate that, during the last two decades, U.S. acquirors lost in excess of $220 billion at the announcement of merger bids alone. Such findings have been interpreted as evidence of empire building of acquiring CEOs (Jensen, 1986), other misaligned personal objectives of CEOs (Morck, Shleifer, and Vishny, 1990), or the result of CEO overconfidence about their proposed mergers (Roll, 1986; Malmendier and Tate, 2008).

However, the evaluation of the causes and consequences of mergers has been hampered by the empirical difficulty in assessing the value created, or destroyed, in mergers. Using the announcement effect as a proxy, one may mismeasure the value creation of a merger due to price pressure around mergers (Mitchell, Pulvino, and Stafford, 2004), information revealed in the merger bid (Asquith, Bruner, and Mullins, 1987), or failure of the efficient markets hypothesis (Loughran and Vijh, 1997). And, to the extent that the returns to mergers are revealed only over time and the announcement effect is insufficient, it is hard to measure what portion of the long-run returns can be attributed to a merger decision rather than other corporate events or market movements. Consider, for example, the argument of Shleifer and Vishny (2003) and Rhodes-Kropf and Viswanathan (2004) that CEOs undertake mergers when their own firms are overvalued. Under this scenario, CEOs acquire targets that are less overvalued by using their overvalued stock. The announcement effect of such a merger might be negative even if, in the long-run, the merger is in the best interest of current shareholders: Had the CEOs not used the overvalued stock for acquisitions, the stock price would have fallen even more.

In general, the lack of a clear counterfactual makes it is difficult to evaluate the returns to mergers. In this paper we propose a new strategy to address this problem. Our research design exploits the concurrent bidding of two or more companies for the same target. We identify those cases in which, ex ante, at least two bidders had a significant chance at winning the bidding

contest. We then use the losing bidder's post-merger performance to identify the hypothetical post-merger performance of the winning bidder had he not undertaken the merger. Effectively, participation in a close bidding contest provides a novel matching criterion, over and above the usual market-, industry-, and firm-level observable characteristics. Our empirical approach allows us not only to provide a more credible estimate of the causal effect of the merger in the sample of contested mergers, but also to evaluate existing methodologies, including announcement effects and various methods to measure long-run returns, by comparing their estimates with the winner-loser difference estimates. As such, our analysis provides insights going beyond the specific sample of contested mergers.

Relative to prior empirical approaches to measuring the returns to mergers, our strategy is a methodological improvement because it is more robust to possible sources of biases. First, our strategy addresses concerns about acquiror overvaluation affecting the propensity to acquire. If overvaluation affects a company's decision to bid for a target, it is likely to also affect other firms who are bidding for the same target at the same time. Moreover, our empirical strategy allows us to compare the valuation paths of acquirors and matched competing bidders month by month in the years prior to the merger contest. If overvaluation were to affect bidding decisions differently, this difference should be reflected in different return paths. Our strategy is also likely to control for strategic considerations that affect the decision to attempt a takeover and other unobserved sources of selection, which are hard to control for with the set of standard financial variables. Under the assumption that the losers provide a good counterfactual for the winners, our empirical methodology allows us to control for all unobserved sources of selection.

We construct a new data set of all mergers with overlapping bids of at least two potential acquirors since 1985. We then seek to identify the subsample of mergers where both the winner and the loser(s) had a significant chance to win the contest. We find that, in short-duration contests, there is typically a clear candidate for winning, and therefore one bidder easily and quickly prevails. By contrast, in long-duration contests, the back and forth between bidders indicates that at least two bidders have a significant chance at winning the contest. In other words, among all merger contests, our identification strategy is most likely to be valid in the

case of long, hard-fought contests. Therefore winners and losers in long mergers contests are our preferred comparison set.

In this sample, we first compare the abnormal performance of winners and losers in the years before the merger contest. To measure abnormal stock performance, we remove the effect of observable predictors of stock returns - market, industry, risk, and firm characteristics - from the raw return series. Consistent with our identifying assumption, the abnormal returns of winners and losers track each other closely during the pre-merger period. This finding implies that the market considered winners and losers as comparable in the years before the merger and, moreover, expected them to have similar profitability in the future.

After the merger is completed, however, the abnormal returns of winners and losers diverge significantly. In the clean comparison set of close (i.e., long-duration) contests, losers significantly outperform winners. Economically, the effect is large. The difference in abnormal performance amounts to about 50 percentage points over the three years following the merger contest. As expected, the effect is different for short-duration contests. Here, winners outperform losers – though they do not outperform (but insignificantly underperform) the market. The difference between the longest-duration and shortest-duration quartiles of merger contests is strongly significant in all specifications.

These results are robust to various sample selection criteria and controls. First, we check whether the ultimate loser lost due to the decision of target shareholders or board, or was truly outbid, rather than decided to pass on the deal. In the latter case, the voluntary withdrawal may be an indication of a well-governed firm, who is likely to outperform the worse-governed winner firm, independently of the merger. We document that voluntary withdrawal does occur, in about 20% of our cases, but none of them are in the long-duration quartile. Second, we address the alternative explanation that winners undergo a change in risk profile due to the merger. We test for differential shifts in winner- versus loser betas around the merger contest, and find no significant differences. Moreover, our methodology adjusts for the performance effects of (time-varying) risk exposure.

The last main step of our analysis is an evaluation of standard approaches to measuring

returns to mergers. Our setting provides a testing ground for existing methodologies since we can compare standard estimates to those based on the winner-loser differences in abnormal returns. First, we simply calculate the returns to the winners in our sample using existing approaches: announcement returns, alphas based on four-factor portfolio regressions, and abnormal returns based on characteristics-matched portfolios. In the full sample, the announcement effect is negative and significant, but fails entirely to capture the worsening outcome, going from short-duration to longer-duration contests. Second, and more directly, we regress the long-run winner-loser abnormal return differences on the announcement effect. We find a negative correlation. In other words, in our sample of contested mergers, the announcement effect fails to predict the causal effect of the merger, even directionally. Standard methodologies to measure long-run returns fare better. Regressing the long-run performance of the winners, calculated using market-adjusted, industry-adjusted, risk-adjusted, and characteristics-adjusted abnormal returns, respectively, with the winner-loser differences in abnormal returns, using the same return benchmarks, we find a significant positive correlation. This implies that, directionally, standard tests and winner-loser methods to assess long-run abnormal returns yield similar results. Quantitatively, however, the results of the methods differ starkly. In the subsample of the long-duration contests, standard methods understate the performance effect relative to the winner-loser method, while in the subsample of short-duration contest, the opposite is true.

Overall, we conclude that, for the subset of mergers that involve at least two bidders either one of whom could be winning the contest, mergers destroy shareholder value of the acquiror. While our findings are specific to the set of contested mergers, the discrepancy between our results and those generated with standard approaches of measuring returns to mergers suggests that the well-known biases in prior approaches are economically important.

The research design in this paper is motivated by Greenstone and Moretti (2004) and Greenstone, Hornbeck, and Moretti (2011). There, the authors analyze the local consequences of attracting a million-dollar plant to a county, including the effects on productivity, labor earnings, public finances. Compared to the county-level analysis in their paper, mergers allow for considerably more exhaustive controls of heterogeneity among bidders. In contrast with measures of

productivity and labor market outcomes, stock prices of bidding companies incorporate not just current conditions, but also expectations about future performance. In terms of the economic question it addresses, this paper relates to the large literature estimating the value creation or destruction of corporate takeovers. Reviews of the empirical evidence on the returns to mergers go back to at least Roll (1986) and Jensen and Ruback (1983) while more recent assessments are from Andrade, Mitchell, and Stafford (2001) and Betton, Eckbo, and Thorburn (2008). Taken together, the evidence on the value effects of mergers for acquirors is mixed. Most studies of acquiror *percentage* announcement returns find relatively small and insignificant effects. More recent studies using large samples find statistically significant effects of 0.5 to 1 percent (Moeller, Schlingemann, and Stulz, 2004; Betton, Eckbo, and Thorburn, 2008). The analysis of *dollar* returns (Moeller, Schlingemann, and Stulz, 2005) has revealed the distribution of merger gains to be heavily skewed, with a small number of large loss deals swamping the gains of the majority of profitable, but smaller acquisitions. Studies of long-run post-merger performance suggest that stock mergers and mergers by highly valued acquirors are followed by poor performance (Loughran and Vijh, 1997; Rau and Vermaelen, 1998). In terms of the empirical identification strategy - the attempt to exploit settings where variation in takeover completion is quasi-random (or exogenous) - this paper is related to the study by Savor and Lu (2009) who use a small sample of acquisition attempts that failed for plausibly exogenous reasons as a counterfactual for the successful acquirors' post-merger performance. As in our paper, their return estimate is sample-specific, there to the set of cancelled mergers, e.g., due to regulatory intervention, which is most likely to happen in mergers that strongly increase market power.

The paper proceeds as follows. Section 2 describes the data sources and presents some summary statistics. Section 3 explains the econometric model. Section 4 describes the results while Section 5 concludes.

2 Data

2.1 Sample Construction

Our initial data set contains all bids in merger contests starting in January 1985 or later, and recorded in the SDC Mergers and Acquisitions database. SDC records all public and binding bids, i. e., typically the prevailing bid in the preceding private auction and any rival bid placed after that.[1] We define bidders as contestants in the same merger fight if they bid for the same target and their bids are effective for overlapping time periods. We first use the SDC flag for contested bids to identify contestants, and code two bids as competing if the first bid is recorded as a competing bid of the second bid and vice versa, or if both bids have a common third competing bid. We then check that all bids classified as contested in the first step are placed before the recorded completion date. The company that succeeds in completing a merger is classified as the winner, all other bidders as losers. In the initial data set, there are three contests to which SDC erroneously assigns two winners. We identify the unique winner by a news wire search.

For each bid we collect the SDC deal number, the acquiror's SDC assigned company identifier (CIDGEN), six-digit CUSIP, ticker, nation, company type, and the SIC and NAICS codes. We also collect the following bid characteristics: announcement date, effective or withdrawal date, the percentage of the transaction value offered in cash, stock or other means, the deal attitude (friendly or hostile), and the acquisition method (tender offer or merger).

We use those data to restrict the sample to bids by public U.S. firms, excluding privately held and government-owned firms, investor groups, joint ventures, mutually owned companies, subsidiaries, and firms whose status SDC cannot reliably identify. We exclude bids by White Knights since they do not provide a plausible hypothetical counterfactual for other contestants.

For each merger contest, we create an event time variable t, which counts the months relative

[1] As described in more detail by Boone and Mulherin (2007), the takeover process usually starts with an investment bank soliciting interest of potential acquirors. Interested parties sign confidentiality agreements and obtain access to non-public information about the target. Following this, several non-binding rounds of bidding are conducted to identify the smaller group of seriously interested parties. A final auction among these bidders leads to a binding offer, and the prevailing bid becomes public. In the spirit of our identification strategy, we focus on public and binding bids because those bidders are most seriously interested in acquiring the target and thus most likely to be ex ante similar.

to the contest. We set t equal to 0 at the end of the month preceding the start of the merger contest, i. e., preceding the announcement of the earliest bid. The end of the prior month is -1, the end of the month before that is -2, etc. Going forward, we set t equal to $+1$ for the end of the month in which the contest ends, i. e., in which the merger is completed or, if there is no winner, in which the last bid is withdrawn. The end of the following month is $+2$, the end of the month after that $+3$, etc. That is, the duration of the merger contest is collapsed into one event-time period, but event-time periods before and after the merger contest are exactly on month long. The construction of even time is illustrated in Figure 1.(a). Figure 1.(b) provides a concrete example from our data set, the merger contest between Westcott Communications and Automatic Data Processing for Sandy Corporation.

[Figure 1 approximately here]

We merge the SDC data with financial and accounting information for a three-year periods around the start and end date of each contest for each bidder. In particular, we extract financial information from the CRSP Monthly Stock Database, including holding period stock return (RET), distribution event code (DISTCD), delisting code (DLSTCD), and delisting return (DLRET); accounting information from the CRSP-COMPUSTAT Fundamental Annual Database, including total assets, book and market value of equity, operating income, and property, plants and equipment; and market data, including the CRSP value-weighted index returns, T-bill yields, and Fama-French factor returns. We merge the different data sets using each company's CRSP permanent company and security identifiers (PERMCO and PERMNO). To obtain the PERMCO pertaining to each SDC bidder, we match the 6-digit CUSIP provided by SDC with the first six digits of CRSP's historical CUSIP (NCUSIP). Since the CUSIP of a firm changes over time, and the reassignment of CUSIPs is particularly common following a merger, we are careful to match SDC's bidder CUSIP with CRSP's NCUSIP for the month end preceding the announcement of the specific bid, and extract the respective PERMCO. We manually check that the SDC company names correspond to the matched CRSP company names. If a firm has multiple equity securities

outstanding, we use (1) the common stock if common and other types of stock are traded; (2) Class A shares if the company has Class A and Class B outstanding; (3) the stock with the longest available time series of data if there are multiple common stocks traded. The availability of these data for the pre- and post-merger period restricts our sample to merger contests, where the first bid was submitted between January 1985 and December 2006.

Using the monthly CRSP stock return series for each bidder, we then construct the time series of monthly bidder returns for a window of three years around the merger contest ($t = -35$ to $t = +36$). Note that the CRSP holding period return is adjusted for stock splits, exchanges, and cash distributions, and thus properly accounts for such events which are particularly common around mergers. We also construct the time series of target returns in the same way. We use the target time series to compute the offer premium as the run-up in the target stock price since $t = -2$, i. e., over the last two calendar months prior to the start of the contest and over the contest duration until completion of the merger. We compute the offer premium both in percent of the target equity value, and in percent of the acquiror equity value.

