Attention in the overnight period and bidder abnormal returns

Ahmed Ameya Prapan and Evangelos Vagenas–Nanos*

January 2021

Abstract

Based on the premise that there is a divergence of investors between the overnight and day periods, we propose absolute overnight returns (AOR) as a proxy for retail investor attention. AOR plays a vital role in the context of one of the largest and most significant corporate events - merger announcements. The study finds that AOR positively affects the acquirer abnormal returns. The short-term overreaction is corrected by price reversals in the post-announcement period. The set of results are strongest for bidders with low institutional ownership and bidders that are hard to value. The results further hold for the overreaction hypothesis related to stock swap deals while rejecting the notion that our proxy AOR captures investor sentiment.

Keywords: Mergers and Acquisitions; Overnight Returns; Retail Investor Attention.

JEL Classification: G3; G4; G34

* Ahmed Ameya Prapan is from Adam Smith Business School, University of Glasgow, UK, E–mail: a.prapan.1@research.gla.ac.uk. Evangelos Vagenas–Nanos is from Adam Smith Business School, University of Glasgow, UK. Email: a.prapan.1@research.gla.ac.uk.

1. Introduction

In this study, we revisit the premise that attention paid to the acquiring firm is a scarce resource and substantially affects the quality of the decision-making by the investors (Barber and Odean, 2008; Kahneman, 1973)[1]. The investors are exposed to an abundance of new information in the stock market yet have very little time to process and integrate the information in their decision-making. When there are many options for the investors, stocks that grab the attention of the investors, are more likely to be selected. On the other hand, stocks that don't attract the attention of investors are more likely to be ignored. The studies on investor attention concur that it's primarily the retail investors who are subject to cognitive bias like short-term attention span that instigates them to trade at prices not justified by market fundamentals[2].

As the retail traders tend to invest as a group, their attention driven collective investments may have a substantial impact on the pricing of the securities. However, behavioral finance empiricists still face a great challenge to measure investor attention as it is not directly observable. In the context of the corporate announcements, DellaVigna and Pollet (2009) propose that Friday announcements can be taken to test the investor inattention hypothesis and find a weak market reaction to the release of corporate news on Fridays when investors have relatively low attention. Louis and Sun (2010) document similar findings for merger announcements. Previous studies also take extreme daily returns, abnormal trading volume, news, advertising expense, and google search volume index as the different proxies of investor attention (Barber and Odean, 2008; Chemmanur and Yan, 2009; Da et al., 2011; Gervais et al., 2001; Grullon et al., 2004; Hou et al., 2009). Although investor attention as a behavioral bias should be more pronounced for the retail investors than the institutional

[1] The term "attention" refers to the aspect of amount and intensity towards a task or activity (Kahneman, 1973). The capacity theory of attention considers that individuals have limited ability to carry out multiple activities at the same time and hypothesizes that the total amount of attention that an individual can assert at any time is limited (Kahneman, 1973). It also assumes that this limited capacity can be allocated with considerable freedom among concurrent activities. When the supply of attention does not meet the demand then the performance of the task falters or even fails.

[2] Please see Odean (1999), Barber and Odean (2008), Lou and Sun (2010), Berkman et al. (2012).

investors, most of these proxies of investor attention do not consider the systematic dispersion between the two sets of investors empirically. To address this issue, based on the premise that it's primarily the retail investors who actively trade in the overnight periods, we propose, mean absolute overnight returns (AOR) as a proxy for the equity investors' attention and test whether high AOR before the acquisition announcement affects the bidders' abnormal announcement returns.

The motivation for selecting AOR as a measure of investor attention stems from the recent findings in the fields of psychology and behavioral finance. For example, Kraemer et al. (2000) document that an individual's ability to give attention may vary based on time-of-day, and the peak in attention often coincides when the stock market is closed in the overnight period. In a recent study, Evans et al. (2017) further posit that compared to the intraday period, individuals are more vulnerable to cognitive biases in the overnight period. These studies from human psychology are further complemented by the recent findings on overnight returns. For instance, Lou et al. (2019) suggest that investor heterogeneity drives the contrasting returns pattern between the overnight and intraday periods. Similarly, Berkman et al. (2012) document that the retail investors who are more likely to be affected by cognitive biases, prefer to trade at the night period and wait for the trades to be executed at the market open. Aboody et al. (2018) on the same premise that retail investors are more likely to be affected by sentiment, propose overnight returns as a proxy for firm-specific investor sentiment. Moreover, when the retail investors place orders outside the trading hours in the overnight period, they seldom worry about liquidity or the price impact of the orders (Lou et al., 2019). Besides, over the years more and more firms are disclosing company-specific information after the market closes (Barclay and Hendershott, 2003; Santosh, 2016). Although these announcements may grab the attention of all sorts of investors, however, it is the retail investors who are more likely to act upon the news and put orders outside the regular trading hours. Keeping these findings as our background premise, we posit that it's the retail traders who are more likely to place orders in the overnight period for the stocks that have grabbed their attention, especially when the significance of the news is such that these trades are too costly to delay (i.e., merger announcement).

Within our framework of M&A announcements, investors' attention may be grabbed long before the actual announcement as the rumors and uncertainties surrounding potential

merger activities infiltrate the market regularly. Shiller (2003) argues that intrinsic animal spirits within the investors increase their propensity to take investment decisions even under uncertainties. In an attempt to reduce the information asymmetry, retail investors who actively trade on these private signals, go through different means like interviewing managers, verifying rumors, analyzing the firm performances from financial statements, etc. (Daniel et al., 1998). Moreover, these investors remain more confident about the precision of the attention-grabbing signals that they get or generate first-hand (Odean 1999). If the private signals about the upcoming merger grab the attention of the individual investors, they are likely to place orders of the stocks of the acquiring firms irrespective of the price or liquidity in the overnight period. These attention-driven trades, primarily by the retail traders results in extreme overnight returns (both positive and negative) leading to the takeover announcement. Lee et al. (1991) and Hirshleifer and Shumway (2003) document that retail investors are net buyers of stocks having both positive and negative earnings surprises. Primarily because the extreme returns whether negative or positive, more often are associated with the news of the corresponding bidders. The news driving the extreme overnight returns will catch the attention of some of the investors, while the extreme return itself may grab the attention of the others, especially, in the absence of official announcements. Consequently, we propose that the high AOR of the bidders' stocks in the period leading to the takeover announcement date means retail investors as a group are actively paying attention to the news of the impending acquisition.

To investigate our empirical predictions related to the AOR, we choose merger announcements as the testing platform for the following reasons: (i) Mergers are one of the most important and complex corporate investments which help the acquiring firms to create value and achieve growth. To successfully create wealth for the shareholders, acquirers hope that there is enough attention from the investors around the announcement days. (ii) Unlike the other forms of corporate announcements (i.e., earnings announcements and dividend announcements) that are more frequent with anticipated announcement days, the M&A announcements are rather infrequent and complex. Consequently, the lack of attention from the market agents means it will take longer for the stock market to incorporate this new announcement information (Louis and Sun, 2010). (iii) The information content of a merger announcement is such that it takes significantly longer for the investors to process the news and act on it. (iv) The market value of the bidder is more susceptible to the subjective

valuations by the investors around the bid period compared to normal periods. Thus, investor attention should affect the way equity investors value the bidder stocks and in turn affect the announcement returns.

It is intuitive to believe that, compared to the normal period, retail investors remain more active in this period leading to the announcement. Hence, to proxy for investor attention faced by US bidders, we estimate the average AOR from -20 to -3 days leading the takeover announcement. Our proxy AOR is different from the previous proxies of investor attention such as, extreme daily returns, abnormal trading volume (Barber and Odean, 2008), Friday announcements (Louis and Sun, 2010) and google search attention (Da et al., 2011) in the following ways: (i) Unlike extreme daily returns and trading volumes that are susceptible to the trades of institutional investors, our proxy of attention AOR should primarily capture the attention driven trades of the retail investors. (ii) We are not only focusing on the investors' attention on a particular day, rather we incorporate the overnight attention starting from 20 days before the announcement. (iii) The data for Google search volume index (SVI) is often unavailable for comparatively less known bidders whereas our proxy for attention remains valid for all the publicly traded bidders.

To investigate the impact of attention on the acquisition returns, we use a sample of US M&A deals announced between January 1993 and December 2018. Bidder CARs are calculated for the 3 days event window starting from 1 day before the announcement date to 1 day after the announcement. We begin our empirical analysis by directly investigating, what do overnight returns capture in the context of M&As? Is it sentiment or attention? It is particularly difficult to differentiate between the attention-driven and sentiment-driven returns as both share similar returns distributions such as long-run returns reversals, a stronger association for firms more retail investors, and a stronger reaction for harder to arbitrage stocks ((Baker and Wurgler, 2007; Danbolt et al., 2015). To distinguish between the two empirically, following Aboody et al. (2018) we also construct mean overnight returns (OR) estimated -20 to -3 days before the takeover announcement and see if OR as a proxy for firm-specific sentiment can explain the bidder abnormal returns.

The attention framework of Barber and Odean (2008) document that individual investors are the net purchasers of attention-grabbing stocks resulting in temporary positive

price pressure. The rationale behind the proposition is that, when individual investors are buying, they have to choose from a large set of available stocks. On the contrary, when they are selling, they can only sell from what they already own. Keeping the findings of Barber and Odean (2008) as our framework, we expect that high AOR on average positively affects the acquirer short-run abnormal returns around the merger announcement. Similarly, in the context of investor sentiment, Danbolt et al. (2015) propose that in the presence of sentiment, investors are likely to overestimate the synergy from the impending merger while underestimating the risk, resulting in a positive market overreaction during the announcement. Consequently, in the context of our study, albeit through two different mechanisms, both the AOR as a proxy of attention and OR as the proxy of sentiment predicts a positive association with bidder abnormal returns.

The results from both the univariate and multivariate analyses give us the initial confirmation that our proxy of retail investor attention, AOR positively affects the bidder abnormal returns whereas there is no evidence of an association between OR and bidder CARs. In the univariate framework, we divide our sample of bidder CARs across the 10 portfolios of OR and AOR. We find that the mean CARs following the highest portfolio of AOR (4.7 %) is more than four times the mean CARs of the overall sample. Furthermore, the difference in mean CARS between the highest and lowest AOR groups is both statistically significant and economically meaningful. On the contrary, the difference in mean CARs following the highest and lowest portfolios of OR is insignificant and economically very small. In the multivariate framework, after controlling for the known bidder-, deal-, and macro-level factors, the coefficient of AOR is positive and statistically significant (1%) in explaining acquirer abnormal returns around the merger announcements. The results show that a percentage point increase in bidder AOR is associated with a .428 percentage point increase in the three-day bidder cumulative abnormal returns. The economic magnitude of such an increase in the AOR coefficient translates into a $796 million value increase for our sample average bidder with a market value of $ 1.19 billion. On the contrary, the coefficients on OR don’t show any explanatory power on the bidder abnormal returns.

Next, we analyze the differential market response to high and AOR for stock swap announcements., The stock swap deals give us a unique research setting to further distinguish

between attention and sentiment. Under the framework of investor inattention, Louis and Sun (2010) document that when the investors are inattentive, the reaction for public stock swaps is less negative and the reaction for private stock swaps is less positive. Similarly, in our case, high AOR should lead to an overreaction of negative abnormal returns for public stock swaps and positive abnormal returns for private stock swaps. However, for the coefficient on OR capturing investor sentiment, we don't expect the association with bidder CARs to vary by public and private stock swap deals. Supporting our conjecture, multivariate results show that following high AOR, the market reacts more negatively to public stock swaps and more positively to private stock swaps. Moreover, the coefficients on OR remain statistically insignificant. These findings further invalidate the concern that sentiment is the mechanism through which overnight returns affect acquirer CARs.

For the next set of analyses, we make predictions related to the economic mechanisms driving the positive association between AOR and bidder CARs. Unravelling the potential channels would give us further validation that investor attention is the main driver behind our reported results. First, we predict that attention-driven overreaction should be stronger for the acquiring firms with greater information asymmetry and harder to value or arbitrage (Baker and Wurgler, 2007; Berkman et al., 2012; Daniel et al., 1998; Zhang, 2006). In our attention framework, investors' subjective valuation varies with the level of information uncertainty in the stock market. In such cases, retail investors tend to overestimate their ability to generate accurate information, particularly in cases where they personally collected the data (Odean, 1999). To test these predictions, we take small bidders, young bidders, and acquisitions of private targets as our three proxies for hard of value acquires and deals. Keeping in line with our assumption, we find that the positive association between AOR and acquirer abnormal returns is strongest for the sub-section of small bidders, young bidders, and private targets.

