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What premiums do target shareholders expect? Explaining negative returns upon offer announcements

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ABSTRACT

We find, in a sample of 7581 merger offer announcements from 1990 to 2013, shareholders of 1283 (or 17%) target firms responded to the offer with negative market returns. These investors were disappointed at the offer, despite the price premium. To explain their disappointment, one must understand how target shareholders form expectations of premium to be received. We use a novel empirical design to find the relative weights of the rational vs. behavioral factors underlying the process of expectation formation. The estimated expected premiums are shown to have predictive power in the subsamples of both the positive and negative market responses. We also compare how the weights of the expectation factors change under different market conditions: hot vs. cold M&A regimes, bull vs. bear stock market, financial crisis vs. non-crisis periods, and dotcom bubble vs. no bubble.

1. Introduction

It is the consensus in the literature on mergers and acquisitions (M&A) that target firms' shareholders reap most of the benefits from such deals. However, these studies also document that a substantial proportion (15–20%) of target firms responded with negative abnormal stock returns at announcements, even for eventually completed deals.[2] This is unexpected given that merger premiums have been generally substantial. Despite the significant frequency with which they occur, negative announcement returns have not been analyzed.

It can be generally agreed that the negative announcement response is the result of investors' disappointment at the actual offer in comparison with the amount they expected. That is, it is the target investors' expectation of the merger offer premium that determines the target's share price response. Understanding the market response is equivalent to understanding how expectations concerning merger premiums are formed by the investors.

In the current state of research in finance, we are expected to consider both behavioral and rational explanations in the formation of investors' expectations. Rational expectation has its place in how market forms expectations, as the market is dominated by professional investors. They possibly own most of the target's shares and are mainly concerned with material profits. They likely

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[2] See, for example, Betton et al. (2008), Bradley et al. (1988), Bruner (2002), Eckbo and Thorburn (2000), Houston et al. (2001), Kaplan and Weisbach (1992), Kohers and Kohers (2000), Mitchell and Stafford (2000), and Mulherin and Boone (2000).

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form expectations of the merger premium based on their valuation of the target and information they can observe from recent mergers. Behavioral explanations, on the other hand, may be justified by their influence on non-professional investors and some professional investors at the margin. For instance, loss aversion may provide a plausible explanation for target shareholders' reluctance to take a loss upon exit. Since the probability that such loss to occur in a merger depends on the cost basis of the target shareholders, benchmarks that serve as important indicators of the cost basis of target investors may also enter into their formation of a behavioral expectation of the merger premium. For target shareholders who acquired their shares during a given time interval, their cost basis lies within the highest and lowest prices during the period. Loss averse target investors thus form their expectation of the offer premium as a function of both their basis plus a cushion, a behavioral premium.

We model target investors' expectations as a weighted function of both rational and behavioral expected offer premium. Testing the hypothesis that (negative) market response to offer announcement is due to the market's disappointment requires measures of market expectations. In terms of our model, this requires an empirical estimate of the parameters of the expectation model. An innovation in this paper is that we develop a novel approach to estimate the expectation parameters, which will also allow us to measure the relative importance of rational versus behavioral variables in determining market expectations.

Our approach to estimate parameters of the expectation model comes from the insight that market response is neutral (or, zero abnormal returns) when the offer price matches the market's expectation of offer price. Therefore, knowing the offer premium, which is now equal to the weighted expected premium, we can estimate the weights of the components of expectation (rational and behavioral) from data. The data consists of the subsample of targets with zero or near zero abnormal returns. Having the expectation parameters, we in turn estimate the expected premiums for the rest of the targets.

We can now estimate a measure of investors' disappointment, calculated as the divergence of actual offer premium from the expected weighted average premium. Our empirical test is to verify the joint hypothesis that market response is a function of market disappointment and that the estimated model captures the market's expected premium.

We use a sample of 7581 U.S. mergers and acquisitions deals, announced between 1990 and 2013. The results show that the sources of offer premium expectations are from both rational and behavioral expectations. We also compare how the weights of the expectation factors change under different market conditions: dotcom bubble vs. no bubble period, hot vs. cold M&A regimes, bull vs. bear stock market, and financial crisis vs. non-crisis period. Namely, we find the market demands much higher premium in non-crisis versus crisis period. In the crisis period, the market reveals a much reduced basis, and shows greater willingness to take a loss (this is reflected by the negative coefficients on the basis variables, the 52-week high and 52-week low) and to rely on more recent returns to form a more realistic premium expectation. We document similar findings in the bear market classification.

On the other hand, our model-derived expected offer price reveals that the sample firms received more than their expected offer price (the estimated reference point). The results also support the prediction of our hypothesis that target firms with negative announcement returns received lower actual offer premiums compared to expected offer premiums; hence, investors were likely disappointed. This result provides a univariate test of the joint hypothesis that a negative announcement return is due to disappointment in the actual offer and the expectation model adequately captures investors' expectations. The findings are robust to use of the initial offer premium or the final offer premium. Results of our multivariate tests also support our model's prediction, as we find that the estimated expected premiums predict market responses in the positive and negative subsamples. We find that the market's response to merger announcement is sensitive to offer above (below) expectations; in other words, the relationship between target announcement return and excess offer price (*initial offer minus expected offer*) is positive and highly significant regardless of the control variables included in the model. The results lend support to the role of disappointment in explaining market response.

In our model the behavioral expectation of the offer premium is based on the notions of loss aversion and disposition effect. We conduct additional tests and find that the coefficient for loss (offer below the reference point) is greater than the coefficient for gain (offer above the reference point) for the whole sample of targets. We conduct these tests under various market conditions, and we also find strong supportive evidence of loss aversion.

Our paper makes three contributions to the finance literature: One, we provide a more rigorous explanation of why investors of target firms are disappointed (elated) over merger offer announcements. Two, we propose an approach to calibrate investors' expectations. We estimate, empirically, the role played by both rational and behavioral expectations. Since we can justify our variables from a model and results from data, we avoid the ad hoc manner in which behavioral variables are introduced in analysis. Three, we show how an empirical study can incorporate both rational and behavioral factors in a more formal way, as revealed by the data.

The rest of the paper is organized as follows: we review the relevant literature in Section 2; we present the model, methodology, and data set in Section 3. We dedicate Section 4 to presenting the empirical findings, and finally we conclude in Section 5.

