Prior target valuations and acquirer returns: risk or perception?*

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Abstract

In a large sample of public-public acquisitions, target valuation changes between their 52-week highs and just prior to the acquisition announcements are positively related to acquirer announcement returns. Behavioral biases based on prospect theory potentially explain this relation. Yet, the target valuation change variables are highly correlated with target valuation uncertainty proxies that also affect acquirer announcement returns. These findings suggest that rational explanations based on target valuation uncertainty are at least as relevant as behavioral stories for explaining the significant empirical relation of prior target valuation changes and acquirer announcement returns.

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In a large sample of public-public acquisitions, target valuation changes between their 52-week highs and just prior to the acquisition announcements are positively related to acquirer announcement returns. Behavioral biases based on prospect theory potentially explain this relation. Yet, the target valuation change variables are highly correlated with target valuation uncertainty proxies that also affect acquirer announcement returns. These findings suggest that rational explanations based on target valuation uncertainty are at least as relevant as behavioral stories for explaining the significant empirical relation of prior target valuation changes and acquirer announcement returns.

1. Introduction

Recent empirical studies show that prior target valuation changes affect acquirer announcement returns. For private targets, Cooney, Moeller, and Stegemoller (2009) find that target valuation changes between a withdrawn initial public offering (IPO) and a subsequent acquisition are positively related to acquirer announcement returns. For public targets, Baker, Pan, and Wurgler (2009) report that targets' 52-week high share prices inflate takeover offer premiums. Pre-offer target prices below their 52-week highs are associated with more negative acquirer announcement returns, presumably because the acquirers offer excessive takeover premiums. The more the offer premiums are driven by the targets' 52-week highs, the more negative is the effect of offer premiums on acquirer announcement returns. Thus, target valuation changes between a 52-week high and just prior to a subsequent acquisition offer are positively related to acquirer announcement returns.

It is not obvious why prior target valuations affect acquirer announcement returns, although the empirical findings are similar to the partial adjustment effect in initial public offerings (Hanley, 1993, Loughran and Ritter, 2002). In fact, it is easier to argue that prior valuations should be irrelevant. In this spirit, Baker et al. (2009) attribute the effect of prior target valuation changes to irrational behavioral biases of acquirers and targets. In contrast, Cooney et al. (2009) favor a rational explanation in which target valuation changes proxy for target valuation uncertainty. This valuation uncertainty fundamentally affects the acquirer announcement returns. Unfortunately, the sample in Cooney et al. (2009) is small and quite distinct. To generalize their results, similar tests with a larger sample of public acquisitions would be necessary.

Any test of the relevance of prior valuation changes relies on defining an anchor valuation. In Cooney et al. (2009), the only feasible target valuation comes from the target's anticipated valuation at the time of its failed IPO. In acquisitions of public targets, choosing the anchor valuation is largely arbitrary. Fortunately, Baker et al. (2009) make a strong case that, of all prior target valuations, the 52-week high has the most empirical relevance. Part of their reasoning is based on the fact that takeover offers cluster heavily around the targets' 52-week high prices. In research with a sample of acquisitions of recent IPOs, Jindra and Moeller (2009) introduce two other choices by selecting the target's IPO price and end of first trading day price as anchors.

In this paper, I examine whether the effect of prior target valuation changes on acquirer announcement returns is driven by behavioral biases or by rational considerations. As in Baker et al. (2009), I use a large sample of public-public acquisitions and base my main target valuation change measure on the target's 52-week high. Similar to Cooney et al. (2009), by focusing on target valuation risk, I expand the search of explanations beyond behavioral biases.

Overall, I find strong support that valuation changes from a target's 52-week high affect acquirer announcement returns. My main measure of target valuation changes is *Target Δ high*, the target's share price one week prior to the acquisition announcement divided by the target's 52-week high share price (also for the period ending one week prior to the acquisition announcement) minus one. Acquirers of targets in the bottom tercile of *Target Δ high* have average announcement returns of -2.8% compared to -1.2% in acquisition of targets in the top tercile. Regression results further show that the farther the target price just prior to the acquisition is below its 52-week high, the more negative is the acquirer announcement return. This result is consistent with behavioral biases based on prospect theory (Kahneman and Tversky, 1979). It also parallels the finding in Cooney et al. (2009) that acquirer announcement returns are positively related to target valuation changes. Yet, I also find that measures of target valuation uncertainty are strongly related to target valuation changes and that they affect acquirer announcement returns.

My main proxies for target valuation uncertainty are *Target price range*, the 52-week high minus the 52-week low, standardized by the mid-point of the 52-week high and low, *Industry M/B stdev*, the standard deviation of the market-to-book ratios of firms in the target industry with assets between half and twice the target's assets, and *Target price stdev*, the standard deviation of the target's share prices, measured from 370 to 15 days before the acquisition announcement. Higher target valuation uncertainty is related to lower acquirer announcement returns. Acquirers of targets in the bottom tercile of *Target price range* have average announcement returns of -1.3% compared to -3.3% in acquisition of targets in the top tercile. The average acquirer announcement returns for the bottom (top) terciles of *Industry M/B stdev* and *Target price stdev* are -1.6% (-3.1%) and -1.3% (-3.2%), respectively.

Why do investors react negatively to acquisitions of risky targets? My risk proxies measure idiosyncratic and industry-specific target valuation uncertainty. In Cooney et al. (2009), acquirer announcement returns are positively related to target valuation risk. They explain the positive relation with risk-averse acquirer managers requiring compensation for the assumption of valuation risk in form of lower acquisition prices. Acquirer shareholders who are less risk-averse than managers focus more on the lower acquisition price than the added idiosyncratic risk (that they can largely diversify away). Since the targets in Cooney et al. (2009) are private, their owners are likely undiversified and benefit from offloading valuation risk to acquirers. Therefore, the acquirer's need for compensation for assuming valuation risk is matched by the target's willingness to provide it. Consequently, higher target valuation risk is associated with higher acquirer announcement returns in private acquisitions.

Shareholders of public targets are likely more diversified than the owners of private firms. Therefore, they have no incentive to provide compensation for offloading idiosyncratic risk. Without compensation in the form of lower acquisition prices, acquirer managers would have to be compelled by other, likely private, benefits to undertake acquisitions of risky targets.[1] Examples of these costly benefits are higher compensation from running a larger firm or a better ability to hide poor performance in a more complex firm. If the takeover market is competitive,

[1] An acquisition, even of a risky target, can be attractive because of synergies. However, there is no reason why synergies and idiosyncratic risk should be correlated, and empirical evidence of synergies is sparse.

the costs of the managerial benefits are borne by the acquiring firm. Therefore, the more risky the public target, the more negative is the investors' reaction.

