Overreaction to Merger and Acquisition Announcements*

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Abstract

We examine investor reactions to merger and acquisition announcements, focusing on the Initial Target Price (ITP) ratio, which is the target firm stock price on the first day after the announcement relative to the offer price, and can be interpreted as a measure of investor optimism regarding deal outcomes. We find that high price-to-offer-price ratios are associated with surprisingly low likelihoods of deal success, and significant negative abnormal returns of 3.5% over the two months following the announcement. We investigate potential explanations for the results, and find that they are most consistent with the interpretation that high ITP ratios indicate investor overreaction.

Keywords: mergers and acquisitions, initial target price, overreaction, anomaly

JEL classification: G14; G34

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1. Introduction

Acquisition attempts generally imply positive news for target firm shareholders. Upon announcement, the stock price of a target firm typically increases toward, and in some cases exceeds, the deal's offer price. The ratio of the target firm stock price on the first day after the announcement to the offer price, which we term as the initial target price (ITP), reflects investors' anticipation of eventual outcomes of the acquisition attempt.[1] As such we view the ITP ratio as a rather direct measure of investor optimism regarding the eventual deal outcome, thereby providing a powerful opportunity to examine the rationality of investor reactions to the arrival of new value-relevant information.

Despite its potential importance, researchers have not fully assessed the information contained in the ITP. Among extant studies, Jindra and Walkling (2004) provide evidence most closely related to our investigation. They study the "speculation spread" (one minus the ITP) in a sample of 362 cash tender offers over the period 1981-1995, showing that it is systematically related to ex ante deal characteristics and contains important information about the market's interpretation of the offer. In particular, they find that the speculation spread predicts revisions in the offer price. However, they do not assess the relation between the ITP and subsequent total returns to target firm shareholders or the extent to investor reactions to merger announcements are rational.

If investors are fully rational in interpreting the information contained in acquisition announcements the ITP ratio will be positively associated with the likelihood of deal success, but will not predict abnormal returns to the target firm after the announcement. On the other hand if

[1] Merger arbitrageurs are especially interested in this ratio. See, among others, Bhagat, Brickley, and Loewenstein (1987), Larcker and Lys (1987), Karolyi and Shannon (1999), Mitchell and Pulvino (2001), Baker and Savasoglu (2002), and Hsieh and Walkling (2005).

investors overreact to the positive information contained in the takeover announcement, then the ITP ratio will overestimate the probability of deal consummation and be negatively associated with future abnormal returns to the target firm, and vice versa. In our empirical analysis we find that high ITP ratios predict surprisingly low likelihoods of deal consummation, as well as negative abnormal returns to target firms following the announcement. These findings suggest that those cases where investors are most optimistic regarding deal outcomes, as reflected in high ITP ratios, are in fact characterized by investor overreaction to the new information. We also find somewhat weaker evidence that low ITP ratios indicate investor underreaction to the new information contained in the merger announcement.

Prior studies on investor reactions to merger and acquisition announcements have focused on stock returns to the acquirer and target firms around the announcement, as well as long-run stock returns to the acquirer after deal completion (see Betton, Eckbo, and Thorburn (2008) for a recent comprehensive literature review). Despite the voluminous literature, we are unaware of any study that assesses the rationality of investor valuation of target firm shares in the wake of acquisition announcements.[2] Our study fills a gap in the mergers and acquisitions literature with new evidence on abnormal post-announcement returns to target firm shareholders, documenting in particular that abnormal returns are predictable based on the ITP ratio, a proxy for investors' degree of optimism about the eventual deal outcome.

A substantial literature has asserted that psychological biases affect investor reactions to new information.[3] Two of the more prominent examples include post earnings announcement

[2] Hsieh and Walkling (2005) find that target firm stock returns over the thirty days after the announcement are positively associated with changes in share holdings of merger arbitrageurs during the six months around the announcement, but do not assess the predictability of abnormal returns to target firms after the announcement.
[3] Barberis, Shleifer, and Vishny (1998), Daniel, Hirshleifer, and Subrahmanyam (1998), and Hong and Stein (1999) construct models in which investor psychological biases lead to both under- and over-reaction to financial information. See Shleifer (2000), Barberis and Thaler (2003), and Baker, Ruback, and Wurgler (2007) for surveys of more studies on behavioral finance.

drift (Bernard and Thomas, 1989) and stock return momentum (Jegadeesh and Titman, 1993), each of which has been attributed to investor underreaction, to the new information contained in earnings and prior stock returns, respectively. We extend this literature by studying returns to target firm shareholders in the months following announcements of potential acquisitions of publicly traded firms. This setting provides opportunity for relatively powerful tests of the rationality of investor reactions to new information, because both the actual deal outcome and the post-announcement stock price of the target firm directly gauge investors' ex ante degree of optimism regarding the eventual outcome of the acquisition attempt.

Prior studies document predominant evidence of investor underreaction to announcements of corporate events, although theory does not provide a clear guidance on whether investors are more likely to over- or under-react to these announcements. For example, the post-announcement abnormal return is of the same sign as the announcement return for many corporate events, including earnings release, share repurchase, stock splits, spinoffs, and dividend omissions.[4] This evidence is suggestive of investor underreaction to announcements of these events. In contrast, we are unaware of prior evidence of investor overreaction to major corporate event announcements. The lack of evidence of investor overreaction to corporate event announcements is puzzling because overreaction is also predicted by some behavioral theories (see Footnote 3). In this study, we add to the literature with evidence of investor overreaction to merger and acquisition announcements.

We study 6,413 mergers and acquisitions announced between 1980 and 2012, and find that high ITP ratios are on average indicative of investor overreaction to the positive news implied by the announcement. In particular, the fraction of successfully acquired target firms is

[4] See, for example, Fama (1998), Loughran and Ritter (2000), and Bessembinder and Zhang (2013) for varying interpretations of the evidence.

is 59.5% for target firms with the highest decile of ITP ratios, compared to 73.5% for the rest target firms with lower ITP ratios. Cumulative abnormal returns (CARs) to target firms with the highest decile of ITP ratios average -3.50% over the two months after the acquisition announcement. We also find some evidence of investor underreaction in those cases where ITP ratios are low, as CARs in these cases are positive. However, the evidence of underreaction in the case of low ITP ratios is of mixed statistical significance and not as robust as the evidence of overreaction in the case of high ITP ratios.

The negative CARs to high ITP target firms are robust to alternative benchmark return models and across methods of acquisition payment. The CARs are negative and both economically and statistically significant for large and liquid firms and for firms of low idiosyncratic risks, indicating that the overreaction is not unique to small, illiquid, or highly risky firms where mispricing would be most difficult to correct. However, we do find that the CARs are more negative for smaller and less liquid firms, and for firms with higher idiosyncratic risks, consistent with the reasoning of Pontiff (2006) and Stambaugh, Yu, and Yuan (2012) that abnormal returns can be larger when trading is more costly and more risky. Returns measured using the calendar time portfolio method lead to similar conclusions. In particular, portfolios formed from target firms with the highest decile of ITP ratios are associated with estimated alpha of about -1.60% per month during the two month period after the acquisition announcement.

We delve further to assess the determinants of post-announcement returns to target firms. ITPs will depend on investor forecasts of deal outcomes. We cannot observe such forecasts, but we can observe ex post deal outcomes, which differ from forecasts randomly if investors are rational. We find that high ITP target firms continue to be associated with significantly negative CARs after controlling for ex ante deal characteristics and actual deal outcomes in multivariate

regressions. We also construct an "orthogonalized ITP ratio", as the portion of the ITP that is unrelated to deal characteristics or ex post deal outcomes. Target firms with the highest decile of orthogonalized ITP ratios are associated with post announcement two-month CARs of -3.70%, while those with the lowest decile are associated with two-month CARs of 1.88%. These results indicate that the abnormal post announcement returns to target firms associated with high ITP ratios cannot be attributed to rational forecasts of ex post deal outcomes.

Returns that are apparently abnormal could arise because our models of benchmark returns are inadequate. Two possibilities are price pressure and merger arbitrage risk. Merger arbitrageurs typically purchase shares of target firms upon acquisition announcement. Their demand can move prices beyond the equilibrium level if liquidity supply is less than perfectly elastic, as in Scholes (1972) and Mitchell, Pulvino, and Stafford (2004). However, such a price pressure hypothesis would apply to all target firms. Our results are inconsistent with this prediction, as we find significant negative returns only for the highest decile of ITP ratios, and we document positive abnormal returns to target firms in the lowest decile of ITP ratios. Baker and Savasoglu (2002) propose that poorly-diversified merger arbitragers will demand positive stock returns as compensation for bearing the risk of acquisition failure. However, our results indicate negative abnormal returns to target firms with high ITP ratios, which is inconsistent with the Baker and Savasoglu (2002) explanation.

We delve further by studying the relation between ITP ratios and actual deal outcomes, focusing in particular on the frequency of deal completion, offer price revisions, and the emergence of competing bids. We find considerable evidence of investor rationality, with the exception of the cases with the highest ITP ratios. In particular, the ITP ratio is a strong predictor of the likelihood that the acquisition will be successfully completed across the first

eight ITP deciles. The completion rate increase from 54.0% in the first decile of ITP ratio to 86.1% in the eighth decile. However, it decreases sharply to 79.1% and 59.5% for the last two deciles. High ITP ratios could in principle be justified by a greater likelihood of follow-on competing bids and/or greater revisions of offer price. However, the actual magnitude of offer price revisions is too small to justify the large variation of the ITP ratio. The average offer price revision is 0.3% for deals with ITP ratios in the first eight deciles, and is only slightly larger (0.8% and 3.4% respectively) for the last two deciles. The fractions of target firms that receive follow-on bids over the twelve months after the acquisition announcement are 9.2% and 19.0% for the last two deciles, rates that are not notably higher than those for the first eight deciles, which range from 5.8% to 17.0%. On balance, the evidence indicates that the low probabilities of deal completion for targets with high ITP ratios are not offset by a sufficiently larger offer price revision or a greater likelihood of competing bids. Instead the results suggest that investors are overoptimistic about eventual outcomes of some mergers and acquisitions, and consequently overreact to their announcements resulting in large ITP ratios.

Our study relates to but is distinct from the earlier literature on merger arbitrage (see Footnote 1 for related studies). In particular, the merger arbitrage literature considers the full set of acquisition attempts, while we focus on the key informational role of the ITP ratio. This reflects that the merger arbitrage literature seeks to measure risk and return for the group of investors who take the risk of deal outcome uncertainty. We focus on a different goal, in particular to gain understanding of whether investors' initial reactions to acquisition announcements are rational.