2. Literature review

Anchoring and adjustment bias refers to the notion that people make estimates by starting from an initial or easily available reference value that they adjust to arrive at the final estimate. Yet adjustments are naturally insufficient; that is, different starting points result in different estimates that are biased toward the salient initial value (e.g., Slovic and Lichtenstein, 1971; Tversky and Kahneman, 1974). Kahneman and Tversky (1979) extend the work on reference-dependence and empirically motivate what is known as Prospect Theory, which challenges the expected utility theory. Prospect Theory posits that individuals value absolute levels of goods and wealth, in addition to changes in wealth relative to established reference points. The theory also postulates that investors are loss averse such that they strongly prefer to avoid losses more than they prefer to win gains of equal value. In other words, the authors develop a value function that is shaped like a kinked "S"; that is, it is "concave for gains, commonly convex for losses, and

is generally steeper for losses than for gains". Moreover, according to Kahneman and Tversky (1979), individuals derive anchors, or reference points, from the context at hand.

In a related work, Shefrin and Statman (1985) develop their "disposition effect," which implies, among other things, that investors are more likely to realize gains and are reluctant to sell stocks that have lost value relative to a reference point. Evidence in support of the disposition effect has been well documented in laboratory experiments and in empirical finance research (see, for example, Grinblatt and Keloharju, 2001; Ivkovich et al., 2005; Odean, 1998; Weber and Camerer, 1998). Recent studies that report supporting evidence include Frazzini (2006), Barber et al. (2009), Choe and Eom (2009), Ye (2014), and Birru, forthcoming.

The literature also shows that investors have other popular reference points, depending on the context at hand, in addition to the purchase price. For instance, Baker and Xuan (2009) find that the share price that the CEO inherited is his reference point for raising outside equity when the prevailing share price exceeds it. Itzhak and Doukas (2006) show that institutional investors exhibit the disposition effect with respect to the highest historical stock price. In order to explain why issuers do not get upset by underpricing, Loughran and Ritter (2002) argue that the midpoint of an IPO price range is the reference point. In a related study, Ljungqvist and Wilhelm (2005) find that IPO firms are more likely to switch underwriters after the IPO if dissatisfied with the underwriter's performance relative to the reference point suggested in Loughran and Ritter (2002). Cen et al. (2013) find that analysts anchor their forecasts on the industry median forecast EPS.

Additionally, peak prices have been popular reference points in prior research, for example, Heath et al. (1999) and Core and Guay (2001) find that exercise of stock options increases when the company's stock price exceeds its 52-week high. Similar effect of the 52-week high is documented in Poteshman and Serbin (2003), George and Hwang (2004), and Marshall and Cahan (2005). Huddart et al. (2009) find stock market volume and price effects around a stock's 52-week high.

On the other hand, research also documents evidence of simultaneous effect of multiple reference points. For instance, DeGeorge et al. (1999) find that executives manage earnings to meet or exceed salient EPS thresholds: positive earnings, lagged earnings, and analyst expectations. Whereas Weber and Camerer (1998), Chui (2001), and Oehler et al. (2002) show similar evidence for two reference points; the purchase price and the last period price. In a similar vein, Baucells et al. (2011) report evidence that the purchase price, the current price, and the average price are important reference points for their test subjects. Arkes et al. (2008, 2010) confirm that the reference point is updated upward following a gain and downward following a loss, with the upward being relatively larger than the downward updating. The offered interpretation is that subjects adapt faster to good news than to bad news.

The application of the notion of a reference point in mergers and acquisitions research appears only, as far as we know, in Baker et al. (2012), who investigate how salient reference points from previous stock prices of the target affect various aspects of M&As. They argue that,

> *First, target shareholders must form an estimate of target value when deciding whether to accept the offer. Lacking time, information, and ability to accurately compute present values of future cash flows etc… some of them will consult the 52-week high as a reference. Second, targets seek and attempt to justify the highest possible price.*

Similarly, acquirer's shareholders also use recent highest price as estimate of target's value. Otherwise, exhibiting the disposition effect, target shareholders may resist selling at a "loss" to a recent peak. Baker et al. (2012) find that deal participants focus on recent price peaks. Namely, they show that offer prices are biased toward the target's recent peak price including the 52-week high (a 10% increase in the 52-week high is associated with a 3% increase in the offer premium). Second, they report higher probability of deal acceptance when offers exceed the 52-week high. Baker et al. (2012) also find that bidding-firm shareholders react negatively to the component of the offer price that is driven by the 52-week high, implying that they consider this portion as overpayment. Finally, the authors find that anchoring on recent peaks may help explain the positive correlation between merger waves and stock market valuations, as high recent returns on the stock market and on likely targets make it easier for bidders to offer a peak price.

3. Model, data and methodology

3.1. Model

We postulate an expectation model that is general enough to allow for both rational and behavioral expectations. Since this is an empirical model to be estimated with data, support for rational versus behavioral theory of market expectations comes from empirical estimates. Our model can be written as:

$$\text{Market expectation of offer premium} = \omega_r \text{RE} + \omega_b \text{BE} \tag{1}$$

where RE and BE are the offer premiums from rational and behavioral expectations with weights ω_r and ω_b.

Market is assumed to form rational expectations from premiums received by targets in most recent merger announcements; i.e., what the market can reasonably expect to receive in comparison to premiums from earlier periods. Behavioral expectation of offer premium is based on the notions of loss aversion and disposition effect. That is, these target shareholders are led to form an expectation of offer premium such that they will not suffer a loss. We model this idea more precisely by recognizing that this class of expectations must incorporate the target shareholders' cost basis, below which a loss could occur. We model the average basis

of target shareholders as located between the target shares' highest price and lowest price, which must be true by definition. We allow the basis, or distance between the average basis vs. high and low prices to be empirically estimated.

$$\text{Average basis} = p_H H + p_L L. \tag{2}$$

That is, average basis is between the high and low prices of the target's share, where its exact location, p_H and p_L are the weights (or inverse of distance) from the average basis. These are to be empirically estimated.

We postulate that behavioral expectation of offer premium consists of the average basis plus a cushion to allow for those whose basis is above the average, an incentive to tender. We label this portion as the behavioral premium (Bp). Putting these two terms together, we write the behavioral expected offer premium as:

$$BE = Bp + p_H H + p_L L. \tag{3}$$

Combining these two sources of expectations, we can expand Eq. (1) as:

$$\begin{aligned} &\text{Market expectation of offer premium} = \omega_r RE + \omega_b (Bp + p_H H + p_L L); \\ &\text{Market expectation of offer premium} = \omega_r RE + \omega_b Bp + \omega_b p_H H + \omega_b p_L L. \end{aligned} \tag{4}$$

This formulation is general enough to accommodate different sources of expectations. However, the parameters are not known. In the following, we propose a procedure to estimate these parameters, to locate the average basis (p_H and p_L), and the relative importance of behavioral vs. rational expectations (ω_b vs. ω_r).