Our initial sample contains 416 bids by 402 bidders in 193 takeover contests. Among these initial bidders, there are 152 winners and 250 losers. We then drop repeated bids by the same bidder, but keep as announcement date the announcement date of the first bid. This eliminates fourteen bids. Next, we drop 85 contests that had not been completed by December 31, 2009. We further drop twelve contests for which either the winner or the loser could not be matched to a CRSP PERMNO. We then delete twenty one contests where the winner is the ultimate parent company of the target since ultimate parents are unlikely to provide a good comparison for other bidders. Next, we balance the sample by requiring non-missing stock return data for the periods -35 to $+36$ (i.e., 3 years before and after the contest). This reduces the number of contests to 212. We also eliminate five bids where the bidding firm has extreme stock price volatility over the event window, with the standard deviation of the price exceeding 200, since these firms appear to be be influenced by idiosyncratic factors and are, ex ante, a poor benchmark for their respective contestants.[2] Finally, we keep only those contests for which we have data for both the winner

[2]If we keep these firms in our sample, the confidence bounds in the pre-merger period increase substantially,

and the losers. This reduces the sample by another 35 contests. The final sample contains 82 contest with bids placed by 172 bidders of which 82 are winners and 90 are losers.

[Table I approximately here]

[Figure 2 approximately here]

Table I summarizes the construction of our data set, and Figure 2 illustrates the frequency distribution of the contests over the sample period. We observe between zero and eight contested mergers per year, with spikes in the mid-1980s and mid-1990s. In the three-year period following a merger contest, many bidder stocks disappear from CRSP due to delisting. We are careful to account for delisting events and their implications for shareholders using all available delisting information provided by CRSP. CRSP's delisting code (DLSTCD) classifies delists broadly into mergers, exchanges for other stock, liquidations, and several categories of dropped firms. In addition, CRSP provides delisting returns and distribution information.[3] We track the performance of a delisted firm from the perspective of a buy-and-hold investor, mirroring the underlying assumption when tracking performance of listed firms. Specifically, we assume that stock payments in takeovers are held in the stock of the acquiring firm; exchanges for other stock are held in the new stock. When shareholders receive payments in cash (in mergers, liquidations, and bankruptcies), or CRSP cannot identify or does not cover the security in which payments are made, we track performance as if all proceeds were invested in the market portfolio.[4] We use the value-weighted CRSP index as a proxy for the market portfolio.

but our qualitative results remain unchanged. The volatility is calculated using the full event window of +/- three years. Three of these firms are in the High Tech sector: CTS Corp, Yahoo!, and QWest Communications. One firm, Hyseq Pharmaceuticals, is in the Healthcare sector. Another firm, Cannon Group, operates in the Service sector. All of these firms show ten- to twenty-fold increases and reversals in their stock market valuations, mostly occurring in the pre-merger period.

[3]Delisting returns are defined as shareholder returns from the last day the stock was traded to the earliest post-delisting date for which CRSP could ascertain the stock's value. In a few cases, that date is more than one month after the delisting. In these cases, we attribute the delisting return to the month immediately following the delisting. Distribution data contains information about whether and to what extent shareholders of a takeover target were paid in cash or stock

[4]In a few cases where the delisting return

2.2 Descriptive Statistics

The descriptive statistics of bidder and deal characteristics are presented in Table II. Panel A contains the bidder characteristics, separately for winners and losers. Panel B describes the deal characteristics. All variables in Panel A are computed from yearly balance sheet and income data, and refer to the fiscal year end preceding the beginning of the contest.

The first three rows of Panel A indicate that both winners and losers are very large compared to the average Compustat firm. This is mainly due to requiring firms to be public. The table also shows that winners tend to be larger than losers, but the size difference is insignificant and also much smaller than that between the average acquiring and non-acquiring firm in Compustat. The difference in Tobin's Q is very small. The average Q is 1.88 for winners and 1.79 for losers. The average case-specific difference is 0.05, the median 0.01 (not reported). Profitability is virtually identical for winners and losers, as is leverage, whether measured in book or in market values. The last two rows of Panel A report the three-day announcement CAR, in percentage and dollar terms. Announcement returns are negative and large compared to those found in large-sample studies of uncontested mergers, which typically find acquiror announcement returns of around plus one percent (Moeller, Schlingemann, and Stulz, 2004, 2005; Betton, Eckbo, and Thorburn, 2008). This suggests that participation in a merger contest is viewed negatively by markets, and equally so for the ultimate winner and loser. Overall, the tests for differences in means reveal that none of the observable characteristics differ significantly between winners and loser. This is a first indication that our identifying assumption is supported by the data and losers might provide for a valid counterfactual for the winners.

Panel B shows that the transaction values of contested mergers are quite large compared to the size of the firms involved, about one quarter of the loser's market capitalization and about 16 percent of the winner's market capitalization. The deal type (tender offer or merger), attitude (hostile or friendly), and the means of payment (stock, cash or other means) do not differ markedly from those found in single-bidder mergers. Most contests recorded by SDC involve only two public bidders. A higher number of publicly traded contestants contestants is observed only

for 33 percent of our sample, and contests with more than three bidders are rare (six cases, or 7 percent of contests). The final offer premium in our sample is about 58 percent, which is somewhat larger than in a typical sample of non-contested bids, e. g., 48 percent in the sample of Betton, Eckbo, and Thorburn (2008), which consists of 4,889 bids for US targets during 1980-2002. This may be an indication of overbidding, or winner's curse, brought about by the presence of competing offers. Below we explore this possibility in more detail. Offer premia expressed as a percentage of the acquiror equity value are smaller, around 10 percent, since acquirors tend to be significantly larger than targets.

The most striking difference between contested and non-contested acquisitions is the duration of the process, from announcement to completion. While the average time to completion in single-bidder mergers is about 65 trading days (see Betton, Eckbo, and Thorburn (2008)), merger contests take three times as long, on average 9.5 months. However, we also observe large heterogeneity in our sample, for example, a median of four months in the lowest quartile of contest duration, but of 15.5 months in the fourth quartile. As discussed earlier, we will exploit the variation in contest length to identify the subsample of contests in which either bidder could have won the merger contest. In short-duration merger, one bidder typially withdraws the bid shortly after the competing bid came in, suggesting that the withdrawing company did not see much of a chance to win the contest. Alternatively, such a fast and voluntary withdrawal may be a sign of a well governed firm, whose CEO or board refuses to get involved in a bidding contest. In either case, the loser is unlikely to provide for a good counterfactual. In longer-duration merger contests, instead, the contestants appear to be committed to winning the takeover fight. Note that the intuition is similar to our basic motivation for choosing merger contests at all: The idea is that single-bidder acquisitions fail to elicit competing bids, and thus have short completion times, precisely because other potential acquirors differ too much in terms of the synergies they could generate. Competing bids are launched only if synergies are similar enough for at least two potential acquirors, and a contest of multiple competing bidders is likely to take longer the more similar the synergies are.

As a first, qualitative test of this interpretation of merger contests and merger duration, we

collect information about the circumstances under which a merger contest ended. The cases that are closest to our ideal experiment are merger contests where the winner was picked for reasons the loser could not influence – a preference of the shareholders, the board, or a court, either because the offer was financially better, or sometimes because the offer was better along other, non-financial dimensions. Furthest from our ideal experiment are cases where the losers withdrew immediately after the competing bid was submitted or withdraw for other reasons such as re-evaluation of the merger opportunity in light of (bad) news about the target. In those cases the loser's management appears to behave systematically differently from the winner's management, possibly indicating differences in corporate governance. In our sample, we find that the vast majority of losers lost due to a higher bid by the competitor after a bidding war (25 percent) or because the target management or shareholders rejected the bid for other, known or unknown reasons (46 percent). Those cases are close to our ideal scenario. In six percent of the cases, the losing bidder withdrew after re-evaluating the merger opportunity, and in 23 percent of cases the loser withdrew shortly after the competing bid was submitted. Cases in these latter two categories are do not fit well with the idea of identifying a hypothetical counterfactual and are reason for concern. However, we find that not a single of these latter cases falls into the subsample (quartile) of long-duration contests. Hence, the qualitative classification of withdrawal reasons or other causes for losing the contest corroborate the choise of long-duration contests as the ideal sample for the counterfactual analysis.

Splitting our sample of contested mergers into duration quartiles, we find that the quartiles contain merger contests that last, respectively, two to four months (first quartile), five to seven months (second quartile), eight to twelve months (third quartile), and more than a year (up to 43 months; fourth quartile). The contest duration in quartile one roughly corresponds to the average duration of non-contested mergers, while all other quartiles contain significantly longer fight durations. In the next subsection, we test empirically whether contest duration is a suitable proxy for bidder similarity.

2.3 Benchmarks for Abnormal Return Calculation

Our empirical analysis uses four different, widely used benchmarks to adjust raw stock performance for observable differences in performance determinants. These benchmarks are

- the market return, r_{mt};
- the bidder's industry return, r_{ikt}, where k references the industry of bidder i. For the industry return, we use the value-weighted return of the all firms in the bidders industry, using the Fama-French 12-industry classification;
- the CAPM required return, $r_{ft} + \hat{\beta}_{ij}(r_{mt} - r_{ft})$, where r_{ft} is the risk free rate, and $\hat{\beta}$ is estimated from monthly returns;
- the characteristics-based return, r^{cm}_{ijt}. This benchmark return is the value-weighted return of a portfolio of firms matched on the characteristics size, book-to-market and 12-month momentum (Daniel, Grinblatt, Titman, and Wermers, 1997).

2.4 A Comparison of Abnormal Returns of Winners and Losers

The descriptive statistics in Table II showed insignificant pre-merger differences in winner-loser characteristics for a range of variables, providing a first piece of suggestive evidence that the loser in a merger contest is a valid counterfactual for the winner. A second piece of evidence is the correlation of the stock performances of winners and losers prior to the beginning of the merger contest. If our identifying assumption holds, we expect all determinants of stock returns – both observed and unobserved – to be similar within a winner-loser pair before the merger. In the following discussion of this subsection, we focus on the *unobserved* determinants of stock returns.[5]

To evaluate the assumption of similarity in unobservables, we first note that, econometrically, stock returns can be conveniently decomposed into the component which is due by observables

[5]We focus on similarity in unobserved performance determinants, because (1) differences in observables are small and statistically insignificant within winner-losers pairs in our sample, (2) remaining differences in observables are controlled for, and (3) the distinctive feature of our approach of matching winners and losers aims precisely at controlling for differences in unobservables.

and that which is due to unobservable or omitted determinants. For instance, we can write risk-adjusted returns as

$$r_{ijt} - r_{ft} - \hat{\beta}_{ij}(r_{mt} - r_{ft}) = \alpha_{ij} + \varepsilon_{ijt}. \tag{1}$$

The component $\beta_{ij}(r_{mt} - r_{ft})$ of the bidder return is explained by the exposure to market risk and the excess return of the market portfolio. In contrast, the intercept α_{ij} and the residual ε_{ijt} are due to factors unobserved by the econometrician: α_{ij} is the average excess return, i.e. the part of the performance trend that cannot be explained by market risk and return, ε_{ijt}, on the other hand, is the monthly unexplained residual return. For the other adjustment types an equivalent formulation obtains. Using this formulation, we obtain estimates of pre-merger alphas and residuals by simply regressing pre-merger abnormal returns of each bidder on a constant.

We then regress the abnormal performance trend of the winners on those of the losers in the same merger contest, and the winner residuals on the loser residuals. If winners and losers have a common determinant that is not accounted for in the abnormal return calculation, then performance trends and residuals should be highly correlated.

In Table III, we report the results of the alpha regressions. Consistent with our assumption, we find that the pre-merger alphas of winners and losers are highly correlated irrespective of the adjustment method used. As shown in the first column of Table III, this holds even for the full sample, implying that winning bidders who experience abnormal run-ups during the three years preceding the merger are typically challenged by rival bidders that have experienced a similar run-up during that period. The correlation is typically even stronger in our preferred sample of "close" fights, i.e., for the quartile of contests with the longest duration (Q4), as shown in column five of the table, with the exception of characteristics-adjusted returns. In fact, in the three other cases the alpha correlation rises monotonically from the first to the fourth quartile of contest duration. It is highly significant in the subsample of the longest merger contests, but always insignificant in the subsample of the shortest contests. Similarly, the R-squared tends to increase with contest duration, and is always highest in the quartile containing the longest

contests. The results for the residual regressions are omitted for space considerations, but they also show positive and highly statistically significant correlation between winners and losers.

These results are an important confirmation of bidder similarity. Contestants with markedly different pre-merger price trends may differ significantly in their motives for and prospects of acquisitions. For example, the post-merger performance of acquirors, motivated by overvaluation of their own stock - possibly following a pre-merger run-up - might be systematically different from the post-merger performance of acquirors that did not experience a recent run-up or even experienced poor pre-merger performance. Here, we find instead that pre-merger abnormal trends of bidders are closely aligned. Furthermore, we also find that the winner-loser correlation in alphas drops substantially from the pre- to the post-merger period and becomes either insignificant or remains only marginally significant (last column). Even more striking is the drop in R-squared from the pre- to the post-merger period. The literal interpretation of these results is that loser performance explains winner performance very well before the merger but no longer does so after the merger. This drop in trend correlation is indicative of a causal effect of the merger.

Taken together, the similarity of winner-loser pairs in pre-merger abnormal performance trends supports the credibility of the identifying assumption that the losers form a valid counterfactual for the winners. Moreover, this similarity increases in the duration of the merger contest, confirming our intuition that longer contests offer the most credible comparison set. In the next Section, we will perform to a set of direct tests of the identifying assumption.