2. Data Sources and Descriptive Statistics

2.1. Sample Construction

We identify mergers and acquisitions targeting publicly-listed US companies announced between 1980 and 2012 from the Thomson Financial SDC database. We select all mergers (SDC deal form "M") and acquisitions of majority interest ("AM"). We follow the many prior studies that separate tender offers from general mergers and acquisitions, and focus on the latter group.[5] To calculate the initial target price, we require availability of the initial offer price in SDC and the target firm's stock price in the CRSP database. We exclude target firms if the first closing price after the acquisition announcement is below five dollars, as these are likely to involve bankrupt targets or penny stocks. If a merger and acquisition is announced on a non-trading day, the announcement date is assumed to be the first trading day after the announcement. We also exclude deals with extreme values of ITP ratio (below 0.2 or above 5), which potentially indicate the existence of data errors. Our final sample consists of 6,413 such mergers and acquisitions.

2.2. The Initial Target Price

Panel A of Table 1 presents summary statistics regarding the ITP ratio. The mean full sample ITP ratio is 93.0%, while the median is 93.7%. The average ITP ratio steadily increases from about 90% in early 1980s to over 95% at the end of the sample period (see also Figure 1). The median ITP ratio follows a similar trend over time, increasing from about 90% to more than 95% in recent years. The ITP ratio varies considerably across deals, with a full sample standard deviation of 15.4%. It is noteworthy that the ITP ratio exceeds one for 12.6% of the sample deals. The 95th percentile of the ITP ratio is 107% over the whole sample period, and is greater than 100% in each year except 1980, when it is 99.7%. While our results are based on a larger

[5] See, among others, Martin and McConnell (1991), Loughran and Vijh (1997), and Jindra and Walkling (2004). Tender offers differ significantly from general mergers and acquisitions in terms of deal hostility, speed of execution, method of payment, characteristics of acquirers and targets, bid premium, announcement returns, and long-run post-acquisition returns to the acquirer. See Betton, Eckbo, and Thorburn (2008) for a comprehensive review of related studies.

and more recent sample, they are generally consistent with Jindra and Walkling (2004) who find that 23% of 362 cash tender offers from occurring from 1981 to 1995 are associated with ITP ratios greater than 100%, i.e., negative speculation spreads.

To assess formally whether a time trend exists, we regress the mean and median ITP ratio by year on the number of years since 1980. Results are reported in Panel B of Table 1. We also assess whether the ITP ratio, being a measure of investor optimism regarding the takeover event, is related to market-wide investor optimism. To this end, we control for the annual level of the Baker-Wurgler (2006) measure of investor sentiment in the time trend regression.

The estimated coefficient on the time trend variable is 0.36%, and statistically significant at the one percent level in both columns of Table 1 Panel B. This indicates that both the mean and the median ITP ratios have increased on average by 0.36 percentage points per year. The coefficient on the Baker-Wurgler investor sentiment measure is positive, but is statistically insignificant. That is, the ITP ratio is not significantly associated with market-level investor sentiment.

The acquirer has incentives to pay the target firm's shareholders with stock rather than cash if the acquirer's stock is overvalued relative to that of the target (Shleifer and Vishny, 2003; Rhodes-Kropf and Viswanathan, 2004). If so, stock-financed mergers and acquisitions might be indicative of overvaluation of the acquirer's stock, and investors might respond differently to announcements of mergers and acquisitions financed by cash versus those financed by stocks, resulting in different ITP ratios. To examine this possibility, we divide our sample of mergers and acquisitions into three groups based on the method of payment: cash only deals, stock only deals, and mixed payment deals. Panel C of Table 1 reports summary statistics of the ITP ratios for the three subsamples of mergers and acquisitions. We observe that the average ITP ratio is

94.9% for cash deals, compared to 92.0% for stock deals and 92.1% for deals of mixed payment. That is, investors respond slightly more favorably to cash deals than deals involving stocks as payment.

2.3. Initial Target Price and Eventual Deal Outcome

Rational investors should set the initial target price based on their anticipations of eventual outcomes of the acquisition attempt. Consistent with this hypothesis, Jindra and Walkling (2004) find that the initial target price is positively associated with the magnitude of post announcement price revisions for the target firm. In testing this prediction, we consider four measures of ex post deal outcome: whether the deal is successfully completed, whether the deal is withdrawn, offer price revisions, and occurrence of follow-on competing offers.

Other things equal rational investors will respond more favorably to a merger and acquisition announcement when they expect the deal is more likely to be successfully completed, implying that the ITP ratio should be positively related to the likelihood of actual deal completion. We divide our sample into deciles based on the ITP ratio. Decile breakpoints are computed based on all 6,413 deals in our sample. In column (3) of Table 2, we report the fraction of deals that are successfully completed for each of the ten ITP deciles. Figure 2 depicts the same information. We observe that the fraction of completed deals increases monotonically from 54.0% for decile 1 to 86.1% for decile 8, consistent with the hypothesis that rational investors set a higher target firm stock price when they expect the acquisition attempt is more likely to succeed. Surprisingly, however, the completion rate sharply drops to 79.1% for decile 9 and even more drastically to 59.5% for the highest decile.

In column (4) of Table 2, we report the fraction of withdrawn deals for each of the ten ITP decils. In line with the results on deal completion, we observe that the fraction of withdrawn

deals monotonically decreases from 36.3% for decile 1 to 10.9% for decile 8, but sharply increases to 17.5% and 33.2% for the last two deciles, respectively. The sharp increase in the likelihood of deal withdrawal for the highest ITP deciles is difficult to reconcile with the hypothesis that investors rationally respond to acquisition announcements.

We next assess the relationship between the ITP ratio and the magnitude of offer price revision. Column (5) of Table 2 presents the magnitude of offer price revision for each of the ten ITP deciles. We observe small offer price revisions ranging between -0.3% and 0.4% for the first eight deciles. Revisions of offer price are larger for the last two deciles: 0.8% and 3.4% respectively. Larger offer price revisions for the last two deciles are potentially consistent with the rational-response hypothesis. However, price revisions are too small to justify the variation of the ITP ratio, since the spread in the ITP ratios across extreme deciles is 46.3%, while the spread in offer price revision is only three percent.

Lastly, we investigate whether high ITP ratios could be justified by high frequencies of follow-on bids from competing acquirers. We present the fraction of target firms receiving competing bids during the year after the acquisition announcement for each of the ten ITP deciles in column (6) of Table 2. The fraction decreases from 17.0% in decile 1 to 5.8% in decile 8, and then increases to 9.2% for decile 9 and 19.0% for decile 10. This pattern is similar to that observed for the fraction of withdrawn deals, reflecting that competing offers in some cases lead to the withdrawal of the existing bid. Alternatively, the withdrawal of the existing bid could inspire other firms to attempt to acquire the target firm, or target management might also invite competing bids from white knights if they are not satisfied with the existing bid.

However, frequencies of competing offers cannot explain the puzzling low likelihood of deal success for deals with high ITP ratios. The combined fraction of completed deals and

follow-on competing offers, which is reported in the last column of Table 2, monotonically increases from 71.0% in decile 1 to 91.9% in decile 8, but decreases to 88.3% and 78.5% for the last two deciles respectively. That is, the occurrence of competing offers partially offsets the low likelihood of deal success for deals with high ITP ratios, but cannot fully explain it.

In summary, we find that the target firm stock prices after acquisition announcements exceed the offer price in a substantial fraction of mergers and acquisitions. The univariate analyses show that high ITP ratios cannot be fully reconciled with actual deal outcomes. Specifically, we find that target firms with the highest ITP ratios are actually less likely to be successfully acquired, and that the low success rates are only partially explained by follow-on competing bids and offer price revisions. An obvious potential explanation is that investors are over-optimistic about the eventual outcome of these deals and thus overreact to the deal announcement. The overreaction hypothesis predicts negative abnormal stock returns to target firms with high ITP ratios following the acquisition announcement. We examine this prediction in the next section.

3. Initial Target Price and Target Firm Stock Returns after Acquisition Announcement

3.1. Measure of Abnormal Stock Returns

Our main analysis focuses on stock returns to the target firm over the first two months following the acquisition announcement, although we also examine their stock returns over longer windows for robustness. We choose the two-month window because it is long enough for investors to learn a great deal about eventual outcomes. Indeed, the final outcome of many mergers and acquisitions is revealed within two months. In the present sample, the median length from announcement to completion is less than five months (137 calendar days), while the

median length to withdrawal is less than three months (80 calendar days). Our results show that abnormal returns to the target firm indeed concentrate in the first two months following acquisition announcement. A longer return window allows us to capture more deals with final resolution, but at cost of additional noise due to unrelated events.

Brown and Warner (1980, 1985) show that cumulative abnormal returns (CARs) adjusted with respect to the market return provide reliable measures of abnormal performance over short event windows. We follow them in calculating daily abnormal returns for each target firm *i* using the Fama-French (1993) and Carhart (1997) four factor model. As shown later, our results are robust to other benchmark models.

Over days (-252, -42) before the acquisition announcement, we estimate the following model:

$$R_{it} - R_{ft} = \alpha + \beta_1\left(R_{mt} - R_{ft}\right) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 UMD_t + e_{it}, \qquad (1)$$

where R_{it}, R_{mt}, and R_{ft} are stock returns to the target firm, the market and the risk-free bond on day *t*, respectively. We choose this ten-month estimation window to avoid potential influences of information leakage along the lines documented by Schwert (1996), who finds that target firm stock prices start to increase about two months before the acquisition announcement. The abnormal return to the target firm on day *s* after the acquisition announcement is then calculated as

$$(R_{is} - R_{fs}) - \widehat{\beta_1}\left(R_{ms} - R_{fs}\right) - \widehat{\beta_2} SMB_s - \widehat{\beta_3} HML_s - \widehat{\beta_4} UMD_s, \qquad (2)$$

where the beta-hats are estimates from model (1). Note that we use pre-announcement betas to calculate abnormal returns after the acquisition announcement, following prior studies on mergers and acquisitions (Betton, Eckbo, and Thorburn, 2008). In section 5.7, we address the

possibility that betas change around acquisition announcements by use of a calendar time portfolio approach.

3.2. Initial Target Price and Abnormal Returns after Acquisition Announcement

In Table 3, we present average CARs to target firms over the first two months after the acquisition announcement, for each of the ten ITP ratio deciles. In particular, we measure CARs during the first week (5 days), the first two weeks (10 days), the first month (21 days), and the first two months (42 days). The ITP deciles are constructed as follows. At the beginning of each year from 1983 to 2012, we compute the decile breakpoints using all mergers and acquisition before this year. The deals in the year are then assigned to a specific ITP decile based on the time-varying breakpoints. We require at least three years of data in order to have reliable decile breakpoints. As a result, the 163 deals over the period 1980-1982 are not assigned to any decile. Constructed in this manner, the decile classification of each sample merger and acquisition is known immediately upon each announcement. Therefore, investors in principle would be aware of any information required to capture the abnormal returns documented here.[6]

We observe that CARs steadily decrease as the ITP ratio increases across all four holding periods: one week, two weeks, one month, and two months. During the first week, CARs are 0.32% to target firms in the low ITP decile, and decrease to -0.28% for decile 9 and -0.74% for the high ITP decile. The magnitude of the CARs for each of the ITP deciles tends to increase with the length of the holding period. When the holding period is extended to two months, CARs become 2.21% for the low ITP decile and decrease to -3.5% for the high ITP decile.