Second, we test whose attention does AOR capture. According to Da et al. (2011) and Berkman et al. (2012), attention-driven purchasing behavior is more pronounced in firms with less institutional investors, since small retail investors as a group are more likely to be affected by attention. Whereas institutional investors are less likely to be affected by attention since they have access to far better information gathering sources like Reuters or Bloomberg (Da et al., 2011). To test these predictions, following Buchanan et al. (2018), we

construct two measures of institutional ownership: i) Top 5 institutional ownership and ii) Block holder ownership. Top 5 institutional ownership variable is the total percentage of the acquirers' shares held by the top 5 institutional investors. Next, we construct two dummy variables as a proxy for the firms with high retail traders: i) Low institutional ownership, a dummy variable equals to 1 if top 5 institutional ownership is lower than the 25th percentile and 0 otherwise; ii) Low blockholder ownership: a dummy variable equals 1 if blockholder ownership variable is less than the 25th percentile value of our sample and 0 otherwise. Supporting our conjecture, the results show that the positive association between AOR and acquirer abnormal returns is stronger in the subsection of acquirers with lower institutional investor holdings.

Third, we posit that attention driven positive overreaction for the private stocks and negative overreaction of public stocks should be more pronounced under the moderating effect of deal complexity and institutional ownership. Confirming our prediction, we find that the coefficients on the interaction variable of AOR and private stocks are more positive for the sub-sample of small bidders, young bidders, low top 5 institutional ownership, and low blockholder ownership. On the contrary, for the same sub-sample of firms, we find the coefficients on the interaction variables of AOR and public stocks to be more negative.

Our results hold for a series of robustness tests. First, we confirm that our results are not driven by any particular window of bidder abnormal returns as the association between AOR and bidder CARs holds for three different windows of bidder abnormal returns. Second, to address the concerns regarding the capacity of the AOR to capture retail investor attention, we take two alternate measures of AOR. The coefficients on the alternate proxies of AOR remain statistically and economically significant in explaining both bidder CARs. Third, we further confirm that all the variants of AOR remain positive and significant in explaining abnormal trading volumes as well.

Next, we investigate the influence of AOR on acquirer abnormal returns between the merger (bid) and normal (pre-bid) period. Previous literature (i.e., Barber and Odean, 2008) primarily explores the relationship between attention and market returns in the normal trading period. However, in this context of takeover announcements, compared to the pre-bid period, the relation between AOR and bidder abnormal return should be stronger around

the bid period when the bidder stock is more exposed to the subjective valuation by the equity investors. For the bid period, we keep the calculation windows exactly like our main multivariate test. For the pre-bid period, the dependent variable is the CARs calculated -22 to -20 days before the merger announcement and the main independent variable is the mean absolute overnight return calculated -40 to -24 days before the announcement. These alternate windows of pre-bid AOR and pre-bid abnormal returns ensure that we can explore the association between them in the normal trading period that is likely to be free from the potential impact of the upcoming merger. Supporting our conjecture, the results show that the association between AOR and bidder abnormal return is only significant in the bid period. Furthermore, the difference between the AOR coefficients in the bid and pre-bid period is also statistically significant. This finding also gives further justification for taking takeover announcements as our research setting.

The positive coefficient on AOR is consistent with the retail investor attention hypothesis suggested by Barber and Odean (2008). On the contrary, it can be the case that the positive coefficient on AOR is simply reflecting the favorable bidder and deal-specific fundamentals captured through the high AOR before the official announcement. Da et al. (2011) propose a way of disentangling the overlapping findings between investor attention and the information-based hypothesis by testing the returns reversal. If the positive market reaction is due to the nature of the acquirer and deal-specific fundamentals, then the positive reaction will continue as the news of the successful acquisition gradually gets incorporated into the acquirer stock price. However, if the temporal price pressure is due to the attention-driven acquirer stock purchase behavior, then we should expect the positive market reactions to be followed by price reversals in the post-announcement periods. Supporting the latter prediction, our results show that overnight attention-driven overreaction is followed by price reversals in the post-announcement days.

Next, we recognize that while retail investors' attention might be grabbed for a multitude of reasons, the nature of firms and deals that grab their attention more easily may not be randomly distributed. For example, it is more likely that retail investors pay more attention to renowned bidders or public targets. Thus, the bidders that get more attention are likely to differ in terms of several characteristics relative to the bidders that get less attention. If the propensity to get attention is related to the bidder's abnormal returns, then we cannot

conclude that AOR affects the bidder CARs. Thus, to reinforce the validity of our prior findings, we perform a propensity score matching (PSM) analysis to control for the firm and deal-level characteristics that could potentially lead to the selection bias in our empirical tests. In particular, we follow the method suggested in Druker and Puri (2005) and construct a sample of bidders that experienced high retail investor attention (the treatment group) with similar characteristics to the low-investor attention bidders (the control group). To match the firms, we use size, book leverage, market–to–book, return on assets (ROA), past returns, firm age, firm volatility, target public status, and stock payment. The impact of the AOR on bidder CARs and the abnormal trading volume for the matched sample remains positive and statistically significant at 1% level of significance, alleviating the concern that potential selection bias by the retail investors may drive our overall results.

Lastly, to address the potential issue that omitted variables may drive our results, we perform a two-stage instrument variable (IV) analysis. For this procedure, we take the percentage of home-broadband users in the US provided by the PEW research center as the instrumental variable. Barber and Odean (2002) find that the availability of the internet in the US homes changed the way retail investors trade in the market. Due to the availability of online trading facilities, retail investors are trading more actively, more speculatively, and earning less profit in the long run (Barber and Odean, 2002). In the context of our study, the percentage of home-broadband users should affect our independent variable AOR, however, unlikely to influence the bidder abnormal returns. Supporting our conjecture, we find that access to the home-internet has a statistically significant association with retail investor attention. More importantly, the post estimation results from the first-stage regression show that the Kleibergen–Paap rk Wald F statistic for the weak identification test is higher than the critical value prescribed in Stock and Yogo (2002). Besides, the results from the second stage of the IV regression confirm that the instrumented AOR remains positive and statistically significant.

This study contributes to the different strands of literature. First, we contribute to the behavioral finance literature. While previous studies in the field of behavioral finance show that the attention driven trading by the retail investors create temporary price pressure in the stock market (Barder and Odean, 2008; Berkman et al., 2012; Da et al., 2011), this paper extends the analysis in the context of M&As and concludes that retail investor attention is a

valid predictor of bidder abnormal returns. We further develop different hypotheses based on the findings of the previous behavioral literature and conclude that the association between AOR and bidder announcement returns is stronger for acquirers with the percentage of low institutional investors, private targets, and harder to arbitrage stocks. Besides, as bidder CARs are calculated over the regular market returns, our results indicate an association beyond the already found relationship between investor attention and the stock market performance in Barber and Odean (2008) and Berkman et al. (2012).

Second, our results further contribute to the emerging literature on the contrasting returns pattern witnessed between overnight returns and intraday reversals resulting from that two distinct clienteles: retail investors in the overnight periods and daytime arbitrageurs in the intraday periods (Akbas et al., 2020; Lou et al., 2019). We extend these findings in the context of M&As by empirically validating that the dispersion of the investors between the overnight and intraday periods affects the bidder abnormal returns. While previous proxies of investor attention either do not differentiate between the two distinctive groups of investors or do not capture the attention of the investors in the long period leading to the announcement, AOR specifically captures the attention of the retail investors, up to 18 days period leading to the announcement. Moreover, unlike the Google search volume index (SVI), data for which can be area restricted and more infrequent for comparatively less available bidders, AOR can be constructed for all the publicly available stocks for the desired period. Even though AOR shows many of the characteristics of firm-specific investor sentiment, by using the testing platform of stock swap deals we show that AOR indeed captures retail investor attention, not investor sentiment.

Third, we contribute to the literature on the determinants of bidder abnormal returns. Prior literature shows that a large pool of factors such as target public status (Agrawal et al., 1992; Higson and Elliott, 1998; Jarrell and Poulsen, 1989; Jensen and Ruback, 1983; Kaplan and Weisbach, 1992), payment methods (Brown and Ryngaert, 1991; Myers and Majluf, 1984; Servaes, 1991; Travlos, 1987), relative size (Asquith et al., 1983; Jarrell and Poulsen, 1989; Jensen and Ruback, 1983), bidder size (Moeller et al., 2004), capital structure (Schlingemann, 2004; Toffanin, 2005; Yook, 2003) corporate governance (Amihud et al., 1990; Ghosh and Ruland, 1998), CEO overconfidence (Malmendier and Tate, 2008), different variants of uncertainties (Bhagwat et al., 2016; Hao et al., 2020; Nguyen and Phan,

2017; Nguyen et al., 2020), bidder and target valuations (Dong et al., 2006; Rhodes-Kropf and Viswanathan, 2004; Rhodes–Kropf et al., 2005; Shleifer and Vishny, 2003), corporate liquidity (Almeida et al., 2011), and investor sentiment (Danbolt et al., 2015; Rosen, 2006) can affect bidder abnormal returns. We uncover AOR as a new determinant showing a short-term positive association with bidder abnormal returns followed by a reversal in the post-announcement periods. Understanding the dynamics between the night traders and day-time arbitrageurs in the context of acquisition announcements is of great significance given the importance of acquisition activity in creating value for the bidders.

Our research is closely related to the behavioral models in Rosen (2006) and Danbolt et al. (2015). Both the studies concur that under the presence of high sentiment, investors overestimate the synergies of the impending mergers while underestimating the risks associated with them resulting in short-term overreaction followed by a long-term reversal. Our study complements these findings by reporting another source of cognitive bias, attention of night traders affecting the bidder abnormal returns. The study also extends the previous findings that managers time their acquisition decisions based on market valuation (Bouwman et al., 2009; Rhodes-Kropf and Viswanathan, 2004; Rhodes–Kropf et al., 2005; Shleifer and Vishny, 2003). We particularly highlight that the trades by the retail investors may also affect the merger announcement returns. Our empirical finding that retail investors are the net buyers of the attention-grabbing bidders around the merger announcements is also largely consistent with the empirical results in Barber and Odean (2008) and Grullon et al. (2004). This finding is also consistent with the story of Gervais et al. (2001) that increased visibility of stock may attract new investors, especially around a major corporate announcement like acquisitions.

The remainder of the chapter is organized as follows: Section 2 includes the literature review. Section 3 describes the sample, data, and variables used in the analysis. Section 4 presents the empirical results. Finally, section 5 concludes the chapter.

2. Literature Review

It is a very well documented notion that on the days of information release or large price movements, stock trading volume increases (Bamber et al., 1997; Karpoff, 1987). For

example, when Maria Bartiromo, the famous presenter of the Midday Call on CNBC, mentions a stock, it's trading volume increases nearly five times in the minutes after the mention (Busse and Green, 2002). The neoclassical asset pricing models assume that new information in the market is readily incorporated into the stock price, requiring the investors to pay enough attention to the news. However, in reality, attention is a scarce cognitive resource (Kahneman, 1973). Recent studies on attention provide us a theoretical framework to assess how investor attention affects the share price movement in the financial market.

One important question to ask here is, who is buying, and who is selling these stocks that grab the attention of the investors? Lee et al. (1991) examine the trading activity around earnings announcements over a year and finds that small retail traders are the net buyers of stocks having both positive and negative earnings surprises. Lee et al. (1991) predict that earnings news may attract investors' attention. Similarly, Hirshleifer and Shumway (2003) also conclude that retail investors are the net buyers following both positive and negative earnings surprises. In another paper, Peng and Xiong (2006) argue that high individual investor attention leads to price overreactions in up markets while offsetting underreactions to events such as earnings reports. Odean (1999) explores the trading records of investors and concludes that on average, the stocks bought by the retail traders underperform those they sell. The author further observes that stocks these investors buy stocks having greater absolute price change in the previous two years. He further suggests that to address the potential search problem of which securities to buy, investors constrain their search to stocks that grabbed their attention.

In another study, Odean (1998) posits that investors trade excessively when they are overconfident about their information, leading to overvaluing the importance of such events that catch their attention and resulting in suboptimal trading. Odean (1999) and Barber and Odean (2001, 2002) similarly find that self-directed individual investors, in the presence of cognitive biases, indeed trade sub-optimally while lowering their expected returns through excessive trading. Seasholes and Wu (2004) observe that individual investors are the net buyer of the stocks that hit the upper limit the day before in the Shanghai Stock Exchange. Moreover, the relationship is stronger for first-time buyers. Grullon et al. (2004) document that, advertising may also grab investors' awareness of a firm. They find that firms that spend more on advertising, increase the investors' association with the firm, and consequently,

these firms have a greater number of individual and institutional investors. Gervais, et al. (2001) find that stocks that experience a high trading volume lead to price appreciation. The authors argue that buyers of these stocks are the investors who are optimistic about their prospects. The increased awareness among the investors, coupled with high trading volume results in the net purchase of these stocks. Thus, investors do not purchase stocks that they don't follow, and these purchases are biased towards the attention-grabbing stocks.

Previous research also reports the role of investor attention in assessing corporate announcements. DellaVigna and Pollet (2009) find that abnormal returns are muted during the announcements made on Fridays when the investor attention is lower. Louis and Sun (2010) document similar findings for merger announcements. Similarly, Hirshleifer et al. (2009) find evidence that the stock market's reaction to earnings surprises is weak on days during which multiple firms give similar announcements. Adra and Barbopoulos (2018), find that limited investor attention allows overvalued bidders to engage in stock financed acquisitions without experiencing great wealth loss. The authors find that, in the presence of limited investor attention, bidders acquiring public targets with stock payments do not experience significant loss around announcements. On the contrary, bidders with high attention, experience more negative abnormal returns in the announcement of acquiring public targets acquired by stocks.

