Target Firm Advertising and Firm Value*

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Abstract

Consistent with hypotheses underlying firm advertising, we find that targets with pre-takeover advertising obtain higher premiums, while their acquirers earn lower announcement returns. These economically significant effects suggest that, through advertising, targets increase their profile and negotiating power. Further, targets that advertise are more likely to initiate their takeovers, attract multiple bidders, receive enhanced bids, capture more merger rents, and even in failed acquisitions, experience a 1% permanent revaluation. The latter result differentiates between information asymmetry and behavioral explanations for the target advertising. Overall, the results support the hypothesis that management advertises to transmit information to investors and potential acquirers.

JEL classification: D03; G02; G14; G34; M41

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1. Introduction

Just after markets closed on Wednesday May 20, 2009, Data Domain, Inc. shareholders received a $25.00 per share takeover offer from NetApp with an almost 40% premium over the day's closing price of $17.91. Twelve days later, EMC started a bidding war with an offer of $30.00. Bidding further escalated until July 6, when EMC finally outbid NetApp at $33.50 per share, resulting in a final 87% premium to the target shareholders.[1] In the fiscal year prior to these offers, Data Domain approximately tripled its advertising spending (twice the firm's revenue growth rate over the period). This example illustrates a common phenomenon in which firms that are later targeted dramatically increase their advertising prior to any takeover offers.

In this paper, we propose two contrasting hypotheses that could each explain this phenomenon and we conduct empirical tests to distinguish between them. The first, the *information transmission* hypothesis, is based on the Milgrom and Roberts' (1986) theory that, through advertising, high-quality firms reveal their type. Thus, the target firm managers advertise to inform not only customers, but also potential investors, that they are high-quality firms. This rationally-based hypothesis can be contrasted with an alternative hypothesis predicated on behavioral biases. Under the *investor attention* hypothesis, the target managers increase advertising to attract the attention of investors and potential bidders, which then increases the visibility of the firm, leading to potential bias in investors' perceptions and actions.[2] The rational information transmission hypothesis and the behavioral investor attention alternative have a commonality in that both share

[1] Even before NetApp responded with a higher bid, The *New York Times* characterized these events as a "bidding war" between NetApp and EMC to buy Data Domain See "EMC Tops NetApp's Bid for Data Domain," at http://dealbook.nytimes.com/2009/06/01/emc-tops-netapps-bid-for-data-domain/

[2] The investor attention hypothesis relates to the work on investor attention (e.g., Barber and Odean, 2008). With regard to mergers, Louis and Sun (2010) find that investors sometimes exhibit inattention during merger announcements. Importantly, we are not arguing that investors are inattentive during mergers. We argue that advertising increases investor attention prior to and during mergers and that such increases have a material effect on the premiums offered to takeover targets.

the assumption that the increased advertising spending is an effort by the managers of firms like Data Domain to promote their products, to attract potential acquirers and investors, and to help their bargaining position in a potential merger offer. Thus, everything else equal, managers interested in situating their firms to become a takeover target have an incentive to boost advertising. The primary implication of both hypotheses is that the advertising should lower search costs for the potential bidders, resulting in a higher probability of being a target, in increased takeover premiums for the target firms, and in a larger share of the expected merger gains than would otherwise be received by the target.

To test these implications, we analyze a sample of 7,827 M&A bids for U.S. publicly traded targets announced during the 1986-2016 period. Our empirical analyses indicate that, in general, targets who advertise prior to a takeover attempt benefit their shareholders through higher takeover premiums, which is consistent with the EMC-Data Domain example and with both of our potential explanations for why target managers would advertise. Further, we find that the advertising effects are economically important, increasing advertising by a single standard deviation (about $1.7 million) is associated with a one percentage point higher takeover premium, which represents an increase of $10.7 million in deal value for the average target firm in our sample.

In line with the hypotheses, we also find that the target's increased advertising is associated with a higher probability of becoming a target. To provide some views into the possible causality of these actions, we examine whether targets with high information costs are particularly aided by their advertising and we find significant results that they are. In addition, more advertising results in more attention as measured through Google searches. A one standard deviation increase in the abnormal search volume intensity for the target results in a premium increase of about 2%.

Additional testable implications arise from both the information transmission and the investor attention hypotheses. First, if target managers increase their advertising expenditures to attract

investors and potential acquirers, these managers should be more likely to initiate their own takeovers, which we find. In addition, if managers can increase a firm's profile in financial markets through advertising, then it follows that the advertising itself should make the target more attractive, which should result in two effects. The first is that the target has an increased probability of receiving more than one bid. The second effect is that the target receives enhanced merger bids. We find that these additional implications of our hypotheses are supported by the data: Targets whose managers increase advertising prior to offers tend to attract more than one bidder and they have a higher probability of the initial takeover bid being revised upwards. This evidence also conforms with the EMC-Data Domain example.

Given these results, there exist follow-on hypotheses. One is whether the merger provides synergistic gains, which we measure with the combined cumulative abnormal returns at the announcement of the merger. Given these gains, we examine whether the increased advertising places the target firm in an improved bargaining position, which implies the returns accruing to their acquirers will be affected as they will have to pay more in the acquisition. Moreover, if the target firm attracts multiple bidders (and subsequently escalated bids), the increased merger gains for the target will come at the expense of gains to the bidder. Consistent with these follow-on hypotheses, we find that a single standard deviation increase in target firm advertising is related to a decrease of 31 basis points in their acquirer's merger announcement return. Such a drop has significant economic consequences as it implies a decline of $36.8 million in terms of potential market capitalization for the average bidder in our sample.

To determine the net impact of the advertising on the target shareholder's wealth, we evaluate its joint effect on the merger premium and the probability of deal completion. We find that a one standard deviation increase in advertising spending is associated with an increase in the probability of deal completion: from 81.8% to 84.4%. This result, combined with the conditional increase in

deal value from our premium tests, suggests that on average, target shareholders unconditionally net $35.9 million higher gains with a one standard deviation increase in pre-merger advertising. Notably, these gains are very close to the average loss of $36.8 million incurred by acquirer shareholders.

Our regression analyses indicate that, on average, target firms benefit from pre-takeover advertising. However, a possible concern with our findings arise from a potential endogeneity in the relationship between target firm advertising and subsequent takeover premiums. However, not all targets that advertise are acquired, which provides us with two important opportunities. First, it allows us to examine the causal effects of target advertising. Indeed, as Malmendier, Opp, and Saidi (2016) note, cancelled mergers are less susceptible to endogeneity concerns. Moreover, Seru (2014) argues that announced M&A deals that are later cancelled for reasons exogenous to certain target characteristics (e.g., advertising) provide a setting akin to a quasi-experiment.[3]

Second, and importantly, the failed mergers allow us to differentiate between our two hypotheses. If managers increase their advertising to transmit information about their firms' quality, then the firm value increase should be permanent even in the face of withdrawn mergers. In contrast, if the managers are catering to investors' behavioral biases, we would expect that any increases in firm value should be reversed if the acquisition fails.[4] Our evidence supports the rational hypothesis: even when acquisitions fail and the deal is withdrawn, targets with pre-takeover advertising exhibit a permanent market capitalization revaluation of about 1% associated with the advertising, which suggests that advertising helps investors distinguish firm quality.

[3] In contemporaneous work, Ma, Ouimet, and Simintzi (2021) also examine withdrawn M&A deals to address similar endogeneity concerns.

[4] This view is in line with Stein's (1996) argument that in an inefficient market, short-horizon managers seeking to maximize their firm's short-term stock price can exploit investors' misperceptions by catering to time-varying investor sentiment.

We recognize that an additional potential econometric concern lies in the fact that omitted unobservable target firm or deal characteristics could be correlated with target advertising. We address this issue by employing multiplicative fixed effects as suggested by Gormley and Matsa (2014). The positive association between target advertising and target premiums is robust to the inclusion of these fixed effects in our analyses. Our results also hold when we use Heckman's (1979) method to correct for selection bias that could arise because firms do not randomly become takeover targets.

Overall, the evidence suggests that increased advertising heightens the target firm's stock market value as well as management's position during merger negotiations, which translates to higher premiums paid for firms that become takeover targets. To complement our baseline findings, we conduct additional tests and find that target advertising affects other features of the acquisition process (e.g., bid competition, offer revisions, and division of merger surplus). We also assess the robustness of our findings with alternative constructs of the variables of interest (e.g., premiums, acquirer returns, and advertising), and evaluate whether the magnitude of our results changes under different conditions (e.g., targets with short-sale constraints, targets with consumer products, targets with strong managerial incentives and targets that manage earnings). Our results hold up to all of these possible alternative explanations.

An important question to be asked regarding our analysis is why target firms, particularly high-quality target firms, would want to be acquired and why the bidders would want to pay for the acquisition of these firms. In general, there are multiple reasons for mergers and acquisitions, such as to achieve synergistic gains, vertical integration, tax advantages, governance changes, growth by accessing other markets, or perhaps for management to exit. In particular, while financially constrained targets in weak positions may be motivated to initiate mergers due to their conditions, other firms that have experienced good financial performance or that have competitive strengths

can also have strong incentives to become takeover targets. That is, this latter group of firms may seek greater resources in order to perform even better and not risk losing their competitive position. For example, as pointed out by Masulis and Simsir (2018), such losses could arise due to industry-specific or economy-wide shocks, such as technological innovations, deregulation, or changes in key input prices. As part of a larger merged firm, targets are likely in a better position to circumvent these shocks. Notably, acquirers may want to buy these firms because synergies would probably be larger before potential shocks arise (and because the shock may adversely affect the acquirer firms themselves).

However, the potential acquirers need to be aware of the opportunities offered by the target firm, which is the role of advertising. According to the Milgrom and Roberts' (1986) theory, through advertising, high-quality firms reveal their type. Ideas based on a similar rationale are put forth in other seminal studies. For example, investment in education reveals top productivity (Spence, 1978), capital structure reveals an entrepreneur's ability (Ross, 1977), and warranties reveal product quality (Grossman, 1981). In our setting, target advertising helps potential acquirer address a crucial issue highlighted by Masulis and Simsir (2018) – that the information asymmetry about *target firm quality* between targets and acquirers is a key concern of bidder firms.

The contributions of our paper are as follows. First, we contribute novel evidence to the large mergers and acquisitions literature. Evidence has previously shown that bidders take actions to make their stocks more attractive in stock-for-stock mergers. For example, prior to mergers, acquirers have been shown to manage earnings upward (Erickson and Wang, 1999) and to manage down analysts' earnings forecasts in order to deliver positive earnings news (He, Liu, Netter, and Shu, 2020).[5] Using advertising and the media have also been successful strategies for bidders

[5] In addition, in cash-financed deals, evidence suggests that the bidders strategically generate news to lower the target's stock price (Kim et al., 2020).

during the pre-takeover period. In other words, different from our setting, previous research focuses on the parties on the other side of the transactions (*the acquirers*), who use these tools to enhance their own acquisition gains. For example, Lou (2014) documents a sharp increase in advertising spending before stock-financed merger deals that essentially "pumps up" the acquirer's stock price. In addition, Ahern and Sosyura (2013) find that by originating more news during private merger negotiations, acquirers generate a short-lived run-up in their stock prices during the period when the stock exchange ratio is determined.

However, a striking difference exists between the potential outcomes for the target advertisers and the previously studied bidder advertisers or news generators. While a short-run bump in stock price strategically improves the position of bidders who use their own stock to pay for the target, Ahern and Sosyura do not find any permanent price effects from these activities. In striking contrast, in our analysis, increasing awareness of target firm quality through advertising can result in not only temporary, but also long-run, effects on the target firms. We also furnish new evidence by showing that targets' pre-takeover advertising affects the wealth of not only the target's shareholders but also the acquirer's shareholders.[6]

Moreover, our results provide an explanation for the division of gains between targets and acquirers, which contributes to the research on the share of the M&A gains captured by the target firms (e.g., Erel, Jang, and Weisbach, 2015; Levine, 2017; Cornaggia and Li, 2018; Lee, Mauer and Zu, 2018), as well as to the work on the efficiency of the takeover market, particularly articles studying the role of investor attention in the merger process (e.g., Ahern and Sosyura, 2013).[7] Moreover, while many studies provide results consistent with the notion that takeover are

[6] Bretton, Eckbo and Thorburn (2008) provide a review of this literature.