A second notable observation is that CARs to target firms in the first two ITP deciles are always positive over the four holding periods, albeit statistically insignificant. In contrast, the

[6] In unreported results (available upon request), we observe similar results if we compute the decile breakpoints based on all mergers and acquisitions in our sample or on deals announced in the same year.

CARs are always negative for the 9th ITP decile and are statistically significant for holding periods up to one month. For the highest ITP decile, the CARs are negative and statistically significant throughout the four holding periods. The associated *t*-statistics are in the range between -5 and -4 for holding periods longer than two weeks. The negative CARs to target firms with the highest ITP ratios are also economically large. The two-month CARs are -3.50%, corresponding to an annualized abnormal return of -21.0%. The spread in CARs between the low ITP decile and the high ITP decile is always positive and statistically significant at the one percent level for holding periods longer than two weeks. In terms of the economic magnitude, the spread in two-month CARs is 5.71%, equivalent to an annualized return of about 34.3%.

Our results show positive but statistically insignificant abnormal returns to target firms with low ITP ratios. On the other hand, there are significantly negative abnormal returns to target firms with high ITP ratios. We also find low likelihoods of deal success for high ITP target firms. On balance the evidence is consistent with that investors are over optimistic about the ex post outcomes of high ITP mergers and acquisitions and consequently overreact to the announcement. In the following section, we carry out a battery of tests to assess the robustness of these main results.

4. Robustness Tests

4.1. Are the Abnormal Returns Robust to Methods of Payment?

We find that investors respond slightly more favorably to cash deals than deals involving stocks as payment (Table 1 Panel C). The average ITP ratio is 94.9% for cash deals, compared to approximately 92.0% for stock deals and deals of mixed payment. In our first robustness test, we examine whether abnormal returns to target firms are robust to different methods of

acquisition payment. To do so, we divide the sample target firms into three subsamples—cash only, stock only, and mixed payment—and examine their CARs over the first two months after the announcement. To conserve space, we only report CARs for the low ITP decile and the high ITP decile.

The results are presented in Panel A of Table 4. We observe that high ITP target firms have negative CARs over the first two months for each of the three methods of payment, and the negative CARs are statistically significant for holding periods longer than two weeks. In terms of the economic magnitude, the two-month CARs are -3.79%, -4.05%, and -2.72%, respectively, for cash only, stock only, and mixed payment deals. The low ITP target firms have insignificant CARs over the two months following the acquisition announcement when the acquisition is financed by cash only or stock only. For mixed-payment deals, the low ITP target firms are associated with positive CARs over the first two months after the announcement, which are statistically significant over the first two weeks and over the first month. Taken together, the results suggest that target firms with the highest decile of ITP ratios experience negative abnormal returns over the first two months following the acquisition announcement regardless of the method of payment.

4.2. Are the Abnormal Returns Robust to Firm Size?

Investors could profit from short selling the target firms with high ITP ratios because of the negative abnormal returns to these firms. It is more costly to short sell small and illiquid stocks, and stocks with high idiosyncratic risks. Consequently, one will expect more significant abnormal returns to high ITP target firms as the transaction cost increases. This is consistent with the reasoning of Pontiff (2006) and Stambaugh, Yu, and Yuan (2012) that anomaly returns will be larger for stocks with higher transaction costs. In the current and the next two

subsections, we assess the robustness of the negative abnormal returns to high ITP target firms with respect to firm size and the level of illiquidity and idiosyncratic risk.

We first investigate whether the abnormal returns depend on the size of the target firm. To do so, we sort the target firms into two subgroups based on their market capitalization. Following Moeller, Schlingemann, and Stulz (2004), we regard small firms as those with market capitalization below the 25^{th} percentile of all NYSE-listed firms at the end of the month prior to the acquisition announcement. The rest firms are assigned to the large size group. About two thirds of the target firms (4,005 of them) are assigned to the small size group, indicating that acquisition targets tend to be small firms.

Panel B of Table 4 presents CARs to the target firm for both the small size group and the large size group. We first discuss the CARs to target firms with the lowest decile of ITP ratios. Over holding periods up to one month CARs to the low ITP target firms are always positive and statistically insignificant. This is true for both the small size group and the large size group. When the holding period is extended to two months, the CARs to small low-ITP target firms become positive and marginally statistically significant at the ten percent level, while the CARs to large low-ITP target firms are negative and statistically insignificant. Differences in CARs to low ITP target firms between the small size group and the large size group are not statistically significant over all the four holding periods.

CARs to target firms with the highest decile of ITP ratios are negative over all the four holding periods, and for both small and large target firms. They are always statistically significant for small target firms, and are statistically significant for large target firms except when the holding period is one week. The CARs to high ITP target firms are greater for the large size group than the small size group over all the four holding periods. For example, the

two-month CARs are -4.45% for small target firms and -2.36% for large target firms. This is consistent with the reasoning that anomaly returns are more significant for small firms. However, differences in CARs to high ITP target firms between the small size group and the large size group are statistically insignificant over all the four holding periods. On balance, the results suggest that CARs to high ITP target firms are significantly negative for both small firms and large firms.

4.3. Are the Abnormal Returns Significant for Liquid Stocks?

We sort our sample target firms into two groups based on whether their level of illiquidity is above the median of all target firms. Illiquidity is computed as the average of the daily ratio of absolute stock return to dollar trading volume, as in Amihud (2002). It is computed using daily stock returns in the third month prior to the acquisition announcement in order to avoid potential impacts of the acquisition due to information leakage.

Panel C of Table 4 presents CARs to both low-illiquidity and high-illiquidity target firms. CARs to low ITP target firms over all the four holding periods are always positive, for both low illiquidity and high illiquidity firms. They are statistically significant only when the holding period is two month and only in the high illiquidity sample. The differences in CARs to low ITP target firms between the two illiquidity groups have mixed signs and are statistically insignificant over all the four holding periods.

As in the whole sample, CARs to high ITP target firms are always negative in both the low illiquidity sample and the high illiquidity sample. They are almost always statistically significant. The only exception occurs to the low illiquidity sample when the holding period is one week. CARs to high ITP target firms are greater in the low illiquidity sample than the high illiquidity sample. The differences in CARs to high ITP target firms between the two samples

are more than 1.25% over all the four holding periods, and are statistically significant over holding periods up to two weeks. Altogether, the results indicate that abnormal returns to high ITP target firms tend to be more negative for illiquid firms. But they remain both economically and statistically significant for liquid firms.

4.4. Do the Abnormal Returns Depend on Idiosyncratic Risk?

Ang, Hodrick, Xing, and Zhang (2006) show that firms with high realized idiosyncratic risks are associated with low expected stock returns. It is possible that the negative abnormal returns to high ITP target firms arise because are characterized by low idiosyncratic risk. In this subsection, we examine whether the negative abnormal returns remain significant for target firms with low idiosyncratic risks. We further examine the relationship between the negative abnormal returns and idiosyncratic risk in multivariate regressions in section 5. Following Ang et al., we compute idiosyncratic volatility as the annualized standard deviation of the residual stock return in the Fama-French three factor regression. It is also measured in the third month prior to the acquisition announcement in order to avoid potential contaminations of the announcement. We then divide the sample target firms into two groups based on their idiosyncratic risk.

Panel D of Table 4 presents CARs to target firms sorted on idiosyncratic risk. CARs to low ITP target firms have mixed signs and are statistically insignificant when idiosyncratic risk is high, but are always positive over all the four holding periods when idiosyncratic risk is low and are statistically significant for holding periods up to one month. The differences in CARs to low ITP target firms between the low idiosyncratic risk sample and the high idiosyncratic risk sample are both economically and statistically significant for holding periods up to one month. For example, the difference in one-month CARs is 4.60% and statistically significant at the five percent level. This is consistent with the finding of Ang et al.

In contrast, CARs to high ITP target firms are negative over all the four holding periods, regardless of the level of idiosyncratic risk. The CARs are always statistically significant at the one percent level for the high idiosyncratic risk sample, but are statistically significant only when the holding period is longer than one month for the low idiosyncratic risk sample. The CARs are more negative when idiosyncratic risk is higher. For example, the two-month CARs are -1.26% for the low idiosyncratic risk group and -4.57% for the high idiosyncratic risk group. The differences in CARs across the low versus high idiosyncratic risk sample are always positive and are statistically significant for holding periods up to one month. On balance, we find more negative CARs to target firms with high idiosyncratic risks, which is broadly consistent with the results of Ang et al. Importantly, however, the negative abnormal returns to high ITP target firms remain economically and statistically significant when idiosyncratic risk is low.

4.5. Are the Abnormal Returns Robust to Different Benchmark Models?

The CARs presented so far are relative to the Fama-French-Carhart four factors specified in equation (1). In this subsection, we examine whether our results are robust to alternative benchmark return models. In particular, we consider raw returns, market-adjusted returns, and abnormal returns with respect to the market model (Brown and Warner, 1980). The market model adjusted return is estimated using a similar procedure as the four factor model adjusted return. Over days (-252, -42) before the acquisition announcement, we estimate the model:

$$R_{it} = \alpha + \beta R_{mt} + e_{it}. \qquad (3)$$

The abnormal return on day s after the acquisition announcement is then calculated as $R_{is} - \hat{\alpha} - \hat{\beta} R_{ms}$.

Panel E of Table 4 presents the CARs based on three different benchmarks as well as the raw cumulative returns. CARs relative to the market model and market-adjusted CARs follow

similar patterns as CARs relative to the four factor model. Specifically, CARs to low ITP target firms are always statistically insignificant, while CARs to high ITP target firms are always negative and statistically significant over all the four holding periods. The CARs are also of comparable economic magnitudes. For example, the two-month CARs to high ITP target firms are -3.50% based on the four factor model, -4.90% based on the market model, and -3.38% relative to the market return. The cumulative raw returns to low ITP target firms are positive over all the four holding periods. The two-month cumulative raw returns are both economically large, 4.52%, and statistically significant at the one percent level. Cumulative raw returns to high ITP target firms are always negative and are statistically significant over holding periods longer than two weeks. Overall, the results in Panel E of Table 4 suggest significantly negative abnormal returns to high ITP target firms relative to alternative benchmark return models.

4.6. Do the Abnormal Returns Reverse over Longer Horizons?

Our analysis to this point has centered on holding periods of up to two months. Do the negative abnormal returns to high ITP target firms reverse over longer horizons? Figure 3 depicts CARs to target firms in each of the ITP deciles. We observe that CARs to target firms in the highest decile of ITP ratios continue to decrease after the first two months. However, the rate of decrease is mitigated, and CARs are quite flat after the first two months. On the other hand, CARs to target firms in the first nine ITP deciles continue to increase after the first two months at slow paces. Altogether, Figure 3 shows that the negative abnormal returns to high ITP target firms do not reverse after the first two months.