We propose AOR as the proxy of retail investor attention, based on the recent developments in finance on overnight returns. The traditional asset pricing models do not account for the overnight returns anomaly which is short-term in nature. Decomposing the daily returns into overnight and intraday components, significant negative autocorrelation is reported between these two returns (Berkman et al., 2012; Branch and Ma, 2012). High overnight returns, calculated at the opening of the market, are followed by negative intraday returns on the same day. The result contradicts the notion of the efficient market hypothesis that the returns should be free from any form of autocorrelation. The evidence further suggests, over the years, more and more earnings announcements and other company-specific rumors are coming outside the regular trading period. Moreover, Cliff et al. (2008) report that over the last decade, equity premiums in the U.S market are mainly driven by the returns in the night period. This indicates that more investors are staying active even after

the stock market is closed. But even with the increased activity in the night period, not much has been reported on the factors that drive high overnight returns.

Several studies have recognized that overnight returns behave differently than the total returns of the firm. For instance, Berkman et al. (2012) find that overnight returns are more prone to capture the attention-grabbing sentiment of retail investors. The paper finds that attention-grabbing stocks on the current day will have higher overnight returns on the following day. Also, due to this attention-driven retail buying pressure, the opening prices are found higher compared to the intraday period. These findings are consistent with the shreds of evidence given in two other papers: Branch and Ma (2012) and Cliff et al. (2008).

Lou et al. (2019) give further evidence that overnight returns behave differently than the total and intraday returns. The most important finding of this paper is overnight returns are better explained by momentum profit where other stock market anomalies (value, size factors, etc) are found more significant for the intraday period. Essentially, all the abnormal return on the momentum strategy occurs at overnight while the abnormal returns on other strategies primarily occur at the intraday period. These findings represent a challenge not only to neoclassical models of risk and return but also to intermediary- and behavioral-based explanations of the cross-section of average returns. The paper argues that investor heterogeneity in two periods can explain why momentum profits accrue overnight. Relative to individuals, institutional investors as a class (on a value-weight basis) tend to trade against momentum during the day. However, the degree to which this is the case varies through time and across stocks, generating an interesting tug of war from intraday to overnight. Similarly, Akbas et al. (2020) report that a more persistent tug of war between the overnight and intraday returns is driven by the differing investor clienteles composed of noise traders in the overnight period and arbitrageurs during the intraday returns leads to higher future returns. The reported association remains strong for both the individual stocks and the overall market. The authors conclude that daytime arbitrageurs underestimate the probability of positive news arriving at the overnight period and consequently, overcorrect the persistent overnight price of the securities.

Aboody et. al (2018), suggest overnight returns as a proxy for the firm-specific investor sentiment. The suitability of overnight returns as a sentiment proxy is based on the

notion that retail investors compared to institutional investors, are more likely to engage themselves in sentiment-driven behavior as explained in Barber et al. (2009), Berkman et al. (2012), and Lee et al. (1991). Moreover, high overnight returns are mainly driven by the purchase of retail investors (Berkman et al., 2012).

Weißofner and Wessels (2020) extend the findings of Aboody et al. (2018) in the international framework and report that overnight returns show the characteristics of investor sentiment in the international equity market as well. Gamm (2019), deconstructs the total stock returns after the earnings announcements into the overnight and intraday returns and reports that strong positive abnormal overnight returns persist for several weeks following extreme earnings announcement returns. The finding is in line with the attention induced trading pattern by the investors. The retail investors remain active in the overnight period after newsworthy events. The association is opposite following the intraday returns, meaning that this trend is not captured through the total returns. The reported association is stronger in the high sentiment period and harder-to-value firms.

3. Data, sample, and estimation of AOR

3.1 Sample development

Our M&A sample which is collected from the SDC Platinum Database includes deals announced between January 1993 to December 2018. The dates before 1993 are not considered because the information for overnight returns is not available in the CRSP database before 1993. The bidders are the US public firms and targets are both public and private firms from all over the world. Next, we exclude deals with a value of less than $1 million and relative deal value to acquirer market capital capitalization one month before the announcement less than 1%. The highly regulated financial (SIC 6000-6999) and utility (SIC 4900–4999) companies are not considered for the sample. We also exclude the bidders that had stock prices less than $1 in our sample period. After these procedures, our M&A sample consists of 16,177 deals with 4,193 unique acquiring firms worth, on average, a total of $2.79 billion per year.

3.2 Measure of AOR

To test different theories related to investor attention, finding an appropriate proxy remains a challenge for the empiricist as there is no direct proxy available for retail investor attention. Currently, there are several indirect proxies available to capture investor attention such as one-day extreme returns, extreme daily returns, abnormal trading volume, news, advertising expense, and google search volume index (Barber and Odean, 2008; Chemmanur and Yan., 2009; Da et al., 2011; Gervais et al., 2001; Hou et al., 2008; Grullon et al., 2004). However, none of these proxies are free from the potential pitfalls. For example, proxies like one-day extreme returns and abnormal volumes suggested by Barber and Odean (2008) are very short-term in nature and also exposed to the trading by the institutional investors. Da et al., (2011) suggest, google search volume index as a potential proxy for retail investor attention. While the proxy can potentially capture the retail investor's attention, the lack of data for the less renowned firms remains a hurdle. Similarly, news headlines as a potential proxy do not guaranty that investors are paying any attention to them.

By addressing the potential issues with current proxies of investor attention, we propose that mean absolute overnight returns (AOR) as a potential proxy to capture retail investors' attention. The motivation for selecting AOR as a measure of investor attention stems from the recent findings in the fields of psychology and behavioral finance. For example, Kraemer et al. (2000) document that an individual's ability to give attention may vary based on time-of-day, and the peak in attention often coincides when the stock market is closed in the overnight period. In a recent study, Evans et al. (2017) further posit that compared to the intraday period, individuals are more vulnerable to cognitive biases in the overnight period. These studies from human psychology are further complemented by the recent findings on overnight returns. For instance, Lou et al. (2019) suggest that investor heterogeneity drives the contrasting returns pattern between the overnight and intraday periods. Similarly, Berkman et al. (2012) document that the retail investors who are more likely to be affected by cognitive biases, prefer to trade at the night period and wait for the trades to be executed at the market open. Aboody et al. (2018) on the same premise that retail investors are more likely to be affected by sentiment, propose overnight returns as a proxy for firm-specific investor sentiment. Moreover, when the retail investors place orders outside

the trading hours in the overnight period, they seldom worry about liquidity or the price impact of the orders (Lou et al., 2019).

Akbas et al. (2020) extend the work of Lou et al. (2019) and support the conjecture that two distinct groups of investors drive the opposing returns patterns in the overnight and intraday periods. The excess demand created by the retail investors in the overnight period pushes the prices in one direction while the daytime arbitrageurs trade against these retail investors resulting in price reversal in the day. Besides, over the years more and more firms are disclosing company-specific information after the market closes (Barclay and Hendershott, 2003; Santosh, 2016). Even though these announcements may grab the attention of all sorts of investors, however, it is the retail investors who are more likely to act upon the news and put orders outside the regular trading hours, especially when the significance of the news is such that these trades are too costly to delay. Thus, our proxy of attention is constructed based on retail investors who actively trade in the overnight period.

Uncertainties in the financial market play a vital role in the trading of investors. Shiller (2003) argues that intrinsic animal spirits within the investors increase their propensity to take investment decisions even under uncertainties. Within our framework of M&A announcements, investors' attention may be grabbed long before the actual announcement. The rumors and speculations surrounding potential merger activities infiltrate the market regularly. In an attempt to reduce the information asymmetry, retail investors who actively trade on these private signals, go through different means like interviewing managers, verifying rumors, analyzing the firm performances from financial statements, etc. (Daniel et al., 1998). Moreover, these investors remain more confident about the precision of the attention-grabbing signals that they get or generate first-hand (Odean 1999). The short-term attention proxies like one-day extreme returns or Friday announcements may not capture the attention of the retail investors that were captured in the period leading to the merger. Thus, to construct our proxy we measure the AOR for the period leading to the merger announcement (-20 to -3 days). If the news, rumors, or the private signals about the upcoming merger grab the attention of the individual investors, they are likely to place orders of the stocks of the acquiring firms irrespective of the price or liquidity in the overnight period (Lou et al., 2019), resulting in extreme overnight returns (both positive and negative). These extreme returns whether negative or positive, more often

are associated with the news of the corresponding bidders. The news driving the extreme overnight returns will catch the attention of some of the investors, while the extreme return itself may grab the attention of the others, especially, in the absence of official announcements. Thus, the high AOR of the bidder in the period leading to the announcement means retail investors as a group are actively paying attention to the imminent acquisition.

To construct AOR, first, we calculate the overnight returns of the bidders in our sample. The total returns of a company can be divided between returns earned in overnight and intraday periods. Overnight returns are the returns earned by the firms between the closing of the market and the opening of the market the next day. Overnight returns of the bidders are calculated in the following way:

$$OR_{it} = \frac{OP_{it} - CP_{it-1}}{CP_{it-1}} \quad (1)$$

where OR_{it} is the overnight return of the bidder i on day t. OP_{it} is the opening price of the stock i on the day t, whereas CP_{it-1} is the closing price of the stock i on day t-1. The opening and the closing price of the stocks are adjusted for the stock splits, stock dividends, and cash dividends.

Next, our main independent variable of interest, the AOR is calculated in the following way:

$$AOR_{it} = \frac{\sum_{t=-20}^{-3} |OR_{it}|}{18} \quad (2)$$

where AOR_{it} is the average absolute overnight returns of the bidder from -20 to -3 days leading to the acquisition announcement on day t. Consequently, our proxy can capture the attention of retail investors up to 20 days before the actual announcement[3]

[3] Our results remain qualitatively similar for other windows from -10 to -2 days and -15 to -2 days before the announcement.

3.3 Cumulative Abnormal Returns

Cumulative Abnormal Returns (CARs) is the short-term measure to capture the initial reaction of the stock market following the merger announcement. It is the cross-sectional analysis of the abnormal stock return of the bidding firm in the days surrounding the announcement date. Abnormal return is the difference between the bidder's stock return and the market return.

$AR_{i\,t} = R_{i\,t} - RM_t$ *(3)*

$CARs_{it} = \sum_{t=-1}^{1} R_{it} - RM_t$ *(2.4)*

where R_{it} is bidder i's daily stock return on date t and RM_t is the return for the value-weighted CRSP index on the same date t. For CARs (-1, +1), abnormal returns are calculated for the 3 days event window starting from 1 day before the announcement date to 1 day after the announcement. Then, the abnormal returns for the 3 days are added to calculate CARs (-1, +1). Similarly, CARs for two other periods, (-2, +2) and (0, +3) are calculated.

3.4 Sample characteristics

Panel A of Table 1 reports all the descriptive statistics of the AOR measure and other control variables used in the empirical setting. A detailed definition of all the variables is included in Appendix A. To take out the effect of the extreme values, we winsorize all the continuous variables at the 1st and 99th percentile. The sample descriptive statistics are in line with the findings of the previous studies (Bonaime et al., 2018; Hao et al., 2020; Nguyen and Phan, 2017).

Panel B of Table 1 presents the major deal-and firm-specific characteristics according to the high and low AOR before the announcement. The sample statistics show that the completed deals following high and low AOR are almost the same (89.5% versus 91%). This result is in line with Louis and Sun's (2010) finding that the deal completion rate does not differ much with varying levels of investor inattention. However, one interesting finding is that on average, deals following high AOR are completed more quickly than the

deals followed by low AOR (53 days versus 59 days). Moreover, the other deal-specific characteristics such as target public status, method of payment are also different for the two different sub-groups. In particular, we find that stock deals are more likely to grab attention than cash deals. This is in line with the previous findings that investors tend to overreact negatively to the public targets bought with stocks and positively to the private targets bought with stocks (Louis and Sun, 2010). So, it is not unlikely that the deals completed with stock acquisitions grabbed more attention in general. Among the firm-specific characteristics, high AOR firms are mostly concentrated among the small bidders, a finding that is in line with Da et al. (2011).

[Please Insert Table 1 About Here]

Table 2 presents the distribution of the average three-day CARs (-1, +1) by different deal-specific characteristics including target public status and methods of payment. The grouping reflects the substantial literature that suggests target listing status and payment method convey information to the market that influences the intrinsic value of bidders (Chang, 1998; Draper and Paudyal, 2006; Myers and Majluf, 1984; Travlos, 1987). For the full sample, the mean cumulative abnormal return for the 3 days is .9 %. According to the target public status, the mean CARs for the private target is significantly higher than the mean CARs of the public target. This result is in line with the long list of studies that confirm that average market reaction for the public target is economically insignificant (Agrawal et al., 1992; Bradley et al., 1988; Jarrell and Poulsen, 1989; Kaplan and Weisbach, 1992) and slightly positive for private targets (Chang, 1998; Fuller et al., 2002). Draper and Paudyal (2006) summarize the different hypotheses behind the outperformance of private targets over public targets. Due to managerial ambition and the more competitive nature of the bidding process, managers tend to overpay for public firms. On the other hand, private targets are often lesser-known, more likely to experience a less competitive bidding process, better fit for the bidders, and often available for the bidders at the discounted price.

