

The Psychology of Pricing in Mergers and Acquisitions*

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May 23, 2009

Abstract

Psychology-driven pricing practices are evident in mergers and acquisitions. In particular, offer prices are highly influenced by the target's 52-week high stock price. This price likely serves as a psychological anchor—a starting point from which actual bid prices do not sufficiently adjust to reflect only current information (Tversky and Kahneman (1974)). Bidders who pursue targets with 52-week highs that are well above their current prices experience more negative offer announcement effects; their investors appear to perceive such bids as more likely to be overpaying. The probability of deal success is discontinuously increased by offering the target a price above its 52-week high, indicating that psychology-driven prices have real effects.

* For helpful comments we thank the Hon. William Allen, Yakov Amihud, Ravi Dhar, Florencia Marotta-Wurgler, Gerald Rosenfeld of Rothschild North America, Josh White, Russ Winer, and seminar participants at Harvard Business School, NYU Stern, and the Securities and Exchange Commission. Baker gratefully acknowledges financial support from the Division of Research of the Harvard Business School.

I. Introduction

The price that a bidding firm offers for a target is usually the outcome of a negotiation with the target's board. The standard finance conception emphasizes synergies. The offer price starts with an estimate of the increased value of the combined entity under the new corporate structure, deriving from cost reductions in labor or capital equipment, supply chain reliability, debt tax shields, market power, market access and expertise, improved management, internal finance, and other economic factors (Lang, Stulz, and Walkling 1989; Servaes 1996). This value gain is then divided between the two entities' shareholders according to their relative bargaining power. In theory, all of this leads to an objective and specific price for the target's shares.

In practice, mergers and acquisitions negotiations do not lead to an objective, determinate price. The expected value gain is a subjective quantity. Many assumptions are needed to justify a particular valuation of the combination. Relative bargaining power may not be fully established. Boards can bluff in the negotiation. Other bidders may emerge. These real-life considerations mean the appropriate target price cannot be set with precision, but established only to be within a potentially broad range. This indeterminacy, in turn, suggests that the final price chosen may be loose enough to reflect other influences, in particular psychological influences to cater to the target board or shareholders, because ultimately the price needs to be "attractive" to them. This paper studies the effect of psychology on offer prices, the market's reaction to the bidder's announcement of an offer, and the target board's and shareholders' reaction in terms of deal success.

Our primary focus is on the target's 52-week high stock price, which is widely reported in the online and print financial press and, perhaps, on the minds of some managers, boards, and investors. Anecdotal evidence that the 52-week high plays a special role in merger negotiations

is indicated in SEC filings of Schedule 14D-9 and other shareholder communications. This filing contains the target board's advice to its shareholders regarding how to react to a tender or exchange offer. Target-firm boards that want to discourage deal success often point out that the bid is below the 52-week high. Those that want to encourage deal success may note that the bid compares favorably with that price. We give examples later in the paper.

Our empirical hypothesis is that the bid price depends, all else equal, on this highly salient but largely irrelevant historical price of the target. The hypothesis has roots in the cognitive psychology of the “anchoring and adjustment” method of estimation (Tversky and Kahneman (1974)) and its influence on bargaining and negotiation. The shape of the prospect theory value function (Kahneman and Tversky (1979)) in the domain of losses also suggests a finer prediction, that the pull of the offer price toward the 52-week high weakens with the distance between the target's 52-week high and its pre-offer price.

The results show a visibly and statistically obvious effect of the 52-week high. Even controlling for the target's stock return over fixed intervals such as the past two months, the past year, or each individual monthly return over the past year, the 52-week high price exerts a strong positive effect on the bid price. A simple histogram of offer prices shows a spike at the 52-week high. For these bidder and target pairs, the 52-week high serves not merely as a subtle psychological anchor but as one so heavy that there is no “adjustment” from it at all.

We examine the pervasiveness and significance of the 52-week high effect in various subsamples and also consider non-psychological alternative explanations. For example, the 52-week high effect could arise because it is correlated with the objective, but unobserved value gain from combination—this is the value that the target assets could just return to if only they were managed as well by the bidder in the future as they were by the target when that high was

reached. We find that the 52-week high of the market index also affects offer prices, however. Given that the market component of the 52-week high cannot be recovered by changing one firm's management, this alternative is unable to provide a complete explanation, at least, for the 52-week high effect.

A crucial and related question is whether psychological pricing actually affects deal success. We find that upon controlling for the level of offer prices with a quartic polynomial, the probability of deal success is significantly and discontinuously enhanced when the bidder makes an offer price above the target's 52-week high. This result offers some of the most convincing evidence to date of real effects of behavioral corporate finance.

Market reactions to announcements of bids are a third interesting aspect of the effect of the 52-week high. The bidder's announcement effect is lower—even more negative than average—the greater is the target's 52-week high premium over its pre-offer price. This suggests that the market views the acquirer as more likely to be overpaying when the target has fallen far from its recent peak, consistent with the basic fact that a high 52-week premium raises offer prices, and inconsistent with the notion that the 52-week high is a proxy for the value gains from the merger.

This paper contributes to behavioral corporate finance, a growing field which studies how corporate financing and investment are affected by the presence of investors and managers who do not possess unlimited cognitive abilities. Prior work on mergers and acquisitions in this context includes Roll (1986), Ben-David, Graham, and Harvey (2007), and Malmendier and Tate (2008), who propose that manager overconfidence leads to more and lower-quality deals. Bertrand and Schoar (2003) and Graham, Harvey, and Puri (2008) find that putatively irrelevant personal characteristics of executives affect business combination decisions. Shleifer and

Vishny (2003) propose stock market mispricing as a motivation for acquisitions. Baker, Ruback, and Wurgler (2007) survey this literature.

The remainder of this paper starts with Section II, which proposes some hypotheses based on the anchoring and adjustment phenomenon, briefly reviews related evidence from finance and marketing, and introduces anecdotal evidence of the 52-week high influence based on SEC filings of target firms. Section III reviews the data. Sections IV, V, and VI report evidence for psychological pricing in target offer prices, offer announcement effects, and deal success, respectively. Section VII concludes.

II. The Psychology of Reference Points, Loss Aversion, and Anchoring and Adjustment

The psychology of pricing is a subfield of marketing. There, the focus is on identifying prices or “price points” that suppliers anticipate will lead to discontinuous jumps in consumer demand. The M&A context is broadly similar: The bidder wants to offer the lowest price that the target will accept. Here we start with the psychology that is most relevant to the primary analysis of the paper which involves the target’s 52-week high price.

A. Reference Points, Loss Aversion, and Anchoring and Adjustment

The empirically-motivated prospect theory of Kahneman and Tversky (1979) identifies a departure from preference specifications that emphasize levels of goods and wealth as the sole drivers of value or utility. Their theory holds that changes in status relative to particular reference points are another important carrier of perceived value. The reference point in their theory is derived from the context of the choice at hand. It may be influenced by normatively-irrelevant

frames (of reference). It may also be based on an aspirational level or expectation and not the status quo (Kahneman (1992)).