Private targets in Cooney et al. (2009) and public targets here are likely the reason for the opposite effects of target valuation risk on acquirer announcement returns. Target valuation risk seems to affect public and private takeovers in fundamentally different ways, similar to the unconditional differences in acquirer announcement returns that are on average positive for private targets (Fuller, Netter, and Stegemoller, 2002) and negative for public targets (e.g., Moeller, 2005).

In contrast to Cooney et al. (2009), the target valuation change and target valuation uncertainty variables are negatively correlated in my study. The farther the target's stock price one week before the acquisition announcement is below its 52-week high, the higher is the target valuation uncertainty. This relation is intuitive because a larger absolute distance from a prior value suggests that investors are uncertain about the appropriate target valuation. Consequently, *Target Δ high* can be interpreted as a risk proxy. Higher valuation risk is associated with lower *Target Δ high*, which in turn is associated with lower acquirer announcement returns. The difference to Cooney et al. (2009) can be due to their target valuation change variable having positive and negative values (*Target Δ high* is smaller than or equal to zero in my sample). Their positive correlation of the target valuation risk proxy with positive target valuation changes is intuitive because larger absolute valuation changes suggest higher risk. For negative target valuation changes, it is unintuitive. An alternative interpretation would be that negative target valuation changes are a measure of overvaluation instead of valuation risk.

One difficulty in interpreting the empirical results is that target valuation change variables and target valuation uncertainty proxies are highly correlated. In addition, these variables have substantial correlation with acquirer and target market-to-book ratios. Absent a convincing empirical identification, only qualitative arguments can favor some explanations over others.

Considering the evidence, there is no reason to attribute the effects of target valuation changes on acquirer announcement returns solely to behavioral biases. There is significant evidence that target valuation uncertainty drives at least part of the effect. Furthermore, the target valuation uncertainty rationale seems to be more appealing than the irrational behavioral bias explanation. Since rational and irrational explanations are not mutually exclusive, both types of theories can cause the empirical relevance of prior target valuation changes for acquirer announcement returns.

The rest of the paper is organized as follows: Section 2 describes the sample and section 3 presents the empirical results. Section 4 addresses robustness issues and section 6 concludes.

2. Data

I start with 6,142 completed takeovers, announced between 1982 and 2008, from Thomson Reuters' SDC Mergers & Acquisitions database where the target and the acquirer are public U.S. firms and the acquirer holds no more than 10% of the target's shares before the acquisition announcement and no less than 90% afterwards. CRSP and Compustat matches are available for targets and acquirers in 3,702 takeovers. I further require that the deal value is at least $30 million (in year 2000 dollars) and that the market value of the target's equity represents at least 1% of the acquirer's equity value (both measured at the last fiscal year-end before the acquisition announcement).[2] Together with some missing data items, these requirements reduce the main sample to 2,550 observations.

Table 1 presents summary statistics. *Acquirer CAR* is the three-day return of the acquirer in excess of the CRSP equal-weighted index centered on the acquisition announcement. The mean of -1.9% is statistically significant. *Target Δ high* is the target's share price one week prior to the acquisition announcement divided by the target's 52-week high share price (also for the period

[2] Jarrell and Poulsen (1989) report that acquisitions of relatively small targets have little impact on the value of the acquirer. I remove those acquisitions to reduce noise. The results are similar with 2%, 5%, and 10% relative size cutoffs.

ending one week prior to the acquisition announcement) minus one. One week before the acquisition announcement, the mean (median) target share price change from the 52-week high is a decline of 22% (14.5%).

To test whether the 52-week high is a unique anchor, I analyze two similar anchors. *Target Δ low* is the target's share price one week prior to the acquisition announcement divided by the target's 52-week low share price minus one. The target share price one week before the announcement increased by a mean (median) of 61.3% (40.9%) from the 52-week low. *Target Δ six months* arbitrarily selects the share price 180 calendar days before the announcement as the anchor and is otherwise calculated as the two prior variables. The average (median) share price change over the roughly six months is 12.5% (8.2%).

I consider several target valuation risk measures. *Target price range* is the 52-week high minus the 52-week low, standardized by the mid-point of the 52-week high and low. The mean (median) *Target price range* is 65.1% (57.3%). *Industry M/B stdev* is the standard deviation of the market-to-book ratios of firms in the target industry with assets between half and twice the target's assets. I define industry using the four-digit standard industrial classification (SIC) code and require at least ten matching firms. If there are fewer matches, I use the first three digits of the SIC code, then the first two, and if there are still fewer than ten matches only the first digit. *Industry M/B stdev* has a mean and median of 1.3 and 0.7, respectively. *Target price skew* is the skewness of the target's share prices, measured from 370 to 15 calendar days before the acquisition announcement. The average and median skewness is positive with values of 0.274 and 0.225, respectively.

The market value of equity is calculated from Compustat data as of the last fiscal year-end before the acquisition announcement. Median *Acquirer market value* is $1.4 billion while median *Target market value* is $189 million. *Relative size* is the ratio of target to acquirer market value of equity. The median target has approximately one sixth of the market value of the acquirer. The market-to-book ratios are calculated as (market value of equity + book value of assets – book value of equity) divided by book value of assets. *Acquirer* (*Target*) *M/B* has a median of 1.4 (1.3). The average fraction of the acquisition price that is paid with acquirer stock (*Stock pct*) is 60.1%. *Target cash flow/ cash*, the net cash flow from operating activities divided by cash and short-term investments, has a mean of 631.8% and a median of 56.5% while *Target net income/ assets*, the target's net income divided by its total assets, has a mean and median of -1% and 1.5%, respectively. *Target runup* is the return of the target from 60 calendar days before to the beginning of the announcement return window. Its mean is 10% and its median is 7.2%.

Panel B shows that the SDC Mergers & Acquisitions database classifies only 1.7% of the sample takeovers as hostile, while 14.9% involve tender offers. The acquisition is paid with at least 90% stock (*Stock*) in 70.8% of the observations. I describe the variable *Risk index* below.

Panel C shows the distribution of the sample takeovers over time. The highest activity is between 1995 and 2000, accounting for slightly more than half of the sample.

3. Results

I test the effect of prior target valuation changes and target valuation uncertainty proxies on acquirer announcement returns.

3.1. Univariate results

In Table 2, I create subsamples by splitting the observations into terciles based on target valuation change, target valuation uncertainty proxies, and various control variables. Then I compare the mean and median *Acquirer CAR* of the bottom and top terciles.

Target Δ high has a strong positive relation with *Acquirer CAR*. Acquirers of targets in the top tercile of *Target Δ high* have mean and median announcement returns of -1.2% and -1.3% while the mean and median are -2.8% and -1.8% for the bottom tercile, respectively. Both means and medians are statistically different at the 0.01 level. The means of *Target Δ low* and *Target Δ six* *months* are also positively related to acquirer announcement returns, but the medians have a negative relation. Both differences are insignificant, indicating that the 52-week high is a stronger anchor than the 52-week low or an arbitrarily selected price.