The average CARs (1.5%) following 100% cash deals is higher than the average CARs (-.3%) following 100% stock acquisitions, the finding is in line with the previous studies report that cash acquisitions report slightly higher abnormal returns than stock acquisitions (Myers and Majluf, 1984; Travlos, 1987). In our study, the average CARs (-

2.5%) is the lowest for the sub-sample of public targets bought with stock payments. On the contrary, the average CARs (2.1%) for the sub-sample private targets purchased with stocks is significantly positive. The contrasting market reactions between the public and private targets purchased with stock swaps are well documented in the previous studies. The market generally reacts negatively to stock acquisitions of public targets as it reflects overvalued bidders whereas the positive market reaction for private targets purchased with stocks reflects the increased monitoring by external blockholders in the combined firm, (Chang, 1998).

[Please Insert Table 2 About Here]

4 Empirical analysis

4.1 AOR and market reaction

The neoclassical theorists believe that investors are inherently rational in nature and only make decisions to maximize their utility function. However, the extant literature in the fields of psychology and behavioral finance shows that different behavioral and cognitive biases can affect the investment choices made by individuals[4]. In this study, we revisit the premise that attention given by investors is a scarce resource that substantially affects the quality of the decision-making by the equity investors (Kahneman, 1973; Barber and Odean, 2008). Equity investors have a great deal of exposure to new information in the stock mark and yet, have very little time to process and integrate the information in their decision-making. Consequently, retail investors are subject to cognitive bias like short-term attention span that instigates them to trade at prices not justified by market fundamentals[5].

The term "attention" refers to the intensity of a task or activity (Kahneman, 1973). In our everyday life, there is more attention than mere selection. The concept of selection is

[4] Please see Greenwald (1980), Svenson (1981), Cooper et al. (1988), Taylor and Brown (1988), and Griffin and Tversky (1992).

[5] Please see Odean (1999), Barber and Odean (2008), Lou and Sun (2010), Berkman et al. (2012).

fundamentally important to explain attention as individuals must select from different activities in which they can engage at a point in time. The capacity theory of attention considers that individuals have limited ability to carry out multiple activities at the same time and hypothesizes that the total amount of attention that an individual can assert at any time is limited (Kahneman, 1973). It also assumes that this limited capacity can be allocated with considerable freedom among concurrent activities (Moray, 1967). When the supply of attention does not meet the demand then the performance of the task falters or even fails. Similarly, in the financial market, when there are many options for the investors, stocks that grab the attention of the investors, are more likely to be selected. On the other hand, stocks that don't attract the attention of investors are more likely to be ignored. For example, DellaVigna and Pollet (2009) find a weak market reaction to the release of corporate news on Fridays when investors have low attention. Louis and Sun (2010) document similar findings for merger announcements[6].

How does a sharp increase in retail investor attention, proxied by high AOR, affect the market reaction of the bidders' stocks at the merger announcement? According to the price pressure hypothesis given by Barber and Odean (2008), retail investors are the net buyer of attention-grabbing stocks. While selecting stocks to purchase, individual investors, face difficulty as they are bombarded with hundreds of choices. However, while selling, they can only sell from the few stocks that they have in their portfolio. Although the retail investors do not end up buying all the stocks that grab their attention, however, they are the net buyers of the attention-grabbing stocks. As retail investors short sell very infrequently, the selling side is not equally affected as they can only sell the stocks that they have in their portfolio. If the high AOR leading to the announcement indeed captures the retail investors' attention, we can directly test the price pressure hypothesis given by Barber and Odean (2008). After private signals of the impending merger grab the attention of the retail investors and at a later point when public news confirms their initial prediction, it increases the demand for the bidders' stocks. More specifically, we predict that high AOR before the merger

[6] More recently Michaely et al. (2016) contribute these findings to selection bias.

announcement should put a temporal price pressure that positively affects the bidders' abnormal returns at the merger announcement.

4.1.1 Univariate analysis

We start our empirical tests by directly investigating what does overnight returns capture in the context of merger announcements. It is plausible that our proxy of retail investor attention AOR is capturing investor sentiment, instead of retail investor attention. Aboody et. al (2018), suggest overnight returns (OR) as a proxy for the firm-specific investor sentiment. It is imperative to disentangle between the attention and sentiment as just like attention-driven stock returns, sentiment-driven market returns are reversal prone while showing stronger reaction for harder to arbitrage stocks (Baker and Wrugler, 2007; Dan bolt et al., 2015). To distinguish between the two empirically, following Aboody et al. (2018) we also construct mean overnight returns (OR) estimated -20 to -3 days before the takeover announcement and see if OR as a proxy for firm-specific sentiment can explain the bidder abnormal returns. In the context of investor sentiment, Danbolt et al. (2015) propose that in the presence of sentiment, investors are likely to overestimate the synergy from the impending merger while underestimating the risk, resulting in a positive market overreaction during the announcement. Consequently, in the context of our study, albeit through two different mechanisms, both the AOR as a proxy of attention and OR as the proxy of sentiment predicts a positive association with bidder abnormal returns.

Table 3 presents the first univariate analysis that explores the differential market reactions by the deciles of OR and AOR. The average acquirer OR and AOR are calculated for the 18 days (-20 to -3) period before each announcement. Next, the individual merger announcements are ranked and divided into the deciles of OR and AOR. Dividing the sample into deciles allows us to have a deeper look into how bidder CARs change across the 10 portfolios of OR and AOR. Portfolio 1 comprises of the bidders with the lowest OR and AOR whereas portfolio 10 represents the bidders with the highest OR and AOR before the announcement. The results from the univariate test give us the initial support that our proxy of retail investor attention, AOR positively affects the bidder abnormal returns whereas there is no evidence of a strong association between OR and bidder CARs. The mean CARs following the highest portfolio of AOR (4.7 %) is more than four times the mean CARs of

the overall sample. Further, the difference in mean CARS between the highest and lowest AOR groups is both statistically significant and economically meaningful. On the contrary, the difference in mean CARs following the highest and lowest portfolios of OR is insignificant and economically very small.

[Please Insert Table 3 About Here]

4.1.2. Multivariate analysis

To empirically assess the impact of AOR on the three-day cumulative bidder abnormal returns (1, +1) in the multivariate framework, we run OLS regression by controlling for a series of firm-, deal-, and macro-level determinants that previous literature has shown to affect the acquirers' acquisition performance. We use the following model:

$$CARs_{i,t} = \alpha + \beta \times AOR_{i,t} + \times X' \times C_{i,t-1} + \gamma\ INDUSTRY\ FIXED\ EFFECTS + \lambda\ TIME\ FIXED\ EFFECTS + \varepsilon_{i,t} \quad (2.5)$$

where the dependent variable is the three-day acquirer CARs (-1, +1) calculated by using the market model where the CRSP value-weighted index return is the market return. Our main variable of interest AOR is the mean absolute overnight returns calculated -20 to -3 days before the merger announcement. C is a series of all the control variables included in the multivariate model. All the firm-level control variables are measured in the fiscal year ending in the previous calendar year, and the macroeconomic variables are measured (as averages) in the prior calendar year of the acquisition announcement.

The bidder-specific firm-level control variables include size, book leverage, market–to–book, return on assets (ROA), sales growth, cash to assets, past returns, non–cash working capital, firm age, and firm volatility. For the deal-specific control variables, we include the listing status of the target firm (public vs private) and payment method (cash vs stock payment), high tech dummy, hostile takeover dummy, diversification dummy, and challenge dummy (Draper and Paudyal, 2006; Chang, 1998; Myers and Majluf, 1984; Travlos, 1987).

We follow Bonaime et al. (2018) to include the following macro-variables that may affect the bidders' announcement returns. First, we include the principal component of the University of Michigan index of consumer confidence, the National Activity Index from the Chicago Federal Reserve Board, and the average one–year–ahead GDP growth forecast from the Livingstone Survey of Professional Forecasters. Second, we construct an industry–level economic shock variable which is the first principal component of seven economic shock variables (profitability, asset turnover, research and development, capital expenditures, employee growth, ROA, and sales growth) for each Fama–French 48 industry. Third, to control for market liquidity, we use the spread between Baa–rated bonds and the Federal Funds rate. Fourth, to account for different facets of macro-uncertainty we take the first principal component of the Jurado et al. (2015) monthly index of macroeconomic uncertainty, VXO implied volatility index released by the CBOE and following Bloom (2009), we add to our model the cross-sectional standard deviations of monthly returns from CRSP and the cross-sectional standard deviations of annual sales growth from Compustat.

Besides, to account for the possibility that our proxy of retail investor attention AOR may capture the high equity valuation of the stock market, we add a series of control variables as a proxy for relative valuation, overall market valuations, and investor sentiment. In particular, we add the Shiller's cyclically adjusted price-earnings (CAPE) ratio, as a proxy for the relative valuation of the market (high values indicate overvaluation). Further, to proxy for overall market valuation, we estimate the industry median Tobin's q and industry median cumulative returns over the prior three years for each of the Fama and French (1997) 48 industries (Harford, 2005). To capture industry return volatility, we calculate the industry median standard deviation of monthly returns during the 36 months ending the prior fiscal year. The detailed descriptions of the variables are presented in Appendix A.

Table 4 reports the results for multivariate OLS regressions. Specifications (1) and (3) do not include the macro-level controls whereas specifications (2) and (4) are the complete models including the macro-level controls. In all the specifications, we further include the time and industry fixed effects. Finally, we use robust standard errors double–clustered by firm and year. Supporting the price pressure hypothesis of attention, we find that AOR has a strong positive association with bidder abnormal returns. In both specifications (1) and (2), the coefficient of AOR is statistically 1 % level of significance.

Specification (2), our main multivariate model, reports that the parameter coefficient on AOR is 0.428 with a t-value equal to 3.017, depicting that with one percentage point increase in bidder AOR is associated with a .428 percentage point increase in the three-day bidder cumulative abnormal returns. The economic magnitude of such an increase in the coefficient on AOR translates into a $1.19 billion value increase for our sample average bidder with a market value of $ 2.79 billion. Moreover, as bidder CARs are calculated in-excess of the CRSP value-weighted market returns, the reported positive association in the study is on top of the attention-driven stock returns already reported in previous studies.

Specifications (3) and (4) in Table 4 confirm that OR, the proxy for firm-specific investor sentiment doesn't hold any explanatory power on the bidder abnormal returns. The results in specifications (3) and (4) confirm that the coefficients on OR do not have any statistical significance. To summarise, the market overreacts to the acquisition announcements that follow high retail investor attention captured through high AOR however, the proxy for sentiment OR remains insignificant.

[Please Insert Table 4 About Here]

4.2 Stock swap deals

Louis and Sun (2010) argue that the research setting of stock swap deals is particularly relevant for the investor attention hypothesis. They base their argument on the premise that targets' public status is one of the most vital determinants of bidders' abnormal return for the stock swap announcements. For the merger announcements involving stock acquisitions, investors not only need to closely monitor the value of the target and the potential synergy but also interpret all the complex conditions and contingencies involving the deal. Moreover, the investors tend to react quite strongly to these stock swap deals. In particular, previous studies confirm that on average, investors react positively to stock swap deals involving private targets and negatively to those involving public targets. The average CARs for public and private stock swap deals in Table 2 for our sample data also support these predictions. Since investors have a strong predisposition that the announcement of stock swaps involving private targets is a positive outcome, under the investor attention framework it is intuitive to think that following high AOR the market reaction of stock

acquisitions involving private targets should be more positive. Similarly, as investors have a strong belief that stock acquisition of a public target is a negative event, the market reaction of these deals following high (low) AOR should be more (less) negative.

Supporting our conjecture, multivariate analyses in Table 5 show that the association between AOR and bidder abnormal returns vary significantly between the public and private stock swap deals. In the multivariate framework, the coefficient on the interaction variable AOR*Public stock (-.860) is strongly negative and statistically significant at a 1% level of significance. In terms of economic magnitude, for the public deals with stock payments, one percentage point increase in AOR results in an approximate value loss of $2.39 billion compared to our sample average bidder of $2.79 billion. On the contrary, the coefficient on the interaction variable AOR*Private stock remains positive, economically large, and statistically significant. These findings provide further justifications for using AOR as a proxy for retail investor attention. At the same time, it contradicts the investor sentiment explanation as the specifications (3) and (4) report that the coefficients on the interaction variable of OR with public stock and private stock deals do not have any explanatory power over the bidder abnormal returns in the stock swap deals framework.

[Please Insert Table 6 About Here]

4.3 Economic mechanism

The positive coefficient on AOR in explaining the bidder abnormal returns provide support to the price pressure hypothesis. To further validate the finding that temporal price pressure is indeed the economic mechanism that drives our results, we do additional tests related to the acquiring firms' institutional ownership, harder to value deals, and stock swap deals.