3 Econometric Model

A naive estimator of the effect of mergers on firm performance can be obtained by regressing a measure of abnormal returns on a dummy for whether a firm completes a merger, controlling for observable characteristics of the firm. Alternatively, a simple matching estimator can be obtained by comparing the returns of firms that successfully complete a merger to the returns of the average firm in the market with a similar set of observable characteristics. The consistency of both types

of estimators crucially depends on the assumption that, in the absence of the merger, the returns of the acquiring firm would have evolved like those of the average (or matched) firm with similar observable characteristics. In other words, both the regression and the matching estimator are based on the assumption that the acquiring firm and the average (or matched) firm in the market have identical unobserved determinants of returns, conditional on covariates.

In reality, this assumption is likely to be violated. Positive selection occurs if acquirors have better unobservable characteristics, for example, if firms that are outperforming other firms in the same industry tend to grow by mergers and acquisitions. Negative selection occurs if acquirors have worse unobservables, for example, if firms that are experiencing declines in demand tend to consolidate and merge with other firms. In the naive regression or the matching estimator described above, positive selection leads to an overestimate of the effect of a merger on firm performance, and negative selection leads to an underestimate.

In this paper, we use of the sample of contested mergers to provide a credible estimate of the value implications of mergers for acquiring-company shareholders. Our key assumption is that the performance of the losing firm provides a valid counterfactual for what would have happened to the winning firm in the absence of the merger. Even if this assumption is not true exactly, it is likely that winners are more similar to losers than to the average firm in the market, or to non-acquiring firms that have similar observable characteristics. We test the validity of this assumption by comparing the pre-merger performance of winners and losers. The pre-merger analysis also allows us to compare the credibility of the winner-loser counterfactual with benchmarks and counterfactuals based on other methodologies.

3.1 Model

Our estimation proceeds in two steps. In the first step, we calculate each bidder's cumulative abnormal performance using a range of different approaches to account for the exposure to observable factors, which we describe in detail below. For example, exposure to risk factors such as the market portfolio or the Fama-French factors could systematically vary between winners and losers in takeover contests, and the difference in exposure is likely to vary over time. In particu-

lar, the risk exposure of the winning bidder will change from that of the pre-merger, stand-alone company to the weighted average of winner's and target's exposures. In order to isolate the merger's abnormal value effect, we remove the effect of all observable differences between winners and losers and account for time-variation in these differences.

We compute buy-and-hold cumulative abnormal returns (CARs) for each month in the three-year event window around merger contests. We compute the CAR as the difference between the cumulated bidder stock return and a cumulated benchmark return, starting from zero at $t = 0$. Cumulating forward, this amounts to:

$$CAR_{ijt} = \prod_{s=1}^{t}(1 + r_{ijs}) - \prod_{s=1}^{t}(1 + r_{ijs}^{bm}), \tag{2}$$

where i denotes the bidder, j the bidding contest, t and s index the period in event time, r_{ijs} is the bidder's stock return earned in event period s, i. e., over the time interval from $s-1$ to s (including all distributions), and r_{ijs}^{bm} is the benchmark return in the event period s. As explained above, event time is defined such that $t = 0$ indicates the end of the month preceding the start of the merger contest, while $t = 1$ refers to end of the month of merger completion. Hence, the return at $t = 1$ spans the whole period from the end of the month prior to the start of the merger to the end of the month of merger completion and is typically longer than one calendar month. This way, the performance during the contest period is captured in the CAR but collapsed into the time between event period $t = 0$ and $t = 1$. For instance, the CAR in $t = 1$ reflects both the stock price reaction at the announcement of the first bid and at resolution of the contest. After $t = 1$, however, event time proceeds in steps of calendar months, and hence the return r_{ijs} corresponds to the return in the respective calendar month for all $s > 1$. Going back in event time, i.e. for $t < 0$, CARs are computed correspondingly as

$$CAR_{ijt} = \prod_{s=0}^{t+1}(1 + r_{ijs})^{-1} - \prod_{s=0}^{t+1}(1 + r_{ijs}^{bm})^{-1} \tag{3}$$

We use the four different benchmarks described in Section 2.3 above to compute CARs: (1) the market return, (2) the bidder's industry return, (3) the CAPM required return, and (4) the return of a characteristics-based portfolio. We call the adjusted performance measures market-adjusted, industry-adjusted, risk-adjusted, and characteristics-adjusted CARs, respectively.

In the second step, we evaluate winner-loser differences in abnormal performance in a three-year window around the merger contest using a regression framework. To illustrate the performance paths of winners and losers, we fit the the following regression equation:

$$CAR_{ijt} = \sum_{t'=\underline{T}}^{\overline{T}} \pi_{t'}^{W} W_{ijt}^{t'} + \sum_{t'=\underline{T}}^{\overline{T}} \pi_{t'}^{L} L_{ijt}^{t'} + \eta_j + \xi_t + \varepsilon_{ijt} \tag{4}$$

The outcome variable in this equation (4) is the CAR of bidder i in contest j and event time t, as described above. The vector η_j is a full set of contest fixed effects that adjusts for permanent case-specific differences in the intercept of the outcome variable. These dummies account for all fixed characteristics of each pair or group of contestants. ξ_t is a vector of calendar month fixed effects, capturing any calendar time-specific effects on winner or loser stock prices. These indicators control for aggregate fluctuations of bidder prices. $\varepsilon_{i,j,\tau}$ is a stochastic error term.

The key variables are the $W_{ijt}^{t'}$ and the $L_{ijt}^{t'}$ indicators. The $W_{ijt}^{t'}$ variables are a set of dummies indicating event time and whether bidder i was a winner in contest j, i.e. $W_{ijt}^{t'} = I(t = t' \; and \; i \text{ is a winner in contest } j)$. The $L_{ijt}^{t'}$ variables are an equivalent set of loser-event time dummies, i.e. $L_{ijt}^{t'} = I(t = t' \; and \; i \text{ is a loser in contest } j)$.

Given these two sets of indicator variables, the coefficients $\pi_{t'}^{W}$ measure the average winner price, while the coefficients $\pi_{t'}^{L}$ estimate the average loser price in period t'. In this way, the effect of winner or loser status is allowed to vary with event time. For example, for $t' = 3$, $\pi_{t'}^{W}$ is the conditional mean of the winner CAR 3 months after the end of the bidding contest, and $\pi_{t'}^{L}$ is the conditional mean of the losing firms' CAR 3 months after the completion of the merger.

A few details about the identification of the π coefficients deserve highlighting. First, and most importantly, including case fixed effects guarantees that the π-series are identified from comparisons within a winner-loser pair. Including them allows us to retain the intuitive appeal of

pairwise differencing in a regression framework. Second, it is possible to separately identify the π's, and calendar time effects because the merger announcements occur in multiple years. Third, some firms are winners and/or losers two times or more, and any observation from these firms will simultaneously identify multiple π's. Finally, by using CARs as the dependent variable in the main regression, our 2-step approach controls for differences in observable predictors of stock price performance.

Figure 3 illustrates the series of winner and loser π-coefficients in event time for the four quartiles of contest duration. For this figure, we use the market-adjusted CAR as the dependent variable.[6] The series of winner-π-coefficients is plotted in black and the loser coefficients in gray. The top panel illustrates the regression results for the quartile subsample of the longest-lasting contests only, while the bottom panels display all quartiles separately. Again, as shown in more detail in Section 2.4 above, it is evident that the winning and losing firms have very similar price paths during the 3 years before the start of the contest. Notably, this pre-merger similarity is also present in the subsamples of long and short contest duration, where post-merger performance deviate dramatically.

In order to explicitly test for winner-loser divergence in performance, we reformulate equation 4, so as to directly estimate winner-loser differences:

$$CAR_{ijt} = \sum_{t'=\underline{T}}^{\overline{T}} \pi_{t'} W_{ijt}^{t'} + \sum_{t'=\underline{T}}^{\overline{T}} \delta_{t'} C_{ijt}^{t'} + \eta_j + \xi_t + \varepsilon_{ijt} \tag{5}$$

The only difference of this equation with equation (4) is that the loser-period dummies $L_{ijt}^{t'}$ are replaced by simple period dummies $C_{ijt}^{t'} = I(t = t')$. This implies that the winner-period coefficients, π, directly estimate the period-specific winner-loser *differences* while the coefficients of the period dummies still estimate the period-specific loser performance.

In principle, the parameters in equation (5) can alternatively be estimated using "differenced" data. For example, the OLS estimate of the π-vector in regression (5) is approximately equal to

[6] Appendix Figure A-1 plots the same series of coefficients for the long-lasting contests only, and using various alternative measures of performance as the dependent variable.

the estimate of the $\overline{\pi}$-vector of the following regression:

$$\Delta CAR_{jt} = \sum_{t'=\underline{T}}^{\overline{T}} \overline{\pi}_{t'} C_{jt}^{t'} + \xi_t + \varepsilon_{jt} \tag{6}$$

Here, the dependent variable is the period-specific winner-loser CAR difference within a contest. Because, in this specification, the regression is run on the within-case winner-loser differences, the coefficients of the event time dummies, $C_{j,\tau}^{\tau'}$, directly estimate the average period-specific winner-loser differences. The series of period-winner indicators, $W_{i,j,\tau}^{\tau'}$, thus drops out, as do the case fixed effects. It can be shown that, on a balanced sample with only one loser per contest, the OLS estimates of π and $\overline{\pi}$ are numerically identical. However, these estimates generally differ in unbalanced samples and in samples that contain contests with multiple losers. In essence, the "level" specification of equation (5) makes better use of multiple losers, and it is therefore our specification of choice.

3.2 The Effect of Mergers on Winners

Finally, we specify a more parsimonious version of equation (5) that estimates a piecewise-linear approximation of the period-specific π-coefficients:

$$\begin{aligned} CAR_{ijt} = {} & \alpha_0 + \alpha_1\, W_{ijt} + \alpha_2\, t + \alpha_3\, t \cdot W_{ijt} + \alpha_4\, Post_{ijt} + \alpha_5\, Post_{ijt} \cdot W_{ijt} \\ & + \alpha_6\, t \cdot Post_{ijt} + \alpha_7\, t \cdot Post_{ijt} \cdot W_{ijt} + \eta_j + \xi_t + \varepsilon_{ijt} \end{aligned} \tag{7}$$

This is the specification we use to run our statistical tests of merger effects. It allows for a difference in performance between winners and losers in the period before the merger ($\alpha_1 W_{ijt}$) and after the merger ($\alpha_5 Post_{ijt} W_{ijt}$); two separate linear time trends for the pre-merger and post-merger period ($\alpha_2 t$ and $\alpha_6 t Post_{ijt}$); deviations from these trends for winners for the pre-merger and post-merger period ($\alpha_3 t W_{ijt}$ and $\alpha_7 t Post_{ijt} W_{ijt}$); as well as dummies that control for the contest (η_j), the month (ξ_t) and the period after the merger ($\alpha_4\ Post_{ijt}$). Unlike equation (5), which yields 72 coefficients for winners and 72 coefficients for losers – one for each month in

the three years prior to the merger and the three years after the merger – equation 7 summarizes the effect of the merger with few interpretable coefficients.

To assess the validity of our identifying assumption, we test whether the parameter α_3 is zero. The parameter α_3 represents the difference between winners and losers in the trend in stock performance in the months before the merger. Our identifying assumption requires that winners and losers have similar trends in abnormal returns before the merger contest. Different trends would suggest that winners and losers differ in (possibly unobservable) characteristics that affect performance even before the merger contest begins.[7]

To assess the causal effect of the merger, we seek to estimate how the long-run difference in trends between winners and losers changes after the merger relative to before. Concretely, if our identifying assumption is not rejected, the winner-loser difference at $t = +36$ tells us whether mergers have a value effect. In terms of regression (7) this difference is estimated by $[\hat{\alpha}_1 + \hat{\alpha}_5 + \#\text{ of post-merger periods} \cdot (\hat{\alpha}_3 + \hat{\alpha}_7)] = 0$.[8]

We estimate this model separately for short and long merger fights. The descriptive statistics in Section 2.2 show that contest duration is an aspect that sets multi-bidder takeover contests apart from single-bidder acquisitions. Time to completion is more than three times longer in contested bids than in single-bidder acquisitions. Further, the arguments made above and the evidence on pre-merger abnormal returns of Section 2.4, suggest that longer contest durations are associated with more similarity of winners and losers in takeover battles, including the potential for synergies or other strategic considerations. We split our sample of contested mergers into duration quartiles. The quartiles (from first to fourth) contain merger contests that last, respec-

[7] Alternatively, we can test whether the winner-loser difference at $t = -36$ is significantly different from zero. This difference is estimated by $[\hat{\alpha}_1 + \#\text{ of pre-merger periods} \cdot \hat{\alpha}_3]$. If it is positive, ultimate winners have been declining in value relative to losers in the three years leading up to the merger. In contrast, if winners and losers are similar before the merger, then their abnormal performance trends should also be similar and the $t = -36$ winner-loser difference should not be significantly different from zero. Given our normalization of cumulative abnormal returns at $t = 0$, the two tests are identical.

[8] The estimate of the the pre-merger winner-loser difference, $\hat{\alpha}_1$, is included in the equation even though winner-loser differences are normalized to zero in period $t = 0$, because the regression does not estimate $\hat{\alpha}_1$ to be precisely equal to zero. Hence, the piecewise-linear approximation of the post-merger performance difference would be misstated if $\hat{\alpha}_1$ were not accounted for. The parameter measuring the pre-merger trend, $\hat{\alpha}_3$, is included in the test equation, since our aim is to measure the total slope of the post-merger trend, not just the incremental trend shift, if the identifying assumption is not rejected in our data.

tively, two to four months, five to seven months, eight to twelve months, and more than a year (up to 43 months). The contest duration in quartile one roughly corresponds to the average duration of non-contested mergers, while all other quartiles contain significantly longer fight durations.