The target valuation uncertainty proxies *Target price range*, *Industry M/B stdev*, and *Target price stdev* have strong negative relations with *Acquirer CAR*. The mean (median) acquirer announcement returns for the bottom and top terciles of *Target price range* are -1.3% and -3.3% (-1.1% and -2.6%), respectively. Both differences are significant at the 0.01 level. The differences for *Industry M/B stdev* and *Target price stdev* are of similar magnitudes and also significant at the 0.01 level, except for the virtually identical medians of *Industry M/B stdev*. Despite the similar medians, a Wilcoxon signed-rank test shows *Acquirer CAR* for both terciles of *Industry M/B stdev* to be significantly different at the 0.05 level.

Acquirer size (*Acquirer market value*) seems to have no impact on acquirer announcement returns, but both *Target market value* and *Relative size* show that acquisitions of (relatively) larger targets are associated with significantly lower acquirer announcement returns.

Acquirer and target market-to-book ratios are significantly negatively related to *Acquirer CAR* and so is *Stock pct*. When I split the sample using the dummy variable *Stock* instead of the terciles based on *Stock pct*, the results are similar. If acquirer market-to-book is a measure of overvaluation, paying with stock can signal the overvaluation and cause the negative relations of *Acquirer M/B* and *Stock pct* with *Acquirer CAR*. The significance of *Target M/B* can be due to *Target M/B* being a proxy for overvaluation and overpaying by the acquirer, but its significance can also be spurious because acquirer and target market-to-book ratios are highly correlated.

Finally, I combine the three measures of target valuation uncertainty (*Target price range*, *Industry M/B stdev*, and *Target price stdev*) into a summary risk variable. *Risk index* ranges from zero to three and adds one point for each target valuation risk variable that ranks in the top tercile. Consistent with the results for the individual risk variables, acquirer announcement returns are significantly lower when *Risk index* equals two or three, indicating high risk, than when it equals zero. Mean and median differences are significant at the 0.01 level. This summary variable alleviates concerns that individual target valuation uncertainty proxies mismeasure risk. While it discards valuable information, it is useful in regressions to address concerns about nonlinearities and outliers.

Overall, Table 2 shows that the target's price change from its 52-week high to just prior to the acquisition announcement is negatively related to acquirer announcement returns. The more the target's price declines prior to the acquisition, the lower are the acquirer announcement returns. This result is consistent with behavioral biases based on prospect theory. If the 52-week high serves as an anchor valuation for the target,[3] target management should negotiate harder, the further the target's current price is from this anchor. A tougher negotiation stance of the target should lead to a worse deal for the acquirer, resulting in lower acquirer announcement returns. The behavioral bias can also occur on the acquirer side. If the acquirer anchors on the target's 52-week high, the further the target's price is below that level, the better the perceived deal for the acquirer and presumably the more lax its negotiation approach.

The relations of the three target valuation uncertainty proxies and the combination measure *Risk index* to acquirer announcement returns are of similar magnitude and significance as the relation of *Target Δ high* and *Acquirer CAR*. These relations suggest that target valuation risk has a significantly negative effect on acquirer announcement returns. The interesting question is whether the target valuation uncertainty proxies measure essentially the same underlying effect as *Target Δ high*. I contend that *Target Δ high* can be related to both behavioral biases and target valuation risk while it is difficult to interpret the target valuation uncertainty proxies as measures related to behavioral biases. Therefore, the relation of *Target Δ high* and the target valuation uncertainty proxies and their joint effect on *Acquirer CAR* should help determine the underlying force behind the relation of target valuation changes and acquirer announcement returns.

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[3] For ease of exposition, I frequently use only" acquirer" or "target" to refer to the respective decision makers instead of mentioning the acquirer's and target's management or shareholders explicitly.

3.2. Regression results

To confirm the univariate results in the presence of control variables, I regress *Acquirer CAR* separately on *Target Δ high* and the target valuation risk proxies. All regressions have acquisition year dummy variables (not reported in tables) and heteroskedasticity-adjusted standard errors following White (1980) and MacKinnon and White (1985). "Log" in front of the variable name indicates the natural logarithm of the variable, or one plus the variable where needed to avoid logarithms of negative numbers. The reason for using logarithms is to reduce the impact of outliers.

In column 1 of Table 3, *Log target Δ high* is positive and significant at the 0.01 level. The closer the target trades to its 52-week high one week before the acquisition announcement, the higher is the acquirer announcement return. This result is consistent with the partial adjustment effect for private targets found in Cooney et al. (2009). In columns 2 to 4, *Target price range*, *Log industry M/B stdev*, and *Log target price stdev* have negative coefficients and are significant at the 0.01, 0.01, and 0.05 levels, respectively. The combination target valuation uncertainty measure *Risk index* is also significantly negative at the 0.01 level in column 5. Therefore, Table 3 confirms the significant relations of acquirer announcement returns with *Target Δ high* and the target valuation risk proxies. It is noteworthy that the regression with *Risk index* has the highest adjusted R^2.

Among the control variables, *Log relative size*, *Log acquirer M/B x Stock*, and *Stock pct* are consistently negative and significant at the 0.01 level. I include *Log relative size* as a control variable because Faccio, McConnell, and Stolin (2006) and Asquith, Bruner, and Mullins (1983) find a positive relation between acquirer announcement returns and relative size in private and public acquisitions, respectively. The negative coefficient on *Log relative size* in Table 3 is inconsistent with these earlier studies.

Moeller, Schlingemann, and Stulz (2004) find that larger acquirers earn approximately 2% lower announcement returns than do smaller acquirers. They interpret this finding as evidence of hubris (Roll, 1986). Therefore, I include *Log acquirer market value*. The results are mixed with *Log acquirer market value* being significantly negative in columns 1 to 3, but insignificant when *Log target price stdev* or *Risk index* are the target uncertainty proxy.

For acquisitions of private firms, Fuller et al. (2002) and Faccio et al. (2006) find higher acquirer returns when the acquirer pays with stock. Officer, Poulsen, and Stegemoller (2009) show that using stock as a method of payment mitigates asymmetric information about the target and leads to more positive acquirer returns. In univariate tests of acquisitions of public targets, Moeller et al. (2004) find lower acquirer announcement returns when the method of payment is stock. In my sample, *Stock pct* is significantly negatively related to *Acquirer CAR*. Lang, Stulz, and Walkling (1989) show that acquirers with high Tobin's *Q* gain more than acquirers with low Tobin's *Q*. In my sample, *Log acquirer M/B* negatively affects *Log acquirer CAR*, but only if the method of payment is stock (*Stock* equals one if at least 90% of the purchase price is paid with acquirer stock). While these results differ from those in Lang et al. (1989) and the findings in research focusing on private targets, they are consistent with investors realizing that overvalued acquirers have incentives to make stock acquisitions. Furthermore, when I control for selection effects in section 4, paying with stock has a positive effect on acquirer announcement returns.