4.3.1 Harder to value deals

What makes some deals more exposed to the cognitive bias driven trades by the retail traders than others? In our attention framework, investors' subjective valuation about a bidder varies with the level of information uncertainty in the stock market. For example,

smaller and younger firms with good growth opportunities, however, having little earrings history and fluctuating cashflows make it difficult for the investors to justify their subjective valuations put on the price of such securities (Baker and Wrugler, 2007). In such cases, investors overweight their ability to generate and process private information and underweight the forecasting error associated with the prediction (Odean, 1999). Further, under the presence of uncertainty, even when investors have access to the same basic information, the differences of opinion may persist in large magnitude (Miller, 1977). Zhang (2006) also suggests that investors overreact more when the market provides less information on certain stocks (young, volatile, harder to value stocks). Keeping these findings as our background, we predict that the attention-driven overreaction should be stronger for the acquiring firms and deals that the investors find less information about and harder to value or arbitrage (Baker and Wurgler, 2007; Berkman et al., 2012; Daniel et al., 1998; Zhang, 2006).

We take small bidders, young bidders, and acquisitions of private targets as our three proxies for hard to value acquires and deals. A series of extant literature shows that arbitrage is particularly expensive for the smaller and younger firms with a high degree of idiosyncratic variations in their returns and cashflows (D'avolio, 2002; Wurgler and Zhuravskaya, 2002). Moreover, the attention-driven overreaction should be pronounced for the small firms that are usually associated with a larger price change (Da et al., 2011). We further predict that as retail investors are more likely to rely on private information that grabbed their attention, the attention driven overreaction should be stronger for the private targets having comparatively less publicly available information. To test the predictions, we construct the following variables: i) small firm, a dummy variable equals 1 if the bidder's size is lower than the 25^{th} percentile and 0 otherwise; ii) young firm: a dummy variable equals 1 if bidder's age is less than the 25^{th} percentile and 0 otherwise. iii) private: a dummy variable equals 1 if the target is private, 0 otherwise.

The results in Panel A, Table 6 explore the predictive power of AOR on bidder abnormal returns by the varying level of information asymmetry and deal difficulty. Keeping in line with our prediction, the results in specifications (1) – (3) confirm that the positive association between AOR and bidder CARs is stronger for the subsection of small acquirers, young acquirers, and private deals. Particularly, the coefficients on the interaction variables

of AOR with the small firm dummy, young firm dummy, and the private target dummy remain economically large and statistically significant. To sum up, the results in Table 2.6 are in line with our prediction that attention driven overreaction of bidder announcement returns is stronger under the presence of greater information asymmetry.

4.3.2 Whose attention does AOR capture?

In this section, we ask the question, whose attention does high AOR capture? Previous studies show that the investors who trade in the overnight period are different from the investors who trade in the intraday period. For instance, Lou et al. (2019) confirm that the level of investor heterogeneity is one of the major determinants of the opposite returns pattern observed between the overnight and intraday periods. Similarly, Berkman et al. (2012) suggest that the trading strategies of retail investors are more likely to be influenced by different cognitive biases, including attention. Whereas institutional investors are less likely to be affected by attention since they have access to far better information gathering sources like Reuters or Bloomberg (Da et al., 2011). Aboody et al. (2018) while proposing overnight returns as a proxy of firm-specific investor sentiment, find that retail investors are more likely to be affected by it. Moreover, when the retail investors place orders outside the trading hours in the overnight period, they seldom worry about liquidity or the price impact of the orders (Lou et al., 2019). Keeping these findings as our background premise, intuitively, following high AOR, the overreaction to merger announcements should be stronger for the sub-section of firms with more retail traders.

To test whether AOR has a stronger association with bidders' abnormal return for acquirers with a greater proportion of retail investors, following Buchanan et al. (2018) we construct two measures of institutional ownership: i) Top 5 institutional ownership and ii) Blockholder ownership. Top 5 institutional ownership variable is the total percentage of the acquirers' shares held by the top 5 institutional investors. The blockholder ownership variable is the total percentage of the acquirers' shares held by the investors with at least 5% ownership of acquirers' shares. Next, we construct two dummy variables as the proxies for the firms with high retail traders: i) low institutional ownership, a dummy variable equals to 1 if top 5 institutional ownership is lower than the 25^{th} percentile and 0 otherwise; ii) low

blockholder ownership: a dummy variable equals if block holder ownership variable is less than the 25th percentile value of our sample and 0 otherwise.

Specifications (4) and (5) in Panel A of Table 6 report the association between AOR and bidder returns by the acquirers' institutional ownership status. Confirming our prediction, the reported positive association between AOR and bidder CARs is stronger for the subsection of bidders with low institutional ownership. In particular, we find that the positive coefficient on the interaction variables AOR* Low institutional ownership, and AOR* Low blockholder are large and statistically significant. Moreover, the predictive power of AOR on acquirer CARs goes down once we introduce the interaction with institutional ownership dummies. All these results indicate that smaller and less sophisticated retail investors who are susceptible to behavioral biases are more likely to drive the attention driven overreaction.

[Please Insert Table 6 About Here]

4.3.3 Institutional ownership, deal complexity, and stock swap

For the next set of analyses, we test how the association between AOR and bidder abnormal returns for the stock swap deals varies according to the deal complexity and institutional ownership status. In line with our findings so far, if the AOR indeed affects the bidder CARs through the mechanism of the investor attention, then we expect the positive overreaction for private stocks and negative overreaction for the public stocks should be more pronounced when the deals are already harder to value or bidders having a greater concentration of retail investors.

To test our predictions, we measure the interaction variables of AOR with public and private stocks for the subsection of bidders based on firm size, firm age, top 5 institutional ownership percentage, and blockholder ownership percentage. The Panel B of Table 6 shows that supporting our prediction, the attention driven positive overreaction for private stock deals and negative overreaction for public stock deals are amplified for the sub-section of small bidders, young bidders, the low percentage of top 5 institutional ownership, and low percentage blockholder ownership.

4.4 Robustness tests

In this part of our analysis, we run a series of robustness tests to provide further justifications to the baseline estimations.

4.4.1 Alternate CARs, alternate AOR, and abnormal trading volume

In this section, we further justify our main results by extending our analysis for different windows of CARs, alternate definitions of AOR, and abnormal trading volume. First, we test the impact of AOR on bidder CARS for two additional windows: CARs (-2, +2) and CARs (0, +3). Specifications (1) and (2) of Table 7 confirm that our results are not driven by any particular window of bidder abnormal returns, rather the association between AOR and bidder abnormal returns holds across different durations of bidder CARs.

One potential concern could be that our proxy of attention could be biased towards the small bidders for whom, a small price change might lead to a greater change to our main independent variable AOR. To address this particular issue, for the next robustness tests, we construct two alternate proxies of retail investor attention based on absolute overnight returns. For the first alternate proxy, we take the difference between mean absolute overnight returns (-20, -3 days) in the merger period and the mean absolute overnight returns (-40, -20 days) in the normal period. We construct the second alternate proxy of attention by taking the difference between mean absolute overnight returns measured -20 to -3 days prior to the takeover announcement and CRSP value-weighted index return for the same period. Specifications (3) and (4) of Table 7 confirm that the coefficients on the alternate proxies of AOR remain statistically and economically significant in explaining bidder CARs.

Next, we test the association between AOR and abnormal trading volume. If the price pressure hypothesis truly holds then high acquirer AOR leading to the merger announcement should result in a high announcement period abnormal trading volume as well. To construct the abnormal trading volume, we take the percentage change of the acquirers' trading volumes from the pre-bid (-40, -24) to the announcement (0, +3) period. To measure the abnormal trading volumes, first, we take the natural logarithm of the daily trading volumes. Next, we estimate the percentage difference between mean LOG_VOLUME at the merger

announcement period (0, 3 days) and mean LOG_VOLUME calculated over the pre-bid period (-40, -24 days). The control variables remain unchanged. The specifications (5), (6), and (7) confirm that all three variants of AOR positively affect the bidder abnormal volume around the merger announcements.

[Please Insert Table 7 About Here]

4.4.2 Reversal in acquirer returns

The positive and statistically significant AOR coefficients in Table 4 are consistent with the price pressure hypothesis suggested by Barber and Odean (2008) that the retail investors make their purchase decision based on the stocks that grabbed their attention which eventually increases the price of the relevant stocks. On the contrary, neo-classical theorists might argue that the price increase simply reflects the market's positive reaction to the potential merger synergy. Consequently, if the AOR coefficient captures the positive deal-specific fundamentals, then the initial positive reaction should sustain in the post-merger stock performance of the acquirer as the potential merger synergies slowly get integrated into the acquirer stock price. However, if the positive short-term performance is an overreaction due to overnight attention paid by the retail investors then we expect the market to adjust their initial overreaction in the post-merger period and the same acquirers will underperform in the long run.

To disentangle the overlapping findings stemming from two different schools of thought, we focus on the post-merger stock performance of the deals that are completed following periods of high AOR. In particular, we examine the effect of AOR on post-merger bidder cumulative abnormal returns (+4, +8). Supporting our conjecture of returns reversal, specification (1) of Table 8 reports that the coefficient on AOR in explaining CARs (+4, +8) is negative and statistically significant. More specifically, one percentage point increase in acquirer AOR results in a .166% decrease in the four-days post-announcement CARs (+4, +8). After comparing the coefficients on AOR between in announcement and post-announcement period, we can see that a significant portion of the retail investor attention driven overreaction in the market is quickly adjusted in the post-announcement period. The result is in line with the previous findings that following the overreaction in the short-term bidder announcement returns, repeated public signals drive the stock price back to the

fundamental values (Daniel et al., 1998). Additionally, merger arbitrageurs actively trade around the announcement days to take advantage of the short-term mispricing and cause the post-merger prices to reverse (Danbolt et al., 2015).

Additionally, we complement the short-run analysis by investigating the long-run effect of AOR on acquirer 1-, 2-, and 3-year BHAR using the matched firm adjusted method suggested by Barber and Lyon (1997) and Lyon, Barber, and Tsai (1999). The long-run analysis helps to further distinguish between the price pressure and favorable information incorporation hypothesis. If the acquirer AOR indeed captures good news instead of retail investor attention, then the positive association should persist in the long run. Specifications (2) to (4) of Table 8 report that the association between AOR with long-run BHARs is statistically insignificant. These results further confirm our previous finding that AOR affects the bidder abnormal returns through the price pressure channel.

[Please Insert Table 2.8 About Here]

4.4.3 Merger versus normal period

To give further validation that the mean AOR leading to the merger announcement indeed captures the attention of the induvial retail investors, we compare the association between AOR and acquirer abnormal return in the merger (bid) and normal (pre-bid) period. This test also helps us to justify using mergers and acquisitions as our testing platform. Mergers are one of the most important and complex corporate investments which help the acquiring firms to create value and achieve growth. To successfully create wealth for the shareholders, acquirers hope that there is enough attention from the investors around the announcement days. The information content of a merger announcement is such that it takes significantly longer for the investors to process the news and act on it. Consequently, the lack of attention from the market agents means it will take longer for the stock market to incorporate this new announcement information (Louis and Sun, 2010).

Retail investors as a group, are more likely to speculate on private information that grabbed their attention. In this context of takeover announcements, compared to the normal period, the relation between AOR and bidder abnormal return should be stronger around the bid period when the bidder stock is more exposed to the subjective valuation by the equity

investors. For the bid period, we keep calculation windows exactly like our main multivariate test in Table 4. For the pre-bid period, the new dependent variable is CARs calculated -22 to -20 days before the merger announcement and the pre-bid AOR is calculated on -40 to -24 days before the announcement.

Table 9 reports the relation between AOR and bidder abnormal returns compared in the bid and pre-bid period. Specification (1) of Table 9 repeats our main multivariate test from Table 4, the association between AOR and acquirer CARs (-1, +1) in the bid period. In specification (2), we repeat the same test by taking pre-bid AOR as the main independent variable. The reported coefficient on pre-bid AOR in specification (2) confirms that the coefficient on pre-bid AOR is weaker and statistically insignificant. Specification (3) reports that the difference between AOR and pre-bid AOR in explaining three days acquire CARs (-1, +1) is .317 and statistically significant at a 1% level of significance. This result also lends support to the justify measuring AOR for the period -20 to -3 days leading to the announcement. Lastly, specification (4) of Table 9 reports that the pre-bid AOR has no explanatory power on the pre-bid CARs, as the coefficient on pre-bid AOR remains weak and statistically insignificant. To summarise, supporting our conjecture, all the results show that the association between AOR and bidder abnormal return is only significant in the bid period. Furthermore, the difference between the AOR coefficients in the bid and pre-bid period is also statistically significant. Barber and Odean (2008) and Berkman et al., (2012) previously investigated the impact of attention on stock market returns, focusing primarily on the normal periods. Our results show that the association between retail investor attention and market abnormal returns are equally important around special corporate events like takeover announcements.

[Please Insert Table 9 About Here]

4.4.4 Propensity score matching (PSM)

Attention paid by the retail investors in different merger announcements may not be distributed randomly. As Da et al., (2011) and Reyes (2018) point out that retail investors are more likely to pay attention to the deals that make the headlines. Moreover, the Google search volume index shows that investors actively pay more attention to the deals involving

large bidders and targets (Reyes, 2018). Consequently, AOR may also differ along with these different bidders and deal-specific characteristics. Even though our results do hold even after controlling for a series of firm-, deal- and macro-level characteristics, to further control for the potential selection bias that the retail investors might have, we conduct the propensity score matching (PSM) analysis. In particular, we follow the method suggested in Drucker and Puri (2005) and construct a sample of bidders that experienced high retail investor attention (the treatment group) with similar characteristics to the low-investor attention bidders (the control group). Next, we use the sample to retest our multivariate OLS regressions in Table 4. Rosenbaum and Rubin (1985) and Imbens and Wooldridge (2009) suggest that this method eradicates the potential biases while estimating the average treatment effects.