3.3 Is There an Effect of Mergers on Losers?

An important consideration in interpreting the estimates of our identification strategy concerns the possibility that losers' profitability may be *directly* affected by the merger. If, for example, the merger significantly changes their market power, the loser performance does not provide a counterfactual for the winner's performance. This is not a completely unrealistic scenario, given that in a significant number of cases the loser and the target firm belong to the same industry, so that losers market power is likely to change after the merger.

If, everything else constant, the loser's loss of market power hurts their stock performance, this consideration should strengthen our results for the group of protracted contests. Given that our main finding points to a negative effect of mergers on stock performance for long-duration contests, as discussed below, our estimates would be even more negative in the absence of this effect. Hence our estimate of a negative effect in the case of protracted fights should be interpreted as a conservative lower bound.[9]

However, it is also possible that a merger is more beneficial to the loser than to the winner. Stigler (1950) is the first to raise the possibility that after a merger, the combined firm may reduce its production below the combined output of its parts, thus raising industry prices. In this case, firms that did not merge may expand output and ultimately profit from the higher industry price. In both a Cournot oligopoly model and a differentiated products Bertrand model, if the synergy or efficiency effects of a merger are not very large, the non-merging firm may benefit. Salant, Switzer, and Reynolds (1983) concluded that in general, a merger is not profitable in a Cournot oligopoly, with the exception of two duopolists that become a monopoly.[10] Subsequent

[9]Similarly, our finding of a positive effect on in the case of short fights could be explained by this bias.

[10]For example, the Continental-United and Delta-Northwest mergers in the airlines industry are expected by some observers to benefit the non-merging airlines.

literature has identified some of the limits of this result.[11]

While it is certainly possible in theory that a merger is not profitable, this class of models is unlikely to apply in our case. By definition, in these settings, it must be the case that firms prefer not to merge. By contrast, in all our cases firms engage in deliberate and protracted battles to prevail in the merger.

4 Results

4.1 Main Results

We have seen from Figure 3 that the price paths of winners and losers appear *visually* very similar in the years before the merger, but they diverge after the merger. For short contests (those in the first quartile), the winners' price path seems to be above losers' price path, suggesting a positive effect of mergers. For long contests (those in the fourth quartile), the opposite appears to be true. Winners' price path lies below the losers price path. There does not appear to be much of a difference for contests of medium length (second and third quartile).

We now quantify more rigorously this visual impression. Table IV reports estimates of equation 7. We report separate estimates for each of the four quartiles of contest duration, and for each of four alternative measures of stock performance: market-adjusted CAR, industry-adjusted CAR, risk-adjusted CAR and characteristics adjusted CAR. To account for possible serial correlation and correlations between winners and losers, standard errors are clustered by contest.[12]

[Table IV here]

[11] For example, Deneckere and Davidson (1983) argue that the existence of product differentiation can result in the merged firm producing all the output of its pre merger parts. Perry and Porter (1985) identify many circumstances in which an incentive to merge exists, even though the product is homogeneous.

[12] Note that the standard errors may be affected by (1) a possible cross-correlation due to long, overlapping event periods, and (2) skewness in CARs because CARs are bounded below at -100% but unbounded above. Adjustment of standard errors is, however, not straightforward. The bootstrapped and skewness-adjusted t-statistic proposed by Lyon, Barber, and Tsai (1999), for example, is hard to implement in a regression framework and, moreover, debated in terms of its effectiveness in achieving the intended objective (Mitchell and Stafford, 2000). A good overview of the econometric issues with standard errors in long-horizon event studies is given in Kothari and Warner (2005).

Starting with the tests of the identifying assumption, it is clear that the coefficient α_3 on the interaction between Winner and Time is never statistically significant. This means that, the trends in the months before the mergers are very similar for winners and losers. Based on this piece of evidence we conclude that, consistent with the visual evidence in Figure 3, and the additional tests in Table III, winner and loser prices are statistically undistinguishable at conventional levels during the 36 months leading up to the merger.[13] Estimates for the pooled sample - reported in Table A-I, for completeness - also yield the same finding.

The last rows in the table - labelled "Merger Effect" - report our estimate of the causal effect of the merger on the acquiring firm's stock performance. We find that the effect of the merger on the acquiring firm's stock performance varies monotonically and significantly with the duration of the merger contest. The acquirors with the shortest contest duration perform well relative to the loser following merger completion. While winner-loser price differences are virtually zero in the three years leading to the merger contest, there is a sharp trend break in price paths following in the contest period. Winners outperform losers by 31 to 37 percentage points in the three years following the merger, depending on the measure of performance used. Despite the small sample (22 contests), the outperformance is statistically significant for all four measures of performance.

In contrast, in the subsample of the longest contest durations, winners fare significantly worse than losers. Here, the cumulative *under*performance of winners over three years is about 49 to 54 percentage points and also statistically significant, depending on the measure of performance used. This effect is statistically significant for all four measures of performance. A statistical test of the Q4-Q1 difference in the long-term value effect of the merger is economically large. The interquartile range of underperformance is between 80 and 89 percentage points, depending on the outcome variable used. In all cases, the interquartile difference is precisely estimated and highly statistically significant. Estimates for quartiles 2 and 3 (medium duration) and estimates for the pooled sample in Table A-I uncover no significant effect of mergers on stock performance.

[13] We find the same result when we run the parameter tests using less restrictive sample selection criteria: when the sample is balanced but not matched, when the sample is matched but not balanced, or when the sample is neither balanced nor matched.

4.2 Economic Mechanism

The results so far show that post-merger performance differs substantially with the duration of the contest. Losing is better than winning for the subsample of long-lasting bidding contest. But for mergers with a short duration, e.g., the lowest quartile, the result reverses. In fact, under any econometric specification, the results for the lowest and highest quartile are always significantly different from zero.

What explains these differences across fight duration quartiles? A first possible explanation is that longer-lasting bidding wars increase the premium paid to target shareholders, and higher premia may explain the worse performance of acquirors. However, our prior results indicate, for the fourth quartile, an underperformance trend over the three years following merger completion and, for the first quartile, an overperformance trend over the following three years. This *long-term* trend is hard to explain with a one-time payment.

Nevertheless we investigate a possible causal role of differences in offer premia empirically. For this analysis we use the target price run-up prior to the contest resolution to construct the offer premium as described in Section 2.1. Therefore, we need to restrict the sample to the 66 winning bids for which the target stock price is available. The top panel of Figure 4 plots the offer premium against the duration of the bidding contest (in months). We observe a weak positive correlation. A simple linear regression of the offer premium on the duration of the merger contest (not shown) reveals a weakly significant effect (p-value$<$ 0.1): one additional month implies a premium that is 1.74 percentage points higher. As the scatter plot also shows, however, the positive correlation is driven by a few outliers with extreme fight durations.

[Figure 4 approximately here]

In order to gauge the potential impact of overbidding on acquiror stock prices, we also estimate the effect of contest duration on the offer premium expressed as a percentage of the *acquiror's* market valuation. This allows us to directly evaluate how much of the over- or underperformance of the winner can be explained by contest-duration-induced additional payments. Recall that we normalize bidder stock prices to 100 in the month prior to the beginning of the contest,

so that winner-loser differences in performance are effectively percentage differences in bidder valuations. The bottom panel of Figure 4 shows a scatter plot of this relationship. The figure show that, when the offer premium is expressed as a percentage of the acquiror value rather than as a percentage of the target value, the correlation with contest duration becomes an order of magnitude smaller. In an unreported regression of the offer premium and contest duration we show that the relationship is statistically insignificant. Therefore, duration-induced overbidding cannot explain the underperformance of long merger contests.

A more plausible explanation of the large differences between bidder returns in the short-duration and the long-duration subsamples relates to our initial motivation: Our analysis aims to exploit bidding contests to construct a hypothetical counterfactual for acquiror performance had the merger not taken place. In the case of bidding contest of short duration, however, it is likely that the ultimate winner entered the contest as the likely winner, e.g., due to higher synergies. In other words, winners and losers in short-duration contests of two to four months may be significantly different along merger-relevant dimensions while winners and losers in long-duration fights, which may last a year or more, are more similar. In that case, return differences in the short-duration sample are not a good measure of the hypothetical counterfactual while the long-duration estimates provide the correct estimate of the hypothetical counterfactual.

Measuring differences in synergies or, more broadly, differences in characteristics that affect the returns to mergers, is difficult. Instead, we attempt to test for such differences by comparing observable characteristics. First, we compare, one-by-one, the differences in characteristics between winners and losers, separately for the samples of long-duration and short-duration contests. The results, reported in Table II, Panel B, indicate some differences across the duration quartiles. Size differences, whether measured in terms of book assets, market capitalization or sales, tend to increase across from short to long-lasting contests. There is, however, evidence that bidders in long-duration contests tend to be in the same industry.

We also examine whether characteristics of the completed deal, i.e. that of the winning bid, exhibit differences across contest duration. Panel C of Table II shows a range of deal characteristics for the aggregate sample and the four quartiles of contest duration. Two characteristics

stands out. First, long-duration contests are far more likely to be concluded with a stock-financed deal. The median percentage of stock financing increases monotonically from 0 percent in the short contest to 71 percent in the long contests. This pattern is in part explained the more extensive documentation and filing necessary for stock offerings. Given these differences, it could be the case that the means of financing explains the variation of performance across contest duration. In fact, Loughran and Vijh (1997) find that stock mergers tend to have negative abnormal returns in the five years following the merger. As we show below in Section 4.4, acquirors in stock mergers do perform worse than those in cash mergers in our sample of contested bids. However, the post-merger performance difference between cash and stock mergers is only about half as large as that between long and short contests. So the means of payment cannot fully explain the duration result.

Second, contests with long-durations are for significantly larger targets than short contests. The median transaction value increases from \$146m to \$648m from the first to the fourth quartile. However, we show below in Section 4.4 that acquirors of large targets do not perform worse than those for small targets in our sample of contested bids. So target size also cannot explain the duration result.

4.3 Comparison with Existing Return Methodologies

We now test whether the long-run divergence of winner and loser performance is consistent with the sign and magnitude of other methodologies to calculate abnormal returns. While our previous results of large negative abnormal returns of -50 percentage points over a three-year post-merger period are likely specific to our sample, we can use those estimates to test how bias-prone existing measures are.

We first present a simple comparison of several return methodologies. Because of the difficulty of identifying a valid benchmark for long-run performance, announcement returns are commonly viewed as a good market-based measure of the causal effect of merger. The first row of Panel A in Table V reports 3-day cumulative abnormal announcement returns (CARs) of the winning bid. The estimates show that winners' CARs of the full sample of contested bids are negative and

economically large. The average CAR is -3.9 percent (median: -2.3 percent). The announcement reaction is more negative than for non-contested acquisitions where CARs are typically in the range between 0 to -1 percent. However, the estimates for duration subsamples Q1 to Q4 also reveal that announcement returns do not vary systematically with the length of the contest duration, as long-run winner-loser performance differences do. In fact, the difference between the announcement return in the first and the fourth quartile is 0.00 percent. Q2 has the lowest average announcement return (-5.7 percent), and Q3 has the highest (-3.2 percent), though the picture changes if we calculate dollar returns, i.e., the dollar gain of the acquiror. Now, Q2 features the highest average return (-9.6transacation value), and Q1 the lowest (-32.9For comparison, Panel B summarizes the winner-loser difference estimates for all four types of abnormal return calculation. As discussed above, here, we always find a positive estimate in the shortest-duration quartile and a negative estimate for the longest-duration quartile, and the difference is always highly statistically significant.

Standard methodologies to evaluate long-run returns appear to do better than the announcement effect. For example, in the second row of Panel A, we show the four-factor abnormal returns, using an equally-weighted calendar month portfolio methodology for the post-acquisition returns of the winner. Here, we do observe a positive return in the shortest-duration quartile and a negative return in the longest-duration quartile, though the magnitude in Q4 is only about half of the winner-loser estimate and none of the estimates are significant. Using characteristics-matched portfolios to calculate the abnormal post-merger returns of the winner, shown in the third row of Panel A, produces a small negative estimate for Q1 and a negative estimate for Q4. However, the magnitude in the long-duration quartile is again less than half compared to the winner-loser estimate.

In Table VI, we further illustrate the failure of the announcement effect methodology to capture returns to mergers and the (partial) success of long-run return methodologies by correlating the respective estimates with the estimates based on winner-loser differences in returns. That is, we regress the long-run winner-loser performance difference on the winning bid's announcement return (Panel A) in order to explore whether the market is, on average, correct in its assessment

of the value effects of acquisitions. And, similarly, we regress the winner-loser estimate calculated with the various benchmark returns on the winning bid's long-run post-merger returns alone, using the same benchmark return (Panel B).

[Table VI here]

In the full sample, the announcement returns does not show any significant relation with the winner-loser estimate of the returns to mergers, and the sign of the coefficient is even opposite of what would be expected if markets were on average correct. Even more surprising, in our preferre comparison sample of long-duration contests the correlation coefficient is even significantly negative. In other words, announcement returns appear to be entirely uninformative about the abnormal returns to be expected from the merger. In the case of long-run returns, the picture is more positive - here we observe a significantly positive correlation, both in the full sample and in the quartile of protracted merger contests, again regardless of the type of benchmark used to calculate abnormal returns.

These results imply that researchers might need to be more cautious when using announcement returns as a measure of expected returns to mergers. At least in the subsample of merger contests, the announcement effects methodology not only misses out on the long-run return implications but fully mispredicts the value implications even directionally. Existing long-run return methodologies give a more adequate picture, though tend to underestimate the value destruction caused by protracted mergers, as shown in the previous table.