[7] Ahern and Sosyura (2013) conclude that the division of gains during completed mergers that are financed with the bidder's stock is positively related to news origination. Beyond our different sample (both completed and withdrawn deals and both cash and stock-financed transactions), we have a different focus in terms of which party to the merger takes actions to draw attention and also on the type of actions taken. That is, whereas Ahern and Sosyura examine press releases by the acquirers, we study advertising expenditures by the targets.

advantageous for poorly-performing firms, our findings indicate that some well-performing and efficiently managed firms are also better-off being acquired.

Our work also offers new insights into the theoretical and empirical literature on the economics of advertising.[8] For example, in the Milgrom and Roberts (1986) sequential equilibrium model, high- and low-quality producers choose different advertising strategies so that consumers can distinguish their true quality. In the separating equilibrium, the high-quality firm selects an advertising strategy that is too costly for the low-quality type to mimic. According to Milgrom and Roberts, while there may be many such strategies, the high-quality type will select the one that maximizes its profits. Consistent with the previous theories, our empirical evidence suggests that takeover targets use advertising to convey their quality and that they increase advertising spending to maximize their share of the M&A gains.[9] From an empirical perspective, our results suggesting that target advertising attracts the attention of prospective acquirers complements the findings by Grullon, Kanatas, and Weston (2004). They show that firms with greater advertising expenditures have a larger number of both individual and institutional investors, and better liquidity of their common stock. More generally, our study advances the literature on behavioral biases and investor attention (Barber and Odean, 2008; Da, Engelberg, and Gao, 2011), most particularly on advertising (Liaukonyte and Zaldokas, 2021).

[8] This literature includes theoretical articles (e.g., Nelson, 1974; Bagwell, 2007; Becker and Murphy, 1993) and work linking advertising and firm value (e.g., Chauvin and Hirschey, 1993; Fehle, Tsyplakov and Zdorovtsov, 2005; Chemmanur and Yan, 2009; Fee, Hadlock, and Pierce, 2009; Gurun and Butler, 2012; Lou, 2014).

[9] Contemporaneous work examines the impact of daily advertising on firm value. Focke, Ruenzi, and Ungeheuer (2020) use daily print and television ads and firms' Wikipedia pages and conclude that advertising affects investor attention, but not firm value. Similarly, Madsen and Neissner (2019) use print ads and conclude that no relationship exists between advertising and daily stock returns. Our study is very different. Our examination of changes in advertising expenditures, although much less frequent in observation, capture a different and fuller aspect of firms' advertising expenditures than do print or other media ads, which is essential for our purposes. More importantly, we focus on firms facing specific circumstances in which the ads are designed to capture both customer and investor attention. Thus, while advertising may not have an effect on value for firms in general (i.e., unconditionally), our results suggest that managers can strategically employ advertising to increase firm value in particular situations.

2. Data and variable definitions

In this section, we describe the sample of M&A bids we analyze as well as the variables employed to track the firms' advertising expenditures.

2.1. Sample overview

Our initial sample consists of all M&A offers of at least $1 million in value submitted for publicly traded U.S. companies from 1986-2016 and reported in the Securities Data Company (SDC) database. We retain transactions involving target companies for which stock market and accounting data are also available from the Center for Research in Security Prices (CRSP) and Compustat, respectively. Because we want major bids without tertiary issues, we implement a sample selection procedure similar to that of Bargeron, Schlingemann, Stulz, and Zutter (2008). Specifically, we exclude observations involving spinoffs, recapitalizations, exchange offers, repurchases, self-tenders, privatizations, acquisitions of remaining interest, and partial interests or assets. This process yields 8,839 deals announced during our sample period. From this set, we eliminate 1,012 bids due to inability to access premium data from SDC, SEC filings or trade publications (such as *Mergers & Acquisitions* or *Investment Dealers' Digest*). This process results in a final sample of 7,827 deals.

Panel A of Table 1 reports the temporal distribution of the target firms in our sample, which is consistent with the Shleifer and Vishny (2003) conjecture that stock market health drives merger activity. For example, we find that during periods of economic expansion and higher stock market valuations such as 1998-2001, the number of M&A transactions is greater. In contrast, during periods of economic contraction, such as the beginning of our sample or the 2008-2009 period, the number of deals declines. Panel A also reports the industrial distribution of our sample targets based on the Fama and French (1997) classification. The distribution across industries is

widespread with some concentration in the business equipment sector (which includes software) at 20.1% and the finance sector at 22.8%.

In Panel B of Table 1 we report the summary statistics for particular key characteristics related to the sample deals. (We provide detailed definitions of these characteristics and other variables in the Appendix.) In comparing the key characteristics provided in the table to other studies on mergers and acquisitions we find similar magnitudes.[10]

2.2. Product market advertising

Panel C of Table 1 reports summary statistics for four different variables that capture target firms' advertising, based on annual advertising expenses measured at the fiscal year end before the merger announcement date (Compustat data item 45 in USD millions). These advertising variables are: (1) *ln*(Advertising spending), defined as the natural logarithm of (1 + advertising spending), (2) Scaled advertising spending, calculated as advertising spending divided by total assets, (3) Advertising intensity, computed as advertising spending divided by the firm's total sales, and (4) Advertising growth, estimated as the percentage change in advertising during the two fiscal years immediately preceding the initial merger bid.[11]

According to Panel C of Table 1, the mean advertising intensity of targets in our sample is 0.96%. This figure is calculated across all target firms regardless of whether they advertise. We also report the results when the sample is restricted to the 2,743 target firms (about 35% of our sample) that do advertise as represented by their positive advertising spending. The average

[10] For example, 82% of the transactions in our sample are completed and tender offers account for 24% of the deals. Both the target and the bidder operate in the same industry in 53% of the transactions. These statistics are comparable to those in Officer (2003). He reports a completion rate of 83%, a tender offer proportion of 20%, and a same industry incidence of 52% in his 1988-2000 M&A sample. Similarly, 52% of our bids are all cash which is close to the 46% Masulis, Wang, and Xie's (2007) study of mergers during 1990-2003. Over 89% of transactions in our sample consist of friendly acquisitions, which is close to the 93% in Moeller's (2005) study of mergers during 1990-1999.

[11] We note that (2) and (3) are set to zero for firms that do not spend on advertising. Our results are robust to using only targets with positive advertising spending and alternative ways of treating missing advertising data.

advertising intensity for this subset is about 2.7%.[12] Throughout the analysis our results remain consistent across the four advertising variables. Thus, we primarily employ advertising spending in our tests, but we at times include the other advertising proxies because they elucidate different aspects of management's advertising decisions.

3. Advertising and takeover premiums

The information transmission and investor attention hypotheses rely on the intuition that firms interested in becoming acquisition targets can increase their profiles by heightening the advertising of their business and in so doing increase the probability that they will become a target as well as strengthen their bargaining power during a takeover. Consistent with the Milgrom and Roberts (1986) model, under the information transmission hypothesis we assume that not all targets can scale up their advertising, because it would be too costly for the firms of lesser quality. In this section, we examine different characteristics of the takeover deals to test these hypotheses.

3.1. Takeover premiums

The information transmission hypothesis implies that advertising can cause investors to reassess the value of the firm, which should benefit their shareholders. Similarly, in our setting, the behavioral bias theory suggests that increased advertising by target firms should increase investor attention, which could result in higher prices for these firms. Thus, under both hypotheses merger premiums should be increasing in greater pre-acquisition advertising. Consequently, we first examine whether the merger premiums offered to our sample targets are explained by advertising spending, while controlling for characteristics of the takeover deal, the current takeover market, and the target firm. The takeover deal characteristics include whether the acquirer is a

[12] Our measure of the target's mean advertising intensity is close to that reported by Gurun and Butler (2012) for their sample of Compustat firms during 2002-2006. Further, about 35% of the firms analyzed by Lou (2014) that have advertising expenditures during his 1974-2010 sample period with a mean advertising intensity of 4%, which is similar to our findings.

private firm, the payment is in cash, the offer is a tender offer, the deal is hostile, there exist multiple bidders, the bidder has a toehold, the deal is diversifying, is a merger of equals, and whether the deal includes a termination fee or a lock up provision (e.g., Bargeron, Schlingemann, Stulz, and Zutter, 2008). The current takeover market characteristics we control for are the competitiveness of the target firm's industry using the Herfindahl-Hirschman index (Masulis, Wang, and Xie, 2007), the liquidity of the market for corporate control for the target firm's industry (Schlingemann, Stulz, and Walkling, 2002) and to capture recent macroeconomic changes, the difference in the industrial production index over the one year period before the merger. Finally, we include target firm characteristics: firm size, Q, leverage, sales growth, stock liquidity, operating cash flow and the prior year abnormal stock return.[13]

In Table 2 Panel A, we report the results of our model to explain takeover premiums measured as the four-week final offer premium reported by SDC.[14] These tests also include year- and industry-fixed effects. In Models (1) to (3), we include all 7,287 sample deals and find that the merger premium is significantly related to the target's advertising spending. As shown in the Appendix, if we employ the other advertising proxies, we find the same qualitative results. In Models (4) and (5), we limit the sample to the 3,401 cases in which the bidder is a publicly traded company. In these tests, we add characteristics of the bidder as further control variables. Again, we find that the merger premium is significantly related to the advertising proxy.

The results in Table 2 Panel A document an economically important positive association between our primary advertising proxy and the measured takeover premiums. According to the estimates in Model (5) (which are the most conservative estimates), increasing advertising

[13] Academic studies argue that Tobin's Q captures a firm's intangibles (Morck, Shleifer, and Vishny, 1989; Villalonga, 2004). In light of this argument and because advertising has the potential to create an intangible asset (Hirschey, 1982; Bagwell, 2007; McAlister, Srinivasan, and Kim, 2007) we include Q as a control variable.

[14] To lessen potential problems with outliers, we limit the premium to values between 0 and 2 (or 200%) as does Officer (2003).

spending by one standard deviation translates into a premium increase of 0.91 percentage points. For the average transaction in our sample, this increase implies an additional $11.20 million in terms of deal value for the target shareholders. Put differently, for the average deal in our sample, an extra dollar of advertising is related to an increase in deal value of $6.28.

The tests in Table 2 Panel A analyze targets that advertise along with those that do not. Thus, the one percentage point premium increase might understate the effect of advertising. In untabulated analyses, we use the subsample of 2,473 targets that advertise to re-estimate our takeover premium tests. We find that a one standard deviation increase in advertising spending is related to a (higher) increase of 2.49% in the takeover premium.

As noted by Gormley and Matsa (2014), because most corporate policies depend on unobservable factors, controlling for common errors (or unobserved heterogeneity) is a major challenge in empirical finance research. One concern affecting identification in our setting that could potentially bias our findings is that omitted unobservable firm-specific characteristics of the targets might be correlated with the wealth effects accruing to the targets that advertise. We address this issue with the method proposed by Gormley and Matsa (2014). They endorse the use of multiplicative fixed effects as an effective econometric tool for addressing unobserved heterogeneity. To account for unobserved target firm heterogeneity, Models (2) and (5) of Table 2 Panel A include Target industry × Year fixed effects. Coefficient estimates for our advertising proxy in the alternative target premium regressions remain positive and statistically significant in these tests. Given that heterogeneity might also be a concern at the deal level, we create bidder-target-pairwise industry fixed effects (by interacting the acquirer's industry with the target's industry and also with year dummies). In the premium tests in Models (3) and (4) of Table 2 Panel A, which include these triple interaction fixed effects, we find that the positive advertising-

premium relation is not affected. Thus, unobserved heterogeneity captured through the Gormley and Matsa methods does not appear to be a problem for our analysis.

3.2. Unconditional premiums

In Panel B of Table 2, we report four *unconditional* premium regressions, which we estimate in a sample of 205,511 firm-years with data available from CRSP and Compustat during 1985-2015. Using the Comment and Schwert (1995) method, the dependent variable equals zero in nontakeover firm-years. Otherwise, for firm-years associated with a takeover, the dependent variable equals the actual takeover premium as recorded in SDC. The key explanatory variables in the four regressions in Panel B are our four advertising spending variables respectively. The coefficients for each of the key independent variables indicate that unconditional premiums increase in advertising. According to the coefficient in Model (1), a one standard deviation increase in advertising is related to an unconditional premium increase of 10 basis points. Since the *unconditional* takeover premium combines the effects of a conditional takeover premium and the likelihood with which a takeover bid occurs, this result suggests that advertising by the target firm adds value unconditionally by increasing some combination of the premium conditional on a takeover (as in Panel A of Table 2) and the probability with which such a deal occurs.[15] Moreover, the beneficial effects of advertising during takeovers (documented in Panel A) are likely understated since, as the tests in Panel B suggest, advertising increases the unconditional value of the firm.