3.2. Methodology

To explain market response at merger offer announcement, a measure of market disappointment is needed. Market disappointment, in turn, depends on knowing market expectation of offer premium, as disappointment is the gap between actual offer premium and the expected offer premium. However, expected offer premium in Eq. (4) is a function of four unknown parameters. The values of these parameters are needed to perform the series of connected tests discussed above.

The solution to obtain estimates for these parameters comes from an insight that, although the value of the left hand side variable in Eq. (4) is to be computed, its value is known for a particular subsample. In cases when market response is neutral (i.e., zero or near zero abnormal return at announcement), the market's expectation is met by definition. Thus, the market's expectation of the offer premium is equal to the actual offer premium, and we can substitute this actual offer premium to the left hand side of Eq. (4) then estimate the parameters {ω_r, ω_b Bp, ω_b p_H,, ω_b p_L} via regressions with known rational, RE, and behavioral variables, H and L. ω_b Bp is the regression intercept term.

Having obtained the parameters in Eq. (4), we can proceed to estimate the market expected offer premium for the rest of the targets in the sample. These market expected offer premiums in turn enable us to construct a measure of market disappointment given the actual offer premiums received. This measure enables us to test whether disappointment (elation) could explain negative (positive) market reactions to offer announcements.

3.3. Data and sample used

In order to construct the sample for our study, we search the Thomson Financial SDC Database for all the M&A deals announced by US acquirers between January 1, 1990 and December 31, 2013.

The sample consists of target firms that are publicly listed on the US stock markets and of US acquiring firms that are either publicly listed, privately held, or subsidiaries of public firms. We also follow standard refinement criteria for inclusion as follows:

(i) All Acquisitions announced between January 1, 1990 and December 31, 2013.[3]
(ii) Percentage of shares held by the acquirer six month prior to announcement is less than 50%.
(iii) Percentage of shares owned after transaction (completed deals) or sought (non-completed deals) is more than 50%.[4]

These two criteria are meant to ensure that the deals result (when completed) in a transfer of control.

The initial sample includes 11,320 deals, 7581 of which had target share price data available on the Centre for Research in Security Prices (CRSP) database. This is our main sample of study. Additionally, as the final offer price is an important variable in our study, we find that for 6243 deals such data is available on the Thomson Financial database.

Table 1, Panel A, contains a summary of the sample sorted by the year in which the acquisition is announced. In this table we report the number of acquisitions for three payment forms: pure cash, pure shares, and mixed offers; we report separately for the following deal types: hostile, industry-related, competing offer, completed, withdrawn, other (unknown status or rumored), and bankrupt target acquisitions. We also report the numbers according to the acquiring firm's public status: public, private, or a subsidiary firm.

We estimate abnormal returns using a standard event study methodology as in Brown and Warner (1985) and employing the market model. We estimate the model's parameters over the (−210, −21) interval using the CRSP value-weighted index returns

[3] We exclude from these deals privatizations, leveraged buyouts, spinoffs, recapitalizations, self-tenders, repurchases, and exchange offers.
[4] Netter et al. (2011) include only completed deals.

Table 1
Sample summary and descriptive statistics.
The table presents the number of acquisitions for the whole sample during each year partitioned by the method of payment: pure cash, pure shares, or mixed offers. We also report the numbers for industry-related, hostile, acquirer type, competing offer, bankrupt, completed, and withdrawn deals in each announcement year. The sample comprises the acquisitions announced by US acquirers between January, 1990 and December, 2013 as reported by the SDC, where the acquirer gains or seeks to gain control of a public target firm. In Panel B we report the cumulative abnormal returns estimation for the whole sample and three subsamples, as explained below.

Panel A: Summary by method of payment and deal type

Year	All	Cash	Shares	Mixed	Industry-related	Hostile	Private acquirer	Public acquirer	Subsidiary acquirer	Competing offer	Bankrupt target	Completed deal	Withdrawn	Other deal status
1990	246	66	49	131	124	10	68	140	36	13	7	127	85	34
1991	262	35	66	161	137	5	77	161	23	13	24	152	73	37
1992	224	37	77	110	130	7	51	152	21	12	22	153	50	21
1993	268	66	85	117	173	6	43	201	22	8	7	190	57	21
1994	365	100	151	114	240	25	49	298	17	20	4	266	87	12
1995	452	139	182	131	275	37	60	341	47	45	13	327	98	27
1996	494	134	164	196	299	37	77	375	39	24	4	368	87	39
1997	571	145	227	199	349	18	64	464	42	44	8	461	90	20
1998	601	172	239	190	362	10	73	479	44	33	1	473	100	28
1999	577	188	202	187	340	18	79	448	45	29	2	441	99	37
2000	464	159	157	148	267	6	55	365	40	33	8	349	89	26
2001	383	124	109	150	232	4	54	287	36	22	11	313	52	18
2002	239	107	42	90	137	3	52	157	26	15	20	184	35	20
2003	292	131	43	118	160	8	84	169	30	19	15	238	38	16
2004	230	87	47	96	145	4	31	173	21	8	10	192	27	11
2005	237	123	34	80	126	3	53	153	26	22	7	190	35	12
2006	267	145	30	92	158	4	46	178	39	27	2	205	37	25
2007	275	145	31	99	163	1	55	179	34	25	4	211	41	23
2008	216	119	25	72	136	6	43	135	34	11	4	139	54	23
2009	203	80	29	94	105	1	49	119	29	16	17	150	28	25
2010	212	122	23	67	120	1	45	121	42	15	6	165	26	21
2011	179	102	21	56	102	6	29	89	60	12	5	138	28	13
2012	170	96	21	53	100	0	25	105	35	5	4	133	13	24
2013	154	91	12	51	101	0	35	98	21	6	2	95	14	45
All	7581	2713	2066	2802	4481	220	1297	5387	809	477	207	5660	1343	578

Panel B: Cumulative abnormal returns for target firms. The table presents the cumulative abnormal returns for all deals and for subsamples of neutral market reaction (−1.25% < target return < +1.25%), positive (greater than 1.25%), or negative (less than −1.25%) reaction. The sample comprises the acquisitions announced by US acquirers between January, 1990 and December, 2013 as reported by the SDC, where the acquirer gains or seeks to gain control of a public target firm. CAR (−1, +1) is the 3-day cumulative abnormal returns estimated using the market model. The statistical significance of the returns is tested using the Patell (1976) test corrected for time-series and cross-sectional variation of abnormal returns. The mean difference tests between positive and negative returns targets are based on the *t*-tests for equality in means assuming unequal variances. The Cochrane–Cox method is used to approximate the *t*-statistic. The median difference tests are conducted using the Wilcoxon test.