In summary, the negative abnormal returns to high ITP target firms are robust to a battery of additional tests. Specifically, they are robust to all forms of acquisition payment, different benchmark return models, firm size, the level of idiosyncratic risk and illiquidity, and do not

reverse over longer holding horizons. The magnitude of the negative abnormal returns becomes smaller but remains both economically and statistically significant for large and liquid firms and firms of small idiosyncratic risks, which are less costly to short sell.

5. Distinguishing Between Explanations

In sections 2-4 we find that investors respond to a substantial fraction of acquisition announcements with very high target firm stock prices. In some cases the prices are so high that they exceed the offer price from the current acquirer, i.e., the initial target price is greater than one. Are the high ITP ratios the result of investor overreaction to the acquisition announcement? Our findings are consistent with this reasoning. In particular, we document low likelihoods of ex post deal consummation and negative post-announcement stock returns to target firms in the highest decile of ITP ratios. These results suggest that investors are overly optimistic about the eventual outcome of certain acquisition announcements. Their optimism results in overly high target firm stock prices right after the announcement, which reverse after the announcement when the uncertainty of the deal outcome is gradually resolved. However, there are alternative possible explanations for the results besides investor overreaction, which we assess in this section.

5.1. Could Ex Ante Deal Characteristics Explain the Negative Abnormal Returns?

Rational investors will set the stock price of the target firm upon the acquisition announcement based on observable deal characteristics and anticipations of eventual deal outcomes. Consistent with this rational investor hypothesis, Jindra and Walkling (2004) find that the initial target price is significantly associated with ex ante deal characteristics in their sample of 362 cash tender offers over the 1981-1995 period. It is possible that the negative abnormal

returns to target firms with the highest decile of ITP ratios are driven by ex ante deal characteristics that are correlated with the ITP ratio. If so, the negative abnormal returns may be explained once we control for relevant deal characteristics. We term this alternative explanation as the omitted deal characteristics hypothesis.

We test this hypothesis in multivariate regressions of post-announcement CARs to the target firm, in which we include the high ITP dummy and relevant deal characteristics as explanatory variables. The high ITP dummy takes the value of one if the ITP ratio is in the highest decile, and zero otherwise. A negative coefficient estimate on the high ITP dummy would be at odds with the hypothesis, while an insignificant or positive coefficient will be at odds with the investor overreaction hypothesis. The explanatory deal characteristics we consider are motivated by Jindra and Walkling (2004). In particular, we control for the following characteristics: attitude of the target management toward the acquisition, the transaction value (converted to 2012 dollars using consumer price index), the diversification deal indicator, the bid premium, the stock only indicator, and target firm stock price runup over days (-42, -2) before the acquisition announcement.

We present the regression results in Table 5. The coefficient estimate on the high ITP dummy when we do not control for deal characteristics is -3.54 (column 1). In column (2) we report results while controlling for deal characteristics. The coefficient on the high ITP dummy becomes -2.98, and remains statistically significant at the one percent level. Two of the six deal characteristics are significantly associated with the two-month CARs. In particular, diversifying deals and deals with low bid premiums are negatively associated with two-month CARs.

In column (3) of Table 5 we also control for idiosyncratic risk and illiquidity of the target firm in addition to the deal characteristics. The two-month CARs are negatively associated with

idiosyncratic risk and positively associated with illiquidity. The results are consistent with Ang, Hodrick, Xing, and Zhang (2006) and Amihud (2002). More important, the coefficient on the high ITP dummy remains negative and statistically significant at the one percent level.

In the models specified in columns (4)-(6), we replace the dependent variable with the one-month, two-week, and one-week CARs, respectively. The coefficient in on the high ITP dummy remains negative and statistically significant in all three columns, though statistical significance is marginal when the holding period is one week. Altogether, the regression results in Table 5 suggest that ex ante deal characteristics are not the driving force behind the negative abnormal returns to high ITP target firms.

5.2. Could Anticipations of Deal Outcome Explain the Negative Abnormal Returns?

The ITP ratio should also be related to investors' expectations of eventual deal outcomes at the time of acquisition announcement. If these expectations are rational then the ex post deal outcomes should equal the expected outcomes plus random noise. Relevant deal outcomes include whether the deal is completed, whether there is a follow-on bid from competing acquirers, and the magnitude of the revision of the offer price by the existing acquirer. As shown in Table 2 and Figure 2, target firms in the last two ITP deciles are associated with surprisingly low likelihoods of deal consummation. Neither offer price revisions nor follow-on competing bids seem to be able to explain the low likelihood of deal completion. However, it is possible that the negative abnormal returns to high ITP target firms are driven by investors' rational expectations of eventual deal outcomes at the time of acquisition announcement. We examine this possibility in multivariate regressions. Specifically, we regress post-announcement CARs to target firms on the eventual deal outcomes and the high ITP dummy. The coefficient

estimate on the high ITP dummy should be insignificant if the negative abnormal returns are driven by investors' anticipations of the eventual outcome.

Results of this analysis are presented in Table 6. In column (1), we observe that the coefficient on an indicator variable that equals one if a deal is completed is 6.21, and is statistically significant at the one percent level with an associated *t*-statistic of 12.02. That is, two-month CARs to successfully acquired target firms are 6.21% higher than those to target firms that remain independent. The coefficient on the indicator variable for the presence of a follow-on bid is 5.01 and statistically significant at the one percent level. This indicates that two-month CARs are 5.01% higher for target firms that receive follow-on bids from competing acquirers. The coefficient on the magnitude of offer price revision is also positive and statistically significant at the one percent level. The results are intuitive, as they indicate higher two-month CARs to target firms that are successfully acquired, that receive follow-on competing offers, and that experience larger offer price revisions, ex post.

Most importantly, the analysis indicates that high ITP target firms are still associated with negative CARs over the two months following the acquisition announcement after controlling for the ex post deal outcomes: The coefficient estimate for the high ITP dummy is -3.75 and statistically significant. When we add ex ante deal characteristics, idiosyncratic risk and illiquidity as explanatory variables (column 2), the coefficients on eventual deal outcomes and the high ITP indicator are largely unaffected. In columns (3)-(5), we replace the dependent variable with the one-month, two-week, and one-week CARs, respectively. The coefficient on the high ITP dummy remains negative and statistically significant at the one percent level in all three model specifications. Overall, the results indicate that neither eventual deal outcomes nor ex ante deal characteristics can explain the negative abnormal returns to high ITP target firms.

5.3. Deal Completion Risk

Baker and Savasoglu (2002) propose that merger arbitrageurs should be compensated for bearing the risk of deal withdrawal in the markets with limits to arbitrage. The completion risk hypothesis predicts that post announcement returns to target firms will be positive on average and will increase with the estimated ex ante deal completion risk.

Our finding of negative abnormal returns to high ITP target firms are unlikely to be explained by ex ante completion risk, for the following reasons. First, the completion risk hypothesis implies positive post announcement returns to target firms, and thus cannot account for the negative abnormal returns to high ITP target firms. Second, high ITP target firms are less likely to be successful acquired ex post (see Table 2 and Figure 2) and thus have high ex ante completion risks. Third, the regression results in Table 5 show that high ITP target firms are associated with significant negative abnormal returns after controlling for relevant ex ante deal characteristics, i.e., after controlling for ex ante deal completion risk.

Nevertheless, we estimate ex ante completion risk following Baker and Savasoglu (2002). In unreported regression results (available upon request), we find that high ITP target firms are associated with significantly negative abnormal returns after controlling for the estimated completion risk and other relevant deal characteristics.

5.4. Orthogonalized Initial Target Price and Post Announcement Stock Returns

In this subsection, we report on another test of the possibility that the negative abnormal returns to high ITP target firms are driven by ex ante deal characteristics and/or investors' rational expectations of eventual deal outcomes at the time of deal announcement. In particular, we orthogonalize the ITP ratio with respect to deal characteristics and eventual outcomes in linear regressions. The orthogonalized ITP ratio cannot be explained by observable deal

characteristics or ex post deal outcomes. Variability in the orthogonalized ITP ratio cannot be attributed to variation in rational forecasts of deal outcomes. In this sense, it is a less noisy proxy for investor mis-reaction to the acquisition announcement.

We first describe the orthogonalization process. The corresponding regression results are presented in Panel A of Table 7. In column (1), we only include ex post deal outcomes as explanatory variables. We observe that the coefficient in front of the completed deal dummy is 2.60 and statistically significant at the one percent level. That is, the ITP ratio of completed deals is 2.60 percentage points higher than other deals. The coefficient on offer price revision is 0.34 and also statistically significant at the one percent level. On the other hand, target firms receiving follow-on bids are not significantly associated with the ITP ratio. In column (2), we employ ex ante deal characteristics to explain the ITP ratio. We observe that hostile deals, stock deals, and bid premium are negatively associated with the ITP ratio, while pre-bid target firm price runup is positively associated with the ITP ratio. The model specified in column (3) controls for both ex ante deal characteristics and actual deal outcomes. The coefficients in front of the variables are qualitatively similar to those in the first two columns. The results indicate that investors indeed react to acquisition announcements based on observable deal characteristics and their expectations of eventual deal outcomes.

We use the residuals estimated from column (3) of Table 7 Panel A as the orthogonalized ITP ratio. We then sort the sample target firms into deciles based on the orthogonalized ITP ratio. Panel B of Table 7 presents post announcement CARs to target firms for each of the deciles. The first decile has positive CARs over all the four holding periods. The CARs are statistically significant when the holding period is longer than five days. The last two deciles have negative and statistically significant CARs for each of the four holding periods considered

here. The negative CARs are economically large. For example, the two-month CARs are -2.57% for the highest decile of orthogonalized ITP ratio. The seven deciles in between have mixed signs and are occasionally statistically significant. Overall, the patterns of post announcement CARs are similar to those in Table 3. Target firms with high orthogonalized ITP ratios are associated with significantly negative abnormal returns following the acquisition announcement. The results are at odds with the hypothesis that the ITP ratio reflects investors' reactions to the acquisition announcement in a fully rational manner. They provide further support for the investor overreaction hypothesis.

5.5. Do Investors Correct the Overreaction Over Time?

We next assess whether investors have learned over time that high ITP ratios are indicative of overreaction. In particular, we examine whether the low likelihoods of deal consummation and/or the negative abnormal returns to target firms in the highest decile of ITP ratios diminish or disappear over time. To do so, we divide our sample into three sub periods of equal length—1980-1990, 1991-2001, and 2002-2012—and investigate changes in the ITP ratio and changes in abnormal returns to high ITP target firms over time.

In Panel A of Table 8, we examine the percentage of mergers and acquisitions that are successfully consummated over each sub-period. We observe that high ITP ratios are associated with low likelihoods of deal success in all three periods. During the first period the success rate increases from 44.7% from the low ITP decile to 61.8% for the 7th decile, and then decreases to 36.8% for the high ITP decile. The overall success rate is low (49.0%) in this period because of the popularity of hostile takeovers in 1980s. The success rate follows a similar inverse "U" shape over the last two periods. The high ITP decile is associated with a success rate of 77.4%

and 60.6%, respectively, in the last two periods, which are lower than the success rate of 80.5% for all deals over each period.