4. Advertising, probability of being a target and search costs

Under both the information transmission hypothesis and the attention hypothesis, if targets advertise it should increase their likelihood of becoming a target. Thus, we examine the probability

[15] See Panel A of Table 3.

of becoming a target for the subsample of our data for which we have the necessary data. The subsample consists of 36,929 firm-year observations (with complete financial data in CRSP and Compustat and with CEO data from Execucomp and manually collected from annual proxies).[16] We estimate the probability of becoming a target, drawing on the methodologies of previous work (e.g., Comment and Schwert, 1995 and Palepu, 1986) that finds the likelihood of receiving a merger offer has its own determinants. In addition to the effects of advertising we also include controls to capture the target CEO's career concerns and retirement preferences. As noted by Jenter and Lewellen (2015), these factors should be important determinants of the target CEO's interest in a merger. Further, given that Graham, Harvey and Puri (2015) provide evidence that CEOs are unlikely to delegate decision-making authority on mergers, the CEO's preferences are an important aspect in the decision. Thus, we include two additional variables to capture those preferences: (1) whether the target CEO is around retirement age (defined as one if the CEO's age is between 64 and 66) and (2) the target CEO's tenure as the target's chief executive. As shown by Cline and Yore (2016), 19% of their sample of Execucomp firms have a mandatory retirement age of 65. Further, Ge (2019) shows for her Execucomp sample that the probability of retirement increases strikingly between ages 64 and 66. We also include other control variables (deal, market and firm characteristics) used in our previous analyses.

The results of the probit regression for the probability of becoming a target are reported in Panel A of Table 3. The dependent variable equals one if the firm becomes a takeover target and equals zero otherwise. In this table we employ all four of the potential advertising proxies. The parameter estimates indicate that each of our advertising proxies attains a positive and significant coefficient. Moreover, these effects are economically significant. For example, the marginal effect we estimate in Model (1) indicates that a single standard deviation increase in advertising spending

[16] Due to data limitations, the subsample covers the 1992-2015 period.

increases the likelihood of becoming a target by 0.53 percentage points. To put this result into context, the unconditional probability of becoming a target in the subsample analyzed in Panel A of Table 3 is 4.2%.[17]

4.1. Search costs

One outcome of the advertising that would be beneficial to potential bidders is in a reduction of their search costs. Potential target firms engaging in advertising to attract the attention of bidders would be consistent with the investor attention hypothesis as well as with the rational information hypothesis. Consequently, advertising could be particularly valuable for potential target firms with high search costs as it would reduce the costs of bidders looking for high-quality targets. Under this possibility, high-search-costs firms that advertise should have a higher probability of being acquired. To examine this conjecture, we define three different (0,1) indicator variables to proxy for high-search costs. The first, *Low analyst coverage*, equals one if the number of analysts covering the firm is in the bottom quartile of all firms in the same year and industry. The second, *Low trading volume*, equals one if the trading volume for the firm's stock is in the bottom quartile of all firms in the same year and industry. The third, *High bid ask spread*, equals one if the bid ask spread of the firm's stock is in the top quartile of all firms in the same year and industry.

Panel B of Table 3 presents four different regressions of the probability of becoming a takeover target. Using OLS because linear probability estimation improves the reliability of the interaction term coefficients in Models (2) through (4), Model (1) reproduces the baseline result from Panel A, i.e., a base model without the search cost variables. The results are economically important. Model (1), the baseline test, shows that a one standard deviation increase in advertising spending is associated with 0.53 percentage points increase in the probability of becoming an M&A target.

[17] This probability is similar to that in the Jenter and Lewellen (2015) sample of 4.7%.

Further, according to the three models that use the three high search cost proxies as well as their interaction with *Advertising spending*, advertising is more beneficial for target firms with higher search costs. According to Model (2), that probability increases by an additional 0.69 percentage points for high search cost firms.

4.2 Google trends in searching

A further implication of the search costs is that if the target firms advertise because they want to increase the odds of becoming a target, then the advertising should result in lessening search costs for potential bidders. For example, if the increased advertising attracts more attention or conveys new information about the firm, then we should observe increased Google searches for the target firm and these should be related to the takeover premiums. To test this prediction, we first measure a baseline aggregated search frequency from Google Trends in our target sample. We find that 17% of our target firm-weeks observations have a search volume index (SVI) of zero. We calculate ASVI = the log of SVI during the week that occurs one month before the deal announcement date minus the log of median SVI during the previous 48 weeks. Da, Engelberg, and Gao (2011) note that "Intuitively, the median [of ASVI] over a longer time window captures the "normal" level of attention in a way that is robust to recent jumps. ASVI also has the advantage that time trends and other low frequency seasonalities are removed. A large positive ASVI clearly represents a surge in investor attention and can be compared across stocks in the cross-section."[18]

In Panel C of Table 3, we find significant marginal effects. A one standard deviation increase in ASVI is associated with an increase in premium of 2.03% (Model (1)) or 1.87% (Model (2)). The results support the hypothesis that advertising lessens search costs for the bidder.

[18] In Da, Engelberg, and Gao (2011), a ticker is rarely searched on Google (zero SVI) in 44% of the firm-week observations during Jan 2004 – June 2008 of their 3606 stocks. Our larger search frequency could be due to targets getting more attention than a typical firm during the year leading to the M&A announcement. We also find that the correlation between *ln*(SVI) using name and *ln*(SVI) using ticker in our sample is 0.089 while that in Da et al is 0.093.

5. Characteristics of the takeover deals

5.1. Deal initiation

If managers do indeed increase their firm's advertising to convey information and attract a potential takeover bid, we would also expect that they should initiate their own sale through a takeover. Thus, we study a subsample of 5,314 M&A offers during 1993-2009 with data on the deal's background from the merger proxies filed by either the target or the acquirer with the SEC (S-4, DEFM 14, SC 14D9, SC TO, DEF 14, 8-K). In this subsample, we identify 2,326 bid contests where one or several acquirers bid for a single target. We use information from the first bid in the contest to identify the party (target or acquirer) who initiates the M&A transaction. We find that 39.4% of transactions in our sample are initiated by the target firm, which is comparable to the 42% reported in Aktas, de Bodt, and Roll (2010).[19]

In Table 4, we report results from regressions of deal initiation probability in which the dependent variable equals one if the deal is first initiated by the target. In Models (1) through (4) we run logit regressions. Using our main advertising proxy, advertising spending, the results indicate that targets who increase their advertising expenditures are more likely to also initiate

[19] In the case of bid contests, there exist multiple bids by different bidders for the same target. After examining the series of bids by different bidders disclosed in the proxies, we identify the first bid in the contest. We check the description of this first bid to identify the party (target or bidder) that initiates the deal. For example, in the deal of Affymetrix Inc acquired by Thermo Fisher Scientific Inc in 2016, available at: https://www.sec.gov/Archives/edgar/data/913077/000119312516475795/d117352ddefm14a.htm#toc117352_13 the merger background document states the following. "In mid-October 2015, the Chief Executive Officer of Company A orally expressed to Dr. Witney Company A's intention to submit a proposal to acquire Affymetrix for $1.0 billion, to be paid in a combination of cash and shares of Company A common stock. At a Board meeting on October 19, Dr. Witney discussed his interaction with Company A. Also in October 2015, Affymetrix management received a request to meet from another company, Company B. The Board, following discussion with its legal and financial advisors, decided to pursue a staged multi-party process. The initial stages would consist of (a) initial outreach to and preliminary discussions with three additional potential strategic parties, including Thermo Fisher, Company C and Company D, who were selected in consultation with Morgan Stanley and Affymetrix management, and (b) further engagement with Company A and Company B, including detailed due diligence (including data room access, site visits and meetings with management). In this case, based on our reading of the merger background, the deal is not initiated by the target firm Affymetrix.

their own takeover.[20] A one standard deviation increase in advertising spending (in Model (1)) increases the likelihood of a target initiating a deal by 4.17 percentage points.[21] In Model (5) we alternatively estimate OLS regressions given that Wooldridge (2010, p. 612) argues that logit regressions with a large number of fixed effects do not perform well. The statistically significant relationship between the deal initiation probability and the advertising proxy remains under this specification as well.

The fact that targets that increase their advertising are more likely to initiate their own sale and also more likely to obtain higher merger premiums might seem counterintuitive given that Aktas, et al. (2010) argue that targets that initiate the merger lose bargaining power. However, according to recent work by Eaton, Liu, and Officer (2021), target-initiated deals take longer to complete and when this issue is considered, they find no significant difference between deal premiums in target-initiated and non-target-initiated deals. The implication of our results is that the targets would not have received as high a premium had they not increased their advertising.

5.2. Bid competition

A further implication of increased advertising resulting in raising the profile of target firms is that the advertising could attract additional bidders. Thus, we examine whether target companies with increased advertising are more likely to be pursued by multiple bidders. Panel A of Table 5 reports the coefficients from logit regressions (Models (1) through (4)) and OLS regressions (Model (5)) in which the dependent variable is set to one for targets that receive a public takeover

[20] In Table 4, we use raw advertising expenditure but as the tests in the Internet Appendix show, substituting any of the other advertising proxies provides the same qualitative results.

[21] We estimate marginal effects by first calculating the probability of a target-initiated deal using the sample means for all continuous independent variables and zeroes for all (0,1) independent variables (the base predicted probability). The probability of a target-initiated deal initiated is then recomputed by changing each independent variable (in turn) by adding one standard deviation to the mean of continuous variables (or using a one for each indicator variable). This method is applied to obtain marginal effects for other (0,1) response models in our analyses.

offer from more than one bidder, and set to zero otherwise. In these tests we examine a subsample of 7,204 bid contests.[22] Our four target advertising proxies are the respective key explanatory variables described in Section 2.2. Again, each coefficient derives from a separate regression. All other control variables, which are listed in the table, are similar to those in Officer (2003).

The parameter estimates in Table 5 Panel A, suggest that advertising by the target is associated with a higher likelihood of competing bids in the takeovers: the coefficient estimates for our advertising proxies are significantly positive in all of the regressions. Using the lowest estimate (in Model 1), the marginal economic impact related to a one standard deviation increase in advertising spending implies a 1.45 percentage point increase in the probability that more than one bidder submits a public offer for the target. This is a considerable effect when benchmarked against the 7.22% incidence of bid competition for the transactions in our sample.

The results in Panel A also suggest that product market advertising triggers additional interest in acquiring the targets and promoting competition to buy these firms. The increased competition from the improved attention or better information transmission could explain the higher premiums paid to firms with more advertising.

5.3. Offer revisions

Given that advertising by target firms generates interest by multiple bidders to buy these firms, we next examine whether the bidders are more likely revise their offers upwards. We define a bid revision as the percent difference between the initial and final bid premium offered for the target firm as recorded by SDC.[23] We note that 908 (or 11.6%) of our sample bids exhibit a revision. This frequency compares favorably to that of 10.05% in Fich, Harford, and Tran (2015).

[22] As in Betton, Eckbo, and Thorburn (2009), the contest may be single-bid (first offer is accepted or rejected with no further observed bids) or multiple-bid (several bids and/or bid revisions are observed). The initial bidder may win, a rival bidder may win, or all bids may be rejected (no bidder wins).

[23] We cannot observe any bid revisions that are privately negotiated before the initial bid is publicly announced.

In Panel B of Table 5 we estimate a series of bid revision logit regressions (Models (1) through (4)) and OLS regressions (Model (5)). In these tests, the dependent variable is set to one if the bid is revised upward and set to zero otherwise.

Our bid revision regressions indicate that increases in the bid premium offered to the target firms are significantly related to advertising spending. According to the lowest marginal effect we estimate in Model (3), a one standard deviation increase in advertising spending raises the probability of an upward bid premium revision by 1.23 percentage points. Together with the findings from our bid competition tests, those in Panel B of Table 5 suggest that increased investor interest resulting from the increased advertising by target companies all but prompts a bidding war to acquire these firms. This result is consistent with the evidence related to the EMC and Data Domain example discussed in the Introduction.