Consider a one standard deviation drop in *Log target Δ high*, an about 21% drop in the target price from the 52-week high, to assess the economic significance of the change from the average *Acquirer CAR*. The coefficient of 0.021 on *Log target Δ high* in column 1 means that *Acquirer CAR* decreases by about 0.8 percentage points. For the median acquirer market value of equity of $1,439 million, the 0.8% represents $12 million. With a median deal value of $304 million, the $12 million account for approximately 4% of that value. For a one standard deviation increase in

Target price range and *Log industry M/B stdev*, *Acquirer CAR* decreases by 0.7 and 0.6 percentage points, respectively.

Cooney et al. (2009) hypothesize that the skewness of the distribution of possible target values affects takeover prices and acquirer announcement returns. *Target price skew* is potentially a proxy for this skewness. However, it is not significantly related to acquirer announcement returns in column 6 of Table 3.

My goal is to determine to what extend the target valuation change from its 52-week high and the three proxies for target valuation uncertainty measure the same underlying effect on acquirer announcement returns. In Table 4, I include *Log target Δ high* and one of the target valuation risk proxies at a time as explanatory variables. In column 1, *Target price range* still has a negative point estimate but is insignificant. The coefficient of *Log target Δ high* declines from 0.021 to 0.017 and its significance declines from the 0.01 to the 0.05 level. In column 2, *Log industry M/B stdev* is less negative and less significant (at the 0.05 level versus the 0.01) than in Table 3. The point estimate and significance of *Log target Δ high* are also slightly reduced. In column 3, *Log target price stdev* is insignificant and the point estimate and significance of *Log target Δ high* are slightly reduced compared to Table 3. Finally, the combination target valuation uncertainty measure *Risk index* remains negative and significant at the 0.01 level in column 4. Here, *Log target Δ high*'s significance is reduced to the 0.05 level.

Overall, the first four columns of Table 4 indicate that there is some overlap in the effects of *Log target Δ high* and the target valuation uncertainty measures on acquirer announcement returns. This overlap suggests that *Log target Δ high* is at least partially a measure of target valuation uncertainty. With the exception of *Risk index*, *Log target Δ high* dominates the target valuation risk measures in terms of significance. However, in light of substantial multicolinearity, this dominance is not particularly meaningful. For example, it is possible that *Log target Δ high* is simply a more precise measure of target valuation uncertainty than the other proxies.

Column 5 adds *High risk*, a dummy variable that equals one when *Risk index* has values of two or three and zero otherwise. I create this dummy variable to test how the interaction of target valuation risk and prior target valuation changes affects acquirer announcement returns. *Log target Δ high x High risk* is significant at the 0.05 level with a point estimate of 0.028. *Log target Δ high* and *High risk* are insignificant. This regression shows that *Log target Δ high* only affects acquirer announcement returns when there is substantial uncertainty in valuing the target. It supports the claim that *Log target Δ high* is largely a proxy of target valuation risk. At least, it demonstrates that the effects of targets' prior valuation changes and targets' valuation uncertainty are tightly intertwined.

Column 6 tests the effect of *Target price skew* in the presence of *Log target Δ high*. Again, *Target price skew* is insignificant.

3.3 Correlation of target valuation change and target valuation risk measures

Because the results in Table 4 suggest substantial overlap of the target valuation uncertainty measures and *Log target Δ high*, I examine the correlation between these variables in Table 5. *Target price range* has correlations with *Log industry M/B stdev* and *Log target price stdev* of 0.44 and 0.35, respectively. By design, all three variables are highly correlated with *Risk index*, with correlations between 0.54 and 0.73. Among these four target risk variables, *Target price range* has the highest correlation with *Log target Δ high* (-0.7), followed by *Risk index* (-0.47), *Log industry M/B stdev* (-0.27), and *Log target price stdev* (-0.23). Overall, these correlations are moderate to high and further support the contention that *Log target Δ high* at least partially measures target valuation uncertainty.

The correlation of *Target price skew* with *Log target Δ high* and the target valuation risk measures is low to moderate and ranges from -0.13 to 0.21. *Target price skew* appears to measure a different aspect of target valuation uncertainty than the other risk variables and has a low correlation with *Log target Δ high*.

Many factors can affect target valuation changes. Therefore, I repeat the correlation analysis with control variables in a regression framework in Table 6. I add acquisition year dummy variables to control for time effects and *Target market value* to address differences due to size. I also control for fundamental drivers of value with *Log target cash flow/ cash* and *Log target net income/ assets*, both of which have a significant positive effect on *Log target Δ high*. *Target market value* is generally significant, but its sign changes depending on the target valuation uncertainty proxy in the regression.

Confirming the correlation analysis, each risk variable has a highly significant negative coefficient in columns 1 through 5 of Table 6. In column 6, I include all target valuation risk variables together with the exception of *Target price range*. *Target price range* dominates the other risk measures when it comes to their correlations with *Log target Δ high*, as shown by the correlation coefficient of -0.7 and the adjusted R^2 of 0.51 in column 1. Three of the remaining four risk measures are significantly negative in column 6. *Log industry M/B stdev* has a negative point estimate but a p-value of 0.267. Overall, the correlation analysis shows a tight relation between my target valuation uncertainty proxies and *Log target Δ high*.

4. Method of payment

The method of payment is an important determinant of acquirer announcement returns. In both the univariate tests and the regressions, the use of stock as payment reduces acquirer announcement returns, in particular when the acquirer's market-to-book ratio is high. These results suggest that the method of payment reveals information about the acquirer that affects acquirer announcement returns, e.g., that the acquirer management believes the acquirer is overvalued or that the acquirer does not have sufficient cash to make a cash acquisition. However, the method of payment can also be affected by the type of target. Officer et al. (2009) show that using stock is beneficial for acquirers when targets are difficult to value. Because the method of payment is likely correlated with the target valuation uncertainty that I focus on here, the regression results can be inconsistent and biased when this relation is not adequately addressed.