We next examine changes in abnormal returns to high ITP target firms over time in multivariate regressions. Specifically, we regress the two-month CARs on deal characteristics and deal outcomes, idiosyncratic volatility and illiquidity, and the high ITP dummy. The investor learning hypothesis predicts that the coefficient estimate on the high ITP dummy will diminish over time. In Panel B of Table 8, we observe that the coefficient is -3.01, -2.89, and -2.28 over the three periods, respectively. The estimate is statistically significant at the five percent level in all three periods. Differences in coefficient estimates across time periods are always statistically insignificant, with associated *t*-statistics smaller than 0.45. The results in Table 8 therefore provide only limited evidence in favor of the investor learning hypothesis. While magnitudes of abnormal returns decrease slightly decreases over time, the changes are statistically insignificant, and the evidence indicates overreaction for high ITP ratios in all three time periods.

5.6. Are the Negative Abnormal Returns the Result of Price Pressure?

Merger arbitrageurs purchase shares of the target firm upon acquisition announcement, while short selling shares of the acquirer firm. Mitchell, Pulvino, and Stafford (2004) show that price pressure that results from the short selling of merger arbitragers accounts for nearly half of the negative announcement returns to stock-financed acquirers. By analogy, price pressure associated with the demand for target firm shares could push stock prices above the full information equilibrium if the liquidity supply curve is not perfectly elastic, as in Scholes (1972). Since the price pressure hypothesis predicts that target firm stock price will reverse to the

information-efficient level following acquisition announcement it is possible that the negative abnormal returns to high ITP target firms are the result of price pressure.

However, the price pressure effect cannot be the driving force behind the negative abnormal returns to high ITP target firms, for the following three reasons. First, Baker and Savasoglu (2002) propose that merger arbitragers are not fully diversified and need to be compensated with extra stock returns for bearing the risk of acquisition failure. Rational merger arbitrageurs should not demand so many shares of the target firm that their price is pushed beyond full information levels. Second, the price pressure effect implies negative abnormal returns to all target firms regardless of the level of the ITP ratio. However, we do not observe negative abnormal returns to target firms with low ITP ratios. In contrast, Table 7 reports positive abnormal returns to target firms with the lowest decile of ITP ratios. In addition, the price pressure hypothesis has no specific predictions on the relationship between the initial target price ratio and eventual deal outcomes. Therefore, it cannot explain the low likelihood of deal consummation for high ITP target firms. On balance, the results reported here are difficult to reconcile with the price pressure hypothesis.

5.7. Time-varying Loadings on Risk Factors

To this point we have computed CARs to target firms using model (1), based on loadings on risk factors before the acquisition announcement. It is possible that factor loadings could change after acquisition announcements. For example, Bhagat, Brickley, and Loewenstein (1987) propose that the acquisition offer is essentially an option to the target shareholders, the existence of which could change factor loadings. To test this possibility, we examine abnormal returns to target firms based on calendar time portfolio analysis.

The calendar time portfolio analysis is interesting of additional interest, for two reasons. Portfolio returns are less subject to firm-specific risks, and thus helping to alleviate any concern related to omitted firm-specific risk factors. In addition, calendar time portfolios offer an measure of returns to investors who are potentially interested in applying our findings in practice.

We form monthly trading portfolios based on the ITP ratio as follows. At the beginning of each month from January 1983 to December 2012, we identify target firms that received an acquisition bid during the previous two months.[7] We then divide the identified target firms into ten portfolios depending on its ITP ratio. The decile breakpoints are computed using mergers and acquisitions announced in preceding years.

Panel A of Table 9 summarizes raw returns to the monthly portfolios. On average there are 2.5 to 5.7 stocks in each portfolio in a month. The equal-weighted portfolio return is 2.15% for the low ITP decile and sharply decreases to -0.68% for the high ITP decile.[8] The decrease in portfolio return across the ITP deciles is not strictly monotonic. The value-weighted return follows a similar pattern, decreasing from 1.89% for the low ITP decile to -0.69% for the high ITP decile.

We then estimate the alpha for each monthly portfolio as the intercept obtained when regressing the monthly portfolio return in excess of the risk-free interest rate on the four Fama-French (1993) and Carhart (1997) risk factors. Estimated alphas for each equal-weighted portfolio are presented in Panel B of Table 9. The estimated alpha is -1.63% per month for the high ITP decile, which is statistically significant at the one percent level with an associated *t*-

[7] We also extend the holding period to six months after the acquisition announcement, and find estimated alphas of about -1.40% per month for the portfolio of target firms in the last ITP decile. The alphas are statistically significant at the one percent level with *t*-statistics below -3.4. The results are available upon request.

[8] Asparouhova, Bessembinder, and Kalcheva (2013) show that noise in transaction prices leads to upward bias in equal-weighted portfolio returns. Following their suggestion we correct the potential bias by weighting the return of each individual stock by the prior-period gross return on the same stock.

statistic of -3.32. Estimated alphas for the other nine deciles have mixed signs and are statistically insignificant, except for the fourth decile. Panel C of Table 9 presents the same results for value-weighted portfolio returns. The estimated alpha is -1.59% per month for the high ITP decile, which is statistically significant at the one percent level. The alphas for the other nine deciles are largely insignificant.

The calendar time portfolio analysis shows that high ITP target firms are associated with estimated alphas of about -1.60% per month. The negative and significant alphas confirm the finding of negative CARs reported in Tables 3-7. They suggest that the negative CARs are not driven by changing loadings on risk factors before versus after the acquisition announcement. These results are consistent with investors overreacting to merger and acquisition announcements that are characterized with high ITP ratios.

5. Conclusions

We investigate investor reactions to merger and acquisition announcements. Such announcements provide a powerful opportunity to examine the rationality of investor reaction to new information because the target firm stock price immediately after the announcement provides a measure of investors' degree of optimism regarding the eventual deal outcome. Employing the ratio of the target firm stock price on the first day after the announcement to the offer price, termed as the initial target price, as the proxy for the degree of investor optimism, we find that target firms with the highest decile of initial target price ratios are associated with surprisingly low likelihoods of actual deal consummation and large negative abnormal returns over the first two months after the announcement. The results are robust to methods of payment, benchmark stock return models, firm size, the level of illiquidity, and the level of idiosyncratic

risk. The results are generally not consistent with alternative explanations such as price pressure. The results suggest that investors are overoptimistic about the eventual deal outcome of some mergers and acquisitions and overreact to their announcements.

This study contributes to both the mergers and acquisitions literature and the behavioral finance literature. Prior studies on investor reactions to mergers and acquisitions center on announcement returns to the acquirer and the target firms and long-run stock returns to the acquirer after deal completion. This study fills the gap in the literature with new evidence of abnormal stock returns to target firms following the announcement. The abnormal returns also add new evidence to the behavioral finance literature. In addition, we provide evidence regarding why investors overreact to some merger and acquisition announcements: They are overoptimistic about the eventual deal outcome.

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Figure 1: Initial target price and the Baker-Wurgler sentiment

This figure depicts the average initial target price and the Baker-Wurgler (2006) sentiment measure by year. Initial target price is the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. Our sample includes mergers and acquisitions announced between 1980 and 2012.

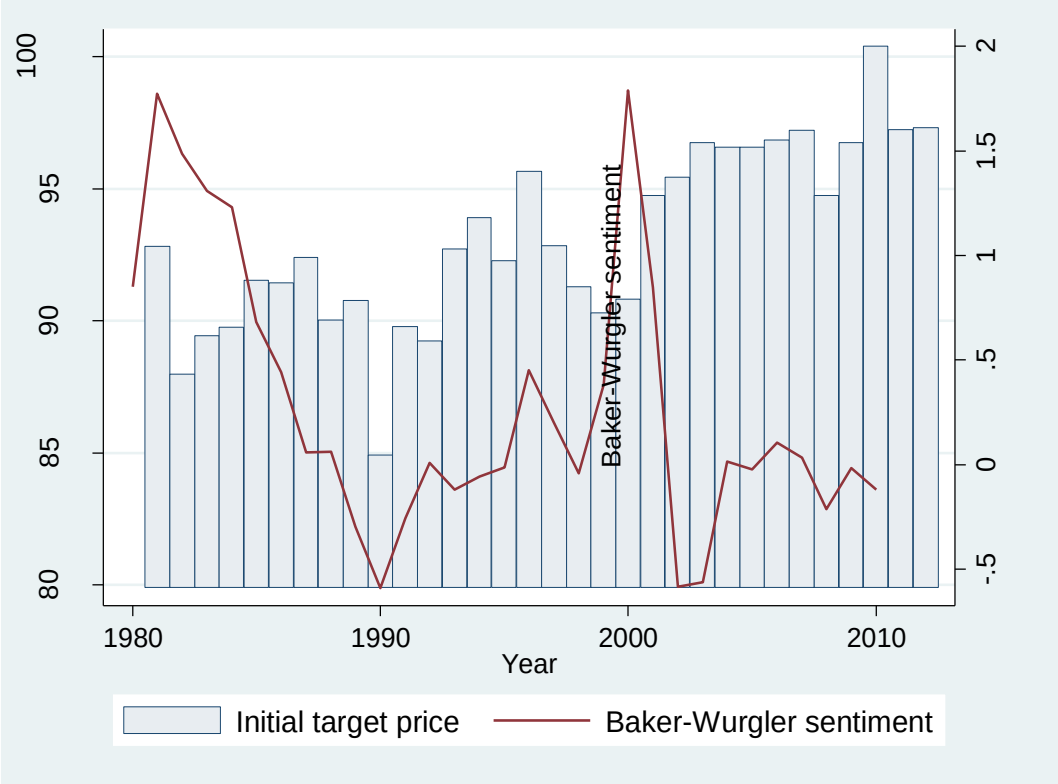
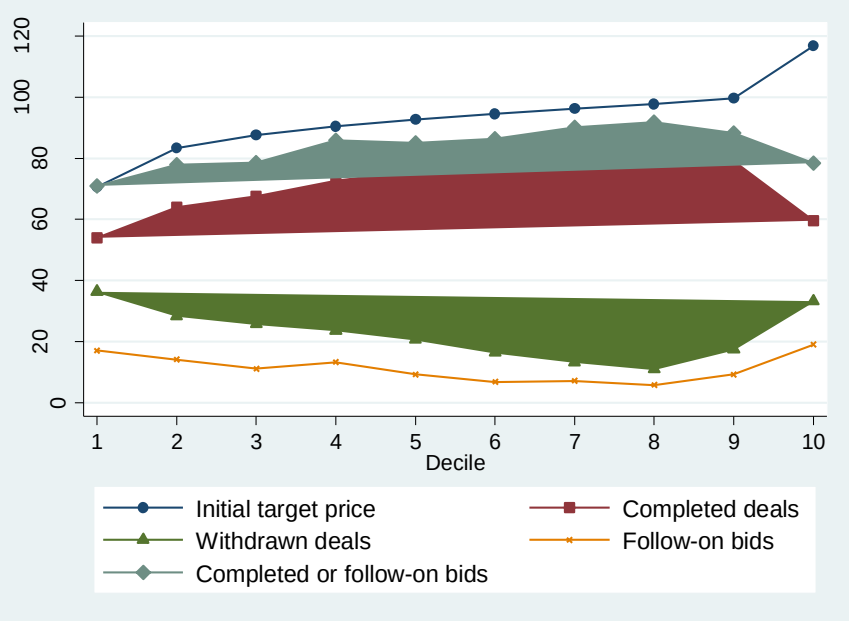


Figure 2: Initial target price and outcome of mergers and acquisitions

This figure depicts the outcome of the sample mergers and acquisitions, grouped by decile of the initial target price. Initial target price is the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. The outcome includes deal completion, deal withdrawal, revision of offer price, and follow-on competing bids in the one-year period after the acquisition announcement. Our sample includes mergers and acquisitions announced between 1980 and 2012.