5.4. Synergies, bidder returns and share of merger gains

Our results to this point provide evidence, consistent with both the information transmission and the attention hypotheses, that targets that advertise are more likely to receive higher takeover premiums, are more likely to be acquired, and attract multiple bid offers that often get revised upward. Moreover, the target should receive a higher share of synergistic merger gains. For example, in line with Milgrom and Roberts (1986), a firm that is able to successfully signal that it is high quality, should also be more likely to provide synergistic gains for the merger. Consequently, in Panel A of Table 6, we estimate the relationship between the target firm's advertising spending and the M&A deal synergies. As in Bradley, Desai, and Kim (1988), the dependent variable represents the total synergistic gain from acquisitions, as captured by the three-day CAR measured for a value-weighted portfolio consisting of the acquirer and the target around the merger announcement date. Specifically, the merger synergy represented by the CAR is the

residual from a market model regression estimated over the one-year window ending four weeks prior to the merger announcement.

Examining the key independent variable in the OLS regressions reported in Models (1) through (5) of Panel A, advertising spending, shows that across all specifications, there appears to be expectations of larger deal synergies with higher target firm advertising expenditures. Further, the results indicate that increasing target advertising by one standard deviation is associated with a 32 basis points increase in the combined (target + acquirer) return. This increase implies a synergy value increase of approximately $46 million for shareholders in the average combined firm in our sample.

So far, our results show that takeover premiums increase in the target firm's pre-takeover advertising spending and that there exist synergistic gains from the takeover overall. Although the total returns to acquirer and target shareholder returns are higher, it is not clear whether and how the target's advertising will affect the acquirer's return. That is, we need to estimate how the merger gains become shared between the target and the acquirer. The fact that the target's advertising generates interest by multiple bidders, which often results in increased bids (Table 5), suggests that the target shareholders may capture a larger share of the gains. Thus, we next examine the effect of target advertising on the value of the acquirer.

Panel B of Table 6 reports estimates of the determinants of the bidders' returns. The dependent variable is the three-day merger announcement cumulative abnormal return (CAR) for the 3,401 publicly traded acquirers in our sample. The CARs are centered on the merger announcement day and are calculated as the cumulated residuals from a market model estimated during the one-year window ending four weeks prior to the deal announcement.

In Models (1) through (5) we estimate OLS regressions with control variables similar to those in the acquirer return tests by Moeller, Schlingemann, and Stulz (2004) and by Masulis, Wang,

and Xie (2007), except that we amplify the specification in those studies by including our target advertising spending proxy as the key independent variable. The results indicate that the acquirer returns decrease in the targets' advertising. Further, according to the parameter estimates in Model (1), a one standard deviation increase in total advertising spending by the target is associated with a 33 basis points decrease in the return to the acquirer. This drop implies a value decline of over $38 million for shareholders in the average bidder in our sample. In other words, a single dollar increase in total advertising by the target is related to a reduction in market capitalization of nearly $21 for the average acquirer in our sample.[24]

Together, our takeover premium results and the findings in Table 6 Panel B indicate that the gains accruing to target firms with pre-takeover advertising come from their acquirer's share of the merger rents. We next examine the division of the merger gains directly through a different type of test. Following Ahern (2012), we calculate the merger surplus obtained by the target as the difference in dollar gains between the target and the acquirer divided by the sum of the acquirer's and the target's market value of equity 50 trading days prior to the announcement date. Formally, we define Δ$TCAR as a measure of the relative gain of the target versus the acquirer for each dollar of total market value.

Panel C of Table 6 presents the coefficients from regressions in which Δ$TCAR is the dependent variable and the target advertising proxy is the key independent variable. The results are consistent with the implications of our hypotheses. In the deals in which the target advertises, the relative gain of the target from the deal (versus the acquirer) is higher. The advertising coefficient in Model (5) indicates that increasing advertising spending by a single standard

[24] The control variables in Panel A yield results similar to those by other authors. For instance, as in Moeller et al. (2004), the coefficient for the bidder's leverage is positive and the estimate for the target's industry liquidity index is negative. Similar to Wang and Xie (2009), our tests also indicate that all-cash transactions are associated with higher bidder CARs. Like Officer (2003), we find that tender offers are greeted with more enthusiastic market reactions.

deviation is associated with an increase of 0.40 percentage points in the relative gain of the target as compared to the acquirer. Thus, the effect of target advertising is economically important because in our sample the unconditional mean relative gain for targets is 3.9%.[25] This evidence supports the hypothesis that target managers advertise to enhance the value of their firms in a subsequent acquisition. Further, the results support the corollary hypothesis that the advertising by the target's managers helps their shareholders keep a larger share of the merger surplus.

5.6. Deal completion

Next, we study whether advertising increases the likelihood of a deal being completed. Given that the *unconditional* takeover premium combines the effects of a conditional takeover premium and the probability of selling the firm, we estimate the net effect of advertising on the wealth of target shareholders. In Table 7, we report coefficients from regressions in which the dependent variable equals one if the target is sold and zero if it is not. Models (1) through (4) are based on logit regressions whereas Model (5) uses OLS estimation. Each of the advertising spending estimates are positive and statistically significant. The marginal effect related to the coefficient in Model (1) implies that targets are 2.1 percentage points more likely to be sold when advertising spending increases by a one standard deviation. This effect is economically important since the unconditional probability of a target being sold in our sample is 90.7%.

This result of an increased probability of selling the target, coupled with the increased deal value of $11.20 million associated with growing advertising spending by one standard deviation, implies that the wealth of target shareholders increases from $1.1126 billion (90.7% x $1.2267 billion) to $1.1488 billion (92.8% x $1.2330 billion). Consequently, the average effect of augmenting advertising spending by one standard deviation is a net gain to target shareholders of

[25] This coefficient is quite similar to that of Ahern (2012) who reports a mean relative gain for targets of 3.52% in his sample of transactions during 1980-2008.

$36 million or about 3.6%. Notably, the magnitude of this gain closely matches the average value loss of $38 million to acquirer shareholders for a similar increase in target advertising.

5.7. The effect of advertising in withdrawn transactions

Thus far, our results support the implication of both the rational and the behavioral hypotheses that managers invest more in advertising to receive a larger premium in a merger. Our next tests are designed to differentiate between these two hypotheses. If the increased advertising is intended to provide information transfer regarding the quality of the target, then we would expect a permanent valuation change for the target firm, even with an unsuccessful bid. Alternatively, the behavioral theory does not imply a permanent valuation change for the target firms. De Bondt and Thaler (1985) note that price reversals occur when behavioral biases cause assets to deviate from their fundamental values. In our setting, their argument implies that if the intent of the increased advertising is simply to attract temporary attention based on behavioral biases, then we would not expect an observed effect on firm value to be permanent. Consequently, to differentiate between the theories, we examine the announcement returns around withdrawn offers to test whether the value change is temporary. Studying withdrawn M&As also lessens the endogeneity issue that arises if premiums and advertising expenses are jointly determined because, as Malmendier et al. (2016) note, endogeneity concerns (related to target value) are less relevant for deals that fail.

In Panel A of Table 8, we list the reasons for the withdrawn deals along with the number of deals that fall in each category. For the 1471 deals that failed, we use both the deal synopsis in SDC and LexisNexis news searches to identify the rationale for the M&A failure. Other than the 144 that failed because the bidder was outbid by another acquirer, we are able to determine the reason for another 706 of the withdrawn transactions. As Panel A demonstrates, the M&A deals fail for a variety of reasons, including a set of 316 failures that are unlikely to be related to the target's value, which we term as the "clean" subsample: failures attributable to the bidder such as

the proposed financing falls through, failures due to regulatory issues, and failures due to the inability of the parties to agree on deal terms other than the transaction price.[26] In Panel A we also detail a set of other reasons for deal failure that could be related to the target's value.

In Panel B of Table 8, we report the results from regressing the target's CAR on the advertising proxy for the subsample of 1,421 deals that fail. As in Malmendier, et al. (2016), the dependent variable is the target's CAR running from 25 trading days before the deal announcement date (AD-25) until 25 trading days after the deal withdrawal date (WD+25). Estimates for our advertising proxies in all of the regressions are positive and statistically significant. According to the coefficients in Model (1), increasing advertising spending by a single standard deviation is related to a 1 percent increase in the CAR.[27]

5.7.1. Causality

As Seru (2014) argues, announced M&A deals that subsequently fail for reasons exogenous to certain target characteristics provide a setting akin to a quasi-experiment.[28] Consequently, we next test whether advertising has a causal effect on the M&A premiums that the target firms receive by using the clean sample of 316 withdrawals that are unrelated to target value. The results are reported in Panel C of Table 8, where we analyze these 316 observations in five regressions that are specified as those in Panel B. The estimates for our advertising proxies in Panel C remain

[26] We adopt the term "clean" as in Malmendier et al. (2016). Our subsample of clean deals encompasses almost half of the withdrawn cases for which we can identify the M&A failure reason (316/706). This proportion is similar to the incidence of such cases (81/150) in Malmendier et al. (2016).

[27] We note that 144 deals fail because the bidder is outbid by a competing acquirer firm. The results in Panel B are unaltered when we remove those observations from the analyses. In addition, like Malmendier et al. (2016, Table 4, p.99), in Model 5 of Panel B we examine the 436 failed deals in our sample where both the target and the acquirer are public firms. As with their results, the coefficient for the cash indicator we obtain in that regression is 0.0728, *p*-value = 0.0067. In that same test, a one standard deviation increase in advertising spending is related to a 0.90 percent increase in the CAR.

[28] Malmendier et al., (2016) and Ma, Ouimet, and Simintzi (2021) also rely on failed acquisitions for identification purposes.

positive and statistically significant. The results in Model (4) indicate that increasing advertising spending by one standard deviation *causes* a 1% increase in the target's CAR.

Overall, the results in Panels B and C of Table 8 indicate that even in acquisition deals that fail, target firms benefit from their pre-takeover advertising. More importantly, the permanent revaluation related to a target's pre-takeover advertising is consistent with the information transmission hypothesis and opposite to the behavioral biases alternative.

5.7.2. Interpreting the premium results

Model (5) of Panel A in Table 2 reports that for the takeover sample, increasing advertising spending by one standard deviation is associated with a premium increase of 0.91%. We view this positive advertising-premium association as consistent with advertising prompting improved both takeover premiums and the target's bargaining position. At the same time, Table 8 Panel C Model (4) shows that in acquisitions that fail due to exogenous reasons, a one standard deviation increase in advertising leads to a permanent increase in firm value of about 1%. At first glance, these results do not suggest that target firms increase their bargaining power through advertising because the improved premium (at 0.91%) is smaller than the increase in standalone value (of about 1%). We note that the advertising-related increases in premium reported in Panel A of Table 2 should be interpreted as the amount advertising raises the *average premium*. That is, on average, the premium in our sample increases by 0.91% for targets that advertise. Accordingly, and as a way to provide some intuition, one can view the target revaluation of 1% experienced by targets that advertise in withdrawn deals as the retention of the 0.91% (directly attributable to advertising) plus 0.09% attributable to the unconditional premium offered to targets in our sample. Having provided this intuition, it is important to note that the two measures are not directly comparable because the premium in Table 2 Panel A is the four-week premium drawn from SDC while the revaluation effect is based on the cumulative abnormal return associated with deal failure [i.e., CAR(AD-

25,WD+25)]. Additionally, we note that the 0.91% effect is the most conservative estimate as the increase in premium we estimate ranges from 0.91% (Table 2 Panel A Model (5)) to 1.12% (Table 2 Panel A Model (1)) while the permanent revaluation ranges from 0.93% (Table 7 Panel C Model (2)) to 1% (Table 7 Panel C Model (4)).

6. Robustness tests

In this section, we conduct analyses to check the robustness of our baseline findings and in some cases to expand on these findings.

6.1 Probability of being a target and selection bias

Given potential selection bias, we employ the Heckman (1979) methodology to estimate inverse Mills ratios from our four Probit models reported in Table 3 Panel A.[29] Consequently, in Panel A of Table 9, we use the self-selectivity correction (Heckman, 1979) in a set of target premium regressions. In these tests, the final offer premium comes from SDC and we use the CEO's retirement age in Panel A as the identifying variable in the system because as Jenter and Lewellen (2015) show, the target CEO's retirement age is related to bid probability but not to premium. The marginal effect for the retirement age variable is economically significant in that the probability of becoming a target increases by 1.6% if the CEO is at retirement age.[30] All of the coefficient estimates for the Heckman selection correction variables (inverse Mills ratios) are positive and statistically significant. These results indicate that while selection appears to be an issue affecting our specifications, the Heckman procedure seems to provide an effective correction.[31] Specifically, our findings suggest that unobserved (or omitted) variables that prompt

[29] Heckman (1979) shows that selection bias can be considered a form of omitted variable bias, where the omitted information is a function of the selection probability.
[30] This can be compared to the 1.8% marginal effect of retirement age in the Jenter and Lewellen (2015) sample.
[31] However, Wooldridge (2010, p. 806) notes that the statistical significance of the inverse Mills ratio could also be due to functional form misspecification in the population model.

firms to become takeover targets explain the premium they are offered. Moreover, the positive association between target advertising and premiums is robust to the selection control.