In Table 7, I use a treatment model to explicitly account for the correlation of method of payment and the error term in the acquirer announcement return regressions. The treatment model uses a two-step process to address the effects of endogeneity and selection. I use the maximum likelihood approach suggested by Maddala (1983) as implemented in Stata to estimate the model. In the first step, I estimate the probability of a stock acquisition, i.e., the likelihood that at least 90% of the deal value is paid with stock. Size should affect the method of payment because it is likely difficult to raise sufficient cash for very large acquisitions. While *Log acquirer market value* is insignificant, *Log relative size* is positive and significant at the 0.01 level. Acquirers with high current market valuations have an incentive to make stock acquisitions. Consistent with this rationale, *Log acquirer M/B is positive* and significant at the 0.01 level.

In column 1 of Table 7, I add *Log target Δ high*. It has a significantly negative coefficient, meaning that the further the target price is below the 52-week high, the higher the probability of a stock offer. This result is consistent with *Log target Δ high* being a measure of target valuation uncertainty because acquirers seem to prefer stock offers when they have difficulty valuing the target.[4] Next, I add my target valuation uncertainty proxies one at a time. The results for *Target price range*, *Log target price stdev*, and *Risk index* are similar. All three have significantly positive coefficients, indicating that acquirers pay for harder-to-value targets with stock. Inconsistent with the other target risk variables, *Log industry M/B stdev* has a negative coefficient in column 3. However, this coefficient becomes insignificant in column 4 when I remove the significantly positive *Log acquirer M/B* from the control variables. The surprising estimate for

[4] Note that all observations of *Log target Δ high* are negative or zero. Therefore, the negative coefficient implies a higher probability of a stock offer the larger the absolute value of *Log target Δ high*.

Log industry M/B stdev is potentially due to the estimation method being sensitive to the high correlation of 0.55 between *Log industry M/B stdev* and *Log acquirer M/B*.

The second step of the treatment model estimates regressions similar to those in Table 3. For consistency with the first step, I use the dummy variable *Stock* instead of *Stock pct*. I also omit *Log acquirer M/B x Stock*.[5] Most important, the treatment model accounts for the correlation between the method of payment (*Stock*) and the estimation error in the acquirer announcement return regression. It should therefore produce consistent and unbiased estimates.

The coefficients on *Log target Δ high*, *Target price range*, *Log target price stdev*, and *Risk index* are slightly larger (in absolute terms) then in Table 3 and at least as significant. Interestingly, *Stock* is now positive and significant at the 0.01 level, consistent with the findings in Officer et al. (2009) who find evidence that acquirers benefit when they acquire hard-to-value targets with equity. While the treatment model reverses the sign on the method of payment variable *Stock*, the other variables are qualitatively unchanged. The correlation between *Stock* and the error in the acquirer announcement return regression, as measured by ρ, is about -0.8. A Wald test of ρ being equal to zero is strongly rejected. So it is important to control for endogeneity and selection. When using the treatment model, only the estimate of the method of payment variable changes. This fact enhances the confidence in the robustness of my main results.

Again, I estimate the regressions with *Log industry M/B stdev* with and without *Log acquirer M/B*. With *Log acquirer M/B* in column 3, the coefficient is insignificant. Without *Log acquirer M/B* in column 4, the coefficient on *Log industry M/B stdev* is significantly negative, consistent with the results in the previous tables.

In column 7, I examine the effects of *Target price skew*. It now has a significant negative relation with acquirer announcement return. Acquirers fare better when they acquire targets with large negative outliers in their pricing than large positive outliers. Given that *Target price skew*

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[5] When I add *Log acquirer M/B x Stock*, it is only significant in column 4, and the effect on the other explanatory variables is negligible.

and *Log target Δ high* are negatively correlated, large high price outliers should be associated with larger declines from the target's 52-week high, and vice versa. This result is the opposite of what Cooney et al. (2009) predict for their sample of private acquisitions. However, the way I measure target price skewness here is not necessarily consistent with what they call skewness in their discussion.

5. Robustness and alternative explanations

I examine alternative anchors for the target valuation change variable and add a target runup variable.

5.1. Alternative target valuation anchors

Column 1 of Table 8 is the same regression as column 1 of Table 3, except I replace *Log target Δ high* with *Log target Δ low*, i.e., instead of the 52-week high the 52-week low is the supposed anchor of the target valuation. *Log target Δ low* has an insignificant coefficient. Baker et al. (2009) argue that the 52-week high is a unique psychological anchor. The significance of *Log target Δ high* and the insignificance of *Log target Δ low* support their claim. If only the valuation change from some arbitrary base mattered, *Log target Δ low* should be as significant as *Log target Δ high*. Therefore, this result weakens the target valuation risk explanation. However, *Target Δ low* has much more variability than *Target Δ high*, with more than twice the range between its 10th and 90th percentile and more than four times the standard deviation. These measurement issues can favor the significance of *Log target Δ high* over *Log target Δ low*.

Next, I replace *Log target Δ high* with *Log target Δ six months*. For *Log target Δ six months* I arbitrarily selected the target's stock price 180 calendar days before the acquisition announcement window as the anchor. In column 2, the coefficient is positive and significant at the 0.1 level. In contrast to *Log target Δ high* and *Log target Δ low*, *Log target Δ six months* can have positive and negative values because the stock price can increase or decrease over the six month period (it can only decrease from the 52-week high and increase from the 52-week low). If the target valuation change is a proxy for target valuation risk, the absolute change should be more important than the direction of the change. Both large positive and large negative changes should affect acquirer announcement returns in the same way. To test the effect of the absolute changes, I split *Log target Δ six months* into two variables representing negative and positive valuation changes. In column 3, the coefficient on the negative observations of *Log target Δ six months* is positive and significant at the 0.01 level while the coefficient on the positive changes of *Log target Δ six months* is negative and less significant at the 0.1 level. These estimates are consistent with the positive coefficients on *Log target Δ high* observed in the earlier analyses and the negative coefficients on the other target valuation uncertainty proxies. They also show that target valuation changes have a larger affect on acquirer announcement returns after bad things happened to the target, i.e., after the target stock price declined.

5.2. Target price runup

Another potential explanation of the relation between prior target valuation changes and acquirer announcement returns is based on markup pricing (Schwert, 1996). Under markup pricing, the target's pre-announcement runup is unrelated to post-announcement increases in the target's stock price. Therefore, the pre-announcement runup constitutes an additional cost to acquirers. This explanation implies that acquirers do not take into account targets' recent stock price runups when they determine what premium to offer. Consequently, they overpay for targets with positive price runups. Applied to my study, markup pricing implies that the acquirers' announcement returns should be lower when the targets experience higher prior valuation changes. However, I find the opposite. Regardless, I add *Log target runup* as a control variable. In column 4 of Table 8, the point estimate and significance of *Log target Δ high* slightly decline compared to the same regression without *Log target runup* in Table 3. *Log target runup* is positive and significant at the 0.1 level. In columns 5 and 6, the results for *Target price range* and *Log industry M/B stdev* in the presence of *Log target runup* are largely identical to the estimates without the target runup variable in Table 3. Surprisingly, *Log target runup* has a significantly positive coefficient. I conclude that the target runup effect differs from my results for target valuation changes and target valuation risk.