4.4 Robustness

In this section, we explore several alternative explanations for the heterogeneity observed in our data. Mergers vary on a wide range of aspects, from bidder and target properties to deal characteristics, and prior literature has shown - for single-bidder takeovers - that a number of characteristics are significantly associated with long-term post-merger performance. In this section, we explore whether any of these characteristics also correlate with long-term performance in our sample of contested deals. If this is the case and these characteristics also vary with contest

duration, our result that losers do better than winners in long-lasting contest could be driven by these characteristics. Table VII contains a range of regressions exploring the effect of such characteristics. For each characteristic in question, we report two regressions of equation (7), where each regression is run of a subsample split on the basis of the respective characteristic. For instance, looking at acquiror size, we report one regression run on the acquirors in the highest five size deciles, and one regression for the acquirors in the lowest five size deciles. For all regressions we use the market-adjusted CAR as the dependent variable.

Cash vs stock. First, we test whether the winner-loser comparison yields systematically different results if we split the sample by the means of payment. We look at the performance effect of all-stock versus all-cash financed mergers. Prior studies (Loughran and Vijh, 1997), find that stock mergers exhibit poor long-run abnormal returns relative to size and market-to-book matched firms, while cash mergers outperform the matched firms in the five year period following deal completion. Column one of Table VII shows the results for stock financed mergers, column two contains those for cash financed mergers. Consistent with prior evidence, acquirors in contested stock mergers show poor post-merger performance (relative to losers) while the opposite is true for cash mergers. Though the out- or underperformance is not statistically significant for each subsample separately, the cross-sample difference is significant at the five percent level.

To clarify whether our duration results could be explained by a means-of-payment effect, we first investigate the pattern of cash vs stock offers across the quartiles of contest duration for winners and losers. If stock offers are more frequently made by winners relative to losers in long contests, then the duration results could potentially be driven by the means of payment. This is not the case in our data. The number of deals in which the winner and the loser make the same type of offer - all-cash, all-stock, or mixed - does not show a monotonic pattern across quartiles (12 in Q1, 7 in Q2, 13 in Q3, 8 in Q4). On the other hand, we find that the winner-loser difference in the *percentage* offered in stock indeed increases in fight duration (from -16.76 percent to 18.06 percent).

Next, we run the main regressions of Table IV including the percentage offered in stock as well

as a full set of interaction terms of all other variables with the percentage of stock offered. This allows us to fully control for the method of payment, and in particular to identify separately the merger effect of all-cash deals as well as the incremental merger effect of stock deals. The results (to be reported) show that the merger effect in long contests is even stronger for all-cash offers than on average (i.e. as reported in Table IV). The effect is economically larger and significant at the five percent level in all specifications of the outcome variable. In addition, the incremental effect of stock offers is positive in all quartiles of fight duration, and larger in long contests. This means that winners offering a higher percentage of stock do better relative to losers that offer a similar fraction of stock in long contests. Hence, in Table IV where the percentage of stock offered is omitted, the means-of-payment effect rather biases *against* finding a significant merger effect in long contests.

Hostile vs friendly. It is plausible that hostile bidders are forced to bid higher than they would in a friendly takeover, and so we might expect the underperformance of winners relative to losers to be more pronounced in the subsample of hostile bids than among friendly takeover attempts. Columns three and four test for long-run winner-loser performance differences, separately hostile and friendly mergers. While hostile acquirors tends to do somewhat worse than friendly bidders, the difference is not statistically significant. Furthermore, the subsample of hostile acquisitions is smaller than one quartile of the entire sample (only eight cases out of 82 cases), and, more importantly, hostile bids are more common in *short* contests than in *long* ones. So hostility also cannot explain the duration result.

Acquiror Q. Prior research shows that highly valued acquirors underperform in the long run relative to characteristics-matched firm portfolio (Rau and Vermaelen, 1998). To see whether such a pattern is present in our data, we rank contests by the Tobin's Q of the winning firm at the fiscal year-end preceding the beginning of the contest, and run regression (7) separately for the high-Q and low-Q subsamples. The results are reported in columns five and six of Table VII. We find only a very small and insignificant performance differences across the two subsamples. This result suggest that previous findings may have to be interpreted with caution when a proper

counterfactual is not available. As mentioned above, Shleifer and Vishny (2003) suggest that high-Q acquirors may be overvalued firms seeking to attenuate the reversal in their valuation by means of acquisitions. The poor post-merger performance of such acquirors may hence occur not because of but despite the acquisition. When benchmarked against the right counterfactual, such mergers should show positive not negative relative performance. Though in our sample high-Q winners do not outperform their losing contestants, they do not show the strong underperformance documented in earlier studies.

Acquiror size. Moeller, Schlingemann, and Stulz (2004) and Harford (2005) provide evidence of poor post-acquisition performance of large acquirors. Since acquirors tend to be somewhat larger in long-duration contests (not reported), size effects could potentially explain our duration result. We thus examine sample splits based on the market capitalization of the ultimate acquiror. The results are shown in columns seven and eight on Table VII. Again, we observe no significant differences in post-merger performance across the acquiror size distribution. If anything, the results show a slightly stronger performance of large acquirors relative to small acquirors. Thus, size effects do not explain why winners in long-lasting contest underperform.

Number of Bidders. Another explanation for the duration effect could be that contests take more time to complete the more bidders compete for the same target, and that bidders do not account for the winner's curse, leading to more severe overbidding in contests with many competing bidders. However, as columns nine and ten show, winners do not do worse in contests with more than two bidders than in contests with exactly two bidders.

Diversification. Next, we analyze separately diversifying and non-diversifying mergers. We define a merger as diversifying if the winning bidder has a Fama-French 12-industry classification that is different from the target's classification, and concentrating otherwise. Columns eleven and twelve do not reveal any difference in the merger effect across these types of acquisitions.

Relative deal size. Finally, we use relative deal size, defined as the transaction value relative to the acquiror's market capitalization, as a sorting variable. Target size is weakly positively

associated with contest duration, and thus the duration effect might be driven by target size. However, columns thirteen and fourteen show that winners do not perform significantly worse than losers even when target are relatively large.

5 Conclusion

This paper makes two contributions. Methodologically, we seek to improve on the existing approaches that estimate the effect of mergers. We argue that bidding contests help to address the identification issue caused by the missing counterfactual in corporate acquisitions: In contests where at least two bidders have a significant chance of winning, the post-merger performance of the loser allows to calculate the counterfactual performance the winner would have had without the merger. This is particularly true in protracted merger fights, where all the bidders have a reasonable ex-ante expectation to win. In this case, the identity of the ultimate winer is more likely to be exogenous. By contrast, short merger fights are more similar to uncontested fight, in that one of the bidders is likely to have a decisive advantage that lead it to prevail easily. In this case, a comparison of winners and losers is likely to be polluted by unobserved factors, in the similar way that a naive comparison of uncontested mergers with all other companies would be.

Substantively, this paper provides credible estimates of the effect of contested mergers on stock values. We construct a novel data set of all mergers with overlapping bids between since 1985. We find that the stock returns of bidders are not significantly different before the merger contest, but diverge significantly post-merger. In the full sample, winners underperform losers over a three-year horizon, although this difference is not statistically significant. More importantly, there is large heterogeneity in the effect depending on the duration of the contest. We find that for cases where either bidder was ex ante likely to win the contest, losers outperform winners, while the opposite is true in cases with a predictable winner.

In interpreting our results, it is important to keep in mind two points. First, nobody knows for sure what the price path of winners would have been different in the absence of the merger. Our assumption is that losers provide a good counterfactual for winners in long contests, but we

can not completely rule out that there are additional unobserved factors correlated with merger that affect stock performance. In the paper we discuss various possible omitted factors and show that the empirical evidence is generally consistent with the assumption. But ultimately the credibility of our estimates rests on our identification assumption, which, of course, can not be tested directly.

Second, our estimates are based on the group of contested mergers, which are not necessarily representative of the entire population of mergers. Therefore, the external validity of our findings is unclear. On the other hand, we think that estimates based on this sample are interesting in their own right, as a non-trivial fraction of mergers are contested. More importantly, we believe that the comparison between short and long contests is particularly important, because it tells us something about the effect of mergers when the final outcome of the fight is ex-ante undecided and when it is ex-ante clear.

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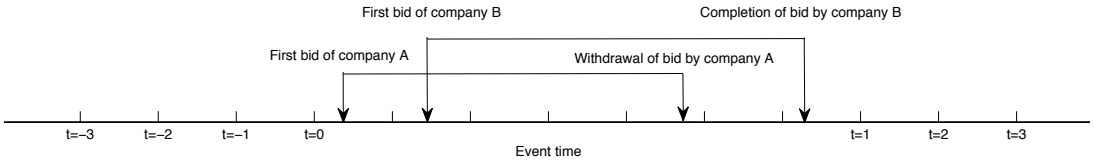
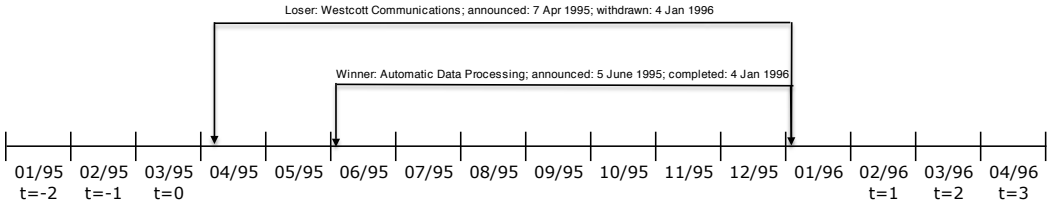


(a) Stylized Example



(b) Data Example

Figure 1
Construction of Event Time

This figure illustrates the construction of event time for merger contests. The top figure shows a stylized example, the bottom figure a concrete example from our data set.

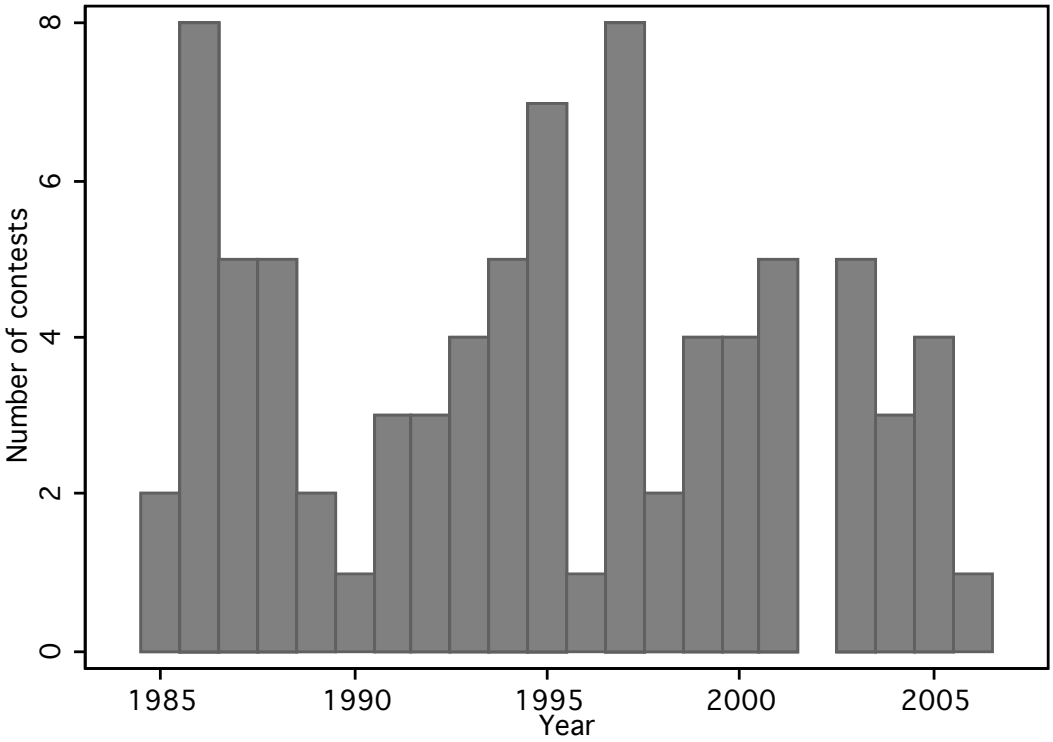
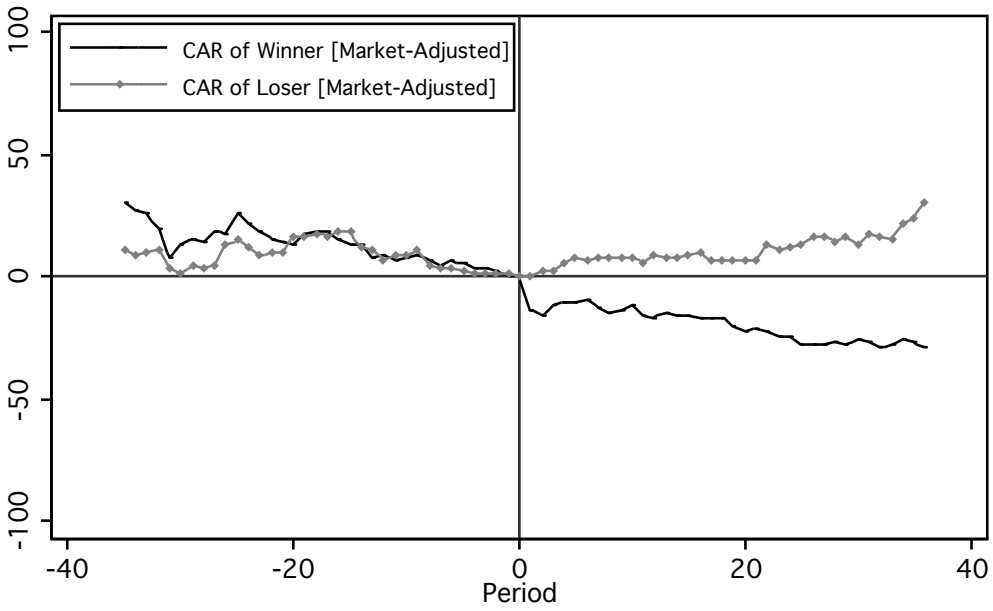
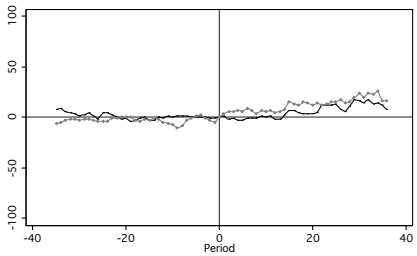


Figure 2
Merger Contests over Time

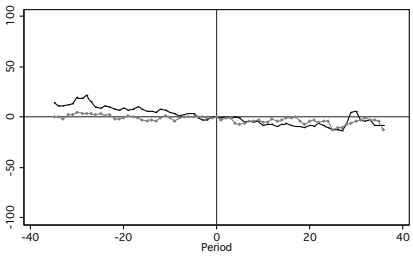
This figure shows the frequency distribution of merger contests over the sample period. Years are the calendar years in which the contests started.