Panel A: Deal completion, withdrawal, and follow-on bids



Panel B: Revision of offer price

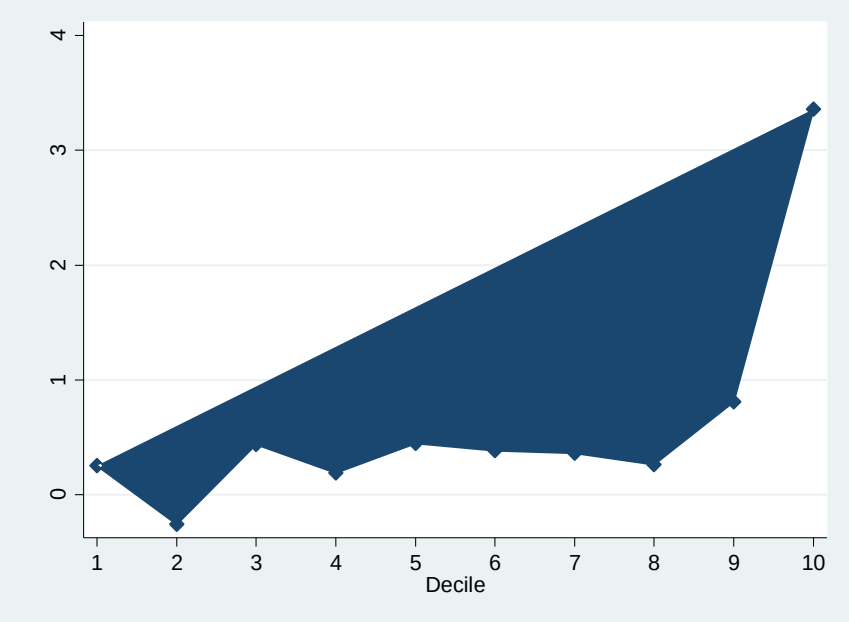


Figure 3: Initial target price and cumulative abnormal returns to the target firm

This figure depicts cumulative abnormal returns (CARs) to the target firm over the 6 months (126 days) starting from the second trading day after the merger and acquisition announcement, grouped by decile based on the initial target price. Initial target price is the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. Daily abnormal return is computed using the Fama-French-Carhart four factor model. Our sample includes mergers and acquisitions announced between 1980 and 2012.

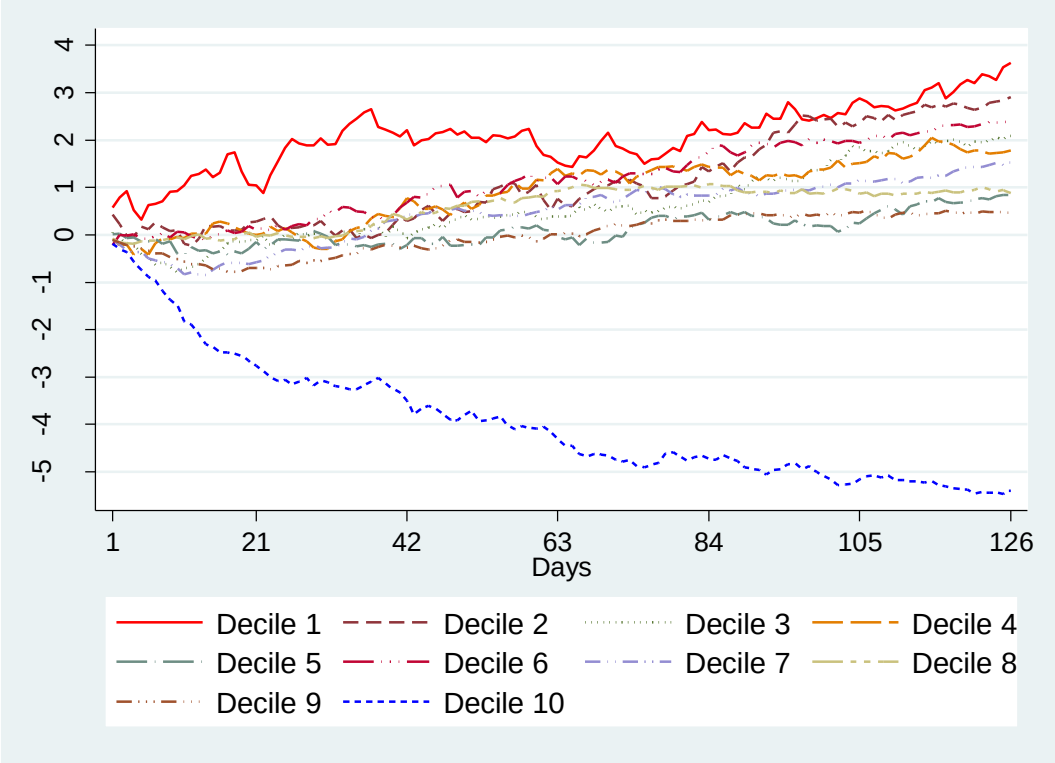


Table 1: Initial target price

Panel A presents the initial target price by year. Panel B presents the OLS regression results where the dependent variable is the mean/median initial target price of all deals in the year. The associated *t*-statistics are reported in the parentheses below each coefficient.

Panel B: Temporal trend in initial target price

	(1)	(2)
Dependent variable	Mean initial target price	Median initial target price
Year (1980 normalized to zero)	0.36***	0.36***
	(4.81)	(8.37)
Baker-Wurgler sentiment	0.52	0.03
	(0.47)	(0.05)
Constant	86.85***	87.20***
	(56.58)	(96.59)
Observations	31	31
R-squared	0.600	0.770

Panel C: Initial target price by method of payment

	Number	Initial target price (%)						
Deal type	of deals	Mean	Std. Dev.	p5	p25	Median	p75	p95
All cash	2137	94.9	9.6	80.2	91.7	96.1	98.4	105.2
All stock	1948	92.0	15.6	73.2	86.1	91.9	96.6	109.6
Mixed	2328	92.1	18.9	70.6	86.0	92.6	97.2	106.7

Table 2: Initial target price and outcome of mergers and acquisitions

This table presents the outcome of the sample mergers and acquisitions, grouped by decile of the initial target price. Initial target price is the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. The outcome includes deal completion, deal withdrawal, revision of offer price, and follow-on bids in the one-year period after the acquisition announcement. Offer price revision is set to zero if the offer price is not revised. Our sample includes mergers and acquisitions announced between 1980 and 2012.

Initial target price decile	Number of deals	Initial target price (%)	Percent of completed deals	Percent of withdrawn deals	Revision of offer price (%)	Deals receiving follow-on bids in one year (%)	
	(1)	(2)	(3)	(4)	(5)	(6)	(3) + (6)
Low	641	70.6	54.0	36.3	0.3	17.0	71.0
2	641	83.3	64.0	28.4	-0.3	14.0	78.0
3	640	87.7	67.5	25.8	0.4	11.1	78.6
4	643	90.6	72.6	23.6	0.2	13.2	85.8
5	641	92.7	75.8	20.6	0.4	9.2	85.0
6	635	94.6	79.7	16.4	0.4	6.8	86.5
7	648	96.3	83.0	13.3	0.4	7.1	90.1
8	641	97.8	86.1	10.9	0.3	5.8	91.9
9	641	99.6	79.1	17.5	0.8	9.2	88.3
High	642	116.9	59.5	33.2	3.4	19.0	78.5
Total	6413	93.0	72.1	22.6	0.6	11.2	83.4

Table 3: Initial target price and cumulative abnormal returns to the target firm

This table presents cumulative abnormal returns (CARs) to the target firm over the 2 months (42 days) starting from the second trading day after the merger and acquisition announcement, grouped by the initial target price decile. Initial target price is the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. Daily abnormal return is computed using the Fama-French-Carhart four factor model. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively. *T*-statistics are reported in parentheses. Our sample includes mergers and acquisitions announced between 1980 and 2012.

	Decile, Initial target price										Low -
Days	Low	2	3	4	5	6	7	8	9	High	High
5	0.32	0.18	-0.41	-0.29	-0.15	-0.08	-0.34**	-0.13	-0.28**	-0.74**	1.05
	(0.51)	(0.49)	(-1.59)	(-1.19)	(-0.75)	(-0.44)	(-2.05)	(-1.09)	(-2.33)	(-2.46)	(1.54)
10	0.92	0.09	-0.79**	-0.04	-0.39	0.06	-0.69***	-0.06	-0.51***	-1.48***	2.40***
	(1.19)	(0.20)	(-2.13)	(-0.13)	(-1.47)	(0.25)	(-2.67)	(-0.35)	(-3.02)	(-4.01)	(2.79)
21	1.04	0.29	-0.11	-0.01	-0.15	0.10	-0.58	-0.03	-0.69***	-2.76***	3.80***
	(0.98)	(0.44)	(-0.25)	(-0.01)	(-0.38)	(0.30)	(-1.44)	(-0.15)	(-2.72)	(-5.33)	(3.23)
42	2.21	0.30	-0.07	0.78	-0.22	0.69	0.46	0.32	-0.27	-3.50***	5.71***
	(1.53)	(0.30)	(-0.09)	(1.23)	(-0.36)	(1.34)	(0.89)	(0.98)	(-0.81)	(-4.78)	(3.53)

Table 4: Cumulative abnormal returns to target firm: Robustness checks

This table presents cumulative abnormal returns (CARs) over the 2 months (42 days) starting from the second trading day after the merger and acquisition announcement for target firms with low (first-decile) and high (last-decile) initial target prices. We further divide the target firms into subgroups based on the method of payment (Panel A), firm size (Panel B), illiquidity (Panel C), and idiosyncratic risk (Panel D). Panel E presents CARs based on different benchmark models. Initial target price is the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. Abnormal returns in Panels A-D are computed using the Fama-French-Carhart four factor model. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively. *T*-statistics are reported in parentheses. Our sample includes mergers and acquisitions announced between 1980 and 2012.