Another component of preferences that Kahneman and Tversky emphasize is loss aversion. This refers to a kink in prospect theory's value function at its origin, specifically that losses are disliked more than equal-size gains are liked. Furthermore, they set the shape of their theory's value function to include convexity in the domain of losses and concavity in gains to help it explain finer features of observed choice. To summarize, their value function is shaped like a kinked "S" and is defined over changes in value relative to a reference point.

These aspects of prospect theory enjoy support in experimental psychology. Recent work has explored their relevance in finance. Heath, Huddart, and Lang (1999) find that employee exercise of stock options doubles when their company's stock price exceeds its 52-week high, indicating its use as a reference point. Shefrin and Statman (1985) point out that prospect theory and loss aversion implies that investors are more reluctant to sell stocks in their portfolio showing paper losses than they are stocks showing gains. They term this the "disposition effect." Their tests and those of Odean (1998), Grinblatt and Keloharju (2001), and Grinblatt and Han (2005) support this prediction. Shefrin and Statman (1984) suggest a view of dividends based on loss aversion and framing effects. Barberis, Huang, and Santos (2001) and Barberis and Xiong (2008) discuss asset pricing implications of prospect theory.

The phenomenon of anchoring and adjustment is also associated with Tversky and Kahneman (1974). This refers a belief formation process under which one begins at a specific initial value, which may be salient but also entirely irrelevant, and then adjusts toward a final value based on other considerations. The bias that is typically observed is that the final value represents an insufficient adjustment from the potentially arbitrary initial value, hence its term

“anchor.” For example, Northcraft and Neale (1987) show that the asking price affects estimates of the value of a house, even among professional real estate agents who claim to view it as uninformative. Applications in finance are not plentiful, but George and Hwang (2004) show that nearness to the 52-week high predicts stock returns and propose the explanation that traders seeing positive news about a company are reluctant to push its stock price far above the 52-week high, thus insufficiently adjusting and leaving the information to be only slowly incorporated.

The anchoring and adjustment bias can obviously be used to advantage in negotiations. Kahneman (1992) notes that “negotiators commonly have an interest in misleading their counterpart about their reservation prices.... High claims and low offers are therefore made in the hope of anchoring the other side’s view of one’s true position.... The moral of studies of anchoring is that such efforts at deception can succeed ... even when these messages are neither accepted nor even believed” (p. 309-310). The study by Northcraft and Neale suggests an obvious scenario involving real estate pricing. Neale and Bazerman (1991) consider the setting of union negotiations over wages and review negotiating strategies that exploit anchoring.

B. Hypotheses Based on Target Psychology

In a merger or acquisition of substantial size, the transaction must be approved by the management and shareholders of the target as well as the management and shareholders of the bidder. We start with the target, for whom there are straightforward applications of the psychology outlined above that lead to empirical hypotheses.

The most obvious application involves the disposition effect, or the reluctance to realize losses relative to a reference point. While for some investors the reference point is likely to be their purchase price, another important reference point—and, importantly, one that is common

across shareholders—is the firm’s 52-week high price. This price is widely reported in the financial media. And because it by definition is a fairly recent price, it seems attainable by target shareholders even in the absence of a merger. This logic predicts that targets are more likely to approve mergers in which the offer price approaches or exceeds the 52-week high. The S-shaped value function, on the other hand, predicts that the further is the current price from the 52-week high, the less influence the marginal dollar has in terms of the perception of losses.

Anchoring and adjustment may also reinforce these predictions at the strategic level of negotiations over price. Targets seek and attempt to justify the highest possible price for their shares. Whether or not the target board views it as relevant, the 52-week high price can be used as a negotiating anchor. After all, it is the highest salient and specific price at hand.

C. Hypotheses Based on the Bidder’s Psychology

The bidder’s psychology can be affected by anchoring and adjustment both directly and strategically. When pursuing a target, the bidder has to decide how much it is willing to pay, and that in turn depends on how it values the target. Pinning this down with objectivity is difficult. An input to this estimation is the target’s recent valuations, and as such its 52-week high may enter as an anchor. The bidder may reason, if the target was valued at that level a few months ago, shouldn’t we, with our ability to realize synergies, value it above or at least near that same level? To the extent that logic is employed, the 52-week high becomes an anchor, and insufficient adjustment from that level becomes the norm.

This logic leads to independent, reinforcing predictions for the effect of the 52-week high on offer prices and deal success. A bit more subtly, it suggests that since the bidder’s investors

do not think as hard as its board about the target's potential valuation, they are less biased by the anchoring phenomenon and so more likely to view 52-week-high-driven bids as overpaying.

Once a valuation is established, the bidder must consider the minimum price that the target will accept. Bidder boards advised by experienced investment bankers are likely to predict that the target's 52-week high will both be used as a strategic anchor against them in negotiations as well as a reference point that their own investors truly care about. Again, all of these considerations seem likely to pull the offer price toward the 52-week high.

D. Anecdotal Evidence from Shareholder Communications

The 52-week high price is often cited in communications between managements and shareholders about pending mergers or acquisitions. Here are two examples.

Taro Pharmaceutical Industries, in a July 28, 2008 amendment to its SEC SC 14D-9 filing recommending against the unsolicited tender offer from Sun Pharmaceutical Industries, contains the following: "Beyond what was written in the 14D-9, I would add only the obvious: that Sun's offer of \$7.75 per share is significantly below the price at which our shares are trading today, which is at a 52 week high, and even further below the price that Sun paid to get blocks of Taro shares in recent private transactions with investors. Given our performance year to date and our outlook, I believe the Sun offer significantly undervalues our Company and deprives you of what we believe your shares are worth."

The 52-week high can of course also be cited as reason to embrace, not reject, an offer. Figure 1 shows an example slide from a shareholder presentation by Cablevision to its shareholders in October 24, 2007. In arguing for acceptance of the offer (from the family which

already controlled the company), Cablevision management highlights the fact that the bid price is at a premium to the 52-week high price.

III. Data

A. Merger and Acquisition Sample

The sample of deals is described in Table 1. Our source for mergers and acquisitions is Thomson Financial. We start with 23,350 unique deals where the announcement date is between January 1, 1984, and December 31, 2007, where the target is a public company, where the offer price is not missing, and where the acquirer purchased at least 85% of the target firm shares outstanding or else the percentage of shares acquired is unknown. We exclude deals that are missing an offer price or have been classified by Thomson as recapitalizations, repurchases, rumors, and target solicitations.

Of these deals, we were able to compute the target's 52-week high price from CRSP for a final sample of 7,498. We define the offer premium as the total consideration offered scaled by the target's price as of 30 days prior to the announcement. Similarly, the 52-week target (market index) high is the 52-week high stock price (market index) over the 365 calendar days ending 30 days prior to the announcement date expressed as a percentage difference from the CRSP stock price (market index) 30 calendar days prior to the announcement date. The CRSP market index is formed using total market value-weighted returns.

The purpose of scaling these prices by a common factor is to eliminate heteroskedasticity that would otherwise result from comparing these two prices in raw form. The purpose of choosing a 30-day lagged price as this scaling factor is to attenuate the upward "rumors" effect on the offer premium.