6. Conclusions

Using a broad sample of public-public acquisitions, I explore why prior target valuation changes affect acquirer announcement returns. This initially surprising phenomenon that also occurs in IPOs, the so called partial adjustment effect, is frequently attributed to behavioral biases of managers or investors. However, similar to Cooney et al. (2009) for private acquisitions, I find that rational explanations based on target valuation uncertainty are at least equally likely causes in my sample.

It is difficult to disentangle behavioral from rational effects. Yet, prior target valuation changes are natural measures of target valuation uncertainty. Large valuation changes essentially show that investors are uncertain about the value of a firm. The high correlations of target valuation changes with target valuation uncertainty measures further support the hypothesis that target valuation change variables at least partially measure valuation uncertainty. While behavioral biases can explain the empirical findings regarding the effects of prior valuation changes, they do not explain why the valuation uncertainty variables matter. In my opinion, the rational explanations based on valuation uncertainty provide more comprehensive and appealing justifications for the observed effects than behavioral stories. This paper develops some potential rational explanations and provides evidence that is consistent with those explanations.

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Table 1
Descriptive statistics
Panel A contains the mean, median, standard deviation, 10%, and 90% percentiles of the main variables. *Acquirer CAR* is the three-day return of the acquirer in excess of the CRSP equal-weighted index centered on the acquisition announcement. *Target Δ high* is the target's share price one week prior to the acquisition announcement divided by the target's 52-week high share price (for the period ending one week prior to the acquisition announcement) minus one. *Target Δ low* is the target's share price one week prior to the acquisition announcement divided by the target's 52-week low share price minus one. *Target Δ six months* uses the share price 180 days before the announcement as the anchor and is otherwise calculated as the two prior variables. *Target price range* is the 52-week high minus the 52-week low, standardized by the mid-point of the 52-week high and low. *Industry M/B stdev* is the standard deviation of the market-to-book ratios of firms in the target industry with assets between half and twice the target's assets. *Target price stdev* and *Target price skew* are the standard deviation and skewness of the target's share prices, measured from 370 to 15 days before the acquisition announcement. *Acquirer market value* and *Target market value* are the market value of equity as of the prior fiscal year-end. *Relative size* is the ratio of *Target* to *Acquirer market value*. *Acquirer M/B* and *Target M/B* are calculated as (market value of equity + book value of assets – book value of equity) divided by book value of assets. *Stock pct* is the fraction of the acquisition price that is paid with acquirer stock. *Target cash flow/ cash* is the target's net cash flow from operating activities divided by cash and short-term investments. *Target net income/ assets* is the target's net income divided by its total assets. *Target runup* is the return of the target from 60 calendar days before to the beginning of the announcement return window. Panel B shows the proportions with which the dummy variables equal one and with which the categorical variable *Risk index* takes on its possible values. *Risk index* ranges from zero to three and adds one point for each target valuation risk variable (*Target price range*, *Industry M/B stdev*, and *Target price stdev*) that ranks in the top tercile. *Hostile* and *Tender* are from the SDC Mergers & Acquisitions database. *Stock* is a dummy variable that equals one when *Stock pct* is at least 90%, and zero otherwise. Panel C shows the distribution of the acquisition announcements over time.

Panel A

Variable	Mean	Median	St. Dev.	10%	90%
Acquirer CAR	-0.019	-0.014	0.076	-0.099	0.053
Target Δ high	-0.220	-0.145	0.218	-0.560	-0.009
Target Δ low	0.613	0.409	0.989	0.084	1.204
Target Δ six months	0.125	0.082	0.529	-0.301	0.510
Target price range	0.651	0.573	0.347	0.282	1.159
Industry M/B stdev	1.318	0.749	2.588	0.062	2.617
Target price stdev	3.246	2.108	4.841	0.691	6.242
Target price skew	0.274	0.225	0.677	-0.483	1.088
Acquirer market value ($ million)	7,028	1,439	19,535	158	15,169
Target market value ($ million)	1,156	189	4,497	32	1,988
Relative size	0.319	0.162	0.463	0.024	0.780
Acquirer M/B	2.266	1.413	3.936	1.025	3.731
Target M/B	1.888	1.257	2.158	0.986	3.172
Stock pct	0.601	0.780	0.435	0.000	1.000
Target cash flow/ cash	6.318	0.565	215.449	-0.284	8.646
Target net income/ assets	-0.010	0.015	0.201	-0.134	0.109
Target runup	0.100	0.072	0.234	-0.123	0.363

Panel B

Variable	Proportion
Hostile = 1	0.0165
Tender = 1	0.1486
Stock = 1	0.7078
Risk index = 0	0.3882
Risk index = 1	0.3231
Risk index = 2	0.1984
Risk index = 3	0.0902

Panel C

Acquisition year	Observations	Acquisition year	Observations
1983	4	1996	194
1984	3	1997	266
1985	11	1998	254
1986	13	1999	222
1987	17	2000	187
1988	44	2001	134
1989	46	2002	76
1990	25	2003	107
1991	38	2004	127
1992	38	2005	109
1993	49	2006	114
1994	133	2007	110
1995	176	2008	53
		Total	2,550

Table 2
Univariate tests for acquirer announcement returns
The sample is split into terciles based on the variables in column 1, except for *Stock* (split into 0 versus 1) and *Risk index* (split into 0 versus 2 or 3). Columns 2 and 3 first show the tercile means and then the tercile medians of *Acquirer CAR*. The first (second) value in column 4 is the *p*-value from a *t*-test (Wilcoxon signed-rank test) of the difference in means (medians) between columns 2 and 3. All variables are defined in prior tables.