	All	Neutral (−1.25% < CAR < +1.25%)	Positive (>=1.25%)	Negative (=<−1.25%)	Difference (3)–(4)
	(1)	(2)	(3)	(4)	
Mean CAR (−1, +1)	0.1553***	0.0009	0.2081***	−0.0687***	0.2768***
Median CAR (−1, +1)	0.1324***	0.0009	0.1789***	−0.0711***	0.2499***
Number of deals	7581	529	6001	1051	

***, **, and * denote significance at the 1%, 5% and 10% levels respectively.

as the benchmark. We test the statistical significance of the returns in a manner similar to that used by Moeller et al. (2004), using the Patell (1976) test corrected for time-series and cross-sectional variation of abnormal returns.[5] In order to reduce the effect of possible outliers, we use a 90% winsorization for all variables, including the CARs, by limiting the highest (lowest) values to the 95th (5th) percentile. Furthermore, in order to alleviate any concerns due to what could appear to be an arbitrary division of positive and negative market response target firms, we refine our tests for all our regressions using a continuous variable rather than a binary one. That is, we use Ordinary Least Square (OLS) regressions for the whole sample where the dependent variable is the target firm's abnormal return and we discuss the results in Section 4 below and report the results in the subsequent tables.

3.4. Estimation of the expected offer premium (the reference point)

In our expectation framework, model (4) requires estimating the parameters prior to estimating the reference point; i.e., the market expected offer premium for the entire sample. These parameters are estimated using a sample of target firms for which the market response is neutral (i.e., targets with abnormal returns at zero or not significantly different from zero) at the offer

[5] We also estimated the abnormal return by subtracting the value-weighted market return from the firm's return using the following model: $AR_i = r_i - r_m$, where r_i is the firms' return and r_m is the value-weighted market return. This model yields the same conclusions; hence, we report only the results of the market model.

announcement, in which the market expected offer price equals the actual offer price. For this purpose we select a sample of target firms where the target's CAR (−1, +1) is in the range of [−1.25%, +1.25%].[6] We call this sample the neutral market reaction subsample, while the remaining two sub-samples are the positive subsample, where CAR (−1, +1) > = 1.25%, and the negative subsample, where CAR (−1, +1) = <− 1.25%.[7]

The mean (median) returns are reported in Table 1, Panel B. Most importantly, it is worth noting that for the neutral return subsample the CAR (−1, +1) is not statistically different from zero, which is consistent with our methodology for using it as the appropriate sample for estimating the reference point, or the expected offer price.

We then proceed to specify the expectation variables for our model. For the rational expectation variable, we postulate that the market forms expectations from offer premiums made to target firms in recent takeover announcements. For this purpose we use the mean merger premium in the last eight weeks as the basis on which target shareholders calculate the prevailing offer premium, which they could reasonably expect to receive on average. Their expected offer price is thus the pre-announcement target share price augmented by the recent premium offered in the market [P_{-1}*(1 + Recent merger premium)]. In line with our model's specification, our behavioral expectation variables are based on the concepts of loss aversion and cost basis. Target shareholders' average cost basis is bounded by its highest and lowest prices, which we approximate by the 52-week high and 52-week low prices.[8] We scale all the variables (independent and dependent) by the pre-runup target share price on day −40.

Thus, using the neutral returns subsample mentioned above, we run the following regression to estimate the parameters of model (4):

$$\text{Offer Price} = a + b_1(52\,\text{week high}) + b_2(52\,\text{week low}) + b_3(\text{PricePlusMeanRecentPremium}) + e.$$

The results of this regression, including the standardized coefficients, are reported in Table 2.

4. Results

4.1. Analysis of the expected offer price and the disappointment variables

In Table 2 we present the estimated coefficients from the zero abnormal return subsample in two formats: raw estimated coefficients and three coefficients standardized to 1.0. The results show that the sources of offer premium expectations are from both rational and behavioral expectations, as all three coefficients are statistically significantly different from zero at the 1% level. The table also shows that investors require a premium above their average basis (the high and low prices), as the intercept term is also statistically significantly different from zero at the 1% level. Given that the weight of rational expectation in our regression is 0.1455, the weight of behavioral expectation is more than seven times its magnitude at 0.8545; hence a large part of the expected offer premium (intercept relative weight of 0.6798/0.8545 = 0.7955) is the behavioral expected premium by the investors above their average basis.

We investigate a more general formulation of the composite expectation model and allow the role of the model (regression weights) to vary with the economic and market circumstances. We run four sets of regressions accounting for various market and economic conditions, as follows. 1) Financial crisis: we classify deals announced between July 1, 2007 and December 31, 2008 as falling in the financial crisis period (this classification is in line with Beltratti and Stulz, 2012); otherwise, they are classified as occurring in the non-crisis period. 2) Dotcom bubble period: a deal announced between January 1, 1995 and March 10, 2000 is classified as within the dotcom bubble period (Goldfarb et al., 2007); otherwise, it is classified as not occurring in the dotcom period. 3) Bear stock market: we classify the period March 13, 2000 to September 30, 2002 as a bear market period[9] (Goldfarb et al., 2007); otherwise, it is classified as a bull market period. 4) Hot merger market: we classify a deal as occurring in a hot merger market if the total deal values announced in a given quarter is higher than the average in the last 12 quarters; otherwise, it is classified as not occurring in a hot merger market. Based on these classifications, we rerun the regressions using the zero/near zero abnormal return subsamples for these four classifications, and we report the coefficients of the regressions in Table 2, Panel B.

Panel B of Table 2 reveals several interesting results. Although not unexpected, we find how the market-generated expectations (through the change in expectation coefficients) change with market and economic conditions. For example, consistent with our prior findings, we find the market demands much a higher premium in a non-crisis vs. crisis period (intercept is 0.7369 vs. 0.4349, respectively). Furthermore, under the prevailing climate in the crisis period, the market reveals a much reduced basis, due to large realized losses, and shows a greater willingness to take a loss (this is reflected by the negative coefficients on the basis variables, the 52-week high, and 52-week low) and to rely on recent and hence more realistic premium, as the coefficient of the rational expectation premium is 0.7345. This expectation model (crisis vs. non-crisis period) is also very similar in the bear market classification, perhaps, suggesting that these two circumstances involving large realized losses could be analyzed together; in addition, a

[6] We tried various alternatives and ranges for the cumulative abnormal returns; for example, CAR in the range of [−1.5%, +1.5%] and in the range of [−1.75%, +1.75%]. Our estimates of the model's coefficients were very similar across regressions. All regression coefficients are available upon request.

[7] It is important to note that if we strictly classify targets with CAR (−1, +1) < 0 in the negative return sample we get 1283 targets in this category (i.e., 17% of the deals) and the rest of the 6298 targets earned returns strictly greater than zero.