For all deals, Thomson gives information on whether the offer is a tender offer and whether the acquirer is a financial buyer (LBO). For a subset of deals, we have information on the form of payment is cash, stock, or other, whether the deal is completed or withdrawn, and whether the acquirer attitude is hostile, friendly, or neutral. Data on the form of payment and attitude of the deal are not available before 1990, but we are able to determine the form of payment for 4,361 deals and attitude for 4,346 deals, 220 of which were hostile. Of our main sample, 1522 are tender offers and 192 are acquisitions by financial firms. It seems likely that Thomson is underreporting these deals, particularly the frequency of leveraged buyouts in recent years. We keep track of the success of specific offers, not whether the target is ultimately acquired. Of the 6,926 deals that Thomson records as either completed or withdrawn, 26% are withdrawn. Of course, this includes situations where a competing or revised offer emerged, so the rate of overall success is much higher than these averages would indicate.

B. Summary Statistics

Table 2 reports means, standard deviations, medians, and extreme values for deal pricing, outcome variables, and control variables. Regarding prices, the median offer premium is 34.16%, the median 52-week high target price is 23.60%, and the median 52-week high market price is 3.31%. For the latter two, we Winsorize at the 1% and 99% levels, but this still leaves considerable variation.

In addition to the primary variables of interest, we record secondary deal outcome variables in Panel B, and deal characteristics, and target and acquirer financial characteristics in Panel C. All continuous independent variables are Winsorized at the 1% and 99% levels. We calculate the three-day announcement return of the acquirer by compounding the daily holding

period return from CRSP (CRSP: RET) centered on the announcement date from Thomson. The median is -0.81%. As noted above, 74% of the specific offers are successfully completed.

The target and acquirer return on equity, return on assets, book-to-market equity, and earnings price ratio are from Compustat. Return on equity is defined as net income (Compustat: NI) divided by shareholders' equity (Compustat: SEQ). The return on assets is defined as net income (NI) divided by total assets (Compustat: AT). The book-to-market ratio is defined as book equity divided by market equity, where book equity is total shareholders' equity (Compustat: SEQ) plus deferred taxes and investment tax credit (Compustat: TXDITC) minus the redemption value of preferred stock (Compustat: PSRKRV) and market equity is calculated by multiplying shares outstanding (CRSP: SHROUT) and price (CRSP: PRC) at fiscal year end. The earnings price ratio is defined as earnings before interest and taxes (Compustat: EBIT) divided by market equity (ME). Because not all target and acquirer companies within main sample of 7,498 deals were tracked by Compustat in the year before the announcement of the deal, we have financial ratios of the target for only 5,192 deals and of the acquirer for only 2,050 deals.

The price volatility, two-month return, and one-year return of the target are from CRSP. Volatility is defined as the standard deviation of daily returns for the 365 calendar days ending 30 days prior to the announcement date. Returns are calculated by compounding the daily holding period return (CRSP: RET) for the appropriate period ending 30 days prior to the announcement date. Market capitalization defined as price (CRSP: PRC) times shares outstanding (CRSP: SHROUT) from CRSP at the fiscal year end prior to the announcement date from Thomson.

Panel C of Table 2 summarizes the distribution of our battery of controls. Over the period from 1984 to 2007, 43% of the deals are financed with cash, 33% are financed with stock, 20% are tender offers, 5% are hostile, and 3% are acquired by financial firms. Measures of target strength tend to be lower than the acquirer as one might expect, with a mean ROE of -5.43%, ROA of 2.01%, and E/P of 7.12% compared to 6.69%, 4.28%, and 35.67% for the acquirer.

To sum up, our primary sample consists of 7,498 deals with full data on offer premia and 52-week high prices. We have three categories of controls: deal characteristics, target financials, and acquirer financials. Regressions including target financial variables have a maximum sample of 5,192 observations; those including acquirer financial variables have a maximum sample of 2,050 observations.

IV. Bid Prices and the Target's 52-Week High

A. Basic figures and regressions

We begin with an analysis of the effect of the 52-week high price on offer prices. Figure 2 simply plots the density of offer prices relative to the 52-week high. To keep the scale of the x-axis manageable, we do not plot outcomes beyond the middle 80% of the distribution. It is generally bell-shaped but reveals a clear spike at zero: a number of bidders offer *exactly* the 52-week high price.¹ Interestingly, the density is skewed in that when the offer price does exceed the 52-week high, it tends to do so by a relatively smaller amount.

¹ Note this cannot be mechanical because we have defined the 52-week high for the period ending 30 days before the announcement of the offer.

Many offer prices do not equal the 52-week high, so we examine the overall shape of the relationship between these prices nonparametrically in Figure 3. We estimate Gaussian kernel regressions of the model

$$\frac{Offer_{it}}{P_{i,t-30}} = a + b \left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} \right) + e_{it} \quad (1)$$

with varying bandwidths and estimation points.

Both panels in the figure suggests that the offer premium rises by approximately 3 to 3.5% with every 10% increase in the 52-week high. We limit the sample to situations where the 52-week high is less than 100% higher than the pre-offer price. Beyond this level, with a long right tail and limited data, the estimated incremental effect of the 52-week high is much noisier and both statistically and economically weaker. This could be consistent with the shape of the prospect theory value function—as “losses” increase, the marginal pain of additional loss decreases, so target shareholders may acquiesce more easily. Somewhat more simply, targets which have fallen substantially from their 52-week high may, in negotiation, fail to fully persuade the bidder of the relevance of this past price.

In Table 3 we report OLS regressions along the lines of Eq. (1), adding some control variables and, with the nonlinearity in Figure 3 in mind, also examining a piecewise linear specification:

$$\begin{aligned} \frac{Offer_{it}}{P_{i,t-30}} = & a + b_1 \min\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}}, 50\right) + b_2 \max\left(0, \min\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} - 50, 50\right)\right) \\ & + b_3 \max\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} - 100, 0\right) + e_{it} \end{aligned} \quad (2)$$

clustering standard errors by month. This specification allows for a marginal effect of b_1 for 52-week high premia up to 50%, b_2 for premia between 50% and 100%, and b_3 for premia greater than 100%. We always scale the dependent variable and the key independent variable by the 30-day lagged price to attenuate heteroskedasticity, but to the extent that investors and boards don't

think of these prices in terms of their ratio to the 30-day lagged price, this practice can also lead to a sort of measurement error that induces a spurious positive correlation. To control for this we control for the inverse of the 30-day lagged price in all specifications.

The simplest linear specification shows that offer prices rise 10% for every 0.6% rise in the 52-week high. This is statistically significant but not economically large. The problem is the nonlinear effect of large outliers in the independent variable, which even when Winsorized includes observations with values exceeding 250%. The piecewise linear specifications address this. They show a magnitude similar to that suggested in Figure 3, with a 10% higher 52-week high effecting a roughly 3.5% higher offer price. As the 52-week high exceeds 50%, however, it exerts little further influence.

The 52-week high effect does not arise simply because it reflects some other effect associated with target firm returns over a pre-specified period. We control for both two-month and one-year returns and find little movement in the key estimates. In unreported results, we include returns for each of the eleven months ending at $t-30$ and find that the key estimates are little affected. This is even clearer evidence that it is truly the return *since the 52-week high*, i.e. the 52-week high premium, that is driving our results. Also, in unreported results, we find strong effects in logs, for both premia and past returns, so it is not the specific functional form of the dependent and independent variables that is driving our results.