Terciles based on	Bottom tercile	Top tercile	p-value
Target Δ high	-0.0281	-0.0123	0.000***
	-0.0180	-0.0128	0.000***
Target Δ low	-0.0235	-0.0219	0.663
	-0.0137	-0.0178	0.961
Target Δ six months	-0.0244	-0.0184	0.134
	-0.0151	-0.0173	0.531
Target price range	-0.0125	-0.0333	0.000***
	-0.0115	-0.0258	0.000***
Industry M/B stdev	-0.0156	-0.0312	0.000***
	-0.0166	-0.0167	0.044**
Target price stdev	-0.0132	-0.0315	0.000***
	-0.0103	-0.0238	0.000***
Target price skew	-0.0185	-0.0220	0.329
	-0.0152	-0.0128	0.973
Acquirer market value	-0.0201	-0.0199	0.968
	-0.0170	-0.0138	0.290
Target market value	-0.0107	-0.0266	0.000***
	-0.0096	-0.0224	0.000***
Relative size	-0.0078	-0.0305	0.000***
	-0.0065	-0.0282	0.000***
Acquirer M/B	-0.0141	-0.0293	0.000***
	-0.0144	-0.0176	0.030**
Target M/B	-0.0138	-0.0269	0.000***
	-0.0141	-0.0152	0.081*
Stock pct	0.0043	-0.0313	0.000***
	-0.0010	-0.0242	0.000***
Stock (0 , 1)	0.0062	-0.0295	0.000***
	-0.0001	-0.0237	0.000***
Risk index (0, 2 or 3)	-0.0107	-0.0377	0.000***
	-0.0102	-0.0269	0.000***

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

Table 3
Regression results for acquirer announcement returns
Log acquirer CAR is the dependent variable. All regressions include acquisition year dummy variables. "Log" in front of the variable name indicates the natural logarithm of the variable, or of one plus the variable where needed. All variables are defined in prior tables. *p*-Values, based on heteroskedasticity-adjusted standard errors, are in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
Log target Δ high	0.0209***					
	[0.000]					
Target price range		-0.0224***				
		[0.000]				
Log industry M/B stdev			-0.0047***			
			[0.000]			
Log target price stdev				-0.0051**		
				[0.025]		
Risk index					-0.0107***	
					[0.000]	
Target price skew						-0.0025
						[0.258]
Log acquirer market value	-0.0018*	-0.0022**	-0.0021**	0.0004	-0.0011	-0.0012
	[0.082]	[0.039]	[0.045]	[0.752]	[0.307]	[0.270]
Log relative size	-0.0076***	-0.0084***	-0.0083***	-0.0064***	-0.0075***	-0.0077***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Log acquirer M/B	-0.0023	-0.0023	-0.0013	-0.0053	-0.0000	-0.0049
	[0.705]	[0.705]	[0.826]	[0.378]	[0.998]	[0.415]
Log acquirer M/B x Stock	-0.0203***	-0.0188***	-0.0197***	-0.0186***	-0.0199***	-0.0195***
	[0.002]	[0.004]	[0.002]	[0.004]	[0.002]	[0.003]
Log target M/B	0.0053	0.0066	0.0085	0.0052	0.0098*	0.0040
	[0.313]	[0.213]	[0.121]	[0.319]	[0.069]	[0.451]
Stock pct	-0.0238***	-0.0249***	-0.0265***	-0.0253***	-0.0241***	-0.0251***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Tender	0.0035	0.0040	0.0044	0.0027	0.0044	0.0030
	[0.470]	[0.414]	[0.374]	[0.579]	[0.366]	[0.540]
Hostile	0.0173	0.0150	0.0168	0.0163	0.0162	0.0163
	[0.133]	[0.187]	[0.139]	[0.150]	[0.146]	[0.150]
Adjusted R^2	0.1133	0.1096	0.1062	0.1046	0.1144	0.1029
Observations	2,550	2,550	2,550	2,550	2,550	2,550

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

Table 4
Relation of target valuation change and target valuation uncertainty with acquirer announcement returns
Log acquirer CAR is the dependent variable. All regressions include acquisition year dummy variables. "Log" in front of the variable name indicates the natural logarithm of the variable, or of one plus the variable where needed. All variables are defined in prior tables. *p*-Values, based on heteroskedasticity-adjusted standard errors, are in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
Log target Δ high	0.0173**	0.0194***	0.0198***	0.0142**	-0.0047	0.0207***
	[0.018]	[0.001]	[0.001]	[0.022]	[0.649]	[0.000]
Log target Δ high x High risk					0.0281**	
					[0.030]	
Target price range	-0.0070					
	[0.342]					
Log industry M/B stdev		-0.0034**				
		[0.010]				
Log target price stdev			-0.0022			
			[0.331]			
Risk index				-0.0078***		
				[0.000]		
High risk					-0.0042	
					[0.467]	
Target price skew						-0.0008
						[0.713]
Log acquirer market value	-0.0020*	-0.0025**	-0.0012	-0.0016	-0.0015	-0.0019*
	[0.051]	[0.017]	[0.337]	[0.133]	[0.156]	[0.079]
Log relative size	-0.0079***	-0.0081***	-0.0071***	-0.0076***	-0.0075***	-0.0077***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Log acquirer M/B	-0.0019	0.0001	-0.0025	0.0005	-0.0002	-0.0023
	[0.754]	[0.980]	[0.672]	[0.939]	[0.969]	[0.706]
Log acquirer M/B x Stock	-0.0200***	-0.0203***	-0.0199***	-0.0203***	-0.0210***	-0.0203***
	[0.002]	[0.002]	[0.002]	[0.002]	[0.001]	[0.002]
Log target M/B	0.0058	0.0083	0.0057	0.0090*	0.0073	0.0052
	[0.257]	[0.119]	[0.272]	[0.087]	[0.165]	[0.319]
Stock pct	-0.0239***	-0.0248***	-0.0239***	-0.0234***	-0.0224***	-0.0238***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Tender	0.0038	0.0046	0.0035	0.0045	0.0043	0.0036
	[0.440]	[0.344]	[0.477]	[0.357]	[0.380]	[0.461]
Hostile	0.0168	0.0177	0.0173	0.0170	0.0143	0.0173
	[0.146]	[0.123]	[0.132]	[0.133]	[0.208]	[0.131]
Adjusted R^2	0.1133	0.1148	0.1133	0.1182	0.1196	0.1130
Observations	2,550	2,550	2,550	2,550	2,550	2,550

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

Table 5
Correlations of target valuation change and target valuation uncertainty variables
The table presents the correlations among the target valuation change and target valuation uncertainty variables. All variables are defined in prior tables.

	Log target Δ high	Target price range	Log industry M/B stdev	Log target price stdev	Risk index	Target price skew
Log target Δ high	1.00					
Target price range	-0.70	1.00				
Log industry M/B stdev	-0.27	0.44	1.00			
Log target price stdev	-0.23	0.35	0.07	1.00		
Risk index	-0.47	0.73	0.55	0.54	1.00	
Target price skew	-0.13	0.21	0.08	0.08	0.15	1.00