[8] Another interpretation of 52-week high is that it is a salient reference point in various contexts (e.g., Baker et al., 2012; George and Hwang, 2004; Marshall and Cahan, 2005). However, there is no similar interpretation of 52 weeks low, other than in the context of cost basis, as discussed above. Empirically, the importance of the alternative interpretation may be inferred from the magnitude of the coefficient for 52 weeks high vs. that of 52 weeks low, $\omega_b\, p_H$ vs. $\omega_b\, p_L$.

[9] This classification is meant to differentiate this period from the financial crisis period, in which the stock market also suffered large decline.

Table 2
Estimate of reference points.
The table contains the results of the regression estimating the coefficients of the reference point. The regression is conducted for a subsample of firms for which the target CAR (−1, +1) is not significantly different from zero. The dependent variable is the Initial Offer Price and the independent variables are the target firm's 52-week high price, 52-week low price, and the pre-announcement share price augmented by the recent merger premium; this is taken as the mean final premium offered in the last eight weeks prior to the merger announcement. All variables are scaled by the target pre-runup share price on day −40. In Panel B we repeat the regressions after dividing the sample according to various market and economic conditions so that the coefficients are separately estimated for firms satisfying each category.

Panel A: Regression of the components of the reference point

	Parameters	*p*-Value
Intercept	0.6798	<.0001
52 week-high	0.0245	0.0206
52 week-low	0.3544	0.0110
PrcPlusMeanRECENTpremium	0.1455	<.0001
Adj. Rsqrd.	0.1536	
Standardized coefficients		
52 week-high	0.0467	
52 week-low	0.6758	
PrcPlusMeanRECENTpremium	0.2775	

Panel B: Regression of reference point components by market condition

Various Conditions	Intercept	52 week-high	52 week-low	PrcPlusMeanRECENTpremium
Financial crisis				
No crisis period	0.7369	0.0241	0.3102	0.1345
Crisis period	0.4349	−0.2672	−0.0432	0.7345
Dotcom bubble				
No bubble period	0.6893	0.0272	0.4345	0.1060
Bubble period	0.0885	0.0123	0.2298	0.5603
Stock market				
Bull	0.7825	0.0643	0.2353	0.0936
Bear	−0.1645	−0.0081	0.4576	0.7119
M&A market				
Cold	0.1902	0.0100	0.3850	0.4477
Hot	0.9084	0.0434	0.1487	0.0698

negative intercept in a bear market period also indicates a negative expectation for the premium, or a discount from basis. Of particular relevance to mergers is the comparison between the hot and cold M&A markets. We find investors in the hot M&A market expect much higher behavioral premium above their basis. This is consistent with and may explain the overpayment typically observed during hot merger markets.

We estimate the expected offer price (reference point) for each merger deal in the whole sample using the estimated coefficients in Panel A of Table 2 as follows:

$$\text{Expected offer price} = 0.6798 + 0.0245 * (52\,\text{week high}) + 0.3544 * (52\,\text{week low}) + 0.1455 * (\text{PrcPlusMeanRecentPremium}).$$

We then calculate the difference between the actual offer price and the expected offer price as a measure of how well the market's expectations for offer premium were met. Negative difference results in disappointment, while positive difference indicates satisfaction. In Table 3, we report the summary statistics of these in addition to measures of the merger premium offered for the whole sample. In order to reduce the effect of outliers, we use a 90% winsorization for all variables, including the CARs, by limiting the highest (lowest) values to the 95th (5th) percentile. We notice that the sample estimated reference points (expected offer prices) have a

Table 3
Sample reference point and offer price statistics.
The table presents the summary statistics of the sample's estimated reference point, the post-runup premium (final offer premium relative to day −1), the pre-runup premium (final offer premium relative to day −40) and the excess offer price measures (Initial Offer Price minus reference point, and Final Offer Price minus reference point); similar to the reference point, the offer prices in these two variables are scaled by the pre-runup target share price on day −40. The variable definitions are presented in Appendix A.

Variable	All						
	Nobs	Mean	Median	S.D	Min	Max	% below reference point
CAR (−1, +1)	7581	0.1553	0.1324	0.1643	−0.1056	0.5187	NA
Reference point	7557	1.2166	1.2119	0.166	0.6123	1.2518	NA
Initial Offer Price minus the reference point	4603	0.1802	0.129	0.3331	−0.0658	1.2404	0.3089
Final Offer Price minus the reference point	6245	0.1991	0.1513	0.3398	−0.0724	1.2557	0.2887
Final offer premium relative to day −1	6254	0.3051	0.2557	0.2614	−0.0721	0.9405	NA
Final offer premium relative to day −40	6255	0.4223	0.363	0.3616	−0.1379	1.2857	NA

Table 4
Analysis of disappointment of target firms.
The table presents similar statistics to those in Table 3, but these are segregated based on whether the market's reaction to the merger announcement is neutral (−1.25% < target return < +1.25%), positive (greater than 1.25%), or negative (less than −1.25%). The variable definitions are presented in Appendix A.

Variable	Neutral			Positive			Negative			p-Value for difference in mean [median]
	Nobs	Mean [median]	% below reference point	Nobs	Mean [median]	% below reference point	Nobs	Mean [median]	% below reference point	
Reference point	522	1.2112 [1.2056]		5984	1.2198 [1.2154]	NA	1051	1.2012 [1.1907]	NA	0.000 [0.000]
Initial Offer Price minus the reference point	215	0.0179 [−0.0268]	0.5442	3920	0.2139 [0.1602]	0.2541	468	−0.0270 [−0.1058]	0.6603	0.000 [0.000]
Final Offer Price minus the reference point	313	0.0282 [−0.0290]	0.5431	5257	0.2369 [0.1895]	0.2294	675	−0.0162 [−0.0933]	0.6326	0.000 [0.000]
Final offer premium relative to day −1	315	0.1293 [0.0673]		5264	0.3427 [0.2903]	NA	675	0.0940 [0.0148]	NA	0.000 [0.000]
Final offer premium relative to day −40	315	0.2526 [0.1873]		5265	0.4614 [0.3943]	NA	675	0.1964 [0.0898]	NA	0.000 [0.000]

mean (median) of 1.2166 (1.2119), reflecting an expected mean (median) merger premium of around 21.66% (21.19%). The table also shows that the sample firms were offered a premium, on average, more than they expected with the mean (median) final offer premium relative to the pre-runup price of 42.23% (36.30%). Thus, the difference between actual offer price and the expected offer price is quite substantial whether it is calculated from Initial Offer Price or from Final Offer Price. Such results lead to observing a highly positive average target CAR in the three-day announcement window (−1, +1). It is also worth noting that the majority of target firms received an offer in excess of the reference point; only 28.87% of the target firms received an offer below the reference point.