The last specification in Table 3 is useful in evaluating a non-psychological alternative explanation. This explanation says that the 52-week high price is particularly relevant because it represents a clear level of value that the bidder could hope to obtain by returning the target to “optimal” management (defined as the policies prevailing as of the time the high was reached). The specification replaces the 52-week high premium for the target with the overall market-level

52-week high. The fact that this is also a statistically and economically significant predictor of offer prices is inconsistent with the alternative explanation, since the bidder cannot hope to recapture the market component of the target's 52-week high.

B. Robustness and Other Subsamples

We report robustness tests in Table 4. We first examine characteristics of the transaction itself—whether it is for cash, stock, hostile, and so forth. Some of these deal characteristics significantly influence the offer price, but do not much reduce the effect of the 52-week high, and do not much increase the total regression R^2 . We also ask how the 52-week high effect compares with bidder and target firm fundamentals as key inputs to offer premia. We control for seven characteristics of the bidder and the target and find little to suggest that any available simple proxies for “synergies” rival the 52-week high in their explanatory power. A notable control variable is the target's return volatility—this is correlated to the 52-week premium and could reflect aspects of the target's value to the bidder (although in what direction is unclear). But the inclusion of this and several other controls does not much reduce the effect.²

Results for subsamples are in Table 5. The 52-week high is about equally strong in certain subsamples, including both tender and non-tender offers, both cash and stock deals, and deals completed successfully and those that failed. The effect is not statistically significant in our subsample of hostile deals, however. It is unclear whether this is due to insufficient sample size or, more prosaically, the bidder ignoring the target's aspiration to its recent high price and thus contributing to the hostility.

² One result suggested by the last column of Table 5 is that offer premia are higher in the case of a large bidder and a small target.

C. *The Persistent Relevance of the 52-Week High*

In Table 6 we ask whether the time between the 52-week high and the bid affects the relevance of the 52-week high. We include in our piecewise linear specifications an interaction with the log number of days elapsed between these two events. Perhaps surprisingly, there is a statistically insignificant deterioration in the effect. The 52-week high, even if it was achieved many months ago, still affects the offer premium. However, it is economically significant. Using the results from column 3, the coefficients indicate that the effect falls from 7% increase in the offer premium per 10% increase in the 52-week high down to 3% when the 52-week high reached at the beginning of the annual period.

V. Deal Success

The previous tests directly addressed only the division of value between the bidding and target shareholders. An important question is whether 52-week high pricing affects deal success, thus leading to a “real” effect via capital allocation.

Consistent with such a real effect, the probability of success across our sample is 69.9% if the offer price is below the 52-week high and 76.9% if it is above. Bear in mind that this is the success of a particular offer, not the overall rate of success in selling the target to an acquirer. Table 7 tests for such an effect more formally with probit regressions and relevant control variables. Where $S = 1$ if the deal is successful, we model

$$pr(S) = a + b \frac{Offer_{it}}{P_{i,t-30}} + c(Offer_{it} > 52WeekHigh_{i,t-30}) + e_{it} \quad (3)$$

with various control variables. This specification allows us to control for the *absolute* level of the offer premium, unlike the simple cross-tab just reported, and thus test whether offer prices that are high *relative* to the 52-week high enjoy an increased probability of success.

The results indicate that there is a discontinuous increase in the probability of success as the offer price rises above the 52-week high. The dummy variable is significant even when including a flexible quartic polynomial of the offer price. The importance of exceeding the 52-week high is particularly clear, and also most econometrically convincing, upon the inclusion of numerous control variables that contain most of the explanatory power for deal success, such as hostility and acquirer size.³

VI. Bidders' Announcement Returns

Last, we investigate how the bidder's shareholders react to bids that reflect the target's 52-week high. We compute the 3-day cumulative market-adjusted return around each bidder's announcement. We then run simple OLS regressions of

$$r_{t-1 \rightarrow t+1} = a + b \frac{Offer_{it}}{P_{i,t-30}} + e_{it} \quad (4)$$

and compare the slope estimates to those from two-stage least squares estimations using the 52-week high as an instrument for the offer price. In particular, we use Eq. (2) as a first stage.

Table 8 shows the results of this investigation. Not surprisingly, the OLS estimates show that bidding shareholders tend to react negatively to a high offer price, regardless of the economic or psychological forces from which it derives. But the magnitude of this effect is not large: the third specification indicates that a 10% increase in the offer premium is associated with a -0.2% announcement effect.

In contrast, the bidder's shareholders seem to be much more disappointed when the offer price is driven by the 52-week high. The last IV regression implies that when the component of

³ At this point it is interesting to look back at Figure 2. Table 8 shows that as we move toward the right of this distribution, the probability of success increases. But Figure 2 is skewed such that when the offer price does exceed the 52-week high, it tends to do so by a modest amount. This may reflect economizing bidders who perceive the discontinuous effect of the 52-week high.

the offer premium driven by the 52-week high increases by 10%, the bidder's shareholders react with a considerable -1.37% announcement effect. The large difference in magnitudes between the OLS and IV results suggests that bidder shareholders view 52-week-high-driven bids as overpaying. Since they are also less likely to suffer from 52-week high anchoring than the other sets of agents involved—the target's management and shareholders and the bidder's management—this differential response may reflect their greater objectivity.

VII. Conclusions

This paper argues that mergers and acquisitions are importantly shaped by psychological considerations involving reference points and anchors. We focus on the role of the target's 52-week high price. The 52-week high stock price is widely available and represents a salient price level to investors and managers. Empirically, we show that the target's 52-week high exercises a strong effect on the bidder's offer price. A number of bidders offer exactly this price, demonstrating its unique salience. The effect is difficult to square with alternative explanations and appears best explained in terms of the use of the 52-week high as a reference point by the target's shareholders or as an anchor in negotiations with the bidder.

Our evidence suggests that bidders' shareholders view bids driven by the target's 52-week high as overpaying: They react especially negatively to the component of the offer price driven by the target's 52-week high. Most important, perhaps, is the fact that psychological pricing has real effects. Bids that exceed the 52-week high discontinuously increase the probability of deal success and thus the distribution of capital across firms' alternative investment policies. We regard this as some of the clearest evidence of “real effects” of behavioral corporate finance found to date.

We conjecture that reference points and related psychological phenomena may affect larger-scale patterns in mergers and acquisitions. For example, the 52-week high effect could help to explain why merger waves are associated with high stock market valuations. We are investigating this hypothesis in ongoing work.

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Table 1. Sample. The sample consists of merger or acquisition announcements. We start with 23,350 unique deals from Thomson Financial, where the announcement date is between January 1, 1984, and December 31, 2007, where the target is a public company, where the offer price is not missing, and where the acquirer purchased at least 85% of the target firm shares outstanding or the percentage of shares acquired is unknown. Of these, we were able to compute 52-week high prices from CRSP for a final sample of 7498. We have information on whether the offer is a tender offer and whether the acquirer is a financial buyer from Thomson *for all deals*. We have information on whether the form of payment is cash, stock, or other, whether the deal is completed or withdrawn, and whether the acquirer attitude is hostile, friendly, or neutral from Thomson *for a subset of deals*.