Panel A: Robustness to method of payment

	Cash		Stock		Mixed	
Days	Low	High	Low	High	Low	High
5	2.10	-0.35	-0.76	-0.73	0.73	-1.07**
	(1.03)	(-0.80)	(-0.95)	(-1.11)	(0.76)	(-2.58)
10	1.31	-1.37**	-0.62	-1.57*	2.28*	-1.49***
	(0.55)	(-2.56)	(-0.58)	(-1.94)	(1.88)	(-2.90)
21	-0.32	-2.72***	-0.66	-3.14***	3.17**	-2.43***
	(-0.09)	(-3.60)	(-0.42)	(-2.76)	(2.08)	(-3.41)
42	-0.46	-3.79***	2.44	-4.05**	2.93	-2.72***
	(-0.11)	(-3.72)	(0.99)	(-2.52)	(1.60)	(-2.62)

Panel B: Robustness to firm size

	Small		Large		Small - Large	
Days	Low	High	Low	High	Low	High
5	0.50	-0.78**	0.02	-0.69	0.48	-0.09
	(0.63)	(-2.19)	(0.02)	(-1.37)	(0.38)	(-0.14)
10	0.87	-1.75***	1.01	-1.16*	-0.14	-0.59
	(0.88)	(-3.78)	(0.80)	(-1.96)	(-0.09)	(-0.78)
21	1.02	-3.38***	1.07	-2.02***	-0.04	-1.36
	(0.75)	(-4.65)	(0.64)	(-2.76)	(-0.02)	(-1.31)
42	3.64*	-4.45***	-0.12	-2.36**	3.76	-2.09
	(1.96)	(-4.33)	(-0.05)	(-2.28)	(1.28)	(-1.43)

Panel C: Robustness to illiquidity

	Low illiquidity		High illiquidity		Low - High illiq.	
Days	Low	High	Low	High	Low	High
5	0.01	-0.25	0.75	-1.52***	-0.73	1.27**
	(0.01)	(-0.62)	(0.82)	(-3.49)	(-0.59)	(2.14)
10	1.39	-0.89*	0.66	-2.37***	0.73	1.48**
	(1.26)	(-1.87)	(0.60)	(-4.06)	(0.47)	(1.97)
21	0.58	-2.23***	1.74	-3.54***	-1.17	1.31
	(0.41)	(-3.43)	(1.10)	(-4.13)	(-0.55)	(1.22)
42	1.13	-2.95***	4.00**	-4.22***	-2.87	1.27
	(0.54)	(-3.21)	(2.05)	(-3.51)	(-1.00)	(0.84)

Panel D: Robustness to idiosyncratic risk

	Low idio. risk		High idio. risk		Low - High idio. risk	
Days	Low	High	Low	High	Low	High
5	2.51**	-0.23	-0.82	-1.31***	3.33**	1.08*
	(2.34)	(-0.59)	(-1.10)	(-2.82)	(2.55)	(1.79)
10	3.57***	-0.68	-0.40	-2.27***	3.97**	1.59**
	(2.82)	(-1.58)	(-0.41)	(-3.72)	(2.49)	(2.13)
21	4.11**	-1.51***	-0.49	-4.04***	4.60**	2.53**
	(2.47)	(-2.84)	(-0.36)	(-4.42)	(2.14)	(2.39)
42	2.47	-2.26***	2.63	-4.57***	-0.16	2.31
	(1.23)	(-3.31)	(1.36)	(-3.44)	(-0.06)	(1.55)

Panel E: Robustness to benchmark model

	4-factor model		Market model		Market-adjusted		Raw return	
Days	Low	High	Low	High	Low	High	Low	High
5	0.32	-0.74**	-0.05	-0.86***	-0.10	-0.67**	0.42	-0.43
	(0.51)	(-2.46)	(-0.08)	(-2.93)	(-0.16)	(-2.35)	(0.66)	(-1.49)
10	0.92	-1.48***	0.25	-1.75***	0.27	-1.45***	1.18	-1.03***
	(1.19)	(-4.01)	(0.31)	(-4.98)	(0.34)	(-4.23)	(1.42)	(-2.99)
21	1.04	-2.76***	0.00	-3.41***	0.31	-2.67***	1.59	-2.28***
	(0.98)	(-5.33)	(0.00)	(-6.73)	(0.28)	(-5.74)	(1.40)	(-4.86)
42	2.21	-3.50***	0.89	-4.90***	1.54	-3.38***	4.52***	-2.67***
	(1.53)	(-4.78)	(0.55)	(-7.00)	(1.03)	(-5.40)	(2.78)	(-4.22)

Table 5: The initial target price and cumulative abnormal returns to the target firm: Controlling for ex-ante deal characteristics

This table presents OLS regression results where the dependent variable is cumulative abnormal returns (CARs) to the target firm over four different horizons (5 days, 10 days, 21 days, or 42 days) starting from the second trading day after the merger and acquisition announcement. The abnormal return on each day is computed using model (1). Initial target price is the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. High initial target price takes the value of one if the initial target price is in the 10th decile. Hostile, diversifying deal, and stock deal are indication variables taking the value of one if the target management regards the acquisition attempt as hostile, if the acquire and the target are in different Fama-French 48 industries, and if the acquisition if financed with stock only, respectively. Price runup is cumulative stock returns to the target firm over days (-42, -2) before the acquisition announcement. Idiosyncratic risk is the standard deviation of the residual daily stock returns in the Fama-French three factor regression. Illiquidity is the average daily ratio of absolute stock return to dollar trading volume. Both variables are estimated using stock returns in the third month before the merger announcement. All model specifications employ robust standard errors. The associated *t*-statistics are reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively. Our sample includes mergers and acquisitions announced between 1980 and 2012.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable	42-day CARs			21-day CARs	10-day CARs	5-day CARs
High ITP dummy	-3.54***	-2.98***	-3.08***	-2.21***	-1.00***	-0.50*
	(-4.95)	(-4.03)	(-4.15)	(-4.13)	(-2.68)	(-1.72)
Hostile		0.37	0.21	0.24	0.66	0.46
		(0.38)	(0.21)	(0.28)	(0.95)	(0.82)
Log Tran. value		-0.02	0.30	0.31*	0.15	0.05
		(-0.17)	(1.18)	(1.77)	(1.21)	(0.47)
Diversifying deal		-1.11***	-0.89**	-0.89***	-0.60***	-0.23
		(-2.72)	(-2.19)	(-3.14)	(-3.03)	(-1.52)
Stock deal		0.50	0.74	-0.16	-0.32	-0.15
		(0.99)	(1.50)	(-0.47)	(-1.41)	(-0.84)
Bid premium		0.02***	0.02***	0.01	0.01	0.00
		(2.78)	(2.61)	(1.61)	(1.49)	(0.50)
Target price runup		-0.01	-0.01	-0.01	-0.01	-0.01
		(-0.46)	(-0.40)	(-0.64)	(-0.96)	(-1.38)
Idiosyncratic risk			-0.40**	-0.44***	-0.24***	-0.14**
			(-2.29)	(-3.69)	(-2.84)	(-2.17)
Log Illiquidity			0.28*	0.26**	0.13	0.06
			(1.80)	(2.50)	(1.63)	(0.93)
Constant	0.28	0.04	-0.17	-0.05	-0.02	0.20
	(1.41)	(0.06)	(-0.13)	(-0.05)	(-0.04)	(0.39)
Observations	6,413	6,369	6,263	6,263	6,263	6,263
R-squared	0.005	0.009	0.012	0.014	0.009	0.004

Table 6: The initial target price and cumulative abnormal returns to the target firm: Controlling for ex-post deal outcomes

This table presents OLS regression results where the dependent variable is cumulative abnormal returns (CARs) to the target firm over four different horizons (5 days, 10 days, 21 days, or 42 days) starting from the second trading day after the merger and acquisition announcement. The abnormal return on each day is computed using model (1). Initial target price is the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. High initial target price takes the value of one if the initial target price is in the 10th decile. Completed deal is a dummy variable that takes the value of one if the deal is successfully completed. Offer price revision is the difference between the final offer price and the initial offer price, divided by the initial offer price. "Follow-on bids" takes the value of one if the target firm receives another acquisition bid in the one-year period after the acquisition announcement. See Table 5 for definitions of other variables. All model specifications employ robust standard errors. The associated *t*-statistics are reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively. Our sample includes mergers and acquisitions announced between 1980 and 2012.

	(1)	(2)	(3)	(4)	(5)
Dependent variable	42-day CARs		21-day CARs	10-day CARs	5-day CARs
High ITP dummy	-3.75***	-3.48***	-2.66***	-1.40***	-0.88***
	(-5.18)	(-4.59)	(-4.91)	(-3.73)	(-2.97)
Completed deal	6.21***	6.17***	3.37***	1.76***	0.82***
	(12.02)	(11.14)	(8.34)	(6.34)	(4.26)
Offer price revision	0.21***	0.21***	0.17***	0.14***	0.12***
	(4.69)	(4.68)	(4.51)	(3.84)	(2.69)
Follow-on bids	5.01***	4.80***	2.92***	1.40***	0.52*
	(7.57)	(7.25)	(6.01)	(3.73)	(1.77)
Hostile		1.79*	0.76	0.71	0.25
		(1.90)	(0.99)	(1.17)	(0.50)
Log Tran. value		0.15	0.22	0.10	0.02
		(0.62)	(1.32)	(0.86)	(0.20)
Diversifying deal		-0.33	-0.60**	-0.44**	-0.14
		(-0.82)	(-2.16)	(-2.21)	(-0.91)
Stock deal		0.28	-0.37	-0.43*	-0.18
		(0.57)	(-1.13)	(-1.91)	(-1.11)
Bid premium		0.01	0.00	0.00	-0.00
		(1.49)	(0.67)	(0.25)	(-0.83)
Target price runup		-0.01	-0.01	-0.01	-0.01
		(-0.30)	(-0.53)	(-0.84)	(-1.26)
Idiosyncratic risk		-0.35**	-0.41***	-0.22***	-0.13*
		(-2.05)	(-3.42)	(-2.58)	(-1.93)
Log Illiquidity		0.29*	0.27***	0.14*	0.07
		(1.90)	(2.71)	(1.87)	(1.22)
Constant	-4.88***	-4.36***	-2.28***	-1.11*	-0.22
	(-9.93)	(-3.36)	(-2.58)	(-1.82)	(-0.45)
Observations	6,413	6,263	6,263	6,263	6,263
R-squared	0.046	0.050	0.049	0.043	0.040

Table 7: Orthogonalized initial target price and cumulative abnormal returns to the target firm

Panel A presents the OLS regression results where the dependent variable is the initial target price, which is the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. See Tables 5-6 for definitions of other variables. All model specifications employ robust standard errors. The associated *t*-statistics are reported in the parentheses below each coefficient. Panel B presents cumulative abnormal returns (CARs) to the target firm over the 2 months (42 days) starting from the second trading day after the merger and acquisition announcement, grouped by decile based on the residual initial target price estimated from column (3) of Panel A. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively. Our sample includes mergers and acquisitions announced between 1980 and 2012.