The matching sample is constructed by matching each firm with a control firm. The control firm is a bidder that is not affected by high retail investor attention (i.e., do not belong to the top retail attention bidder group), however, has a close propensity score to the treated firms based on the one-to-one nearest neighbor matching with replacement. To match the firms, we use the following covariates based on the different deal- and bidder-specific variables: size, book leverage, market–to–book, return on assets (ROA), past returns, firm age, firm volatility, target public status, and stock payments. Panel A of Table 10 reports the univariate comparison between the firm-characteristics between the treatment group and the control group. In the majority of the cases, the differences between the two groups remain insignificant, meaning that most of the characteristics between the two groups are largely similar. Next, Panel B of Table 10 shows that the impact of the AOR on bidder CARs and the abnormal trading volume for the matched sample remains positive and statistically significant at 1% level of significance. These results alleviate the concern that potential selection bias by the investors may drive our overall results.

[Please Insert Table 10 About Here]

4.4.5 Instrumental variable (IV)

To address the issue that omitted variables may drive our results, in this section of our analysis we perform a two-stage instrumental variable (IV) procedure. This method

requires an instrumental variable that affects our independent variable AOR, however, unlikely to influence the bidder abnormal returns. Therefore, to instrument for AOR, we select the percentage of home-broadband users in the US provided by the PEW research agency. The suitability of using the percentage of home-broadband users stems from the findings in Barber and Odean (2002) that the availability of internet in the US homes changed the way retail investors trade in the market. After the easy accessibility to online trading, particularly from 1999 onwards, these retail investors have started trading more actively, more speculatively, and earning less profit in the long run (Barber and Odean, 2002). On the contrary, institutional investors rely primarily on the more sophisticated news sources like Reuters or Bloomberg terminals (Da et al., 2011). In the context of our study, the accessibility to home internet may affect the retail investor attention driven decisions in two ways. Firstly, the internet has become one of the most important sources of verifying attention-grabbing events. Secondly, it gives the retail investors the option to trade instantly on the news that grabbed their attention. At the same instant, it is unlikely that the percentage of home-broadband users would have any direct association with bidder abnormal returns. One of the potential pitfalls of using this IV is that it restricts our sample as the percentage of home broadband users is only made available from the year 2000.

Table 11 reports the findings from the IV analysis. To perform the IV analysis, in the first stage (specification (1) and specification (3)), we quantify the impact of the percentage of home-broadband subscribers on the AOR. Supporting our conjecture, we find that access to the home-internet has a statistically significant association with retail investor attention. More importantly, the post estimation results from the first-stage regression show that the Kleibergen–Paap rk Wald F statistic for the weak identification test is higher than the critical value prescribed in Stock and Yogo (2002) (i.e., LIML Size of Nominal 10% Wald, that is 16.38 in our case) and rejects the null hypothesis of the weak instrument. In specification (2) and (4) of table 11, the results confirm that the instrumented AOR remains positive and statistically significant in explaining bidder abnormal returns and abnormal volume.

[Please Insert Table 11 About Here]

5. Conclusion

The study revisits the role of investor attention on the stock market returns by examining a previously unexplored behavioral dimension – attention in the overnight period, in the context of takeover announcements. Previous literature (i.e., Barber and Odean 2012; Berkman et al., 2012) finds a positive association between attention and stock market returns. Similarly, Aboody et al., (2018) and Lou et al., (2019) find that the distribution of two different clienteles drives the short-term overreaction in the stock market. However, our study goes beyond this reaction between retail investor trading and stock market returns in the normal period and focuses on the merger announcement period when the market value of the bidder is more susceptible to the subjective valuations by the retail investors. Given the importance of the corporate acquisitions in creating value for the shareholders, the attention driven short-term overreaction around the merger announcements is expected to have a great influence on the value of the combined firm.

We argue that in the presence of overnight attention, retail investors overestimate their ability to make a correct prediction and underestimate the risks associated with mergers. Taking this new proxy of retail investor attention, we provide robust evidence that AOR has a strong positive short-term association with bidder abnormal returns. The results show both the statistical and economic significance. 1 % percent increase in AOR before the announcement leads to a .428% percent increase in the bidder CARs. The magnitude of the association is quite high considering that bidder CARs are already calculated over market returns. The found positive association between the AOR and bidder CARs support the price pressure hypothesis of investor attention as the AOR induced short-term overreaction in the market is followed by returns reversals in the post-announcement days. Additionally, several other cross-sectional tests show that the positive impact of AOR on bidder abnormal returns is stronger for bidders with low institutional ownership and bidders that are hard to value.

Furthermore, by exploiting the research setting of the stock swap deals, we report that AOR positively affects the bidder announcement returns around private stocks while negatively affects the announcement returns for the public stocks. The significance of this finding is two-fold. First, we document that, when investors already have a negative belief about the outcome of certain deals (e.g., public targets acquired by stocks), heightened retail

investor attention can lead to negative stock returns. Second, the stock swap deals help us to disentangle the debate regarding what overnight returns capture. The alternate reactions to stock swap deals mean that AOR is indeed capturing investors' attention instead of sentiment which is not likely to differ between the public stock and private stock deals.

For the empiricists, especially in behavioral finance, it is always a challenge to find the appropriate proxies that are easily constructed and applied in the research context. While the search volume index proposed by Da et al. (2011) can capture retail investor attention, however, the lack of data remains a hurdle, especially for the deals that fail to generate significant news. To our knowledge, this is the first paper that uses this research setting of divergent investors between the overnight and intraday periods on the bidder abnormal returns. Finally, in a period characterized by great uncertainty across the world, our findings have important implications for corporate managers as well. Corporate managers, who are responsible for assessing the risks and strategically time the announcement of their merger, should pay special consideration to the attention paid by overnight traders and the impact on the shareholder value.

Reference

Adra, S, Barbopoulos, LG. The valuation effects of investor attention in stock-financed acquisitions. Journal of Empirical finance 2018;45;108-125.

Agrawal, A, Jaffe, JF, Mandelker, GN. The post-merger performance of acquiring firms: a re-examination of an anomaly. The journal of finance 1992;47;1605-1621.

Akbas, F, Boehmer, E, Jiang, C, Koch, PD. Overnight Returns, Daytime Reversals, and Future Stock Returns. Daytime Reversals, and Future Stock Returns (January 1, 2020) 2020.

Almeida, H, Campello, M, Hackbarth, D. Liquidity mergers. Journal of financial economics 2011;102;526-558.

Amihud, Y, Lev, B, Travlos, NG. Corporate control and the choice of investment financing: The case of corporate acquisitions. The journal of finance 1990;45;603-616.

Asquith, P, Bruner, RF, Mullins Jr, DW. The gains to bidding firms from merger. Journal of financial economics 1983;11;121-139.

Baker, M, Wurgler, J. Investor sentiment and the cross-section of stock returns. The journal of finance 2006;61;1645-1680.

Baker, M, Wurgler, J. Investor sentiment in the stock market. Journal of economic perspectives 2007;21;129-152.

Bamber, LS, Barron, OE, Stober, TL. Trading volume and different aspects of disagreement coincident with earnings announcements. Accounting Review 1997;575-597.

Barber, BM, Odean, T. Online investors: do the slow die first? The Review of Financial Studies 2002;15;455-488.

Barber, BM, Odean, T. All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors. The Review of Financial Studies 2008;21;785-818.

Berkman, H, Koch, PD, Tuttle, L, Zhang, YJ. Paying attention: overnight returns and the hidden cost of buying at the open. Journal of Financial and Quantitative Analysis 2012;715-741.

Bhagwat, V, Dam, R, Harford, J. The real effects of uncertainty on merger activity. The Review of Financial Studies 2016;29;3000-3034.

Bonaime, A, Gulen, H, Ion, M. Does policy uncertainty affect mergers and acquisitions? Journal of financial economics 2018;129;531-558.

Bouwman, CH, Fuller, K, Nain, AS. Market valuation and acquisition quality: Empirical evidence. The Review of Financial Studies 2009;22;633-679.

Bradley, M, Desai, A, Kim, EH. Synergistic gains from corporate acquisitions and their division between the stockholders of target and acquiring firms. Journal of financial economics 1988;21;3-40.

Branch, BS, Ma, AJ. Overnight return, the invisible hand behind intraday returns? Journal of Applied Finance (Formerly Financial Practice and Education) 2012;22.

Brown, DT, Ryngaert, MD. The mode of acquisition in takeovers: Taxes and asymmetric information. The journal of finance 1991;46;653-669.

Buchanan, B, Cao, CX, Chen, C. Corporate social responsibility, firm value, and influential institutional ownership. Journal of Corporate finance 2018;52;73-95.

Busse, JA, Green, TC. Market efficiency in real time. Journal of financial economics 2002;65;415-437.

Chang, S. Takeovers of privately held targets, methods of payment, and bidder returns. The journal of finance 1998;53;773-784.

Chemmanur, T, Yan, A. Product market advertising and new equity issues. Journal of financial economics 2009;92;40-65.

Cliff, M, Cooper, MJ, Gulen, H. Return differences between trading and non-trading hours: Like night and day. SSRN eLibrary 2008;32.

D'avolio, G. The market for borrowing stock. Journal of financial economics 2002;66;271-306.

Da, Z, Engelberg, J, Gao, P. In search of attention. The journal of finance 2011;66;1461-1499.

Danbolt, J, Siganos, A, Vagenas-Nanos, E. Investor sentiment and bidder announcement abnormal returns. Journal of Corporate finance 2015;33;164-179.

Daniel, K, Hirshleifer, D, Subrahmanyam, A. Investor psychology and security market under-and overreactions. The journal of finance 1998;53;1839-1885.

DellaVigna, S, Pollet, JM. Investor inattention and Friday earnings announcements. The journal of finance 2009;64;709-749.

Dong, M, Hirshleifer, D, Richardson, S, Teoh, SH. Does investor misvaluation drive the takeover market? The journal of finance 2006;61;725-762.

Draper, P, Paudyal, K. Acquisitions: private versus public. European Financial Management 2006;12;57-80.

Drucker, S, Puri, M. On the benefits of concurrent lending and underwriting. The journal of finance 2005;60;2763-2799.

Fama, EF, French, KR. Industry costs of equity. Journal of financial economics 1997;43;153-193.

Gamm, F. A surprise that keeps you awake: Overnight returns after earnings announcements. Available at SSRN 3293638 2019.

Gervais, S, Kaniel, R, Mingelgrin, DH. The high-volume return premium. The journal of finance 2001;56;877-919.

Ghosh, A, Ruland, W. Managerial ownership, the method of payment for acquisitions, and executive job retention. The journal of finance 1998;53;785-798.

Grullon, G, Kanatas, G, Weston, JP. Advertising, breadth of ownership, and liquidity. The Review of Financial Studies 2004;17;439-461.

Hao, Z, Prapan, AA, Gavriilidis, K, Petmezas, D, Vagenas-Nanos, E. Does Geopolitical Risk Affect Acquisitions? Available at SSRN 3475537 2020.

Harford, J. What drives merger waves? Journal of financial economics 2005;77;529-560.

Higson, C, Elliott, J. Post-takeover returns: The UK evidence. Journal of Empirical finance 1998;5;27-46.

Hirshleifer, D, Shumway, T. Good day sunshine: Stock returns and the weather. The journal of finance 2003;58;1009-1032.

Hou, K, Xiong, W, Peng, L. A tale of two anomalies: The implications of investor attention for price and earnings momentum. Available at SSRN 976394 2009.

Hribar, P, McInnis, J. Investor sentiment and analysts' earnings forecast errors. Management science 2012;58;293-307.

Imbens, GW, Wooldridge, JM. Recent developments in the econometrics of program evaluation. Journal of economic literature 2009;47;5-86.

Jarrell, GA, Poulsen, AB. The returns to acquiring firms in tender offers: Evidence from three decades. Financial management 1989;12-19.

Jensen, MC, Ruback, RS. The market for corporate control: The scientific evidence. Journal of financial economics 1983;11;5-50.

Jurado, K, Ludvigson, SC, Ng, S. Measuring uncertainty. American economic review 2015;105;1177-1216.

Kahneman, D, Attention and effort. Citeseer; 1973.

Kaplan, SN, Weisbach, MS. The success of acquisitions: Evidence from divestitures. The journal of finance 1992;47;107-138.

Karpoff, JM. The relation between price changes and trading volume: A survey. Journal of Financial and Quantitative Analysis 1987;109-126.

Lee, CM, Shleifer, A, Thaler, RH. Investor sentiment and the closed-end fund puzzle. The journal of finance 1991;46;75-109.

Lou, D, Polk, C, Skouras, S. A tug of war: Overnight versus intraday expected returns. Journal of financial economics 2019;134;192-213.