Year	Median Pricing			Form of Payment			Attitude		Completed				
	Total Deals	Offer Premium %	52-Week High %	Tender	Cash	Stock	Other	Friendly	Hostile	Yes	No	?	LBO
1984	221	34.8	26.9	61						115	97	9	3
1985	241	29.0	10.7	67						121	93	27	2
1986	260	32.6	13.3	98						152	93	14	3
1987	284	32.1	18.8	82						153	112	19	4
1988	450	42.2	33.6	160						219	194	34	8
1989	330	31.0	13.2	94						158	129	41	1
1990	179	41.9	50.0	30						91	63	17	4
1991	135	46.5	36.7	10	1	3	0	4	0	77	44	10	0
1992	149	40.2	21.7	9	6	14	5	23	1	92	33	6	1
1993	201	38.5	17.3	23	18	22	11	51	0	125	52	12	2
1994	285	35.7	25.0	42	32	56	20	106	2	187	77	14	0
1995	357	34.1	17.6	64	81	112	40	224	9	256	86	13	2
1996	375	31.9	15.0	53	77	133	75	277	8	282	72	18	6
1997	473	31.8	16.3	94	103	187	95	376	9	374	81	17	11
1998	520	33.3	30.6	98	131	206	103	430	10	417	90	13	10
1999	612	41.3	38.3	139	200	203	129	503	27	474	106	28	17
2000	516	45.2	44.1	126	202	159	101	430	30	377	101	32	15
2001	334	46.6	48.8	80	126	94	90	294	13	267	44	22	2
2002	229	39.1	46.2	44	110	40	61	188	22	159	47	20	3
2003	237	31.3	21.6	39	122	51	52	204	21	181	40	14	6
2004	221	25.1	12.0	18	94	59	60	199	13	184	26	8	8
2005	256	25.5	19.4	26	150	37	63	226	23	204	33	18	16
2006	313	25.2	17.8	18	202	37	71	291	17	238	34	37	34
2007	320	24.1	16.0	47	203	40	74	300	15	232	44	40	34
Total	7498	35.0	25.5	1522	1858	1453	1050	4126	220	5135	1791	483	192

Table 2. Summary Statistics. Means, standard deviations, medians, and extreme values for the pricing of mergers and acquisitions and control variables. Panel A shows the offer premium, the 52-week target high, and the 52-week market index high. The offer premium is the offer price from Thomson expressed as a percentage difference from the CRSP stock price 30 calendar days prior to the announcement date. The 52-week target (market index) high is the 52-week high stock price (market index) over the 365 calendar days ending 30 days prior to the announcement date expressed as a percentage difference from the CRSP stock price (market index) 30 calendar days prior to the announcement date. The CRSP market index is formed using total market value-weighted returns. Panel B shows the two other outcome variables: whether the deal was recorded as completed from Thomson and the acquirer 3-day announcement return from CRSP centered on the announcement date from Thomson. Panel C shows control variables. The form of payment (cash, stock), the acquirer attitude (hostile), the offer type (tender), and the identity of the acquirer (financial buyer) are from Thomson. The target and acquirer return on equity, return on assets, book-to-market equity, and earnings price ratio are from Compustat. The return on equity is defined as net income (Compustat:NI) divided by shareholders' equity (Compustat:SEQ). The return on assets is defined as net income (NI) divided by total assets (Compustat:AT). The book-to-market ratio is defined as book equity divided by market equity, where book equity is total shareholders' equity (Compustat:SEQ) plus deferred taxes and investment tax credit (Compustat:TXDITC) minus the redemption value of preferred stock (Compustat:PSRKRKRV) and market equity is calculated by multiplying shares outstanding (CRSP:SHROUT) and price (CRSP:PRC) at fiscal year end. The earnings price ratio is defined as earnings before interest and taxes (Compustat:EBIT) divided by market equity (ME). The target's volatility is from CRSP. Market capitalization is equal to price times shares outstanding from CRSP at the fiscal year end prior to the announcement date from Thomson. Volatility is the standard deviation of daily returns for the 365 calendar days ending 30 days prior to the announcement date. The past two-month and one-year target returns are computed ending 30 days prior to the announcement date. Continuous independent variables are Winsorized at the 1% and 99% levels.

	N	Mean	SD	5%	Median	95%	Winsorized
Panel A: Merger and Acquisition Pricing							
Offer Premium %	7498	45.65	109.49	-3.23	34.16	120.00	No
52-Week Target High Price %	7498	67.24	150.47	1.57	23.60	250.41	Yes
52-Week Market Index High Price %	7498	6.84	8.50	0.00	3.31	26.46	Yes
Panel B: Other Outcome Variables							
Completed	6926	0.74	0.44	0.00	1.00	1.00	No
Acquirer 3-day Announcement Return %	3937	-1.12	8.11	-13.44	-0.81	10.26	No
Panel C: Control Variables							
Cash	4361	0.43	0.49	0.00	0.00	1.00	No
Stock	4361	0.33	0.47	0.00	0.00	1.00	No
Hostile	4361	0.05	0.22	0.00	0.00	1.00	No
Tender	7498	0.20	0.40	0.00	0.00	1.00	No
Financial Buyer	7498	0.03	0.16	0.00	0.00	0.00	No
Target ROE %	5192	-5.43	82.28	-89.10	7.16	33.70	Yes
Target ROA %	5192	2.01	20.28	-34.81	6.53	21.03	Yes
Target B/M %	5192	238.48	902.76	0.75	61.97	777.90	Yes
Target E/P %	5192	7.12	116.28	-62.47	3.36	56.73	Yes
log(Target Market Capitalization)	5192	11.64	1.76	8.90	11.54	14.65	Yes
Target Volatility %	5192	3.90	2.25	1.41	3.37	8.41	Yes
Target 2-Month Return %	7498	3.79	24.97	-35.42	2.28	45.95	Yes
Target 1-Year Return %	7498	9.13	53.23	-65.22	3.99	101.55	Yes
Acquirer ROE %	2050	6.69	41.59	-45.76	11.20	36.50	Yes
Acquirer ROA %	2050	4.28	12.92	-13.73	3.82	22.51	Yes
Acquirer B/M %	2050	316.89	1572.80	0.60	44.69	882.17	Yes
Acquirer E/P %	2050	35.67	191.22	-14.90	4.34	105.94	Yes
log(Acquirer Market Capitalization)	2050	13.88	2.25	10.18	13.81	17.92	Yes

Table 3. The Pricing of Mergers and Acquisitions. Regressions of the offer premium on the 52-week target high price. We run ordinary least squares and piecewise linear regressions.

$$\frac{Offer_{it}}{P_{i,t-30}} = a + b \frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} + e_{it}$$

$$\frac{Offer_{it}}{P_{i,t-30}} = a + b_1 \min\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}}, 50\right) + b_2 \max\left(0, \min\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} - 50, 50\right)\right) + b_3 \max\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} - 100, 0\right) + e_{it}$$

where *Offer* is the offer price from Thomson, *P* is the target stock price from CRSP, and *52WeekHigh* is the high stock price over the 365 calendar days ending 30 days prior to the announcement date. All regressions control for *1/P*. Column 1 shows basic OLS results. Columns 2, 3, and 4 show piecewise linear regressions without and with controls for target past returns. Time fixed effects are included in the fourth column. Column 5 repeats Column 1 replacing the high target stock price with the high market index price. Standard errors are clustered by month.