In Table 4 we segregate the data according to the target firms' cumulative abnormal returns: neutral, positive, and negative. The table shows that in the sub-sample of firms with negative returns the reference point is significantly lower than it is in the sub-sample of firms with positive returns, with mean (median) of 1.2012 (1.1907) vs. 1.2198 (1.2154); all are significant at the 1% level.[10] In spite of lower expected offer premium, the average excess offer price, the difference between the offer price and the reference point, is significantly lower than that of the sub-sample of firms with positive returns. The result supports the prediction of our hypothesis that negative announcement return target firms receive lower actual offer premiums than expected; i.e., shareholders were disappointed. The result provides a univariate test of the joint hypothesis that a negative announcement return is due to disappointment at the actual offer and that the expectation model adequately captures investors' expectations. This result is robust to use of the initial offer premium or the final offer premium (under a particularly strong form of rational expectation).

We report for both sub-samples (negative and positive) the proportion of firms with negative offer price difference; that is, with an actual offer price below the reference point. The evidence shows that in the sample of firms with negative returns, the percentage is much larger than it is in the positive returns sample.

4.2. Multivariate analysis

This section provides further evidence of the role of disappointment in explaining market reaction to the announcement under multivariate model specifications. The empirical model includes the excess offer price as estimated in the previous section, plus other control variables. We estimate the regression models under different specifications, such as various market and economic conditions.

4.2.1. Does market response reflect disappointment in the offer price?

The dependent variable is the target CAR (−1, +1). The independent variables include the excess offer price above the estimated reference point (*Initial price minus Ref. Point*). Other independent variables include dummies that take the value of one if (i) the deal is hostile, (ii) the deal is between firms operating in related industries, (iii) the acquirer had at least 5% ownership (toehold) in the target firm, (iv) the method of payment is pure equity, (v) the method of payment is mixed of cash, equity, and other considerations, (vi) the deal is completed,[11] (vii) the target firm is bankrupt, (viii) the acquirer is public, (ix) the acquirer is private, or (x) the deal includes a competing offer, and zero otherwise. The model also contains other variables for the characteristics of deals and target firms such as: $\ln(\text{Equity}_{MV})$, $\text{Debt-to-Assets}_{MV}$, operating cash flow scaled by assets ($\text{OCF-to-Assets}_{MV}$), and market to book ratio (M/B). We also add the run-up in target share and the abnormal trading volume in order to control for the addition of new investors or speculators that might have rational or irrational expectations. We also include the acquirer CAR (−1, +1) in model 8.

[10] It is worth noting that the reference point reported is scaled by the target share price on day −40.
[11] The market would not know whether the deal could go through at the initial announcement date, we use actual deal completion status, as reported by SDC, as the best market forecast at announcement. Thus, it is a variable measured with errors.

We find that the market's response to the merger announcement is sensitive to offers above (below) expectations; that is, in all the models used, the relation between the target return and the excess offer price (*Initial price minus Reference Point* or expected offer premium) is positive and highly significant regardless of the control variables included in the models, supporting the role for disappointment. Furthermore, the target return is also negatively associated with (*M/B*) ratio. This result is consistent with earlier studies that document a negative relationship between stock returns and valuation ratios (e.g., Dong et al., 2006; Rau and Vermaelen, 1998). This is also consistent with Weitzel and Kling (2013), who find that target overvaluation is a main determinant of negative or very low premiums. Target returns are lower in pure equity offers and mixed offers than in pure cash offers, which is consistent with prior M&A studies that document lower target gains for deals settled with equity compared with those settled with cash (e.g., Eckbo and Langohr, 1989; Huang and Walkling, 1987; Travlos, 1987). Furthermore, the positive coefficient of the hostile dummy implies that these targets expect to receive higher bids; while the negative coefficient of the OCF-to-$Assets_{MV}$ ratio possibly reflects the market's dissatisfaction with acquirers that have large free cash flow. The results also show that target firms' shareholders earn a lower return if they had a positive abnormal trading volume prior to announcement, which possibly implies that newly added shareholders/speculators hold high expectations of the offer premium.

4.2.2. Additional tests under various market conditions: is loss aversion supported?

The early tests that we conducted, whose results are shown in Table 2, Panel B, revealed that investors' expectations change with market conditions; while the univariate and multivariate tests, so far, revealed that the market's response to the merger announcement is sensitive to an offer above (below) expectations. Consequently, the model we propose adequately captures investors' expectations. Therefore, it is imperative to examine whether the market response to excess offer price still holds under various market conditions.

We model investors' expectations as a combination of both rational and behavioral elements. The behavioral expectation of the offer premium is based on the notions of loss aversion and disposition effect. Specifically, support for the behavioral explanation based on loss aversion requires testing that the coefficient for loss (offer below the reference point) is greater than the coefficient for gain (offer above the reference point). We conduct these tests under various market conditions.

We first split the offer as to whether it is above (positive, implying satisfaction) or below (negative, implying disappointment) the expected offer price into two independent variables:

Initial price minus Ref. Point (*Positive*, *Satisfaction*) = *Initial price minus Ref. Point* if positive (i.e., premium or price is above the reference point), and zero otherwise;

Initial price minus Ref. Point (*Negative*, *Disappointment*) = *Initial price minus Ref. Point* if negative (i.e., premium or price is below the reference point), and zero otherwise. We estimate the coefficients of these two variables in a regression equation to explain target firms' abnormal returns.

Target CAR $(-1, +1) = a + b^*$ *Initial price minus Ref. Point* (*Positive*, *Satisfaction*) $+ c^*$ *Initial price minus Ref. Point* (*Negative*, *Disappointment*) + Control variables.

Under the hypothesis, loss aversion is supported if $c > b$. That is, the slope is greater (lesser) when there is a perceived loss (gain) from the reference point.

We run OLS regressions similar to those shown in Table 5 using the whole sample and then under the various market conditions: crisis, dotcom bubble, bear market, and hot merger market. Our additional independent variables are the same as those employed in prior regressions shown in Table 5. We report the results in Table 6, with tests of statistical difference between the coefficients of *Satisfaction* and *Disappointment* shown at the bottom of the table. We find that the market response to excess offer price still holds in all the models used; hence, the results are similar under various market conditions. Most importantly, initially for the whole sample, we find the coefficient of *Disappointment* (offer below the reference point) to be significantly higher than the coefficient of *Satisfaction* (offer above the reference point), with a *p*-value of <.0001. These findings are confirmed in all of the models used under various market conditions except in the Bear Market period, where the difference between the coefficients of *Disappointment* and *Satisfaction* is not significant. All in all, these results strongly support the conjecture of our expectations model that the behavioral expectation of the offer premium is based on the notions of loss aversion and disposition effect.