6.2. Missing advertising data

Another potential bias could arise from not having complete data on firms' advertising expenses. It is possible that due to variations in reporting of advertising, some companies may have missing data from Compustat data item 45 even though they advertise (for example, they may bundle their advertising with other expenses). To examine whether we could be incorrectly attributing no advertising to some firms and whether this incorrect attribution affects our results, we use the two procedures developed by Koh and Reeb (2015) to study missing research and development spending. The first keeps the expense variable as zero and adds an indicator set to one when the value for the expense variable is missing in Compustat and set to zero otherwise. The second method includes that indicator variable as an additional control and also replaces the missing expenses with the firm's industry average. We use these methods to examine whether there appear to be effects of biases in the results reported in Table 2 Panel A for the relation between acquisition premiums and advertising and the results reported in Panel B of Table 6 for the relation between the bidders' announcement returns and advertising spending. Using the Koh and Reeb (2015) procedures, the results in Panel B of Table 9 show no suggestion of bias.

6.3. Managerial ownership

So far, we argue that managers can draw awareness to their firms' products, accomplishments and expected performance through advertising. Moreover, academic work by Grullon, Kanatas, and Weston (2004), Chemmanur and Yan (2009), and Lou (2014), among others, suggests that managers deliberately use advertising to attract investor recognition and influence their firms' stock prices. Two questions that follow from the above evidence are (1) whether target managers with stronger incentives are more likely to advertise and (2) whether advertising is associated with

larger valuation effects when stronger incentives are present. To address these issues, we examine a subsample of 3,225 M&A transactions with available target CEO ownership data from either Execucomp or the Thomson Financial Insider database.

In Panel C of Table 9, we estimate a series of premium regressions interacting target CEO ownership with each of the four respective advertising proxies. The acquisition premium is the dependent variable for the first three columns, which provide the coefficients on the advertising proxy, the managerial ownership and the interaction between the two for each of the four regressions. According to the first regression, increasing advertising spending by one standard deviation is associated with a premium increase of 1.18%. However, a similar increase in advertising spending produces a premium increase of 0.92% when accompanied by a standard deviation increase in target CEO ownership. The right side of Panel C reports a series of acquirer return regressions interacting target CEO ownership with each of the four respective advertising proxies where the acquirer return is the dependent variable. These four acquirer return regressions show that acquirer M&A announcement returns decrease further in the target CEO's ownership for targets with pre-takeover advertising. Overall, the results suggest that target managers with stronger incentives are both more likely to advertise and their advertising is associated with larger valuation effects.

6.4. Targets with consumer products selecting to advertise

One possibility is that target firms with products or services sold to consumers (instead of to other businesses) may extract more benefits from advertising. If this pattern is pervasive in our data, it is possible that targets with business to consumer (B2C) products could be driving our results. The tests in Panel D of Table 9 allow for this possibility. We present acquisition premium and acquirer CAR regressions considering the role of B2C targets. Targets are coded as B2C if they operate in consumer-oriented industries which we code with the taxonomy in Sharpe (1982).

The results in Panel D continue to indicate that advertising is associated with increasing premiums and decreasing acquirer returns. This evidence mitigates the concern that B2C targets drive our results. Still, we note that in some specifications advertising is related to even higher premiums for B2C targets. For example, a one standard deviation increase in advertising spending is related to a premium increase of 1.65% for B2C targets and 67 basis points for non-B2C targets.

6.5. Short-sale constraints

When investors' beliefs about the prospect of a firm are heterogeneous and pessimistic investors cannot short sell their shares, stock prices only reflect the beliefs of optimistic investors (Miller, 1977).[32] In such circumstances, the stock will be purchased by the investors with higher valuations and is therefore more likely to be overpriced. A similar idea is put forth by Figlewski (1981), who argues that short run mispricing is likely when negative information is not impounded into security prices because pessimistic investors are kept out of the market due to restricted short sales. In relation to acquisitions, Boehme, Danielsen, and Sorescu (2006) suggest that takeover premiums depend on the presence of short-sale constraints.

Our baseline results indicate that targets that advertise obtain higher takeover premiums while their acquirers experience lower acquisition announcement returns. In our analysis, Miller's (1977) views suggest that the transfer of rent from acquirer shareholders to target shareholders should be more acute in the presence of short-sale constraints. To examine this possibility, we define a dichotomous short-sale constraints indicator and set it to one if the target does not have traded options. Otherwise, the indicator is set to zero. To populate the indicator variable, we rely on data from OptionMetrics. Since their coverage begins in 1996, our sample reduces to 5,720 deals. In that group, 49.44% of our target firms have traded options (i.e., 50.56% of the targets are coded as

[32] In addition, Chen, Hong, and Stein (2002) develop a model that shows that diversity of opinion and short-sale constraints cause overpricing.

short-sale constrained). We recognize that short selling can occur in the absence of traded options. However, as concluded by Figlewski and Webb (1993), options facilitate short selling. Moreover, they also note that while short sale constraints cause stock prices to underweight negative information, options reduce such effects. These patterns are also documented by numerous studies that also note that the lack of optionality makes short selling more expensive and often impossible (see, for example, Grundy, Lim, and Verwijmeren, 2012). Thus, at the very least, our short-sale constraints variable captures firms with higher costs of short selling.

Panel E of Table 9 presents key estimates of four target premium regressions and four acquirer CAR regressions. For both sets, the respective independent variables of interest are our four advertising proxies which we interact with the short-sale constraints indicator. Estimates in Panel E suggest that the target advertising effect is associated with stronger wealth effects in the presence of short-sale constraints. The first row coefficients show that, in the presence of such constraints, increasing advertising spending by one standard deviation translates into a target premium increase of 1.29 percentage points and into a 58 basis points drop in the acquirer return.

6.6. Acquirer advertising in stock-for-stock mergers

In unreported premium and acquirer return regressions we control for the acquirers' advertising. In both tests, this control does not attain a significant estimate and does not qualitatively change our baseline results. Nonetheless, we note that Lou (2014) finds that, by pumping the bidders' stock price, acquirer advertising matters in stock-for-stock transactions. As a result, target advertising might not be as effective when its acquirer also advertises, and the consideration is paid with the bidder's stock. We create a variable that measures the *relative advertising* between the merging firms as follows: Target's advertising spending (scaled by assets) minus acquirer's advertising spending (scaled by assets).

We use the relative advertising proxy as the key independent variable in premium and acquirer return tests like those in Model (1) of Table 2 Panel A and Model (1) of Table 5 Panel A, respectively. The new tests analyze the 1,059 stock-for-stock deals in our sample. The estimate for the relative advertising proxy is positive in the premium regression (1.0758, *p*-value = 0.0284) and negative in the acquirer return test (-0.1735, *p*-value = 0.0385). Both results are economically important as they imply that raising the target's advertising relative to the acquirer's advertising by one percent (from the mean of 0.03%) leads to an increase of 3.23% in the takeover premium and a decrease of -0.48% in the acquirer's return. These effects are consistent with those from our baseline tests.

6.7. Bidder-target matching

The results regarding search costs in Panel B of Table 3 indicate that advertising facilitates the bidder-target matching process whenever the costs of searching for a high-quality target are high. In a related vein, we now investigate whether the target firm's product market advertising facilitates potential acquirers' search for target firms with product-market synergies through asset complementarities (Hoberg and Phillips, 2010). The rationale for this line of inquiry is that, unlike other strategic decisions such as earnings/expectation management or media coverage, product market advertisements inform consumers and potential acquirers about specific product characteristics, technologies, and price information. Consequently, the unique content in product advertisement may enable potential bidders to more easily identify targets with product market synergies. Moreover, such target firms should have an improved bargaining position if their advertisement draws the attention of several bidders competing in the same product market space.

In our sample of 7,827 deals announced during 1986-2016 (Table 1), we identify 1,910 deals for which we can match the target and the acquirer to the Hoberg and Philipps Text-based Network Industry Classifications database. In this subsample, we estimate a regression in which the

dependent variable is set to one if the target-bidder product market similarity score by Hoberg and Phillips (2010) is above the median of all firm-by-firm pairwise similarity scores in the same year. The main explanatory variable is advertising spending. This regression, which controls for deal and acquirer characteristics as well as year and acquirer industry fixed effects,[33] yields the following estimate:

Target-bidder match (0,1) = 0.0226 Advertising spending + Deal, acquirer, industry, year controls
(*p*-value = 0.0753)

The results indicate that a one standard deviation increase in target advertising spending is associated with an increase of 2.32% in the probability that the product market similarity score between the target and the bidder are above the median of all firm-by-firm pairwise product market similarity score. This evidence suggests that advertising is particularly important in facilitating the bidder-target matching process when asset complementarities between these parties exist.

6.8. Additional robustness tests: Internet Appendix

In the Internet Appendix, we perform individual tests that consider target premium alternatives, bidder return alternatives, and the change in advertising intensity (instead of the level). Another test mitigates potential concerns related to deal anticipation as we find that most of the target's price appreciation occurs after the deal announcement (mark-up) and not before (run-up). This finding, however, is not surprising given our results showing that deals with target advertising are more likely to generate offers from more than one bidder.

The Internet Appendix also reports results for three tests that use alternative variables. In the first, we build our advertising proxies with advertising expense data from three years before the

[33] Deal characteristics include cash only payment (0,1), tender offer (0,1), hostile deal (0,1), multiple bidders (0,1), toehold, termination fee (0,1), lock up (0,1), diversifying deal (0,1), merger of equals (0,1), industry competition, target industry M&A liquidity index, and one-year macroeconomic change. Control variables for acquirer characteristics include the log of the market value of equity, *q*, leverage, stock liquidity, sales growth, operating cash flow, and the prior year abnormal stock return.

deal. In the second and third tests, we explore whether the effects we document are stronger for firms with higher R&D spending and those with higher excess cash, respectively, by using interaction effects. Finally, we substitute R&D spending scaled by assets for the advertising proxies. In each of these additional tests we do not find significant coefficients on the variable of interest. In addition, we do not find that targets reduce R&D expenses to increase advertising spending. Other items addressed in the tests reported in the Internet Appendix include controls for performance lags, for advertising selection, for industry biases, for the potential effects of deal size, and for concerns related to managerial quality. Lastly, that appendix also reports full Heckman corrections for tests involving other key outcome variables.

7. Conclusions

We hypothesize that managers interested in (or concerned about) being taken over will use advertising to not only raise customer and investor awareness, but to also increase their negotiating position in the case of a merger. Such an incentive would be consistent with two hypotheses. Under the first, managers rationally use advertising to transmit information about their firms' high quality to investors and potential acquirers. The alternative hypothesis posits that managers take advantage of behavioral biases and use advertising to attract attention. We test these hypotheses in a sample of 7,827 M&A bid announcements for U.S. publicly traded targets between 1986 and 2016.

Consistent with both of our hypotheses, we find that increases in a target firm's advertising are associated with increases in target shareholder wealth. Other empirical results are also consistent with our hypotheses in that targets that advertise are more likely to be pursued by multiple bidders and these bidders are more likely to revise their bids upwards. Moreover, our results show the increase in target shareholder wealth tends to be paid out of the acquirer's share of takeover gains. Thus, our evidence suggests that increased advertising not only heightens customer awareness, but

also investor recognition and manager negotiation positions, whether due to behavioral biases or information transmission, which translates to higher premiums paid to takeover target firms.

Finally, through the use of withdrawn deals, we establish the causal effect of advertising on target premiums and also differentiate the (rational) information transmission hypothesis and the (behavioral bias) attention hypothesis. We find that the rational hypothesis is the more likely explanation for the effects we find. Our results show that even if the acquisition fails, targets that advertise prior to receiving a merger offer experience a permanent upward revaluation of about 1%. Such revaluation would not occur if the positive association between a target's pre-takeover advertising and the merger premium paid to that firm stemmed from investors' behavioral biases.