	<i>OLS</i>	<i>Piecewise</i>	<i>Piecewise</i>	<i>Piecewise</i>	<i>OLS</i>
	1	2	3	4	5
52-Week Target High Price %:					
<i>b</i>	0.0676*** (2.91)				
<i>b</i> ₁		0.363*** (7.03)	0.340*** (5.35)	0.215** (2.11)	
<i>b</i> ₂		-0.0356 (-0.24)	-0.0432 (-0.29)	-0.00158 (-0.02)	
<i>b</i> ₃		0.0590 (1.57)	0.0575 (1.54)	0.0593*** (5.01)	
52-Week Market Index High Price %:					
<i>b</i>					0.298** (2.17)
Inverse Price	41.64*** (2.64)	40.69** (2.42)	40.77** (2.41)	41.47*** (12.56)	52.25*** (2.73)
Target 2-Month Return %			-0.0647 (-1.19)	-0.0622 (-1.10)	
Target 1-Year Return %			-0.000491 (-0.03)	-0.0102 (-0.32)	
Time Effects	No	No	No	Yes	No
N	7498	7498	7498	7498	7498
R2	0.0553	0.0570	0.0571	0.111	0.0497

Table 4. The Pricing of Mergers and Acquisitions: Robustness. Piecewise linear regressions of the offer premium on the 52-week target high price. We run piecewise linear regressions.

$$\frac{Offer_{it}}{P_{i,t-30}} = a + b_1 \min\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}}, 50\right) + b_2 \max\left(0, \min\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} - 50, 50\right)\right) + b_3 \max\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} - 100, 0\right) + e_{it}$$

where *Offer* is the offer price from Thomson, *P* is the target stock price from CRSP, and *52WeekHigh* is the high stock price over the 365 calendar days ending 30 days prior to the announcement date. All regressions control for *1/P*. Column 1 is the baseline (Column 3) from Table 3. Column 2 adds deal characteristics (tender, attitude, form of payment, acquirer identity) as controls to the baseline. Column 3 adds target specific controls to the baseline. Column 4 adds acquirer specific financial controls to the baseline. Column 5 includes all controls. All columns control for target past returns and *1/P*. Standard errors are clustered by month.

	<i>Piecewise</i> 1	<i>Piecewise</i> 2	<i>Piecewise</i> 3	<i>Piecewise</i> 4	<i>Piecewise</i> 5
52-Week Target High Price %:					
<i>b</i> ₁	0.340*** (5.35)	0.344*** (4.62)	0.351*** (8.06)	0.470*** (6.34)	0.295*** (3.04)
<i>b</i> ₂	-0.0432 (-0.29)	-0.185 (-0.73)	-0.0324 (-0.21)	-0.0187 (-0.21)	-0.176 (-1.26)
<i>b</i> ₃	0.0575 (1.54)	0.0595 (1.43)	0.0733 (1.34)	0.00722 (0.38)	-0.00302 (-0.14)
Cash		-7.846 (-0.87)			2.100 (0.69)
Stock		-6.165 (-0.69)			2.809 (0.77)
Hostile		-9.311*** (-2.66)			11.50** (2.44)
Tender		7.835** (2.23)			4.169 (1.06)
Financial Buyer		-16.87*** (-5.70)			-16.14* (-1.93)
Target ROA %			0.416 (1.47)		0.0119 (0.08)
Target B/M %			-0.000711 (-0.74)		-0.00224 (-1.57)
log(Target Market Capitalization)			-0.751 (-0.59)		-4.234*** (-4.02)
Target Volatility %			1.050 (0.98)		3.896* (1.72)
Acquirer ROA %				0.0626 (0.58)	0.164 (0.84)
Acquirer B/M %				0.000684 (1.10)	0.00251* (1.87)
log(Acquirer Market Capitalization)				1.590** (2.15)	2.921** (2.49)
Time Effects	No	No	No	No	No
N	7498	4361	5192	2050	1362
R ²	0.0571	0.0722	0.0593	0.115	0.174

Table 5. The Pricing of Mergers and Acquisitions: Subsamples. Piecewise linear regressions of the offer premium on the 52-week target high price, for subsamples.

$$\frac{Offer_{it}}{P_{i,t-30}} = a + b_1 \min\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}}, 50\right) + b_2 \max\left(0, \min\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} - 50, 50\right)\right) + b_3 \max\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} - 100, 0\right) + e_{it}$$

where *Offer* is the offer price from Thomson, *P* is the target stock price from CRSP, and *52WeekHigh* is the high stock price over the 365 calendar days ending 30 days prior to the announcement date. We divide the sample according to form of payment, attitude, and whether it is a tender offer and successfully completed. All regressions control for *1/P*. Standard errors are clustered by month.

	<i>Tender</i>		<i>Form of Payment</i>		<i>Attitude</i>		<i>Successful</i>	
	Yes	No	Cash	Stock	Friendly	Hostile	Yes	No
52-Week Target High Price %:								
<i>b</i> ₁	0.391*** (5.10)	0.323*** (4.80)	0.408*** (5.07)	0.353*** (3.63)	0.361*** (3.99)	0.151 (0.95)	0.331*** (3.82)	0.367*** (3.49)
<i>b</i> ₂	0.251** (2.50)	-0.121 (-0.63)	0.0858 (0.53)	0.0593 (0.47)	-0.181 (-0.69)	0.119 (0.59)	-0.162 (-0.66)	0.149 (1.36)
<i>b</i> ₃	0.0276** (2.22)	0.0750 (1.31)	0.0525** (2.05)	-0.00340 (-0.16)	0.0574 (1.46)	-0.00342 (-0.11)	0.0647 (1.32)	0.0151 (0.76)
Inverse Price	5.655 (1.00)	44.67** (2.51)	28.52** (2.14)	35.44*** (2.91)	68.77** (2.05)	1.400 (0.23)	69.72** (2.13)	13.21* (1.78)
Target 2-Month Return %	-0.0841 (-1.44)	-0.0600 (-0.98)	0.00666 (0.06)	-0.0157 (-0.23)	-0.0906 (-0.95)	-0.0658 (-0.82)	-0.128 (-1.35)	-0.0702 (-1.55)
Target 1-Year Return %	-0.0590*** (-2.61)	0.0145 (0.73)	-0.0289 (-1.28)	0.0350 (1.06)	0.0270 (1.17)	-0.0618 (-1.18)	0.0159 (0.73)	-0.0150 (-0.33)
Time Effects	No	No	No	No	No	No	No	No
N	1522	5976	1855	1453	4125	220	5135	1790
R ²	0.172	0.0574	0.187	0.133	0.0735	0.0598	0.0737	0.0928

Table 6. The Pricing of Mergers and Acquisitions: Time Since 52-Week High. OLS and piecewise linear regressions of the offer premium on the 52-week target high price interacted with $\log Time$. $\log Time$ is the time since the 52-week high was reached measured in days. All regressions control for $1/P$. Column 1 shows basic OLS results of regressing price on the 52-week high. Column 2 shows piecewise linear regressions. Column 3 repeats Column 1 replacing the high target stock price with the high market index price. Columns 4-6 repeat Columns 1-3 with controls for target past returns. Standard errors are clustered by month.