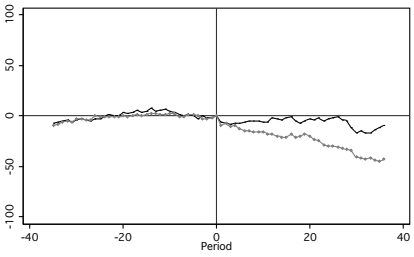
(a) Contest duration: 4th quartile



(b) Contest duration: 3rd quartile



(c) Contest duration: 2nd quartile



(d) Contest duration: 1st quartile

Figure 3
Winner and Loser Abnormal Performance, Market-Adjusted

This figure illustrates market-adjusted stock price performance for winners and losers pre- and post-merger contest. The five figures correspond, respectively, to the entire sample (top figure) and the different quartiles of contest duration (bottom figures). CARs are normalized to zero in the month preceding the start of the contest and are computed as $CAR_{ijt} = \prod_{s=1}^{t}(1 + r_{ijs}) - \prod_{s=1}^{t}(1 + r_{ms})$ going forward in event time, and $CAR_{ijt} = \prod_{s=0}^{t+1}(1 + r_{ijs})^{-1} - \prod_{s=0}^{t+1}(1 + r_{ms})^{-1}$ going backward, where i denotes the bidder, j the contest, m the market, and t the event month. The black lines correspond to the average winner CARs, the grey lines to the average loser CARs.

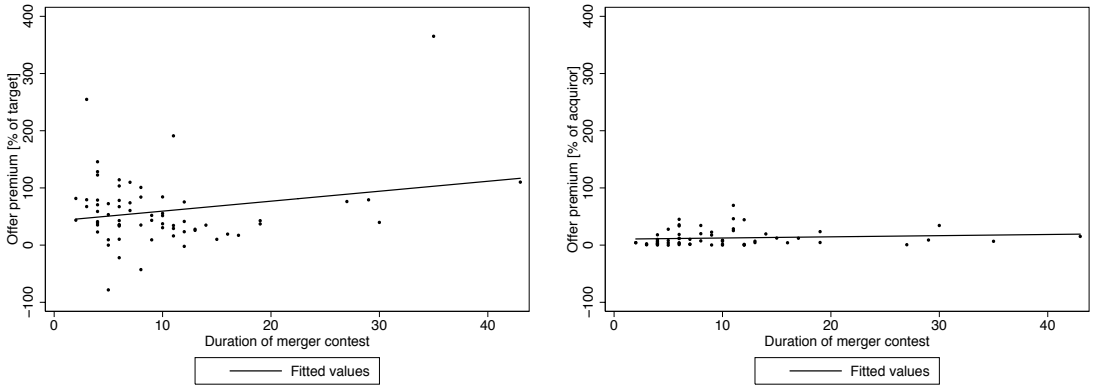


Figure 4
Offer Premium

The figure shows scatter plots of the offer premium against contest duration. The offer premium is computed as the percentage run-up in the target stock price from one month before the beginning of the merger contest until completion. In the left figure, the offer premium is expressed as a percentage of the target's market capitalization, and, in the right figure, as a percentage of the acquiror's market capitalization. Contest duration is expressed in months. The fitted values are the predictions of an OLS regression of the offer premium on the contest duration.

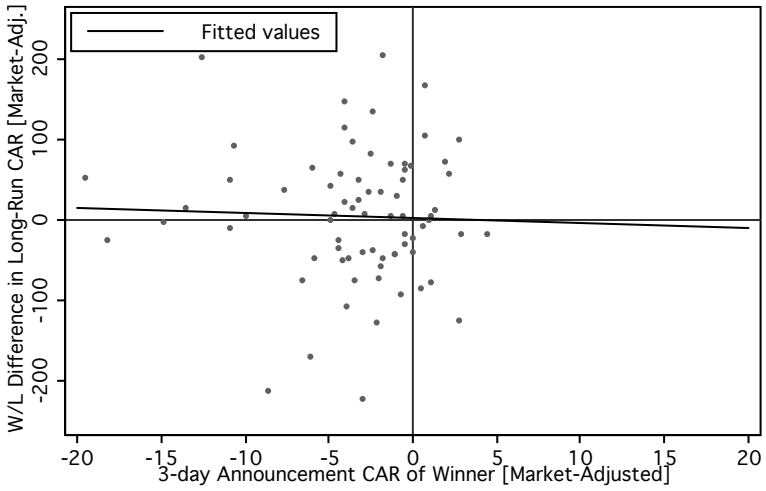


Figure 5
Comparison with Announcement Returns

The figure shows a scatter plot of the long-run winner-loser performance difference (three years after the acquisition) against the three-day cumulative abnormal announcement return of the winning bid. Long-run performance is measured as the market-adjusted, cumulative return. The exact calculation of the long-run CAR is described in Table IV. The 3-day announcement return is calculated as the cumulative, market-adjusted return around the announcement of the winning bid. The fitted values are the predictions of an OLS regression of the long-run winner-loser difference on the announcement CAR.

Table I
Sample Construction

This table details the construction of the sample of contested merger bids. The initial sample consists of all contested merger bids by U.S. public companies recorded in the SDC Mergers and Acquisitions database, and submitted between January 1985 and December 2006. From this initial sample we exclude bids by White Knights. We then apply several criteria to obtain a balanced and matched sample, i.e. a sample with complete data on stock returns for both the winner and the loser(s) in a three-year period around the merger contest.

Sample selection criterion	Bids	Bidders	Winners	Losers	Contests
Initial sample	416	402	152	250	193
less repeated bids of same bidder for same target	402	402	152	250	193
less contests that have not been completed	317	317	152	165	151
less bidders without CRSP PERMNO	305	305	146	159	149
less contests where winner was parent company	284	284	134	150	138
less bidders that have missing return data in the event window [-35,+36]	212	212	107	105	117
less bidders with extreme price volatility (Std>200)	207	207	104	103	114
less bidders in contests with missing winner or loser	172	172	82	90	82

Table II
Descriptive Statistics

This table reports the descriptive statistics of bidders (Panel A) and deals (Panel B) in our sample. In Panel A, total assets are the book value of total assets. Market capitalization is total assets plus market value of equity (common shares outstanding times fiscal-year closing price) minus book value of equity (book value of shareholders equity, plus balance sheet deferred taxes and investment tax credit [if available], minus the book value of preferred stock, where, depending on availability, we use redemption, liquidation, or par value (in that order) to estimate the book value of preferred stock). Tobin's Q is ratio of market capitalization to book value of assets. PP&E is the book value of property, plant and equipment. Profitability is operating income before depreciation divided by total assets. Leverage is debt in current liabilities plus long term debt, either divided by total assets (Book leverage) or by market capitalization (Market leverage). Announcement CAR [%] is the 3-day cumulative abnormal return around the announcement date of the bidder's first bid in a given contest. Abnormal returns are computed as the residuals of a market model estimated on monthly return data over the 36-month pre-merger period. Announcement CAR [$m] are dollar announcement returns, i.e., percentage returns multiplied by the bidder's pre-merger market value of equity. In Panel B, transaction value is the dollar value (in millions) of the bidder's offer. Offer premium [% of target] is the run-up in the target's stock price from the end of the month one month prior to the beginning of the merger contest ($t = -2$) until completion of the merger contest. Offer premium [% of acquiror] is offer premium [% of target] times target equity value divided by acquiror equity value. Contest duration is the number of months from the month-end preceding the first bid until the end of the month of the completion of the merger.

Panel A: Bidder Characteristics

	Winners				Losers				P-value
	Mean	Median	Std	N	Mean	Median	Std	N	W/L Diff. (Mean)
Total assets [$m]	14930.58	3326.24	38841.35	79	9078.59	2440.52	16783.93	88	0.20
Market capitalization [$m]	20987.74	4676.17	49163.33	79	13022.12	2840.48	26533.84	88	0.19
Sales [$m]	5676.67	1835.20	12420.49	79	3377.21	1090.01	5863.70	87	0.12
Tobin's Q	1.88	1.34	1.50	79	1.79	1.19	1.41	88	0.67
PP&E	0.27	0.22	0.24	78	0.27	0.20	0.26	86	0.94
Profitability	0.12	0.11	0.09	78	0.13	0.12	0.12	86	0.42
Book leverage	0.25	0.21	0.21	79	0.23	0.20	0.17	84	0.57
Market leverage	0.18	0.15	0.16	79	0.18	0.14	0.16	84	0.95
Announcement CAR [%]	-3.89	-2.32	6.69	76	-3.78	-3.36	4.16	86	0.90
Announcement CAR [$m]	-295.62	-22.49	1236.71	76	-211.10	-30.43	685.72	86	0.59

Table II - Continued
Descriptive Statistics

Panel B: Deal Characteristics				
	Mean	Median	Std	N
Transaction value [$m]	3436.52	344.83	12400.92	81
Tender offer	0.34	0.00	0.48	82
Hostile	0.10	0.00	0.30	82
Percentage paid in stock	36.94	8.04	43.21	82
Percentage paid in cash	43.93	30.76	44.73	82
Number of bidders	2.43	2.00	0.72	82
Offer premium [% of target]	57.82	42.93	63.02	67
Offer premium [% of acquiror]	9.66	6.64	21.26	67
Contest duration [months]	9.48	7.50	7.37	82

Table III
Comparing Excess Returns of Winners and Losers Pre- and Post-Merger

The table reports winner-loser similarities in abnormal returns, estimated in two steps. In the first step (unreported), we estimate abnormal performance trends by regressing abnormal returns on a constant, separately for the three-year pre-merger and three-year post-merger period and separately for each bidder. We use four specifications of abnormal returns: Market-adjusted returns are $r_{ijt} - r_{mt}$. Industry-adjusted returns are $r_{ijt} - r_{ikt}$, where k is the bidder's industry (Fama-French twelve-industry classification). Risk-adjusted returns are $r_{ijt} - r_{ft} - \beta_i(r_{mt} - r_{ft})$. Characteristics-adjusted returns are $r_{ijt} - r_{cm}$, where r_{cm} is the return of a characteristics-matched portfolio based on size, book-to-market and twelve-month momentum (Daniel, Grinblatt, Titman, and Wermers, 1997). In the second step, we regress the abnormal performance trends of the winners on those of the losers in the same merger contest and the same (pre- or post-merger) period. The table reports the resulting coefficient, separately for the four abnormal performance measures (Panel A to D) and for the pre- and post-merger period. We further show the pre-merger period results split up into quartiles of contest duration (Q1 to Q4). The intercept is omitted.

Panel A: Market-Adjusted Returns

	Pre-Merger	Pre-Merger - Quartiles				Post-Merger
Contest Duration Quartile:	Full Sample	Q1	Q2	Q3	Q4	Full Sample
Coefficient	0.392***	0.234	0.393*	0.565	0.475***	0.284**
SE	(0.113)	(0.219)	(0.190)	(0.389)	(0.162)	(0.133)
R-Squared	0.131	0.054	0.201	0.100	0.325	0.054
Observations	82	22	19	21	20	82

Panel B: Industry-Adjusted Returns

	Pre-Merger	Pre-Merger - Quartiles				Post-Merger
Contest Duration Quartile:	Full Sample	Q1	Q2	Q3	Q4	Full Sample
Coefficient	0.311***	0.004	0.344	0.384	0.551***	0.183
SE	(0.117)	(0.196)	(0.247)	(0.356)	(0.167)	(0.125)
R-Squared	0.081	0.000	0.102	0.058	0.378	0.026
Observations	82	22	19	21	20	82

Panel C: Risk-Adjusted Returns

	Pre-Merger	Pre-Merger - Quartiles				Post-Merger
Contest Duration Quartile:	Full Sample	Q1	Q2	Q3	Q4	Full Sample
Coefficient	0.423***	0.092	0.341	0.519	0.762***	0.208*
SE	(0.111)	(0.233)	(0.213)	(0.320)	(0.167)	(0.119)
R-Squared	0.154	0.008	0.131	0.122	0.536	0.036
Observations	82	22	19	21	20	82

Panel C: Characteristics-Adjusted Returns

	Pre-Merger	Pre-Merger - Quartiles				Post-Merger
Contest Duration Quartile:	Full Sample	Q1	Q2	Q3	Q4	Full Sample
Coefficient	0.291**	0.230	0.408*	0.274	0.157	0.203*
SE	(0.117)	(0.168)	(0.198)	(0.353)	(0.229)	(0.119)
R-Squared	0.086	0.111	0.246	0.034	0.032	67
Observations	67	17	15	19	16	0.043

Table IV
Winner-Loser Differences in Abnormal Returns

This table reports estimates of winner-loser difference in abnormal performance, separately for each quartile of contest duration. The regression equation is: $CAR_{ijt} = \alpha_0 + \alpha_1\ W_{ijt} + \alpha_2\ t + \alpha_3\ t \times W_{ijt} + \alpha_4\ Post_{ijt} + \alpha_5\ Post_{ijt} \times W_{ijt} + \alpha_6\ \tau \times Post_{ijt} + \alpha_7\ t \times Post_{ijt} \times W_{ijt} + \eta_j + \varepsilon_{ijt}$. The dependent variable is the buy-and-hold cumulative abnormal return, normalized to zero in the month preceding the start of the contest and computed as $CAR_{ijt} = \prod_{s=1}^{t}(1 + r_{ijs}) - \prod_{s=1}^{t}(1 + r_{ijs}^{bm})$ going forward in event time, and $CAR_{ijt} = \prod_{s=0}^{t+1}(1 + r_{ijs})^{-1} - \prod_{s=0}^{t+1}(1 + r_{ijs}^{bm})^{-1}$ going backward, where i denotes the bidder, j the contest, t the event month, and bm references a benchmark portfolio. The benchmark for market-adjusted returns is the CRSP value-weighted market return; for industry-adjusted returns it is the return of stock i's Fama French industry portfolio (12-industry classification); for risk-adjusted returns it is the CAPM required return, $r_{ft} + \beta_i(r_{ijt} - r_{ft})$; for characteristics-adjusted returns it is the return of a characteristics-matched portfolio based on size, book-to-market, and 12-month momentum (Daniel, Grinblatt, Titman, and Wermers, 1997). Winner (W_{ijt}) is a dummy indicating whether bidder i is a winner in merger contest j. Period (t) is a variable counting event time. Post merger ($Post_{ijt}$) indicates whether period t is in the post-merger window. The lower part of the table reports tests for $t = +36$ winner-loser differences in CAR. Standard errors for the coefficients are clustered by contest, and are reported in parentheses.