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Table 1: Sample characteristics

This table describes our sample which consists of 7,827 U.S. merger and acquisition bids for public targets announced during 1986-2016 and tracked in the Securities Data Company's (SDC) merger and acquisition database. We screen deals from SDC following the criteria in Bargeron, Schlingemann, Stulz, and Zutter (2008). In addition, we require that target firms have stock market and accounting data available from the Center for Research in Security Prices and Compustat, respectively. In Panel A, we report the temporal and Fama and French 12 industries' distribution of the sample targets and acquirers. In Panel B we report deal status, mode of acquisition, method of payment, deal attitude, deal value, and target financial characteristics. In Panel C, we report summary statistics for four advertising spending measures for the entire sample of 7,827 targets and for the sub-sample of 2,743 targets with positive advertising spending. For the *ln*(1+Advertising spending) and *ln*(Adv spending) – *ln*(Adv spending prior year) variables, we report the actual value of spending (in $US million) and advertising spending growth rate, respectively, which we estimate with the standard $e^X - 1$ transformation. All financial variables are measured at the end of the fiscal year before the merger public announcement date and inflation-adjusted to the end of 2016.

Panel A: Temporal and industrial distribution

Year	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Deal count	228	261	349	259	123	103	83	137	197	367	353
Percent	2.91	3.33	4.46	3.31	1.57	1.32	1.06	1.75	2.52	4.69	4.51
Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Deal count	488	514	563	476	352	201	251	220	247	297	318
Percent	6.23	6.57	7.19	6.08	4.5	2.57	3.21	2.81	3.16	3.79	4.06
Year	2008	2009	2010	2011	2012	2013	2014	2015	2016		Total
Deal count	204	129	219	156	154	149	146	166	117		7,827
Percent	2.61	1.65	2.8	1.99	1.97	1.9	1.87	2.12	1.49		100

	Target		Acquirer	
Industry	Count	Percent	Count	Percent
Nondurable consumer goods	358	4.57	276	3.53
Durable consumer goods	147	1.88	114	1.46
Manufacturing	774	9.89	624	7.97
Energy	236	3.02	203	2.59
Chemical	135	1.72	138	1.76
Business equipment	1,575	20.12	1,155	14.76
Telecommunication	237	3.03	250	3.19
Utilities	170	2.17	172	2.20
Shops	710	9.07	423	5.40
Health	749	9.57	634	8.10
Finance	1,785	22.81	2,872	36.69
Other	951	12.15	966	12.34

Panel B: Deal and firm characteristics

	Proportion of sample	Mean	Median
Deal characteristics			
Completed	0.8184		
Tender offer	0.2356		
All cash payment	0.5174		
Friendly attitude	0.8977		
Same industry	0.5317		
Deal value (US$ billion)		1.2267	0.1983
Relative size (Target/Acquirer)		0.4154	0.1532
Target characteristics			
Market value of equity (US$ billion)		0.7321	0.1023
Q		1.6478	1.2150
Leverage		0.2279	0.1747
Sales growth		0.0759	0.0651

Panel C: Target's advertising spending

	Mean	Q1	Median	Q3	σ
(1) Advertising spending: *ln*(1+Advertising spending)	0.6531	0.0000	0.0000	0.5920	1.7831
(2) Scaled advertising spending	0.0095	0.0000	0.0000	0.0019	0.0280
(3) Advertising intensity	0.0096	0.0000	0.0000	0.0089	0.0257
(4) Advertising growth: *ln*(Adv spending) – *ln*(Adv spending prior year)	0.0648	0.0000	0.0000	0.0000	3.1494
Conditional on positive advertising spending					
(5) Advertising spending: *ln*(1+Advertising spending)	3.2203	0.4870	1.8620	8.3950	2.6032
(6) Scaled advertising spending	0.0270	0.0014	0.0102	0.0334	0.0421
(7) Advertising intensity	0.0274	0.0078	0.0142	0.0302	0.0374
(8) Advertising growth: *ln*(Adv spending) – *ln*(Adv spending prior year)	1.0964	-0.1074	0.0897	0.3528	3.7099

Table 2: Acquisition premiums

In Panel A, we report the coefficients on advertising spending from five separate regressions in which the dependent variable is the final acquisition premium reported by SDC. The main independent variable is the target's advertising spending. In Models (1)-(3), the sample consists of 7,827 deals announced during 1986-2016 described in Table 1. In Models (4) and (5), we examine 3,401 deals in which the acquirer is publicly traded. Standard errors are clustered at the year and target industry level. Panel B presents unconditional premium regressions similar to those in Comment and Schwert (1995). The dependent variable is the final offer premium reported by SDC. The premium is set to zero in non-takeover firm-years. All models use 205,511 firm-years with data available from CRSP and Compustat during fiscal year 1985-2015. Standard errors are clustered at the firm level. Standard errors are clustered at the year and acquirer industry level. In Panel A, control variables for deal characteristics (whose coefficients are not reported) include *private acquirer (0,1), cash only payment (0,1), tender offer (0,1), hostile deal (0,1), multiple bidders (0,1), toehold, termination fee (0,1), lock up (0,1), diversifying deal (0,1), merger of equals (0,1), industry competition, target industry M&A liquidity index,* and *one-year macroeconomic change*. Control variables for target and acquirer characteristics in Panel A include *log of market value of equity, q, leverage, sales growth, stock liquidity, operating cash flow* and *prior year abnormal stock return*. All variables are defined in Appendix A. We report *p*-values in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Acquisition premiums

Dependent variable = Acquisition premium	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
Advertising spending	0.0110***	0.0095**	0.0097**	0.0097***	0.0089**
	(0.0032)	(0.0206)	(0.0128)	(0.0026)	(0.0162)
Deal characteristics	Yes	Yes	Yes	Yes	Yes
Target characteristics	Yes	Yes	Yes	Yes	Yes
Acquirer characteristics				Yes	Yes
Acquirer fixed effects					Yes
Target industry fixed effects	Yes				
Year fixed effects	Yes				
(Target industry × Year) fixed effects		Yes			Yes
(Target industry × Acquirer industry × Year) fixed effects			Yes	Yes	
N	7,827	7,827	7,827	3,401	3,401
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001

Panel B: Unconditional premiums				
Dependent variable = Acquisition premium	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**
Advertising spending	0.0010***			
	(0.0000)			
Scaled advertising spending		0.1118***		
		(0.0000)		
Advertising intensity			0.1416***	
			(0.0000)	
Advertising growth				0.0002***
				(0.0010)
Size	-0.0018***	-0.0016***	-0.0016***	-0.0016***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Q	0.0000	0.0000*	0.0000*	0.0000*
	(0.1004)	(0.0934)	(0.0921)	(0.0967)
Leverage	0.0008	0.0017	0.0017	0.0011
	(0.5728)	(0.2479)	(0.2561)	(0.4462)
Sales growth	0.0000	0.0000	0.0000	0.0000
	(0.1907)	(0.1946)	(0.2044)	(0.2235)
OCF	0.0000***	0.0000***	0.0000***	0.0000***
	(0.0003)	(0.0002)	(0.0001)	(0.0005)
Prior year market adjusted return	0.0000**	0.0000**	0.0000**	-0.0001**
	(0.0452)	(0.0490)	(0.0455)	(0.0343)
Herfindahl-Hirschman Index	-0.0192***	-0.0183***	-0.0189***	-0.0207***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Industry liquidity index	0.0161***	0.0158***	0.0158***	0.0163***
	(0.0001)	(0.0002)	(0.0002)	(0.0001)
One year macroeconomic change	0.0003	0.0003	0.0003	0.0003
	(0.2334)	(0.2301)	(0.2345)	(0.2351)
Constant	0.0119***	0.0107***	0.0105***	0.0118***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Year and industry fixed effects	Yes	Yes	Yes	Yes
N	205,511	205,511	205,511	205,511
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001

Table 3: Probability of becoming a target

Panel A presents probit regressions of the probability of becoming a takeover target using 36,929 firm-years during fiscal years 1992-2015 with financial data available from CRSP and Compustat and with CEO data available from Execucomp and manually collected from annual proxies. The main independent variables are advertising spending in Model (1), scaled advertising spending in Model (2), advertising intensity in Model (3), and advertising growth in Model (4). Standard errors are clustered at the firm and year level. In Panel B, we estimate the effects of search costs on the probability of becoming a takeover target using 36,929 firm-years as in Panel A. We use three proxies for high search costs: low analyst coverage (0,1), low trading volume (0,1), and high bid ask spread (0,1). Low analyst coverage (0,1) equals one if the number of analysts covering the firm is in the bottom quartile of all firms in the same year and industry. Low trading volume (0,1) equals one if the trading volume for the firm's stock is in the bottom quartile of all firms in the same year and industry. High bid ask spread (0,1) equals one if the bid ask spread of the firm's stock is in the top quartile of all firms in the same year and industry. Panel C estimates the effect of abnormal level of investor attention using Google Search Volume Index data on acquisition premium for deals announced during 2005-2016. All variables are defined in Appendix A. We report *p*-values in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Probability of becoming a target

Dependent variable = Target (0,1)	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**
Advertising spending	0.0411***			
	(0.0000)			
Scaled advertising spending		2.1429**		
		(0.0102)		
Advertising intensity			2.6394**	
			(0.0017)	
Advertising growth				0.0326***
				(0.0003)
Size	-0.0831***	-0.0726***	-0.0743***	-0.0724***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Q	-0.0294***	-0.0323***	-0.0327***	-0.0310***
	(0.0035)	(0.0019)	(0.0017)	(0.0017)
Leverage	0.4307***	0.4386***	0.4372***	0.4258***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Sales growth	0.0001***	0.0001***	0.0001***	0.0001***
	(0.0062)	(0.0068)	(0.0096)	(0.0092)
OCF	0.0034	0.0028	0.0036	0.0050
	(0.3858)	(0.4739)	(0.3581)	(0.2075)
Prior year return	-0.3194**	-0.3171**	-0.2983**	-0.3015**
	(0.0137)	(0.0149)	(0.0206)	(0.0196)
CEO around retirement age (0,1)	0.0968***	0.0960***	0.0967***	0.0922**
	(0.0071)	(0.0075)	(0.0071)	(0.0102)
CEO tenure	-0.0087***	-0.0086***	-0.0086***	-0.0088***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Firm's age	-0.0022***	-0.0023***	-0.0022***	-0.0022***
	(0.0099)	(0.0066)	(0.0094)	(0.0095)
Industry Herfindahl-Hirschman Index	-0.4778	-0.5093*	-0.5093*	-0.5267*
	(0.1028)	(0.0828)	(0.0816)	(0.0753)
Industry liquidity index	0.2074	0.1931	0.2042	0.2078
	(0.2469)	(0.2814)	(0.2560)	(0.2466)
One year macroeconomic change	0.0092	0.0091	0.0092	0.0089

	(0.3962)	(0.4013)	(0.3964)	(0.4052)
Constant	-1.1887***	-1.2491***	-1.2373***	-1.2248***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Year and industry fixed effects	Yes	Yes	Yes	Yes
N	36,929	36,929	36,929	36,929
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001

Panel B: The impact of search costs

Dependent variable = Target (0,1)	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**
High search cost proxy =		Low analyst coverage	Low trading volume	High bid ask spread
Advertising spending	0.0032***	0.0028***	0.0024***	0.0021***
	(0.0000)	(0.0004)	(0.0000)	(0.0003)
High search cost (0,1)		-0.0121***	-0.0161***	-0.0180***
		(0.0000)	(0.0000)	(0.0000)
Advertising spending × High search cost (0,1)		0.0043**	0.0070***	0.0104**
		(0.0217)	(0.0014)	(0.0000)
Controls and fixed effects as in	Panel A	Panel A	Panel A	Panel A
N	36,929	30,936	32,195	32,195
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001

Panel C: Abnormal Google Search Volume Index

Dependent variable =	Acquisition premium	
	Model (1)	**Model (2)**
ASVI using name	0.0164***	
	(0.0042)	
ASVI using ticker		0.0172***
		(0.0003)
Other controls as in Model (1) of	Table 2 Panel A	Table 2 Panel A
N	2,154	2,156