	<i>OLS</i>	<i>Piecewise</i>	<i>OLS</i>	<i>OLS</i>	<i>Piecewise</i>	<i>OLS</i>
	1	2	3	4	5	6
$\log Time$	1.720 (1.40)	0.283 (0.68)	2.615*** (5.27)	0.953 (1.05)	-0.0870 (-0.17)	0.789 (1.31)
52-Week Target High Price %:						
b	0.108 (0.48)			0.0471 (0.19)		
b_1		0.728*** (2.99)			0.659** (2.19)	
b_2		0.760 (0.83)			0.662 (0.74)	
b_3		-0.417 (-1.10)			-0.429 (-1.12)	
52-Week Market Index High Price %:						
b			0.150 (0.52)			0.150 (0.53)
52-Week Target High Price % · $\log Time$:						
c	-0.00768 (-0.18)			0.00210 (0.04)		
c_1		-0.0697 (-1.59)			-0.0597 (-1.11)	
c_2		-0.136 (-0.79)			-0.121 (-0.72)	
c_3		0.0833 (1.19)			0.0850 (1.20)	
52-Week Market Index High Price % · $\log Time$:						
c			0.0205 (0.27)			0.0117 (0.15)
Time Effects	No	No	No	No	No	No
N	7498	7498	7498	7498	7498	7498
R ²	0.0559	0.0577	0.0509	0.0563	0.0578	0.0525

Table 7. Predicting Success in Mergers and Acquisitions. Regressions of the offer premium on the 52-week target high price. We run dprobit regressions.

$$pr(S) = a + b \frac{Offer_{it}}{P_{i,t-30}} + c(Offer_{it} > 52WeekHigh_{i,t-30}) + e_{it}$$

where S is equal to 1 if a deal is completed, $Offer$ is the offer price from Thomson, P is the target stock price from CRSP, and $52WeekHigh$ is the high stock price over the 365 calendar days ending 30 days prior to the announcement date. All regressions control for $1/P$. We limit the sample only to those deals that Thomson identifies as completed or withdrawn. The first two columns estimate a linear relationship between the probability of success and the offer premium. The second two columns use a flexible polynomial. Standard errors are clustered by month.

	<i>Probit</i> 1	<i>Probit</i> 2	<i>Probit</i> 3	<i>Probit</i> 4
Offer Premium	0.00219*** (3.42)	0.00216 (1.46)	0.00550** (2.17)	0.0109** (2.13)
Offer Premium ²			-0.0000647 (-0.87)	-0.000210* (-1.86)
Offer Premium ³			0.000000631 (0.51)	0.00000188 (0.87)
Offer Premium ⁴			-2.81e-09 (-0.43)	-6.56e-09 (-0.51)
Offer Premium>52-Week Target High Price	0.0946** (2.33)	0.443*** (4.29)	0.0785* (1.84)	0.412*** (3.92)
Cash		-0.108 (-0.85)		-0.115 (-0.91)
Stock		0.122 (1.06)		0.137 (1.19)
Hostile		-2.001*** (-10.89)		-2.009*** (-10.95)
Tender		0.488** (2.52)		0.495** (2.54)
log(Target Market Capitalization)		-0.0165 (-0.56)		-0.0195 (-0.65)
log(Acquirer Market Capitalization)		0.0630** (2.53)		0.0633** (2.55)
Inverse Price	-0.0768* (-1.77)	-0.131 (-1.16)	-0.0644 (-1.47)	-0.115 (-0.99)
Target 2-Month Return %	0.00174** (2.20)	0.00208 (0.87)	0.00170** (2.15)	0.00171 (0.72)
Target 1-Year Return %	0.00133*** (3.24)	0.000881 (0.65)	0.00137*** (3.35)	0.000841 (0.64)
Time Effects	No	No	No	No
N	6926	2479	6926	2479
R ²	0.00949	0.178	0.00992	0.183

Table 8. Mergers and Acquisitions: Market Reaction. Ordinary and two-stage least squares regressions of the 3-day CAR of the acquirer on the offer premium.

$$\frac{Offer_{it}}{P_{i,t-30}} = a + b_1 \min\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}}, 50\right) + b_2 \max\left(0, \min\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} - 50, 50\right)\right) + b_3 \max\left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} - 100, 0\right) + e_{it}$$

$$r_{t-1 \rightarrow t+1} = a + b \frac{Offer_{it}}{P_{i,t-30}} + e_{it}$$

where r is the market-adjusted return of the acquirer for the three-day period centered on the announcement date, $Offer$ is the offer price from Thomson, P is the target stock price from CRSP, and $52WeekHigh$ is the high stock price over the 365 calendar days ending 30 days prior to the announcement date. The first and the third columns use ordinary least squares. The second and the fourth columns instrument for the offer premium using $52WeekHigh$. Standard errors are clustered by month.

	OLS	IV	OLS	IV
	1	2	3	4
Offer Premium	-0.00959** (-2.02)	-0.0992*** (-3.15)	-0.0206*** (-3.47)	-0.137*** (-3.88)
Cash			1.865*** (4.71)	2.392*** (4.86)
Stock			-1.505*** (-4.24)	-1.060*** (-2.71)
Hostile			-1.287* (-1.69)	-0.611 (-0.64)
Tender			0.855** (2.42)	2.115*** (3.70)
Financial Buyer			0.986 (0.54)	-2.156 (-0.67)
log(Target Market Capitalization)			-0.343*** (-3.04)	-0.587*** (-3.83)
log(Acquirer Market Capitalization)			0.0302 (0.34)	0.130 (1.29)
Inverse Price	0.223 (0.51)	1.278** (1.98)	-0.0279 (-0.05)	1.614** (1.99)
Target 2-Month Return %	0.0140** (2.08)	0.00693 (0.89)	0.0148 (1.61)	0.000656 (0.06)
Target 1-Year Return %	-0.00433 (-1.18)	-0.0115** (-2.34)	-0.00370 (-0.84)	-0.00944* (-1.73)
Time Effects	No	No	No	No
N	3937	3937	2527	2527
R ²	0.00320	.	0.0509	.

Figure 1. Slide from Cablevision Presentation to Shareholders, October 24, 2007. The management of Cablevision recommended acceptance of a \$36.26 per share cash bid from the Dolan family. The slide compares this bid price to various recent prices including 52-week highs.