Dependent Variable:	CAR (Market-Adjusted)				CAR (Industry-Adjusted)			
Quartile of Contest Duration:	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Winner (α_1)	1.973	0.803	0.858	-3.662	2.225	0.483	-4.853	-3.974
	(3.850)	(4.000)	(4.307)	(9.986)	(3.991)	(3.566)	(7.003)	(10.01)
Period (α_2)	0.178	-0.0948	0.0118	-0.183	0.172	-0.0402	0.175	-0.125
	(0.179)	(0.329)	(0.250)	(0.367)	(0.188)	(0.262)	(0.231)	(0.394)
Winner x Period (α_3)	0.0351	-0.384	-0.174	-0.456	-0.0110	-0.335	-0.320	-0.456
	(0.188)	(0.459)	(0.312)	(0.513)	(0.208)	(0.467)	(0.336)	(0.524)
Post merger (α_4)	-7.477	-1.541	5.473	-3.900	-5.447	-6.710	4.305	-1.489
	(7.910)	(8.662)	(9.490)	(17.64)	(9.134)	(8.447)	(8.354)	(16.13)
Winner x Post merger (α_5)	0.683	-1.813	-7.800	-7.416	-0.0582	1.339	-0.341	-7.796
	(8.615)	(7.947)	(7.560)	(16.81)	(9.045)	(9.311)	(10.38)	(16.72)
Period x Post merger (α_6)	-1.205**	0.0319	0.526	0.690	-1.232**	-0.518	0.346	0.631
	(0.448)	(0.620)	(0.483)	(0.589)	(0.465)	(0.589)	(0.560)	(0.603)
Winner x Post merger x Period (α_7)	0.786	0.348	0.175	-0.616	1.005*	0.450	0.229	-0.598
	(0.562)	(0.664)	(0.477)	(0.851)	(0.547)	(0.668)	(0.497)	(0.893)
Contest fixed effects	X	X	X	X	X	X	X	X
Merger effect: $\alpha_1 + \alpha_5 + 35(\alpha_3 + \alpha_7)$	31.38*	-2.278	-6.917	-48.59**	36.96*	5.864	-8.360	-48.67*
Merger effect: P-value	0.0720	0.914	0.592	0.0400	0.0310	0.789	0.558	0.0590
Merger effect: Q4-Q1 difference		-79.968***				-85.624***		
Merger effect: P-value		0.003				0.003		
Observations	3240	2808	3168	3168	3240	2808	3168	3168
R-squared	0.278	0.308	0.342	0.278	0.240	0.275	0.311	0.271
Number of contests	22	19	21	20	22	19	21	20

Table IV - Continued
Winner-Loser Differences in Abnormal Returns

Dependent Variable:	CAR (Risk-Adjusted)				CAR (Characteristics-Adjusted)			
Quartile of Contest Duration:	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Winner (α_1)	2.516	0.560	1.706	-3.197	1.648	3.107	3.679	6.318
	(3.535)	(4.098)	(4.351)	(10.15)	(2.820)	(4.779)	(4.281)	(4.801)
Period (α_2)	0.0489	-0.0734	0.00723	-0.114	-0.0649	-0.180	-0.123	-0.267
	(0.161)	(0.311)	(0.255)	(0.413)	(0.196)	(0.335)	(0.275)	(0.312)
Winner x Period (α_3)	0.116	-0.461	-0.206	-0.513	0.267	-0.237	0.0667	0.213
	(0.201)	(0.485)	(0.311)	(0.529)	(0.263)	(0.529)	(0.314)	(0.326)
Post merger (α_4)	-5.541	0.539	3.563	-5.469	-7.463	-1.906	3.413	3.278
	(8.405)	(8.189)	(10.00)	(19.16)	(6.622)	(7.660)	(8.892)	(13.90)
Winner x Post merger (α_5)	1.451	-3.929	-13.01*	-7.119	6.663	-0.951	-10.11	-12.14
	(8.367)	(8.903)	(7.515)	(16.58)	(8.099)	(8.774)	(8.423)	(14.46)
Period x Post merger (α_6)	-1.208**	-0.0539	0.249	0.467	-0.587	-0.0837	0.634	1.332*
	(0.447)	(0.717)	(0.462)	(0.710)	(0.360)	(0.663)	(0.491)	(0.710)
Winner x Post merger x Period (α_7)	0.827	0.475	0.453	-0.691	0.398	1.291*	-0.230	-1.585*
	(0.544)	(0.773)	(0.517)	(0.944)	(0.617)	(0.700)	(0.605)	(0.817)
Contest fixed effects	X	X	X	X	X	X	X	X
Merger effect: $\alpha_1 + \alpha_5 + 35(\alpha_3 + \alpha_7)$	36.98**	-2.882	-2.637	-52.47*	31.57**	39.04	-12.15	-53.85*
Merger effect: P-value	0.0200	0.906	0.877	0.101	0.0470	0.0360	0.382	0.0720
Merger effect: Q4-Q1 difference		-89.447***				-85.427***		
Merger effect: P-value		0.007				0.006		
Observations	3240	2808	3168	3168	3033	2596	2958	2672
R-squared	0.278	0.332	0.223	0.293	0.339	0.383	0.277	0.381
Number of contests	22	19	21	20	22	19	21	20

Table V
Comparison of Methods to Assess the Returns to Mergers

Panel A reports the returns to mergers estimated as (1) the three-day abnormal announcement return, (2) the four-factor alpha of equally-weighted calendar-month portfolios of post-acquisition acquiror returns, (3) and the long-run cumulative return of acquirors relative to characteristics-matched portfolios. The four-factor alpha is the intercept of a time-series regression of the equally weighted excess return of a post-acquisition acquiror portfolio on the excess market return, the Fama-French factors, and the momentum factor. We require at least five acquiror return observations to be available for a calendar month to be included in the regression. The four-factor alpha from the monthly return regression is multiplied by 36 to make it comparable to the 36-month post-merger returns used for all other statistics reported in the table, except for row one. Panel B reports the results for the winner-loser difference method based on the four different dependent variables used throughout this study. Standard errors are in parentheses.

Panel A: Traditional Methods						
		Quartile of Contest Duration				Difference
	Full sample	Q1	Q2	Q3	Q4	Q4-Q1
Winners' Announcement CAR [%]	-3.89	-3.40	-5.70	-3.20	-3.40	0.00
	(0.77)***	(0.74)***	(2.61)**	(1.27)**	(1.14)***	(1.32)
Winners' 4-Factor Alpha ×36	-4.63	23.76	-18.49	-21.19	-20.69	-44.45
	(7.60)	(20.18)	(46.82)	(31.33)	(38.11)	(48.35)
Winners' Characteristics-Adjusted CARs	0.88	-0.10	23.58	3.03	-21.86	-21.76
	(8.87)	(17.23)	(20.49)	(18.36)	(13.8)	(22.90)

Panel B: Winner-Loser Difference Method						
		Quartile of Contest Duration				Difference
	Full sample	Q1	Q2	Q3	Q4	Q4-Q1
W/L Difference (CAR - Market-Adjusted)	-6.495	31.380*	-2.278	-6.917	-48.590**	-79.968***
	(0.496)	(0.072)	(0.914)	(0.592)	(0.040)	(0.003)
W/L Difference (CAR - Industry-Adjusted)	-3.695	36.960*	5.864	-8.360	-48.670*	-85.624***
	(0.713)	(0.031)	(0.789)	(0.558)	(0.059)	(0.003)
W/L Difference (CAR - Risk-Adjusted)	-4.950	36.980**	-2.882	-2.637	-52.470*	-89.447***
	(0.665)	(0.020)	(0.906)	(0.877)	(0.101)	(0.007)
W/L Difference (CAR - Characteristics-Adjusted)	3.398	31.570**	39.040	-12.150	-53.850*	-85.427***
	(0.731)	(0.047)	(0.036)	(0.382)	(0.072)	(0.006)

Table VI
Correlation of Estimates of the Returns to Mergers

This table reports bivariate ordinary least squares estimates of the winner-loser post-merger performance difference on the three-day cumulative abnormal announcement return (Panel A) and post-merger abnormal returns (Panel B) of the acquiror. The dependent variable is the winner-loser difference in buy-and-hold cumulative abnormal return (CAR) at $t = 36$. CARs are normalized to zero in the month preceding the start of the contest and are computed as $CAR_{ijt} = \prod_{s=1}^{t}(1 + r_{ijs}) - \prod_{s=1}^{t}(1 + r_{ijs}^{bm})$, where i references the firm, j the contest, t event time, and bm a benchmark portfolio. For market-adjusted returns, the benchmark is the CRSP value-weighted market return; for industry-adjusted returns, it is the return of stock i's Fama French industry portfolio (12-industry classification); for risk-adjusted returns it is the CAPM required return, $r_{ft} + \beta_i(r_{ijt} - r_{ft})$; for characteristics-adjusted returns, it is the return of a characteristics-matched portfolio based on size, book-to-market, and 12-month momentum (Daniel, Grinblatt, Titman, and Wermers, 1997). Announcement CARs are three-day cumulative abnormal returns around the first bid announcement of the ultimate acquiror. The CARs are computed from residuals of the model $r_{ijt} - r_{ft} = \alpha_{ij} + \beta_{ij}(r_{mt} - r_{ft}) + \varepsilon_{ijt}$. The parameters are estimated using monthly returns of the three-year pre-merger period. Each regression is reported for both the full sample of merger contests as well as for the quartile of the longest-lasting contest.

Panel A: Comparison with Announcement CARs

Dependent Variable:	W/L Difference - CAR							
	Market-Adjusted		Industry-Adjusted		Risk-Adjusted		Char.-Adjusted	
	Full	Q4	Full	Q4	Full	Q4	Full	Q4
3-day Announcement CAR	-2.082	-17.70**	-2.206	-18.56**	-1.627	-21.94**	-3.552*	-35.65**
	(1.739)	(7.024)	(1.878)	(7.567)	(2.171)	(9.786)	(1.952)	(11.21)
Constant	-8.316	-108.8**	-9.223	-110.5**	-1.924	-125.9**	-3.918	-188.0**
	(13.39)	(39.94)	(14.47)	(43.03)	(16.72)	(55.64)	(15.22)	(58.92)
Observations	76	17	76	17	76	17	59	9
R-squared	0.019	0.297	0.018	0.286	0.008	0.251	0.055	0.591

Panel B: Comparison with Long-Run Winner CARs

Dependent Variable:	W/L Difference - CAR							
	Market-Adjusted		Industry-Adjusted		Risk-Adjusted		Char.-Adjusted	
	Full	Q4	Full	Q4	Full	Q4	Full	Q4
Winner CAR (Market-Adjusted)	0.696***	1.418***						
	(0.109)	(0.319)						
Winner CAR (Industry-Adjusted)			0.784***	2.152***				
			(0.125)	(0.358)				
Winner CAR (Risk-Adjusted)					0.817***	1.336***		
					(0.110)	(0.242)		
Winner CAR (Characteristics-Adjusted)							0.767***	2.501***
							(0.137)	(0.503)
Constant	3.939	-6.786	7.672	20.07	11.55	5.108	4.316	-10.69
	(9.031)	(24.50)	(9.838)	(22.90)	(10.58)	(28.52)	(10.45)	(30.92)
Observations	82	20	82	20	82	20	64	12
R-squared	0.339	0.523	0.331	0.667	0.406	0.628	0.337	0.712