Table 4: Deal initiation

From the original sample described in Table 1, we examine 2,326 bid contests in which one or several bidders bid for a single target and where we can find the deal background from the merger proxies filed by either the target or the acquirer with the SEC (S-4, DEFM 14, SC 14D9, SC TO, DEF 14, and 8-K). We use information from the first bid in the contest. The dependent variable equals one if the deal is first initiated by the target. Models (1)-(4) use logit while model (5) uses OLS due to a large number of fixed effects. In models (1), (2), and (3) we use the full sample while in models (4) and (5), we examine 1,537 bid contests in which the ultimate acquirer is publicly traded. The main independent variable is the target's advertising spending. Control variables for deal characteristics include *private acquirer (0,1), cash only payment (0,1), tender offer (0,1), hostile deal (0,1), multiple bidders (0,1), toehold, termination fee (0,1), lock up (0,1), diversifying deal (0,1), merger of equals (0,1), industry competition, target industry M&A liquidity index,* and *one-year macroeconomic change*. Control variables for target and acquirer characteristics include *log of market value of equity, q, leverage, sales growth, stock liquidity, operating cash flow* and *prior year abnormal stock return*. All variables are defined in Appendix A. Standard errors are clustered at the year and target industry level. We report *p*-values in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Dependent variable = Deal initiated by the target (0,1)	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
Advertising spending	0.1758***	0.2030***	0.1942***	0.1801**	0.0550**
	(0.0000)	(0.0000)	(0.0000)	(0.0178)	(0.0107)
Deal characteristics	Yes	Yes	Yes	Yes	Yes
Target characteristics	Yes	Yes	Yes	Yes	Yes
Acquirer characteristics				Yes	Yes
Acquirer fixed effects					Yes
Target industry fixed effects	Yes				
Year fixed effects	Yes				
(Target industry × Year) fixed effects		Yes			Yes
(Target industry × Acquirer industry × Year) fixed effects			Yes	Yes	
N	2,326	2,326	2,326	1,537	1,537
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001

Table 5: Deal competition and bid revision

In Panel A, from the original sample of 7,827 bids announced during 1986-2016 described in Table 1, we examine 7,204 bid contests in which one or several bidders bid for a single target. The dependent variable equals one if the contest involves multiple bidders. In Panel B, the sample consists of 7,827 deals announced during 1986-2016 described in Table 1. The dependent variable equals one if there is an upward bid revision. In both panels, models (1)-(4) use logit while model (5) uses OLS due to a large number of fixed effects. The main independent variable is the target's advertising spending. Control variables for deal characteristics include *private acquirer (0,1), cash only payment (0,1), tender offer (0,1), hostile deal (0,1), toehold, termination fee (0,1), lock up (0,1), diversifying deal (0,1), merger of equals (0,1), industry competition, target industry M&A liquidity index,* and *one-year macroeconomic change*. Control variables for target and acquirer characteristics in Panel B (initial bidder in Panel A) include *log of market value of equity, q, leverage, sales growth, stock liquidity, operating cash flow* and *prior year abnormal stock return*. All variables are defined in Appendix A. Standard errors are clustered at the year and acquirer industry level. We report *p*-values in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Bid competition					
Dependent variable = Multiple bidders (0,1)	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
Advertising spending	0.1369***	0.1648**	0.1930***	0.1479*	0.0129*
	(0.0031)	(0.0010)	(0.0000)	(0.0825)	(0.0832)
Deal characteristics	Yes	Yes	Yes	Yes	Yes
Target characteristics	Yes	Yes	Yes	Yes	Yes
Acquirer characteristics				Yes	Yes
Acquirer fixed effects					Yes
Target industry fixed effects	Yes				
Year fixed effects	Yes				
(Target industry × Year) fixed effects		Yes			Yes
(Target industry × Acquirer industry × Year) fixed effects			Yes	Yes	
N	7,204	7,204	7,204	3,284	3,284
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001
Panel B: Bid revision					
Dependent variable = Upward bid revision (0,1)	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
Advertising spending	0.1809***	0.1661***	0.1258***	0.1438**	0.0159**
	(0.0000)	(0.0003)	(0.0028)	(0.0402)	(0.0356)
Deal characteristics	Yes	Yes	Yes	Yes	Yes
Target characteristics	Yes	Yes	Yes	Yes	Yes
Acquirer characteristics				Yes	Yes
Acquirer fixed effects					Yes
Target industry fixed effects	Yes				
Year fixed effects	Yes				
(Target industry × Year) fixed effects		Yes			Yes
(Target industry × Acquirer industry × Year) fixed effects			Yes	Yes	
N	7,827	7,827	7,827	3,401	3,401
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001

Table 6: Total merger gains and acquirer returns

From the original sample of 7,827 deals announced during 1986-2016 described in Table 1, we examine 3,401 deals in which both the acquirer and the target are publicly traded. In Panel A, we examine merger synergies. The dependent variable is the three-day cumulative abnormal return for the value-weighted portfolio of the acquirer and the target around the merger announcement. Standard errors are clustered at the year and acquirer industry level. In Panel B, the dependent variable is the acquirer's cumulative abnormal return (CAR) over three days around the merger announcement date. In Panel C, the dependent variable is the relative gain of the target vs the acquirer per dollar of total market value. The main independent variable in all panels is the target's advertising spending. Control variables for deal characteristics include *cash only payment (0,1), tender offer (0,1), hostile deal (0,1), multiple bidders (0,1), toehold, termination fee (0,1), lock up (0,1), diversifying deal (0,1), merger of equals (0,1), industry competition, target industry M&A liquidity index,* and *one-year macroeconomic change*. Control variables for target and acquirer characteristics include *log of market value of equity, q, leverage, sales growth, stock liquidity, operating cash flow* and *prior year abnormal stock return*. All variables are defined in Appendix A. Standard errors are clustered at the year and acquirer industry level. We report *p*-values in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Deal synergies					
Dependent variable = Combined CAR(-1,+1)	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
Advertising spending	0.0032**	0.0033**	0.0033**	0.0033**	0.0033**
	(0.0241)	(0.0309)	(0.0209)	(0.0219)	(0.0213)
Deal characteristics	Yes	Yes	Yes	Yes	Yes
Acquirer characteristics	Yes	Yes	Yes	Yes	Yes
Target characteristics		Yes		Yes	Yes
Acquirer fixed effects					Yes
Acquirer industry fixed effects	Yes	Yes			
Year fixed effects	Yes	Yes			
(Acquirer industry × Year) fixed effects			Yes		Yes
(Acquirer industry × Target industry × Year) fixed effects				Yes	
N	3,401	3,401	3,401	3,401	3,401
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001

Panel B: Acquirer returns					
Dependent variable = Acquirer CAR(-1,+1)	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
Advertising spending	-0.0033**	-0.0033**	-0.0035**	-0.0049**	-0.0043**
	(0.0160)	(0.0154)	(0.0146)	(0.0264)	(0.0184)
Deal characteristics	Yes	Yes	Yes	Yes	Yes
Acquirer characteristics	Yes	Yes	Yes	Yes	Yes
Target characteristics		Yes		Yes	Yes
Acquirer fixed effects					Yes
Acquirer industry fixed effects	Yes	Yes			
Year fixed effects	Yes	Yes			
(Acquirer industry × Year) fixed effects			Yes		Yes
(Acquirer industry × Target industry × Year) fixed effects				Yes	
N	3,401	3,401	3,401	3,401	3,401
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001

Panel C: Division of merger gains					
Dependent variable = Relative gain of the target vs the acquirer	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
Advertising spending	0.0052***	0.0052***	0.0058***	0.0066***	0.0047***
	(0.0006)	(0.0006)	(0.0002)	(0.0003)	(0.0082)
Deal characteristics	Yes	Yes	Yes	Yes	Yes
Acquirer characteristics	Yes	Yes	Yes	Yes	Yes
Target characteristics		Yes		Yes	Yes
Acquirer fixed effects					Yes
Acquirer industry fixed effects	Yes	Yes			
Year fixed effects	Yes	Yes			
(Acquirer industry × Year) fixed effects			Yes		Yes
(Acquirer industry × Target industry × Year) fixed effects				Yes	
N	3,401	3,401	3,401	3,401	3,401
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001

Table 7: Deal completion and advertising

From the original sample of 7,827 bids announced during 1986-2016 described in Table 1, we examine 7,204 bid contests in which one or several bidders bid for a single target. The dependent variable equals one if the target is eventually sold. Models (1)-(4) use logit while model (5) uses OLS due to a large number of fixed effects. Control variables for deal characteristics include *private acquirer (0,1), cash only payment (0,1), tender offer (0,1), hostile deal (0,1), multiple bidders (0,1), toehold, termination fee (0,1), lock up (0,1), diversifying deal (0,1), merger of equals (0,1), industry competition, target industry M&A liquidity index,* and *one-year macroeconomic change*. Control variables for target and acquirer characteristics include *log of market value of equity, q, leverage, sales growth, stock liquidity, operating cash flow* and *prior year abnormal stock return*. All variables are defined in Appendix A. Standard errors are clustered at the year and target industry level. We report *p*-values in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Dependent variable = Target is sold (0,1)	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
Advertising spending	0.1186**	0.1091**	0.1088**	0.1142**	0.0136**
	(0.0112)	(0.0440)	(0.0227)	(0.0165)	(0.0223)
Deal characteristics	Yes	Yes	Yes	Yes	Yes
Target characteristics	Yes	Yes	Yes	Yes	Yes
Acquirer characteristics				Yes	Yes
Acquirer fixed effects					Yes
Target industry fixed effects	Yes				
Year fixed effects	Yes				
(Target industry × Year) fixed effects		Yes			Yes
(Target industry × Acquirer industry × Year) fixed effects			Yes	Yes	
N	7,204	7,204	7,204	3,284	3,284
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001

Table 8: Withdrawn deals and cumulative abnormal returns

In Panel A, the reasons for the withdrawn deals are listed for the deals for which the reasons could be found. In Panel B, we use the 1,421 withdrawn deals from the original sample. The dependent variable is the target's cumulative abnormal returns during the window from 25 trading days before the merger public announcement (AD-25) to 25 trading days after the deal's withdrawn date (WD+25). In Panel C, we include 316 deals for which the failure reason is most likely unrelated to the target's value (i.e., deals withdrawn due to deal terms other than price, due to bidder problems, and due to regulatory reasons).). All models use OLS. In both panels, the main independent variable is the target's advertising spending. Control variables for deal characteristics include *private acquirer (0,1), cash only payment (0,1), tender offer (0,1), hostile deal (0,1), multiple bidders (0,1), toehold, termination fee (0,1), lock up (0,1), diversifying deal (0,1), merger of equals (0,1), industry competition, target industry M&A liquidity index,* and *one-year macroeconomic change*. Control variables for target and acquirer characteristics include *log of market value of equity, q, leverage, sales growth, stock liquidity, operating cash flow* and *prior year abnormal stock return*. All variables are defined in Appendix A. Standard errors are clustered at the year and target industry level. We report *p*-values in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Reasons for the withdrawals

	Number
Deals that fail because the bidder was outbid by another acquirer	144
Deals that fail due to reasons unlikely to be related to the target's value (clean sample)	
Reasons attributable to the bidder, e.g., proposed financing falls through	180
Regulatory issues	128
The inability by the parties to agree on deal terms other than transaction price	8
	316
Deals that fail due to other reasons that could be related to the target's value	
The parties were unable to agree on the final transaction price	87
Target experienced diligence problems or garnered unfavorable news coverage	58
Target's management, board, or shareholders rejected the bid	235
Market or industry conditions deteriorated after M&A announcement	10
	390

Panel B: Withdrawn deals					
Dependent variable = Target CAR(AD-25, WD+25)	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
Advertising spending	0.0094***	0.0099**	0.0093***	0.0100***	0.0072**
	(0.0049)	(0.0327)	(0.0041)	(0.0013)	(0.0117)
Deal characteristics	Yes	Yes	Yes	Yes	Yes
Target characteristics	Yes	Yes	Yes	Yes	Yes
Acquirer characteristics					Yes
Acquirer fixed effects				Yes	
Target industry fixed effects	Yes			Yes	
Year fixed effects	Yes			Yes	
(Target industry × Year) fixed effects		Yes			
(Target industry × Acquirer industry × Year) fixed effects			Yes		Yes
N	1,421	1,421	1,421	1,421	436
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001