Table 6

Relation of target valuation change with target valuation uncertainty variables

The dependent variable is *Log target Δ high*. All regressions include acquisition year dummy variables. "Log" in front of the variable name indicates the natural logarithm of the variable, or of one plus the variable where needed. All variables are defined in prior tables. *p*-Values, based on heteroskedasticity-adjusted standard errors, are in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
Target price range	-0.7731***					
	[0.000]					
Log industry M/B stdev		-0.0624***				-0.0070
		[0.000]				[0.267]
Log target price stdev			-0.1489***			-0.0507***
			[0.000]			[0.000]
Risk index				-0.1642***		-0.1331***
				[0.000]		[0.000]
Target price skew					-0.0653***	-0.0310**
					[0.000]	[0.012]
Target market value	-0.0124***	-0.0091*	0.0401***	0.0136***	-0.0072	0.0244***
	[0.001]	[0.051]	[0.000]	[0.002]	[0.127]	[0.000]
Log target cash flow/ cash	0.0160***	0.0542***	0.0452***	0.0294***	0.0568***	0.0277***
	[0.002]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Log target net income/ assets	0.1971***	0.5027***	0.6157***	0.4516***	0.5368***	0.4855***
	[0.006]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Adjusted R^2	0.5108	0.2131	0.2427	0.3092	0.1825	0.3169
Observations	2,416	2,416	2,416	2,416	2,416	2,416

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

Table 7

Regression results for acquirer announcement returns with treatment model

Stock is the dependent variable in the first step and *Log acquirer CAR* is the dependent variable in the second step. The second step regressions include acquisition year dummy variables. “Log” in front of the variable name indicates the natural logarithm of the variable, or of one plus the variable where needed. The correlation between *Stock* and the error in the acquirer announcement return regression is measured by ρ. The Wald test of ρ being equal to zero is rejected in all columns. All variables are defined in prior tables. *p*-Values, based on heteroskedasticity-adjusted standard errors, are in brackets.

Table 7 (continued)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dependent variable: Log acquirer CAR							
Log target Δ high	0.0250***						
	[0.000]						
Target price range		-0.0274***					
		[0.000]					
Log industry M/B stdev			0.0010	-0.0054***			
			[0.536]	[0.000]			
Log target price stdev					-0.0101***		
					[0.000]		
Risk index						-0.0119***	
						[0.000]	
Target price skew							-0.0055**
							[0.035]
Log acquirer market value	-0.0030**	-0.0035***	-0.0022*	-0.0042***	0.0006	-0.0021*	-0.0024**
	[0.014]	[0.004]	[0.069]	[0.001]	[0.660]	[0.083]	[0.049]
Log relative size	-0.0174***	-0.0184***	-0.0174***	-0.0175***	-0.0151***	-0.0171***	-0.0178***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Log acquirer M/B	-0.0248***	-0.0229***	-0.0315***		-0.0262***	-0.0218***	-0.0276***
	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]
Log target M/B	0.0048	0.0056	0.0075	0.0016	0.0051	0.0089*	0.0039
	[0.361]	[0.284]	[0.166]	[0.734]	[0.329]	[0.093]	[0.459]
Stock	0.0847***	0.0854***	0.0832***	0.0812***	0.0852***	0.0840***	0.0855***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Tender	0.0041	0.0042	0.0055	0.0061	0.0035	0.0049	0.0039
	[0.373]	[0.367]	[0.231]	[0.186]	[0.449]	[0.286]	[0.393]
Hostile	0.0099	0.0087	0.0104	0.0101	0.0092	0.0095	0.0091
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Correlation ρ	-0.790	-0.794	-0.786	-0.776	-0.792	-0.788	-0.793
Wald test ρ = 0	174.056	174.520	164.165	140.929	184.060	172.292	181.581
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Dependent variable: Stock							
Log target Δ high	-0.2639***						
	[0.002]						
Target price range		0.3202***					
		[0.001]					
Log industry M/B stdev			-0.1207***	-0.0023			
			[0.000]	[0.911]			
Log target price stdev					0.1306***		
					[0.000]		
Risk index						0.0652**	
						[0.049]	
Target price skew							0.0860**
							[0.033]
Log acquirer market value	0.0172	0.0238	-0.0076	0.0376**	-0.0259	0.0094	0.0138
	[0.294]	[0.148]	[0.655]	[0.022]	[0.180]	[0.572]	[0.405]
Log relative size	0.2725***	0.2831***	0.2614***	0.2687***	0.2407***	0.2719***	0.2779***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Log acquirer M/B	0.3188***	0.2890***	0.5212***		0.3309***	0.3054***	0.3532***
	[0.000]	[0.000]	[0.000]		[0.000]	[0.000]	[0.000]
Observations	2,550	2,550	2,550	2,550	2,550	2,550	2,550

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.

Table 8
Robustness tests
Log acquirer CAR is the dependent variable. All regressions include acquisition year dummy variables. "Log" in front of the variable name indicates the natural logarithm of the variable, or of one plus the variable where needed. All variables are defined in prior tables. *p*-Values, based on heteroskedasticity-adjusted standard errors, are in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
Log target Δ low	0.0021					
	[0.715]					
Log target Δ six months		0.0106*				
		[0.076]				
Log target Δ six months (if <0)			0.0321***			
			[0.004]			
Log target Δ six months (if ≥0)			-0.0143*			
			[0.078]			
Log target Δ high				0.0169***		
				[0.006]		
Target price range					-0.0214***	
					[0.000]	
Log industry M/B stdev						-0.0046***
						[0.000]
Log target runup				0.0195*	0.0304***	0.0315***
				[0.063]	[0.002]	[0.001]
Log acquirer market value	-0.0010	-0.0013	-0.0017	-0.0016	-0.0020*	-0.0020*
	[0.339]	[0.235]	[0.113]	[0.125]	[0.055]	[0.059]
Log relative size	-0.0075***	-0.0073***	-0.0077***	-0.0073***	-0.0078***	-0.0077***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Log acquirer M/B	-0.0050	-0.0054	-0.0047	-0.0035	-0.0036	-0.0026
	[0.400]	[0.370]	[0.430]	[0.559]	[0.555]	[0.667]
Log acquirer M/B x Stock	-0.0198***	-0.0198***	-0.0181***	-0.0197***	-0.0180***	-0.0188***
	[0.002]	[0.002]	[0.004]	[0.002]	[0.005]	[0.003]
Log target M/B	0.0039	0.0051	0.0059	0.0052	0.0067	0.0086
	[0.449]	[0.340]	[0.266]	[0.320]	[0.200]	[0.109]
Stock pct	-0.0252***	-0.0242***	-0.0246***	-0.0241***	-0.0249***	-0.0265***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Tender	0.0027	0.0046	0.0053	0.0031	0.0035	0.0038
	[0.586]	[0.326]	[0.262]	[0.530]	[0.478]	[0.432]
Hostile	0.0164	0.0162	0.0151	0.0181	0.0167	0.0185
	[0.153]	[0.160]	[0.188]	[0.115]	[0.143]	[0.103]
Adjusted R^2	0.1026	0.1037	0.1094	0.1152	0.1157	0.1128
Observations	2,550	2,533	2,533	2,550	2,550	2,550

***, **, * denote significance at the 0.01, 0.05, and 0.10 level, respectively.