Louis, H, Sun, A. Investor inattention and the market reaction to merger announcements. Management science 2010;56;1781-1793.

Malmendier, U, Tate, G. Who makes acquisitions? CEO overconfidence and the market's reaction. Journal of financial economics 2008;89;20-43.

Miller, EM. Risk, uncertainty, and divergence of opinion. The journal of finance 1977;32;1151-1168.

Moeller, SB, Schlingemann, FP, Stulz, RM. Firm size and the gains from acquisitions. Journal of financial economics 2004;73;201-228.

Myers, SC, Majluf, NS 1984. Corporate financing and investment decisions when firms have informationthat investors do not have. National Bureau of Economic Research; 1984.

Nguyen, NH, Phan, HV. Policy uncertainty and mergers and acquisitions. Journal of Financial and Quantitative Analysis 2017;52;613-644.

Nguyen, T, Petmezas, D, Karampatsas, N. Does Safety Uncertainty Affect Acquisitions? Available at SSRN 3250400 2020.

Odean, T. Are investors reluctant to realize their losses? The journal of finance 1998;53;1775-1798.

Odean, T. Do investors trade too much? American economic review 1999;89;1279-1298.

Peng, L, Xiong, W. Investor attention, overconfidence and category learning. Journal of financial economics 2006;80;563-602.

Reyes, T. Limited attention and M&A announcements. Journal of Empirical finance 2018;49;201-222.

Rhodes-Kropf, M, Viswanathan, S. Market valuation and merger waves. The journal of finance 2004;59;2685-2718.

Rhodes–Kropf, M, Robinson, DT, Viswanathan, S. Valuation waves and merger activity: The empirical evidence. Journal of financial economics 2005;77;561-603.

Rosen, RJ. Merger momentum and investor sentiment: The stock market reaction to merger announcements. The Journal of Business 2006;79;987-1017.

Rosenbaum, PR, Rubin, DB. Constructing a control group using multivariate matched sampling methods that incorporate the propensity score. The American Statistician 1985;39;33-38.

Schlingemann, FP. Financing decisions and bidder gains. Journal of Corporate finance 2004;10;683-701.

Seasholes, M, Wu, G. Profiting from predictability: Smart traders, daily price limits, and investor attention. University of California, Berkeley, working paper 2004.

Servaes, H. Tobin's Q and the Gains from Takeovers. The journal of finance 1991;46;409-419.

Shiller, RJ. From efficient markets theory to behavioral finance. Journal of economic perspectives 2003;17;83-104.

Shleifer, A, Vishny, RW. Stock market driven acquisitions. Journal of financial economics 2003;70;295-311.

Stock, JH, Yogo, M 2002. Testing for weak instruments in linear IV regression. National Bureau of Economic Research; 2002.

Toffanin, M 2005. Examining the implications of financing choice for cash acquisitions. Concordia University; 2005.

Travlos, NG. Corporate takeover bids, methods of payment, and bidding firms' stock returns. The journal of finance 1987;42;943-963.

Weißofner, F, Wessels, U. Overnight Returns: An International Sentiment Measure. Journal of Behavioral Finance 2020;21;205-217.

Wurgler, J, Zhuravskaya, E. Does arbitrage flatten demand curves for stocks? The Journal of Business 2002;75;583-608.

Yook, KC. Larger return to cash acquisitions: signaling effect or leverage effect? The Journal of Business 2003;76;477-498.

Zhang, XF. Information uncertainty and stock returns. The journal of finance 2006;61;105-137.

Appendix A

Variables	Definitions	Source
	Panel A: AOR and OR	
AOR	Mean Absolute Overnight Returns (AOR), measured -20 to -3 days prior to the takeover announcement with 0 being the announcement day.	CRSP
OR	Mean Overnight Returns (OR), measured -20 to -3 days prior to the takeover announcement with 0 being the announcement day.	CRSP
Alternate AOR	The independent variable Alternate_AOR is calculated by taking the difference between the mean absolute overnight returns (-20, -3 days) and mean absolute overnight returns (-40,-20 days) with 0 being the announcement day.	CRSP
Alternate AOR_2	The independent variable Alternate_AOR2 is calculated by taking the difference between mean absolute overnight returns measured -20 to -3 days prior to the takeover announcement and CRSP value-weighted index return for the same period with 0 being the announcement day	CRSP
	Panel B: Dependent variables	
CARs (-1, +1)	Acquirer 3-day (-1, +1) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return.	CRSP

CARs (0, +3)	Acquirer 4-day (0, +3) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return.	CRSP
CARs (-2, +2)	Acquirer 5-day (-2, +2) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return.	CRSP
CARs (+4, 7)	Acquirer 4-day (+4, +7) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return.	CRSP
Buy-hold abnormal returns (BHARs)	Buy–and–hold abnormal returns (BHARs) are estimated using the matched firm adjusted method suggested by Barber and Lyon (1997) and Lyon, Barber, and Tsai (1999) for 1-, 2- and the 3 years after the acquisition.	CRSP
Abnormal trading volume	Abnormal trading volume calculated as the percentage change between mean LOG_VOLUME at the merger announcement period (0, 3 days) and mean LOG_VOLUME calculated over the pre-bid period (-40, -24 days).	CRSP
	Panel C: Firm-specific Controls	
Size	The natural logarithm of the book value of assets.	Compustat

Book leverage	Long-term debt (item DLTT) plus debt in current liabilities (item DLC), divided by total assets (item AT).	Compustat
Market to book	The ratio of the market value of assets to the book value of assets.	Compustat
ROA	Return on assets, measured as income before extraordinary items (annual item IB) plus interest expense (item XINT) plus income taxes (item XINT), divided by total assets (item AT).	Compustat
Sales growth	The company year–on–year difference of year-end sales.	Compustat
Cash to assets	Cash and short-term investments (item CHE) divided by total assets (item AT).	Compustat
Stock returns	Cumulative returns during the 12 months ending at the end of the firm's fiscal year. This is measured using monthly returns from the CRSP monthly database.	CRSP
Non-cash working capital	The ratio of (working capital – cash) to the book value of assets.	Compustat
Firm age	Number of years that a firm appears in Compustat.	Compustat
Firm volatility	The standard deviation of the firm's daily returns from month *t*-13 to *t*-2.	CRSP
Panel D: Macro Controls		
Investment opportunities (First principal component)		

1. Consumer confidence	The monthly, survey-based index of consumer confidence developed by the University of Michigan.	Available at http://www.sca.isr.umich.edu/
2. CFNAI	The Chicago Fed National Activity Index, which is designed to measure current economic activity and inflationary pressure based on 85 monthly economic indicators.	Available at https://www.chicagofed.org/research/ data/cfnai/historical- data
3. Expected GDP growth	The average one-year-ahead GDP forecast from the biannual Livingstone Survey of Professional Forecasters	The Philadelphia FED
Industry economic shock	It is constructed based on the following seven firm-level indicators: net income to sales (IB/SALE), sales to assets (SALE/AT), R&D to assets (XRD/AT), capital expenditures to assets (CAPX/AT), employment growth (percentage change in item EMP), return on assets (IB/AT), and sales growth (percentage change in item SALE). For each of the 48 industries in the Fama and French (1997) classification, each year, we take the industry median of the absolute (annual) change in each of the above variables.	Compustat
Rate spread	The spread between Baa-rated bonds and the Federal Funds rate. To match the annual frequency of the firm-level data, we use calendar-year averages of this (monthly) spread variable.	The St. Louis FED
Shiller's CAPE ratio	The cyclically adjusted price-earnings (CAPE) ratio developed by Robert Shiller.	Available at http://www.econ.yale.edu/~shiller/data.htm
Industry median Q	The annual, median value of Tobin's Q for each of the Fama and French (1997) 48 industries. Tobin's Q is measured as the book value of assets minus the book value of equity plus the market value of equity, divided by the book value of assets.	Compustat

Industry median past returns	The annual median of firm-level 36–month cumulative returns for each of the Fama and French (1997) 48 industries. Each calendar year *t*, we calculate each firm's cumulative returns using the 36 months leading up to the last month of the fiscal year ending in *t*.	CPSP
Industry σ past returns	The annual median of firm-level 36–month return volatility for each of the Fama and French (1997) 48 industries. Each calendar year *t*, we calculate the standard deviation of each firm's returns, using the 36 monthly return observations leading up to the last month of the fiscal year ending in *t*.	CRSP
Macroeconomic uncertainty (First principal component)		
1. JLN uncertainty index:	Monthly index of macro-economic uncertainty developed by Jurado et al. (2015) as the unforecastable component in a system of 279 macroeconomic variables.	Available at https://www.sydneyludvigson.com/data-and-appendixes
2. VXO index	Daily index of implied volatility released by the Chicago Board Options Exchange, calculated based on the trading of S&P 100 options.	Available at http://www.cboe.com/products/vix-index-volatility/volatility-on-stock-indexes
3. CS σ past returns	The cross-sectional standard deviation of cumulative returns from the past three months, calculated each month.	CPSP
4. CS σ past sales growth	The cross-sectional standard deviation of year-on-year sales growth (percentage change in the Compustat quarterly item SALEQ), calculated each calendar quarter.	Compustat
Panel D: Deal-level Controls		

Stock deal dummy	A dummy variable that takes the value of 1 if the payment is 100% in stock, and 0 otherwise.	SDC
Cash deal dummy	A dummy variable that takes the value of 1 if the M&A deal is 100% funded by cash, and 0 otherwise.	SDC
High tech dummy	A dummy variable that takes the value of 1 if an acquirer's 4–digit SIC code is equal to 3571, 3572, 3575, 3577, 3578, 3661, 3663, 3669, 3671, 3672, 3674, 3675, 3677, 3678, 3679, 3812, 3823, 3825, 3826, 3827, 3829, 3841, 3845, 4812, 4813, 4899, 7371–7375, 7378, or 7379, and 0 otherwise.	SDC
Diversification deal dummy	A dummy variable that takes the value of 1 if the acquirer and target belong to different 2–digit SIC code industries, and 0 otherwise.	SDC
Hostile deal dummy	A dummy variable that takes the value of 1 if the M&A deal is a hostile takeover, and 0 otherwise.	SDC
Public target	A dummy variable that takes the value of 1 if the target is a publicly listed firm, and 0 otherwise.	SDC

Table 1 Summary statistics

Panel A of Table 1 reports summary statistics of all variables used in our baseline regression models. The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 1993 and 2018 that pass the filters described in section 2.3.1. The number of observations, mean, standard deviation, minimum, 25th percentile, median, 75th percentile, and maximum are reported from left to right, in sequence for each variable. Detailed definitions of all variables are described in Appendix A. Panel B reports the major deal- and firm-specific characteristics by high versus low AOR.

Panel A	N	Mean	p25	Median	p75	Std. Dev.
AOR	16178	0.011	0.005	0.008	0.013	0.012
OR	16178	0.001	-0.002	.0.000	0.002	0.007
Size	16184	5.768	4.332	5.706	7.095	1.984
Book Leverage	16139	0.225	0.027	0.187	0.349	0.226
A M2B	16129	2.417	1.312	1.739	2.577	3.150
A ROA	16150	0.010	0.004	0.044	0.080	0.210
Sales growth	14310	0.17	-0.06	0.05	0.21	50.731
Cash to assets	16147	0.186	0.027	0.097	0.280	0.212
Stock return	13328	0.138	-.0108	0.147	0.404	0.522
Non-cash working capital	15829	.075	-.021	0.059	0.167	0.169
Firm age	16192	2.113	1.266	2.178	2.98	1.056
Firm volatility	14769	0.038	.025	.035	.052	0.016
Stock	16192	0.130	0.000	0.000	0.000	0.336
Cash	16192	0.310	0.000	0.000	1	0.463
High tech	16192	0.314	0.000	0.000	1	0.464
Diversification	16192	0.377	0.000	0.000	1	0.485
Hostile	16192	0.013	0.000	0.000	0	0.111
Public	16192	0.189	0.000	0.000	0	0.391
Challenge	16192	0.018	0.000	0.000	0	0.135
Investment opportunity	16192	60.891	56.259	62.301	66.085	7.988
Shock index	16191	0.230	0.146	0.202	0.274	0.129
Rate spread	16192	3.796	2.402	4.060	4.994	1.533
Shiller's Cape ratio	16192	26.846	21.755	25.943	30.955	6.427
Industry median Q	16183	1.65	1.27	1.48	1.84	0.551
Industry median past returns	16192	1.225	0.985	1.209	1.451	0.372
Industry σ past returns	16192	0.141	0.110	0.136	0.161	0.041
Macro uncertainty	16192	11.284	8.220	11.103	15.752	8.073

	High AOR		Low AOR	
Panel B	Mean	Stdev	Mean	Stdev
Completion time	52.580	90.028	58.161	84.853
Completed deals	0.895	0.307	0.913	0.281
Public deal	0.164	0.370	0.213	0.410
Stock deal	0.186	0.389	0.074	0.262
Cash deal	0.249	0.432	0.371	0.483
Hight tech deal	0.384	0.486	0.244	0.430
Diversify	0.368	0.482	0.385	0.487
Hostile deal	0.009	0.096	0.016	0.124
Multiple bidder	0.011	0.105	0.026	0.158