Table VII
Stock Performance of Winners and Losers on Various Subsamples

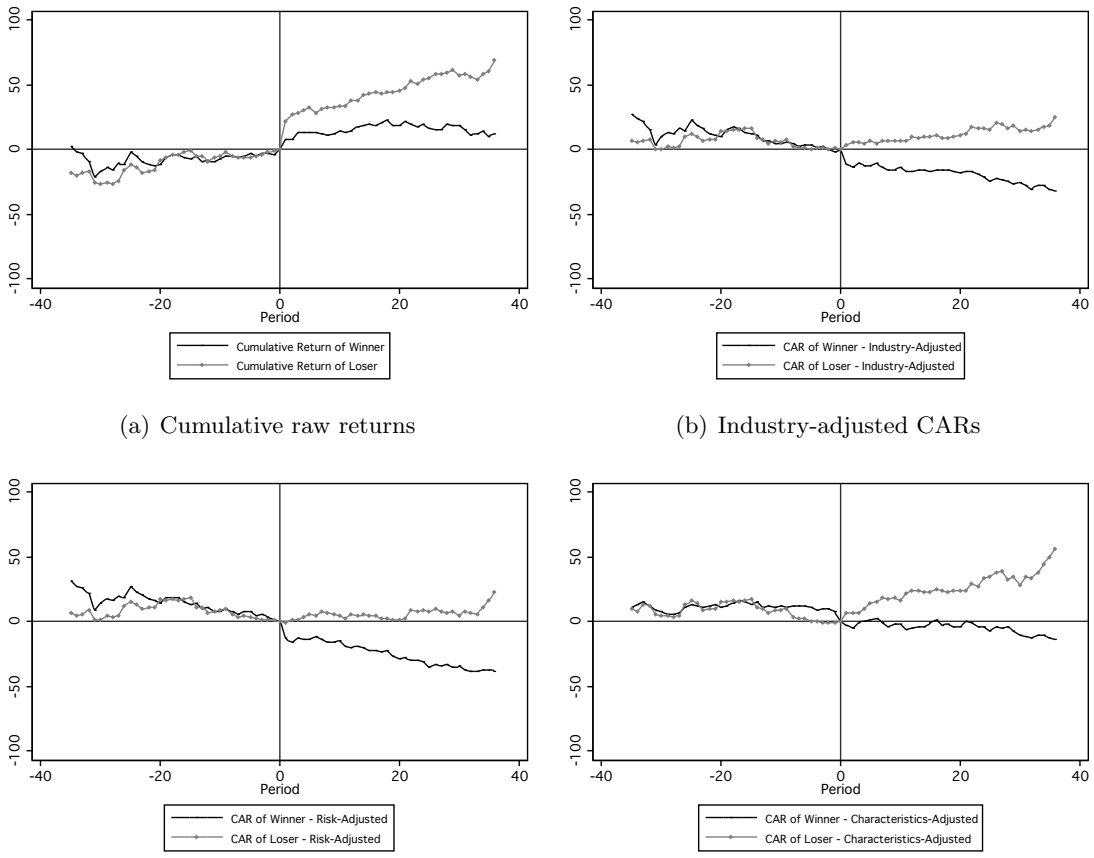
This table reports estimates of regressions using the same empirical model as in Appendix Table A-I but estimated on the various subsamples defined in the second row of the table and using market-adjusted CARs as the dependent variable. Standard errors for the coefficients are clustered by contest, and are reported in parentheses. Sample splits are based on the acquiror's method of payment (stock vs cash), acquiror attitude (hostile vs friendly), the acquiror's Tobins's Q, acquiror size, the number of bidders, whether the merger is diversifying or not, and relative target size. For the method of payment we compare all-stock with all-cash mergers as reported by SDC. For acquiror attitude, we use SDC's classification of hostile and friendly bids. For acquiror Q, acquiror size and relative target size we split the sample into above and below median subsamples in the respective characteristic. Tobin's Q is as defined in Table II. Acquiror size is market capitalization as defined in Table II. Relative target size is the ratio of merger transaction value (as reported by SDC) and acquiror market capitalization.

Dependent Variable:	CAR (Market-Adjusted)							
Sample Split:	All Stock (1)	All Cash (2)	Hostile (3)	Friendly (4)	High Q (5)	Low Q (6)	Large Acquiror (7)	Small Acquiror (8)
Winner (α_1)	-7.208	4.229	0.365	0.0369	2.772	-3.028	2.267	-1.871
	(10.36)	(2.718)	(6.172)	(3.238)	(3.001)	(5.291)	(2.731)	(5.601)
Period (α_2)	-0.371	0.0529	0.203	-0.0433	0.0475	-0.144	0.0929	-0.210
	(0.390)	(0.199)	(0.185)	(0.155)	(0.201)	(0.217)	(0.131)	(0.271)
Winner x Period (α_3)	-0.516	-0.000	-0.312	-0.223	0.234	-0.666**	-0.0945	-0.318
	(0.509)	(0.223)	(0.272)	(0.200)	(0.249)	(0.284)	(0.183)	(0.333)
Post merger (α_4)	3.891	-3.755	1.341	-2.210	-2.764	-1.471	13.09	-17.96**
	(16.29)	(5.863)	(17.80)	(6.285)	(8.625)	(8.649)	(8.630)	(7.686)
Winner x Post merger (α_5)	-11.04	-4.129	-4.002	-4.102	-6.017	1.527	-9.726	5.869
	(12.50)	(5.729)	(9.440)	(5.997)	(8.754)	(7.208)	(8.307)	(7.731)
Period x Post merger (α_6)	0.613	-0.561	-1.140	0.131	-0.566	0.555*	-0.0851	0.158
	(0.503)	(0.411)	(1.137)	(0.278)	(0.471)	(0.326)	(0.360)	(0.451)
Winner x Post merger x Period (α_7)	0.312	0.556	-0.374	0.225	-0.249	0.776*	0.229	0.215
	(0.604)	(0.424)	(1.216)	(0.333)	(0.526)	(0.417)	(0.368)	(0.558)
Contest fixed effects	X	X	X	X	X	X	X	X
Merger effect: $\hat{\alpha}_1 + \hat{\alpha}_5 + 35(\hat{\alpha}_3 + \hat{\alpha}_7)$	-25.40	19.55	-27.64	-4.011	-3.762	2.340	-2.756	0.395
Merger effect: P-value	0.130	0.157	0.450	0.687	0.815	0.829	0.813	0.979
Merger Effect: Difference	-44.950**		-23.630		-6.101		-3.151	
P-value:	0.029		0.485		0.748		0.867	
Observations	2880	5976	1152	11232	5688	6120	5976	5832
R-squared	0.229	0.308	0.373	0.262	0.281	0.277	0.310	0.291
Number of contests	19	40	8	74	39	39	39	39

Table VII - Continued

Dependent Variable:	CAR (Market-Adjusted)					
Sample Split:	2 Bidders	> 2 Bidders	Diversifying	Concentrating	Large Target	Small Target
	(9)	(10)	(11)	(12)	(13)	(14)
Winner (α_1)	-1.196	1.271	-1.658	0.715	0.213	-0.358
	(4.195)	(3.186)	(4.386)	(3.588)	(2.477)	(5.684)
Period (α_2)	-0.0627	0.0436	0.411*	-0.137	-0.0139	-0.0806
	(0.195)	(0.205)	(0.207)	(0.170)	(0.178)	(0.240)
Winner x Period (α_3)	-0.0966	-0.482*	-0.426*	-0.176	-0.259	-0.204
	(0.228)	(0.271)	(0.220)	(0.223)	(0.231)	(0.308)
Post merger (α_4)	-4.785	2.647	-10.78	0.484	-13.06*	7.712
	(7.614)	(9.481)	(10.13)	(6.967)	(7.511)	(9.375)
Winner x Post merger (α_5)	-7.036	3.343	0.990	-5.437	2.799	-8.918
	(7.092)	(8.859)	(7.941)	(6.675)	(8.208)	(7.887)
Period x Post merger (α_6)	-0.115	0.226	-0.681	0.204	0.0883	-0.0219
	(0.373)	(0.391)	(0.714)	(0.289)	(0.391)	(0.421)
Winner x Post merger x Period (α_7)	0.203	0.120	0.0216	0.186	-0.204	0.514
	(0.381)	(0.573)	(0.737)	(0.356)	(0.516)	(0.414)
Contest fixed effects	X	X	X	X	X	X
Merger effect: $\hat{\alpha}_1 + \hat{\alpha}_5 + 35(\hat{\alpha}_3 + \hat{\alpha}_7)$	-4.499	-8.065	-14.83	-4.360	-13.18	1.546
Merger effect: P-value	0.699	0.628	0.554	0.672	0.438	0.871
Merger Effect: Difference		3.566		-10.470		-14.730
P-value:		0.858		0.686		0.440
Observations	7920	4464	2592	9792	5904	5904
R-squared	0.270	0.285	0.189	0.286	0.284	0.259
Number of contests	55	27	17	65	39	39

Appendix



(a) Cumulative raw returns

(b) Industry-adjusted CARs

(c) Risk-adjusted CARs

(d) Characteristics-adjusted CARs

Figure A-1
Winner and Loser Performance in Long Contests - Alternative Performance Measures

The four figures show the stock performance of winners and losers in the subsample of long-lasting merger contests (quartile four of contest duration) for alternative performance measures: cumulative raw returns, cumulative industry-adjusted returns, cumulative risk-adjusted returns, and cumulative characteristics-adjusted returns. The calculation of the various CARs is described in Table IV. Cumulative raw returns are calculated using the same formula, but setting the benchmark return to zero. The black lines correspond to the average winner CRRs, the grey lines to the average loser CRRs.

Table A-I
Winner-Loser Differences in Abnormal Returns, All Quartiles Pooled

This table reports estimates of winner-loser difference in abnormal performance for the pooled sample. The regression equation is: $CAR_{ijt} = \alpha_0 + \alpha_1\ W_{ijt} + \alpha_2\ t + \alpha_3\ t \times W_{ijt} + \alpha_4\ Post_{ijt} + \alpha_5\ Post_{ijt} \times W_{ijt} + \alpha_6\ \tau \times Post_{ijt} + \alpha_7\ t \times Post_{ijt} \times W_{ijt} + \eta_j + \varepsilon_{ijt}$. The dependent variable is the buy-and-hold cumulative abnormal return, normalized to zero in the month preceding the start of the contest and computed as $CAR_{ijt} = \prod_{s=1}^{t}(1+r_{ijs}) - \prod_{s=1}^{t}(1+r_{ijs}^{bm})$ going forward in event time, and $CAR_{ijt} = \prod_{s=0}^{t+1}(1+r_{ijs})^{-1} - \prod_{s=0}^{t+1}(1+r_{ijs}^{bm})^{-1}$ going backward, where i denotes the bidder, j the contest, t the event month, and bm references a benchmark portfolio. The benchmark for market-adjusted returns is the CRSP value-weighted market return; for industry-adjusted returns it is the return of stock i's Fama French industry portfolio (12-industry classification); for risk-adjusted returns it is the CAPM required return, $r_{ft} + \beta_i(r_{ijt} - r_{ft})$; for characteristics-adjusted returns it is the return of a characteristics-matched portfolio based on size, book-to-market, and 12-month momentum (Daniel, Grinblatt, Titman, and Wermers, 1997). Winner (W_{ijt}) is a dummy indicating whether bidder i is a winner in merger contest j. Period (t) is a variable counting event time. Post merger ($Post_{ijt}$) indicates whether period t is in the post-merger window. The lower part of the table reports tests for $t = +36$ winner-loser differences in CAR. Standard errors for the coefficients are clustered by contest, and are reported in parentheses.

Dependent variable:	CAR		CAR		CAR		CAR	
	(Market-Adjusted)		(Industry-Adjusted)		(Risk-Adjusted)		(Char.-Adjusted)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Winner (α_1)	0.170	-0.555	-1.314	-1.724	0.508	-0.310	3.933*	3.557*
	(2.986)	(2.969)	(3.259)	(3.279)	(2.992)	(2.969)	(2.100)	(2.113)
Period (α_2)	-0.0214	-0.549	0.0462	-0.533	-0.0323	-0.634	-0.154	-0.576
	(0.143)	(0.534)	(0.140)	(0.394)	(0.148)	(0.602)	(0.138)	(0.469)
Winner x Period (α_3)	-0.230	-0.246	-0.269	-0.274	-0.251	-0.265	0.0880	0.0814
	(0.182)	(0.179)	(0.188)	(0.185)	(0.190)	(0.187)	(0.176)	(0.176)
Post merger (α_4)	-1.895	-10.10*	-2.180	-11.08**	-1.844	-9.257	-0.460	-5.843
	(5.912)	(5.818)	(5.568)	(5.498)	(6.283)	(6.164)	(4.761)	(5.397)
Winner x Post merger (α_5)	-4.061	-3.189	-1.791	-1.177	-5.529	-4.518	-4.267	-3.719
	(5.506)	(5.454)	(5.908)	(5.917)	(5.533)	(5.458)	(4.983)	(4.904)
Period x Post merger (α_6)	0.0176	-0.0554	-0.173	-0.303	-0.133	-0.175	0.249	0.160
	(0.273)	(0.309)	(0.281)	(0.312)	(0.299)	(0.348)	(0.273)	(0.300)
Winner x Post merger x Period (α_7)	0.155	0.188	0.252	0.263	0.253	0.287	0.0186	0.0414
	(0.319)	(0.319)	(0.327)	(0.326)	(0.350)	(0.351)	(0.340)	(0.342)
Contest fixed effects	X	X	X	X	X	X	X	X
Year fixed effects		X		X		X		X
Merger effect: $\alpha_1 + \alpha_5 + 35(\alpha_3 + \alpha_7)$	-6.495	-5.780	-3.695	-3.277	-4.950	-4.049	3.398	4.136
Merger effect: P-value	0.496	0.544	0.713	0.745	0.665	0.722	0.731	0.671
Observations	12384	12384	12384	12384	12384	12384	11259	11259
R-squared	0.272	0.318	0.243	0.284	0.268	0.310	0.321	0.349
Number of contests	82	82	82	82	82	82	82	82