Panel A: Orthogonalizing the initial target price

	(1)	(2)	(3)
Dependent variable		Initial target price	
Completed deal	2.60***		3.35***
	(5.20)		(6.63)
Offer price revision	0.34***		0.41***
	(4.60)		(8.90)
Follow-on bids	-0.67		-0.62
	(-0.94)		(-0.96)
Hostile		-2.48***	-2.35***
		(-3.13)	(-2.79)
Log Tran. value		-0.05	-0.23*
		(-0.42)	(-1.90)
Diversifying deal		0.28	0.79*
		(0.70)	(1.94)
Stock deal		-1.24***	-1.61***
		(-3.07)	(-4.12)
Bid premium		-0.12***	-0.13***
		(-3.87)	(-3.89)
Target price runup		0.06***	0.07***
		(3.47)	(3.48)
Constant	91.01***	97.92***	96.60***
	(198.63)	(62.16)	(58.94)
Observations	6,413	6,369	6,369
R-squared	0.040	0.115	0.174

Panel B: Cumulative abnormal returns to the target firm

	Decile, Orthogonalized initial target price										Low -
Days	Low	2	3	4	5	6	7	8	9	High	High
5	0.60	-0.18	-0.14	-0.16	-0.28*	-0.03	-0.61***	-0.23	-0.46***	-0.54*	1.13**
	(1.42)	(-0.81)	(-0.69)	(-0.92)	(-1.70)	(-0.19)	(-3.75)	(-1.33)	(-2.59)	(-1.82)	(2.21)
10	1.01**	-0.13	-0.51*	-0.37	-0.51**	0.02	-0.57***	-0.53**	-0.67***	-1.08***	2.08***
	(1.99)	(-0.47)	(-1.87)	(-1.31)	(-2.26)	(0.08)	(-2.66)	(-2.38)	(-2.60)	(-3.03)	(3.37)
21	1.34**	0.14	-0.15	-0.41	-0.54*	0.26	-0.61*	-0.52	-1.19***	-2.27***	3.61***
	(1.98)	(0.32)	(-0.40)	(-0.89)	(-1.84)	(0.72)	(-1.93)	(-1.56)	(-3.25)	(-4.62)	(4.32)
42	2.46***	0.50	0.59	0.74	-0.37	0.47	-0.64	-0.41	-1.19**	-2.57***	5.03***
	(2.59)	(0.85)	(1.07)	(1.32)	(-0.78)	(0.86)	(-1.33)	(-0.86)	(-2.15)	(-3.74)	(4.29)

Table 8: Initial target price and post announcement stock returns to target firms in different time periods

Panel A presents the percentage of mergers and acquisitions that are successfully consummated for each decile of the initial target price, and for each of the three time periods 1980-1990, 1991-2001, 2001-2012. The initial target price is the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. The first three columns of Panel B present OLS regression results for each of the time periods, where the dependent variable is cumulative abnormal returns (CARs) to the target firm over the first 42 days starting from the second trading day after the merger and acquisition announcement. The high ITP dummy takes the value of one if the orthogonalized initial target price is in the 10^{th} decile over the corresponding time period, and zero otherwise. Columns (4)-(6) report differences in the coefficients between the three periods. See Tables 5-6 for definitions of other variables. All model specifications employ robust standard errors. The associated *t*-statistics are reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively. Our sample includes mergers and acquisitions announced between 1980 and 2012.

Panel A: Initial target price and deal completion in different periods

	Percent of completed deals		
Initial target	(1)	(2)	(3)
price decile	1980-1990	1991-2001	2002-2012
Low	44.7	68.1	61.5
2	40.6	74.8	75.9
3	46.7	75.8	80.5
4	48.8	81.1	83.9
5	55.9	84.5	88.5
6	52.9	86.5	93.1
7	61.8	85.3	93.1
8	56.7	89.4	91.4
9	45.3	81.5	77.0
High	36.8	77.4	60.6
All	49.0	80.5	80.5

Panel B: Initial target price and stock returns to target firms after deal announcement

	(1)	(2)	(3)	(4)	(5)	(6)
	1980-1990	1991-2001	2002-2012	Difference in coefficient		
Dependent variable	42-day CARs			(2) - (1)	(3) - (1)	(3) - (2)
High ITP dummy	-3.01**	-2.89**	-2.28**	0.12	0.73	0.61
	(-2.26)	(-2.29)	(-2.39)	(0.06)	(0.45)	(0.39)
Completed deal	6.80***	7.67***	2.72***	0.87	-4.08***	-4.96***
	(8.48)	(7.07)	(2.84)	(0.65)	(-3.27)	(-3.42)
Offer price revision	0.43***	0.16***	0.16***	-0.27*	-0.27**	0.00
	(3.42)	(2.59)	(3.70)	(-1.92)	(-2.02)	(0.01)
Follow-on bids	6.32***	3.43**	3.00**	-2.88*	-3.32**	-0.43
	(7.20)	(2.53)	(2.53)	(-1.78)	(-2.25)	(-0.24)
Hostile	-0.29	4.37**	0.86	4.66**	1.16	-3.50
	(-0.25)	(2.54)	(0.47)	(2.25)	(0.53)	(-1.39)
Log Tran. value	0.00	0.45	-0.25	0.44	-0.25	-0.69
	(0.01)	(1.02)	(-0.60)	(0.76)	(-0.44)	(-1.15)
Diversifying deal	0.76	-0.94	-0.22	-1.70	-0.99	0.71
	(1.04)	(-1.27)	(-0.44)	(-1.64)	(-1.11)	(0.80)
Stock deal	1.16	-0.09	-0.11	-1.25	-1.27	-0.02
	(1.17)	(-0.13)	(-0.12)	(-1.05)	(-0.95)	(-0.02)

Bid premium9 464.23 5

B7MCID 131BDC 72572BT/P6/MCID 120>BDC gp464.23 54.504 12.72 reW* nBT/F2 9.96 Tf1 0 0 prem-

Table 9: Returns to portfolios of target firms with different initial target prices

In each month from January 1983 to December 2012, we form a portfolio of stocks that received a merger and acquisition bid in the previous two months. The portfolio is divided into ten based on the initial target price, i.e., the ratio of the target firm stock price on the first trading day following the acquisition announcement to the offer price. Panel A presents the equal- and value-weighted portfolio returns. Panel B presents the OLS regression results where the dependent variable is the equal-weighted (EW) portfolio return in excess of the risk-free rate; Panel C presents the same regression results for the value-weighted (VW) portfolio return. The equal-weighted portfolio return is weighted by the prior-month gross return to correct for biases due to noise in transaction prices. The independent variables are the four risk factors—MKT, SMB, HML, and UMD—constructed by Fama and French (1993) and Carhart (1997). All model specifications employ robust standard errors. The associated *t*-statistics are reported in the parentheses below each coefficient. Superscripts ***, **, and * correspond to statistical significance at the one, five, and ten percent levels, respectively.

Panel A: Summary statistics of portfolio returns

Initial target price quintile	Number of months	Average number of stocks in portfolio	Average portfolio returns (%) EW	VW
Low	245	2.49	2.15	1.89
2	254	2.91	0.28	0.55
3	273	2.84	1.21	1.16
4	278	3.05	0.94	1.55
5	290	3.28	1.12	1.31
6	309	3.64	1.04	1.10
7	306	3.98	1.19	1.22
8	325	5.28	0.81	1.05
9	330	5.74	0.43	0.51
High	311	3.10	-0.68	-0.69

Panel B: Alpha of equal-weighted portfolio return

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Initial target price decile	Low	2	3	4	5	6	7	8	9	High
Dep. var.	Excess portfolio returns									
MKT	1.02***	1.24***	0.66***	0.64***	0.60***	0.50***	0.50***	0.32***	0.39***	0.93***
	(4.48)	(8.47)	(5.31)	(6.12)	(5.72)	(5.26)	(4.65)	(3.40)	(4.78)	(8.73)
SMB	1.03***	0.67***	0.36**	0.55***	0.12	0.30**	0.35**	0.22**	0.15	0.49***
	(3.39)	(3.06)	(2.29)	(3.69)	(0.80)	(2.27)	(2.58)	(2.29)	(1.16)	(3.13)
HML	-0.05	0.55***	-0.09	0.27	0.17	0.14	0.09	0.07	0.05	-0.14
	(-0.18)	(2.82)	(-0.40)	(1.41)	(1.36)	(1.10)	(0.53)	(0.76)	(0.49)	(-0.79)
UMD	0.40*	-0.13	-0.44*	-0.05	0.13	-0.01	-0.06	0.01	0.05	0.19
	(1.94)	(-1.00)	(-1.92)	(-0.40)	(1.46)	(-0.07)	(-0.33)	(0.17)	(0.72)	(1.22)
Alpha	0.89	-1.03*	0.82	0.07	0.26	0.31	0.56	0.25	-0.22	-1.63***
	(1.00)	(-1.78)	(1.45)	(0.18)	(0.71)	(0.93)	(1.57)	(0.94)	(-0.85)	(-3.32)
Observations	245	254	273	278	290	309	306	325	330	311
R-squared	0.204	0.313	0.252	0.233	0.179	0.156	0.182	0.139	0.151	0.297

Panel C: Alpha of value-weighted portfolio return

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Initial target price decile	Low	2	3	4	5	6	7	8	9	High
Dep. var.	Excess portfolio returns									
MKT	1.25***	1.48***	0.81***	0.74***	0.69***	0.58***	0.48***	0.32***	0.46***	0.94***
	(5.08)	(8.11)	(5.86)	(5.74)	(6.96)	(5.41)	(3.94)	(3.94)	(5.03)	(7.11)
SMB	0.83**	0.41*	0.22	0.65**	0.18	0.34**	0.55**	0.20	0.16	0.57***
	(2.55)	(1.86)	(1.37)	(2.07)	(1.26)	(2.12)	(2.12)	(1.48)	(1.04)	(2.99)
HML	0.23	0.56**	0.04	-0.13	0.13	0.05	0.05	-0.12	0.07	-0.06
	(0.77)	(2.55)	(0.15)	(-0.40)	(0.97)	(0.31)	(0.27)	(-1.07)	(0.57)	(-0.28)
UMD	0.71***	-0.14	-0.51**	-0.05	0.22**	0.08	0.03	-0.00	0.07	0.06
	(2.91)	(-0.94)	(-2.12)	(-0.29)	(2.39)	(0.79)	(0.14)	(-0.04)	(0.69)	(0.29)
Alpha	0.21	-0.89	0.72	0.77	0.33	0.30	0.54	0.58**	-0.21	-1.59***
	(0.22)	(-1.31)	(1.19)	(1.55)	(0.83)	(0.85)	(1.36)	(1.97)	(-0.68)	(-2.84)
Observations	245	254	273	278	290	309	306	325	330	311
R-squared	0.198	0.297	0.255	0.243	0.209	0.184	0.183	0.116	0.131	0.254