Panel C: Withdrawn deals due to reasons most likely unrelated to the target's value					
Dependent variable = Target CAR(AD-25, WD+25)	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**
Advertising spending	0.0095**	0.0091*	0.0095**	0.0098**	0.0097*
	(0.0396)	(0.0789)	(0.0111)	(0.0477)	(0.0568)
Deal characteristics	Yes	Yes	Yes	Yes	Yes
Target characteristics	Yes	Yes	Yes	Yes	Yes
Acquirer characteristics					Yes
Acquirer fixed effects				Yes	
Target industry fixed effects	Yes				
Year fixed effects	Yes				
(Target industry × Year) fixed effects		Yes			
(Target industry × Acquirer industry × Year) fixed effects			Yes		Yes
N	316	316	316	316	129
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001	0.0001

Table 9: Additional analyses

Panel A takes into consideration the selection bias in our tests for the probability of becoming a target in Table 3. In this panel, the dependent variable is the final offer premium reported by SDC and we include the inverse Mill's ratio obtained from the corresponding first stage tests in Panel A of Table 3 to control for target self-selection (Heckman, 1979). Panel B addresses missing advertising data using two methods: (1) including an indicator for missing advertising and using zero for the missing advertising data, and (2) including an indicator for missing advertising and using the firm's industry average advertising for the firm's missing advertising data. Panel C reports acquisition premium and acquirer return tests where each advertising spending proxy is interacted with the target CEO ownership using a subsample of 3,225 deals with ownership data available in Execucomp or Thomson Financial Insider database. Panel D presents acquisition premium and acquirer return tests where each advertising spending proxy is interacted with whether the target belongs to B2C industries. B2C industries are consumer-oriented ones following the classification by Sharpe (1982). In Panel E, we estimate acquisition premium and acquirer return regressions with each advertising spending proxy interacted with short-sale constraints (0,1) using a subsample of 5,720 deals with option data available in OptionMetrics database. In Panels B through E, all acquisition premium regressions follow those in Table 2 Panel A Model (1) and all acquirer CAR regressions follow those in Table 6 Panel B Model (1). All variables are defined in Appendix A. We report *p*-values in parentheses. *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Panel A: Heckman self-selectivity correction				
Dependent variable = Offer premium	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**
Target's advertising spending measures				
Advertising spending	0.0107***			
	(0.0045)			
Scaled advertising spending		0.3745**		
		(0.0147)		
Advertising intensity			0.3785**	
			(0.0425)	
Advertising growth				0.0094***
				(0.0000)
Heckman self-selectivity	0.0177**	0.0181***	0.0185***	0.0172**
	(0.0122)	(0.0098)	(0.0085)	(0.0152)
Deal characteristics	Yes	Yes	Yes	Yes
Target characteristics	Yes	Yes	Yes	Yes
Target industry fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Regression's *p*-value	0.0001	0.0001	0.0001	0.0001

Panel B: Missing advertising data

Dependent variable =	Acquisition premium		Acquirer CAR (-1,+1)	
Coefficient (p-value) of advertising proxy using the following additional control(s)	*Missing advertising indicator*	*Indicator + industry average*	*Missing advertising indicator*	*Indicator + industry average*
Advertising proxy:				
Advertising spending	0.0088**	0.0129***	-0.0041**	-0.0059***
	(0.0163)	(0.0044)	(0.0061)	(0.0055)
Scaled advertising spending	0.3823**	0.2841**	-0.0809*	-0.0845*
	(0.0113)	(0.0108)	(0.0764)	(0.0929)
Advertising intensity	0.4623**	0.4837***	-0.1146**	-0.1099*
	(0.0234)	(0.0000)	(0.0289)	(0.0513)
Advertising growth	0.0089***	0.0056**	-0.0019**	-0.0015**
	(0.0003)	(0.0454)	(0.0136)	(0.0138)

Panel C: Managerial ownership

Dependent variable =	Acquisition premium			Acquirer CAR (-1,+1)		
	Advertising proxy	*Managerial ownership*	*Adv proxy × Managerial ownership*	*Advertising proxy*	*Managerial ownership*	*Adv proxy × Managerial ownership*
Advertising proxy:						
Advertising spending	0.0130***	0.0088	0.0116***	-0.0030**	0.0004	-0.0114**
	(0.0050)	(0.1860)	(0.0070)	(0.0350)	(0.5901)	(0.0216)
Scaled adv. spending	0.4285***	0.0087	0.0644**	-0.1032**	0.0004	-0.1300***
	(0.0000)	(0.7500)	(0.0355)	(0.0071)	(0.7172)	(0.0058)
Advertising intensity	0.3893***	-0.0089	0.0512**	-0.1174**	0.0004	-0.1319*
	(0.0000)	(0.8169)	(0.0313)	(0.0158)	(0.5325)	(0.0511)
Advertising growth	0.0094***	-0.0008	0.0080**	-0.0024**	0.0000	-0.0004*
	(0.0006)	(0.9162)	(0.0001)	(0.0378)	(0.9670)	(0.0722)

Panel D: B2C industries

Dependent variable =	Acquisition premium			Acquirer CAR (-1,+1)		
	Advertising proxy	*B2C industries (0,1)*	*Adv proxy × B2C industries (0,1)*	*Advertising proxy*	*B2C industries (0,1)*	*Adv proxy × B2C industries (0,1)*
Advertising proxy:						
Advertising spending	0.0068**	0.0038	0.0095**	-0.0022***	0.0071**	-0.0027**
	(0.0176)	(0.7287)	(0.0172)	(0.0007)	(0.0210)	(0.0280)
Scaled adv. spending	0.2560**	0.0081	0.1837*	-0.0850**	0.0091***	-0.0686*
	(0.0385)	(0.4280)	(0.0597)	(0.0103)	(0.0021)	(0.0787)
Advertising intensity	0.2843**	0.0082	0.2354*	-0.0827**	0.0099***	-0.0945**
	(0.0309)	(0.4275)	(0.0510)	(0.0219)	(0.0008)	(0.0316)
Advertising growth	0.0081***	0.0022	0.0149**	-0.0029***	0.0089***	-0.0032**
	(0.0041)	(0.6586)	(0.0123)	(0.0092)	(0.0017)	(0.0165)

Panel E: Short-sale constraints

Dependent variable =	Acquisition premium			Acquirer CAR (-1,+1)		
	Advertising proxy	*Short-sale constraints*	*Adv proxy × Short-sale constraints*	*Advertising proxy*	*Short-sale constraints*	*Adv proxy × Short-sale constraints*
Advertising proxy:						
Advertising spending	0.0084*	-0.0070	0.0126**	-0.0021*	0.0071**	-0.0057**
	(0.0913)	(0.6254)	(0.0239)	(0.0704)	(0.0210)	(0.0280)
Scaled adv. spending	0.2933**	-0.0069	0.5351***	-0.1050**	0.2686*	-0.0912**
	(0.0236)	(0.6211)	(0.0056)	(0.0260)	(0.0787)	(0.0210)
Advertising intensity	0.2243**	-0.0058	0.4813**	-0.0826**	0.0999***	-0.0945**
	(0.0333)	(0.6778)	(0.0242)	(0.0219)	(0.0008)	(0.0316)
Advertising growth	0.0056*	-0.0007	0.0175***	-0.0029***	0.0089***	-0.0032**
	(0.0912)	(0.9605)	(0.0076)	(0.0092)	(0.0017)	(0.0116)

Appendix: Variable definitions

Advertising spending proxies	
Advertising spending	the natural logarithm of (1+advertising spending in million $US)
Scaled advertising spending	advertising spending scaled by total assets
Advertising intensity	advertising spending scaled by sales
Advertising growth	the log difference of advertising spending
Deal characteristics	
Acquisition premium	the offer price divided by the target's stock price four weeks before the merger announcement date, minus one, as reported by SDC and limited between 0% and 200%
Target CAR	the target's cumulative abnormal return over the window around the merger announcement date, calculated as the residual from the market model estimated during the one year window ending four weeks prior to the merger announcement
Acquirer CAR	the acquirer's cumulative abnormal return over the window around the merger announcement date, calculated as the residual from the market model estimated during the one year window ending four weeks prior to the merger announcement
Division of merger gains (Target/Acquirer)	the target's gain relative to the acquirer's gain (as in Ahern, 2012). To construct this variable, we first estimate the target $CAR and the acquirer $CAR as the firm's merger announcement CAR(-1,+1) multiplied by market equity of the firm two days before the merger announcement. Next, we compute the target's $CAR minus the acquirer's $CAR. We then divide this difference by the sum of acquirer and target market values 50 trading days before the merger announcement. This measure represents the relative gain of the target versus the acquirer for each dollar of total market value, without the concern that total gains may be negative.
Target is sold (0,1)	one if the target is eventually sold to the bidder
Upward bid revision (0,1)	one if the offer price is revised upward
Multiple bidders (0,1)	one if the deal involves multiple bidders
Private acquirer (0,1)	one if the bidder is not publicly traded
Cash payment (0,1)	one if the deal is paid entirely in cash
Tender offer (0,1)	one if the form of the deal is tender offer
Hostile deal (0,1)	one if the deal is classified hostile by SDC
Competed deal (0,1)	one if the deal has a competed offer identified by SDC
Toehold	fraction of the target's shares owned by the bidder
Target termination fee (0,1)	one if the target has a termination fee provision in the merger contract
Lockup (0,1)	one if the deal includes a lockup of target or acquirer shares
Merger of equals (0,1)	one if the deal is classified by SDC as a merger of equals
Same industry (0,1)	one if both the target and the acquirer belong to the same Fama and French (1997) 48 industrial classification group
Market characteristics	
Target Herfindahl-Hirschman index	the competitiveness of the target industry. An industry's Herfindahl index is computed as the sum of squared market shares of all firms in the industry using data on sales, as in Masulis, Wang and Xie (2007).
Target industry liquidity	the liquidity of the market for corporate control for the target firm's industry. This variable is defined as the value of all corporate control transactions for US$1 million or more reported by SDC for each year and industry

	divided by the total book value of assets of all Compustat firms in the same industry and year, as in Schlingemann, Stulz and Walkling (2002)
One year macroeconomic change	the difference in the industrial production index over one year period before the merger
Firm characteristics	
Size	the natural logarithm of the market value of assets
Q	the market value of assets divided by the book value of assets
Leverage	the book value of debt divided by the sum of book value of debt and market value of equity.
Sales growth	the growth rate in sales from the previous fiscal year to the current fiscal year.
Stock liquidity	the natural logarithm of one plus the average of the daily Amihud (2002) illiquidity measure over the fiscal year, multiplied by minus one to facilitate the liquidity interpretation since a lower Amihud's value implies a higher liquidity level.
OCF	the cash flow from operations scaled by the value of assets
Prior year market adjusted return	the cumulative abnormal return during the one year window ending four weeks prior to the merger announcement, calculated as the residual from the market model estimated during the year before
R&D	the research and development expenditure scaled by the value of assets
Excess cash	the residual from Frésard and Salva (2010) model: $ln(\text{Cash}) = \beta_1 ln(\text{Assets}) + \beta_2 \text{Cash Flow} + \beta_3 \text{Net Working Capital} + \beta_4 \text{Q} + \beta_5 \text{Capex} + \beta_6 \text{Leverage} + \beta_7 \text{R\&D} + \beta_8 \text{Dividend}$ + firm, industry, and time fixed effects
Short-sale constraints (0,1)	one if the firm does not have traded options
Managerial ownership	the equity ownership by the CEO as a proportion of the number of shares outstanding
Institutional ownership	the equity ownership by all institutional investors as a proportion of the number of shares outstanding
Firm's age	the number of years the firm has been in operation from its IPO date or first trading day on CRSP if IPO data is missing
CEO around retirement age (0,1)	one if the CEO's age is between 64 and 66
CEO tenure	the number of years the CEO has been in the chief executive position in the company
Other variables	
Heckman self-selectivity	the Heckman (1979) lambda in a two-stage process. In the first-stage, we estimate the probability of becoming a target. In the second stage, the inverse Mill's ratio from the first stage model is included in the estimation as a variable to control for self-selection.
ASVI	the log of SVI during the week of one month before the deal announcement date minus the log of median SVI during the previous 48 weeks. SVI is the aggregate search frequency from Google Trends, defined in Da, Engelberg, and Gao (2011) page 1470.
Low analyst coverage (0,1)	one if the number of analysts covering the firm is in the bottom quartile of all firms in the same year and industry with data from IBES
Low trading volume (0,1)	one if the trading volume for the firm's stock is in the bottom quartile of all firms in the same year and industry with data from CRSP
High bid ask spread (0,1)	one if the bid ask spread of the firm's stock is in the top quartile of all firms in the same year and industry with data from CRSP