5. Conclusion

The M&A literature document that a non-negligible proportion of target firms earns negative abnormal stock returns. As this subset of firms has not received adequate attention in previous studies, this paper sheds light on the reasons behind the target firm's share price response to a merger announcement, specifically when this response is negative. Since a negative announcement response is the result of investors being disappointed at the actual offer relative to their expectation, the key to understand this issue is to understand what the bases of investors' expectations are. We consider both behavioral and rational explanations in the formation of investors' expectations, and we use a novel empirical design to find the relative weights of the rational versus behavioral factors underlying the process of expectation formation. We use a sample of 7581 U.S. mergers and acquisitions deals, announced between 1990 and 2013. We find that the estimated expected premiums predict in the subsamples of both the positive and negative market responses. We also compare how the weights of the expectation factors change under different market conditions: hot vs. cold M&A regimes, dotcom bubble vs. no bubble period, bull vs. bear stock market, and financial crisis vs. non-crisis period. Our findings reveal that the sample firms, on average, receive a substantially higher than expected offer price (the estimated reference point).

Table 5
OLS regressions: Relationship between target return and excess offer price.
The table contains the OLS regressions of the target returns for deals announced, completed or not, by US acquirers between January, 1990 and December, 2013 as reported by SDC, where the acquiring firm gains or seeks to gain control of the target firm. The dependent variable is the target CAR (−1, +1). The independent variables include a proxy for disappointment/satisfaction, which is the difference between the Initial Offer Price and the estimated reference point (*Initial Price minus Ref. Point*) and dummies for the deal attitude, industry relatedness, equity exchange offers, mixed payment deals, toehold presence in the target firm, completed deals, family control deals, bankrupt targets, competed transactions, public acquirers, and private acquirers that take the value one if the deal is hostile, the deal is between firms that share the same two-digit SIC code, the method of payment is pure equity, the method of payment is mixed, the acquirer owns at least 5% of the target firm's shares prior to the acquisition announcement, the deal is completed, there is a family control in the target firm as defined by SDC, the target firm is bankrupt, there is a competing offer, the acquirer is a public firm, and the acquirer is a private firm, respectively, and zero otherwise. Other independent variables include the acquirer CAR (−1, +1), abnormal trading volume for target firms prior to the deal announcement, market and accounting ratios of targets including the Debt-to-Assets$_{MV}$, OCF-to-Assets$_{MV}$, and ROE. Standard errors in parentheses.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Intercept	0.135***	0.138***	0.152***	0.175***	0.135***	0.123***	0.140***	0.143***
	(0.00235)	(0.00587)	(0.0101)	(0.0115)	(0.00998)	(0.00841)	(0.00953)	(0.011)
Initial price minus Ref. Point	0.261***	0.251***	0.254***	0.251***	0.261***	0.387***	0.384***	0.403***
	(0.0063)	(0.00613)	(0.00656)	(0.00657)	(0.00644)	(0.00621)	(0.00623)	(0.0075)
Shares Pmt		−0.0741***	−0.0750***	−0.0800***	−0.0755***	−0.0710***	−0.0755***	−0.0627***
		(0.00502)	(0.00535)	(0.00576)	(0.00524)	(0.00441)	(0.00475)	(0.00526)
Mixed Pmt		−0.0506***	−0.0527***	−0.0560***	−0.0529***	−0.0483***	−0.0513***	−0.0394***
		(0.00478)	(0.00501)	(0.00524)	(0.00491)	(0.00414)	(0.00433)	(0.00517)
Industry-related		0.00599	0.00244	0.000421	0.00459	0.00427	0.00256	0.0031
		(0.00419)	(0.00438)	(0.00441)	(0.00429)	(0.00362)	(0.00364)	(0.00434)
Toehold		−0.0137*	−0.0112	−0.00809	−0.0137	−0.0143**	−0.0116	−0.0219**
		(0.00815)	(0.00856)	(0.00859)	(0.00838)	(0.00706)	(0.00709)	(0.0109)
Hostile		0.0365***	0.0399***	0.0381***	0.0424***	0.0361***	0.0345***	0.0425***
		(0.0101)	(0.0105)	(0.0105)	(0.0102)	(0.00864)	(0.00864)	(0.0103)
Deal completed		0.0396***	0.0397***	0.0350***	0.0380***	0.0495***	0.0457***	0.0337***
		(0.00531)	(0.00553)	(0.00559)	(0.00541)	(0.00457)	(0.00463)	(0.00591)
Bankrupt target		0.0827	−0.0905	−0.0771	−0.084	−0.180***	−0.169***	
		(0.0603)	(0.0773)	(0.0771)	(0.0756)	(0.0638)	(0.0637)	
Competing offer		−0.0375***	−0.0364***	−0.0355***	−0.0279***	−0.0115*	−0.0108	−0.00509
		(0.00771)	(0.00798)	(0.00796)	(0.00783)	(0.00661)	(0.0066)	(0.00844)
Family Control		−0.0472	−0.0649	−0.0618	−0.0593	−0.0675**	−0.0649*	−0.126***
		(0.0391)	(0.0404)	(0.0403)	(0.0396)	(0.0334)	(0.0333)	(0.0477)
ln (Equity$_{MV}$)			0.00284**	0.00159	0.00453***	0.00510***	0.00410***	0.00403***
			(0.00144)	(0.00146)	(0.00142)	(0.0012)	(0.00121)	(0.00142)
ROE			0.0257***	0.0253***	0.0253***	0.0264***	0.0262***	0.0256***
			(0.00816)	(0.00814)	(0.00799)	(0.00673)	(0.00671)	(0.00812)
M/B			−0.00625***	−0.00624***	−0.00517***	−0.00499***	−0.00499***	−0.00349***
			(0.00131)	(0.0013)	(0.00128)	(0.00108)	(0.00108)	(0.00126)
Debt-to-Assets$_{MV}$			−0.00756	−0.00556	−0.00193	0.00151	0.00311	0.00263
			(0.00818)	(0.00817)	(0.00802)	(0.00676)	(0.00675)	(0.00797)
OCF-to-Assets$_{MV}$			−0.159***	−0.156***	−0.140***	−0.0877***	−0.0857***	−0.110***
			(0.0326)	(0.0325)	(0.0319)	(0.027)	(0.0269)	(0.0343)
Public acquirer				−0.0064			−0.00284	
				(0.00679)			(0.0056)	
Private acquirer				−0.0390***			−0.0291***	
				(0.00818)			(0.00676)	
Ab. Volume					−0.0508***	−0.0236***	−0.0241***	−0.0281***
					(0.00372)	(0.0032)	(0.0032)	(0.00387)
Runup ($(P_{-2} / P_{-40}) - 1$)						−0.410***	−0.408***	−0.432***
						(0.00987)	(0.00985)	(0.0118)
Acq. CAR (−1, +1)								0.416***
								(0.0344)
N	4603	4603	4250	4250	4250	4249	4249	2874
Adjusted R-sq.	0.271	0.32	0.327	0.331	0.355	0.542	0.545	0.573

***, **, and * denote significance at the 1%, 5% and 10% levels respectively.

The results also support the prediction of our hypothesis that target firms with negative announcement returns receive lower actual offer premiums compared to expected offer premium, suggesting disappointment. This result provides a univariate test of the joint hypothesis that a negative announcement return is due to disappointment at the actual offer and that the expectation model adequately captures investors' expectations. We obtain similar findings whether we use the initial offer premium or the final offer premium. Our multivariate tests provide support to the univariate analysis, as we find that the market's response to the merger announcement is sensitive to an offer above (below) expectations. In other words, the relation between the target return and the excess offer price (*Initial price minus Reference Point* or expected offer price) is positive and highly significant regardless of the control variables included in the models, supporting the role of disappointment.