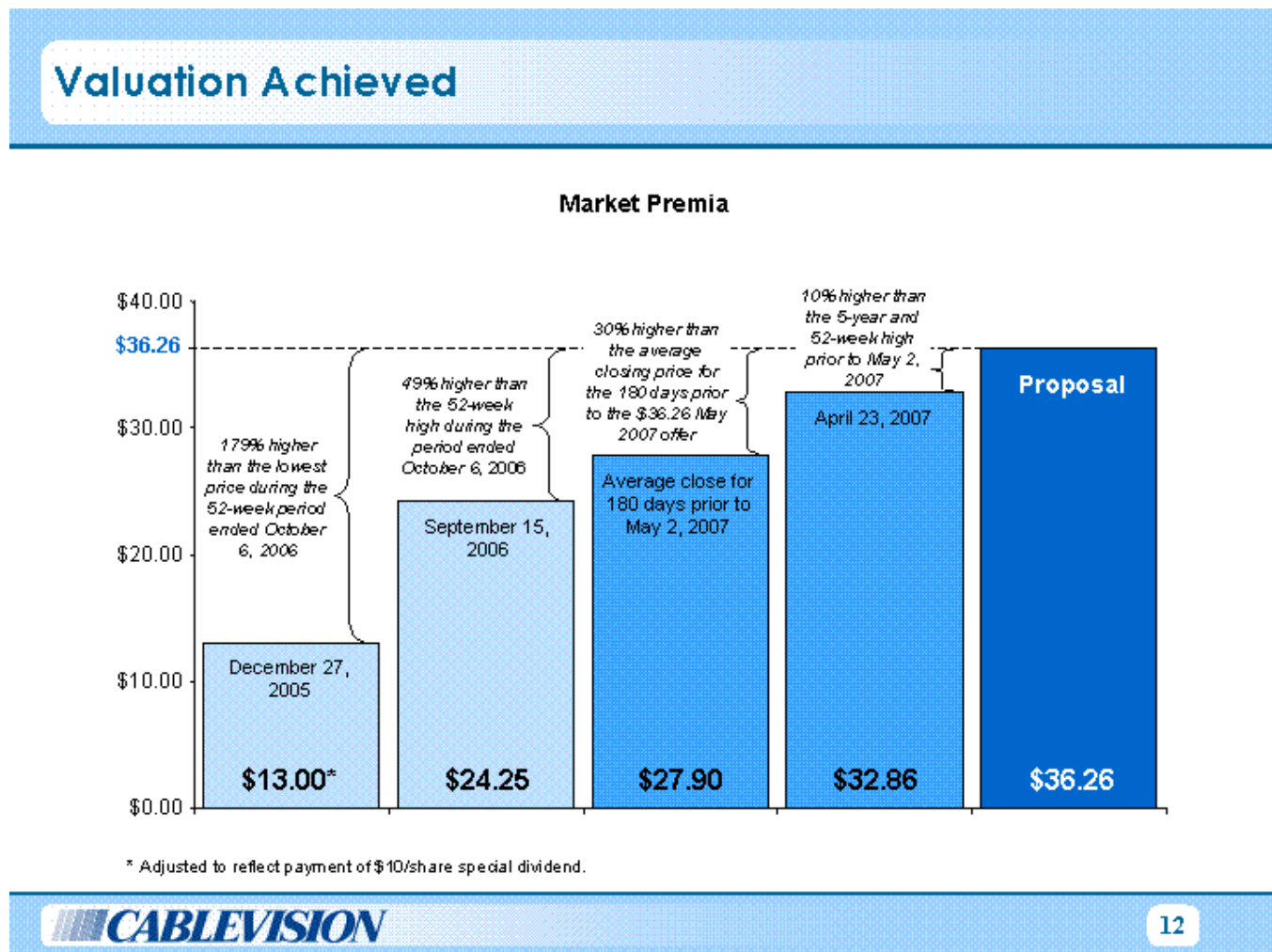


Figure 2. Offer Price Density. Histogram of the difference between the offer price and the target's 52-week high price.

$$\frac{Offer_{it} - 52WeekHigh_{i,t-30}}{P_{i,t-30}}$$

where *Offer* is the offer price from Thomson, *P* is the target stock price from CRSP, and *52WeekHigh* is the high stock price over the 365 calendar days ending 30 days prior to the announcement date.

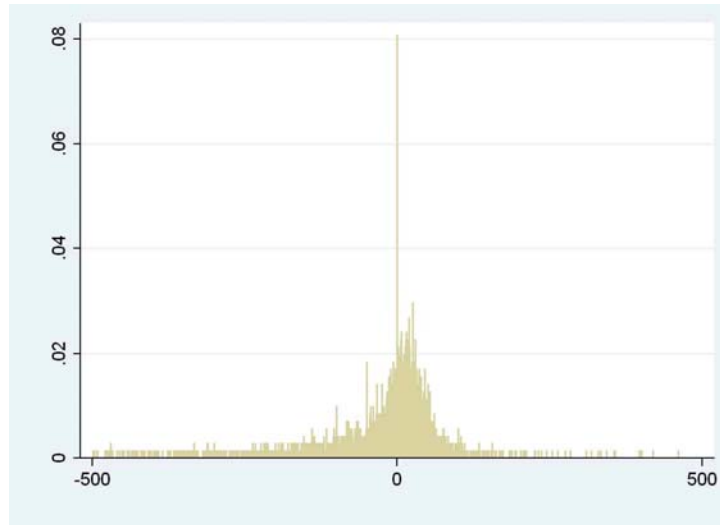
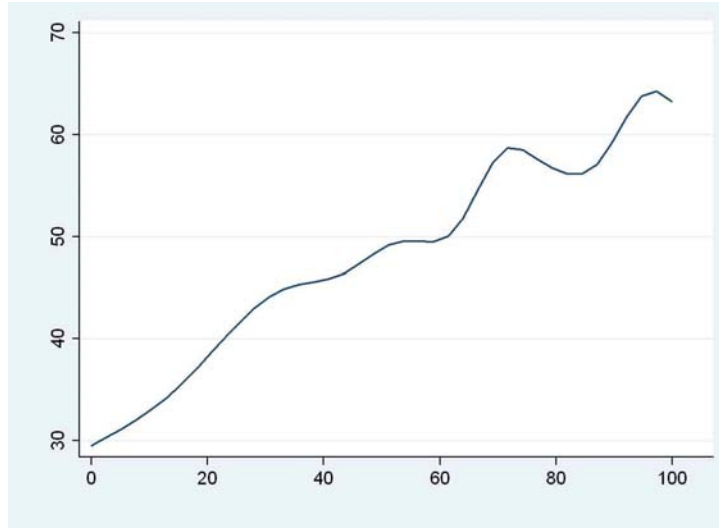


Figure 3. Non-linear effects. Gaussian kernel regressions of the offer premium on the 52-week target high price.

$$\frac{Offer_{it}}{P_{i,t-30}} = a + b \left(\frac{52WeekHigh_{i,t-30}}{P_{i,t-30}} \right) + e_{it}$$

where *Offer* is the offer price from Thomson, *P* is the target stock price from CRSP, and *52WeekHigh* is the high stock price over the 365 calendar days ending 30 days prior to the announcement date. The first kernel regression has a bandwidth of 20 and has 40 estimation points. The second has a bandwidth and 40 estimation points. Panel A limits the sample to situations where the 52-week high is less than double the target price 30-days prior to the announcement date. Panel B limits the sample to situations where the 52-week high is less than three times the target price 30-days prior to the announcement date.

Panel A. Acquisition premium (y-axis) on the 52-week high premium (x-axis), 0 to 100



Panel B. Acquisition premium (y-axis) on the 52-week high premium (x-axis), 0 to 300