In our model the behavioral expectation of the offer premium is based on the notions of loss aversion and disposition effect. We conduct additional tests and find that the coefficient for loss (offer below the reference point) is greater than the coefficient for

Table 6
OLS regressions: Relationship between target return and excess offer price under various market conditions.
The table contains the OLS regressions of the target returns for deals announced, completed or not, by US acquirers between January, 1990 and December, 2013 as reported by SDC, where the acquiring firm gains or seeks to gain control of the target firm. The dependent variable is the target CAR (−1, +1). The independent variables include proxies for disappointment/satisfaction, which are the differences between the Initial Offer Price and the estimated reference point (Initial Offer Price minus Ref. Point), whereby we split this variable into two variables to test the effect of satisfaction vs. disappointment as follows:

Initial price minus Ref. Point (*Positive*, *Satisfaction*) = *Initial price minus Ref. Point* if positive (i.e., premium or price is above the reference point), and zero otherwise. *Initial price minus Ref. Point* (*Negative*, *Disappointment*) = *Initial price minus Ref. Point* if negative (i.e., premium or price is below the reference point), and zero otherwise. All models include the same control variables as those employed in Table 5. The *p*-values of the test of difference between Disappointment and Satisfaction (Negative vs. Positive) are reported at the bottom of the table. Standard errors are in parentheses.

	All	Crisis	No crisis	Dotcom	No dotcom	Bear market	Bull market	Hot merger	Cold merger
Intercept	0.2980***	0.1659**	0.2948***	0.2377***	0.3100***	0.1152***	0.2803***	0.2394***	0.3458***
	(0.0142)	(0.0651)	(0.0143)	(0.0221)	(0.0184)	(0.0297)	(0.0152)	(0.0162)	(0.0251)
Initial price minus Ref. Point Positive, Satisfaction	0.0221***	0.3116***	0.0203***	0.0961***	0.0172***	0.4082***	0.0160***	0.0868***	0.0109***
	(0.0021)	(0.0332)	(0.0021)	(0.0071)	(0.0023)	(0.0148)	(0.0021)	(0.0047)	(0.0026)
Initial price minus Ref. Point Negative, Disappointment	0.3996***	1.0116***	0.3632***	0.5563***	0.3686***	0.3651***	0.3744***	0.3122***	0.4998***
	(0.0190)	(0.0834)	(0.0192)	(0.0376)	(0.0222)	(0.0378)	(0.0203)	(0.0219)	(0.0318)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4247	268	3979	1443	2804	741	3506	2519	1728
Adjusted R-sq.	0.2171	0.5889	0.2065	0.2904	0.2145	0.6345	0.1998	0.2562	0.2415
p-Value difference positive vs. negative	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.3174	<0.0001	<0.0001	<0.0001

***, **, and * denote significance at the 1%, 5% and 10% levels respectively.

gain (offer above the reference point) for the whole sample of targets. We conduct these tests under various market conditions, and we also find strong supportive evidence of loss aversion.

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Appendix A

Variable definitions: the table contains the variable definitions. Accounting variables are taken as of the end of the fiscal year prior to the deal announcement. Dollar values are reported in millions wherever they appear in the tables.

Variable	Description
CAR (−1, +1)	3-day cumulative abnormal return, estimated using the market model over the (−210, −21) interval using the CRSP value-weighted index returns as the benchmark. The statistical significance of the returns is tested using the Patell (1976) test corrected for time-series and cross-sectional variation of abnormal returns.
Ab. Volume	Abnormal trading volume of the target firm, calculated as the natural logarithm of the average trading volume in the (−40, −5) window less the natural logarithm of the average trading volume in the (−252, −41) window for the target firm
Final offer premium relative to day −1	Post-runup premium, calculated as [(Final Offer Price / P_{-1}) − 1]
Final offer premium relative to day −40	Pre-runup premium, calculated as [(Final Offer Price / P_{-40}) − 1]
Runup (P_{-2} / P_{-40}) − 1	Stock price run-up, calculated as [(Target Price on day − 2 / Target Price on day − 40) − 1]
Bankrupt (dummy)	One if the target is bankrupt according to the SDC database; zero otherwise
Deal value	Total consideration paid, as reported in SDC
Cash (dummy)	One if the method of payment is pure cash; zero otherwise
Mixed (dummy)	One if the method of payment is a mixed offer of cash, equity, and other forms; zero otherwise
Shares (dummy)	One if the method of payment is pure shares; zero otherwise
Industry-related (dummy)	One if the acquisition is between firms with the same two-digit SIC code; zero otherwise
Competing offer (dummy)	One if the deal has a competing offer according to the SDC Database; zero otherwise
Family control (dummy)	One if the firm is classified in SDC as being under family control; zero otherwise
Hostile (dummy)	One if the acquisition is hostile according to the SDC database; zero otherwise
Toehold (dummy)	One for deals where the acquirer had at least 5% ownership in the target firm prior to the acquisition; zero otherwise
$Equity_{MV}$	Market value of equity, calculated as share price multiplied by number of shares outstanding.
$Assets_{MV}$	Market value of assets, calculated as total assets minus book value of equity plus market value of equity
Cash-to-$Assets_{BV}$	Cash to book value of assets ratio
Debt-to-$Assets_{MV}$	Total debt to market value of assets ratio, where debt is total assets minus book value of equity
OCF-to-$Assets_{MV}$	Operating cash flow to market value of assets ratio, where operating cash flow is sales minus cost of goods sold, selling and general administrative expenses, and working capital change
Relative size	Target market value of equity divided by acquirer market value of equity
ROE	Return on equity ratio: net Income divided by book value of equity
(*M*/*B*)	Market to book ratio: Market value of equity calculated as share price multiplied by number of shares outstanding, divided by book value of shareholders equity.

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