Size	4.820	1.825	6.714	1.659
Book Leverage	0.204	0.237	0.245	0.213
Market to book value	2.740	4.197	2.096	1.435
ROA	-0.026	0.276	0.047	0.095
Cash to asset	0.232	0.238	0.140	0.171
Stock Return	0.117	0.654	0.157	0.366

Table 2 Sample CARs distribution

Table 2 presents the results of univariate acquirer 3-day (-1, +1) cumulative abnormal returns (CARs) by target listing status, payment method, and the combinations between them. The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 1993 and 2018 that pass the filters described in section 2.3.1. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

		Target Listing Status		**Payment Method**		**Target Listing Status & Payment Method**			
	Full Sample	**Public**	**Private**	**Cash**	**Stock**	**Public Cash**	**Public Stock**	**Private Cash**	**Private Stock**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
CARs (-1,1)	0.009***	-0.001	0.010***	0.015***	-0.003*	0.022***	-0.025***	0.011***	0.021***
	(16.891)	(- 0.192)	(11.585)	(17.320)	(-1.935)	(12.391)	(-8.460)	(7.380)	(5.334)
N	16,189	3,052	7,725	5,021	3,204	1,271	1,068	1,831	1,110

Table 3 Univariate analysis: AOR and acquirer market reactions

Table 3 provides acquirer short-run returns by decile ranking of the (1) mean Overnight Returns (OR), measured -20 to -3 days prior to the takeover announcement and, (2) mean Absolute Overnight Returns (AOR), measured -20 to -3 days prior to the takeover announcement. The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 1993 and 2018 that pass the filters described in section 2.3.1. The dependent variable in specifications (1) and (2) is the acquirer 3-day (-1, +1) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Portfolios	OR	AOR
Portfolio 1	0.031***	0.009***
	(6.840)	(6.987)
N	1,617	1,618
Portfolio 2	0.011***	0.013***
	(5.453)	(8.970)
N	1,618	1,618
Portfolio 3	0.012***	0.009***
	(6.651)	(5.647)
N	1,618	1,618
Portfolio 4	0.009***	0.008***
	(5.066)	(4.764)
N	1,618	1,618
Portfolio 5	0.012***	0.011***
	(6.575)	(6.243)
N	1,617	1,616
Portfolio 6	0.012***	0.011***
	(6.575)	(6.243)
N	1,617	1,616
Portfolio 7	0.014***	0.009***
	(7.328)	(4.217)
N	1,618	1,618
Portfolio 8	0.009***	0.021***
	(4.739)	(6.139)
N	1,618	1,618
Portfolio 9	0.015***	0.016***
	(6.188)	(6.389)
N	1,618	1,618
Portfolio 10	0.029***	0.047***
	(6.161)	(8.190)
N	1,617	1,617

Table 4 Multivariate analysis of AOR and acquirer market reaction

Table 4 presents the results of the OLS regression analysis for the effect of mean Absolute Overnight Returns (AOR), measured -20 to -3 days prior to the takeover announcement (specifications (1) and (2)), and mean Overnight Returns (OR) measured -20 to -3 days prior to the takeover announcement (specifications (3) and (4)) on acquirer short-run returns (specifications (1) -(4)). The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 1993 and 2018 that pass the filters described in section 2.3.1. The dependent variable in specifications (1)-(4) is the acquirer 3-day (-1, +1) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return. All firm-level variables are measured at the end of the prior fiscal year t; macroeconomic variables are measured as averages over the prior calendar year t. The definitions of all variables are provided in Appendix A. In all models, we control for Fama–French 48 industry fixed effects and year fixed effect. Heteroscedasticity– robust standard errors clustered by both firm and year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Acquirer Short-Run CARs			
	(1)	**(2)**	**(3)**	**(4)**
AOR	0.411***	0.428***		
	(3.017)	(3.125)		
OR			-0.417	-0.412
			(-1.153)	(-1.137)
Size	-0.005***	-0.005***	-0.008***	-0.008***
	(-11.845)	(-11.828)	(-10.469)	(-11.347)
Book leverage	0.004	0.004	0.010	0.011
	(0.992)	(1.056)	(0.874)	(0.909)
Market to Book	-0.001***	-0.001***	-0.001*	-0.001**
	(-3.358)	(-3.262)	(-1.950)	(-2.089)
ROA	0.001	-0.000	-0.012	-0.013
	(0.128)	(-0.002)	(-0.967)	(-1.048)
Sales growth	-0.000	-0.000	-0.000	-0.000
	(-0.433)	(-0.406)	(-0.900)	(-0.897)
Cash to assets	-0.018***	-0.016***	-0.021**	-0.021*
	(-3.569)	(-3.349)	(-2.079)	(-1.998)
Stock returns	-0.005***	-0.005***	-0.010***	-0.010***
	(-3.277)	(-3.105)	(-4.553)	(-4.468)
Non-Cash working capital	-0.006	-0.006	-0.014	-0.014
	(-1.095)	(-1.027)	(-1.360)	(-1.354)
Firm age	0.001	0.001	0.001	0.001
	(1.515)	(1.347)	(1.199)	(1.250)
Firm volatility	-0.158	-0.143	-0.356***	-0.322**
	(-1.590)	(-1.440)	(-2.871)	(-2.216)
Stock deal	-0.007***	-0.007***	-0.007*	-0.007*
	(-3.355)	(-3.225)	(-1.905)	(-1.846)
Cash deal	0.011***	0.011***	0.011***	0.011***
	(5.683)	(5.742)	(5.086)	(5.119)
High tech deal	-0.003	-0.002	-0.003	-0.003
	(-0.927)	(-0.765)	(-0.852)	(-0.745)
Diversifying	-0.005***	-0.005***	-0.004	-0.004

	(-3.035)	(-3.085)	(-1.598)	(-1.617)
Hostile	-0.012**	-0.012**	-0.013**	-0.014**
	(-2.064)	(-2.180)	(-2.212)	(-2.321)
Public	-0.006**	-0.006**	-0.006*	-0.005
	(-2.227)	(-2.181)	(-1.747)	(-1.682)
Challenge dummy	0.006	0.007	0.007	0.008
	(0.441)	(0.502)	(0.476)	(0.539)
Investment opportunities (First principal component)		0.000		-0.000
		(0.850)		(-0.392)
Industry economic shock		-0.019		-0.022*
		(-1.679)		(-1.798)
Rate spread		0.001		0.001
		(0.366)		(0.656)
Shiller's CAPE ratio		0.001		0.001*
		(1.426)		(1.989)
Industry median Q		-0.000		-0.000
		(-1.014)		(-1.007)
Industry median past returns		-0.001		0.004
		(-0.414)		(1.197)
Industry σ past returns		-0.011		0.021
		(-0.239)		(0.427)
Macroeconomic uncertainty (First principal component)		0.000		-0.000
		(0.197)		(-0.854)
Industry Fixed Effect	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes
N	12,885	12,879	12,885	12,879
Adjusted R square	0.039	0.039	0.027	0.027

Table 5 Stock swap deals

Table 5 presents the results of Multivariate analysis for the effect of mean Absolute Overnight Returns (AOR), measured -20 to -3 days prior to the takeover announcement (specifications (1) and (2), and mean Overnight Returns (OR), measured -20 to -3 days prior to the takeover announcement (specifications (3) and (4), on acquirer short-run returns by the stock swap deals (Public Stock and Private Stock). The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 1993 and 2018 that pass the filters described in section 2.3.1. The dependent variable in specifications (1)-(4) is the acquirer 3-day (-1, +1) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return. All firm-level variables are measured at the end of the prior fiscal year t; macroeconomic variables are measured as averages over the prior calendar year t. The definitions of all variables are provided in Appendix A. In all models, we control for Fama–French 48 industry fixed effects and year fixed effects. Heteroscedasticity– robust standard errors clustered by both firm and year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Acquirer Short-Run CARs			
	(-1, +1)	**(-1, +1)**	**(-1, +1)**	**(-1, +1)**
	(1)	**(2)**	**(3)**	**(4)**
AOR	0.502***	0.284***		
	(6.736)	(3.690)		
OR			-0.150	-0.096
			(-1.538)	(-0.927)
Public stock	-0.027***		-0.037***	
	(-7.244)		(-14.095)	
Private stock		-0.003		0.006***
		(-0.885)		(2.576)
AOR*Public stock	-0.860***			
	(-3.815)			
AOR*Private stock		0.534***		
		(2.989)		
OR*Public stock			0.571	
			(1.620)	
OR*Private stock				-0.201
				(-0.788)
Firm-level controls	Yes	Yes	Yes	Yes
Deal-level controls	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes
N	12,879	12,879	12,879	12,879
Adjusted R square	0.049	0.028	0.045	0.031

Table 6 Economic mechanism

Table 6 presents the results of OLS regression analysis for the effect of mean Absolute Overnight Returns (AOR), measured -20 to -3 days prior to the takeover announcement, on acquirer short-run returns by deal complexity, institutional ownership percentage, and stock swap deals. The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 1993 and 2018 that pass the filters described in section 2.3.1. The dependent variable in the specifications in Panel A and B is the acquirer 3-day (-1, +1) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return. In Panel A: 1) Small firm, a dummy variable equals 1 if the bidder's size is lower than the 25th percentile and 0 otherwise; 2) Young firm, a dummy variable equals if the bidder's age is less than the 50th percentile value of our sample and 0 otherwise; 3) Private, a dummy variable equals 1 if the target is private, 0 otherwise; (4) Low institutional ownership (IO), a dummy variable equals 1 if the top 5 institutional ownership is lower than the 25th percentile and 0 otherwise; and (5) Low Block holder ownership, a dummy variable equals if the blockholder ownership variable is less than the 25th percentile value of our sample and 0 otherwise. For the sub-sample analysis in Panel B the additional variables are 1) Big firm, a dummy variable equals to 1 if the bidder's size is higher than the 75thth percentile and 0 otherwise; 2) Old firm, a dummy variable equals if bidder's age is greater than the 50th percentile value of our sample and 0 otherwise (3) High institutional ownership (IO), a dummy variable equals 1 if the top 5 institutional ownership is higher than the 75thth percentile and 0 otherwise; and (4) High Block holder ownership, a dummy variable equals if the blockholder ownership variable is higher than the 75th percentile value of our sample and 0 otherwise. All firm-level variables are measured at the end of the prior fiscal year t; macroeconomic variables are measured as averages over the prior calendar year t. The definitions of all variables are provided in Appendix A. In all models, we control for Fama–French 48 industry fixed effects and year fixed effects. Heteroscedasticity– robust standard errors clustered by both firm and year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A	**Acquirer Short-Run CARs**				
	(-1, +1)	**(-1, +1)**	**(-1, +1)**	**(-1, +1)**	**(-1, +1)**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
AOR	0.248	0.269	0.214**	0.148*	0.297***
	(1.443)	(1.642)	(2.307)	(1.781)	(3.736)
Small firm	0.006**				
	(2.424)				
Young firm		-0.012**			
		(-2.758)			
Private			-0.005**		
			(-2.510)		
AOR*Small firm	0.555***				
	(2.894)				
AOR*Young firm		0.690**			
		(2.105)			
AOR*Private			0.332***		
			(2.666)		
Low investor ownership				-0.005*	
				(-1.946)	
Low blockholder					-0.005**
					(-2.187)
AOR*Low investor ownership				0.778***	
				(5.736)	
AOR*Low blockholder					0.464***
					(3.162)
Firm-level controls	Yes	Yes	Yes	Yes	Yes
Deal-level controls	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
N	12,879	12,879	12,879	12,879	12,879
Adjusted R square	0.032	0.037	0.029	0.039	0.036

Panel B	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Low IO	High IO	Low Blockholder	High Blockholder	Small Firms	Big Firms	Young Firms	Old Firms	Low IO	High IO	Low Blockholder	High Blockholder	Small Firms	Big Firms	Young Firms	Old Firms
AOR*Public Stock	-1.769***	-1.330	-1.286***	-1.389	-2.842***	-1.089	-1.862***	-0.679**								
	(-2.926)	(-1.515)	(-2.661)	(-1.436)	(-3.708)	(-1.130)	(-3.014)	(-2.592)								
AOR*Private Stock									2.763***	-0.143	0.907***	-0.435	5.401***	0.488	0.913***	-0.775
									(6.362)	(-0.191)	(2.591)	(-0.553)	(11.112)	(0.451)	(3.650)	(-0.866)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,501	3,236	2,406	2,764	2,714	3,478	5,452	7,420	2,501	3,236	2,406	2,764	2,714	3,478	5,452	7,420
Adjusted R-squared	0.087	0.062	0.066	0.063	0.054	0.053	0.051	0.040	0.097	0.057	0.059	0.056	0.088	0.044	0.033	0.041

Table 7 Alternate CARs, Alternate AOR, and Abnormal Trading Volume

Table 7 presents the results of OLS regression analysis for effect mean Absolute Overnight Returns (AOR), measured -20 to -3 days prior to the takeover announcement (specifications (1), (2) and (5)), and two alternate variants of AOR (specifications (3), (4), (6) and (7)) for different windows of acquirer CARs (specifications (1) (4)) and abnormal trading volume (specifications (5) - (7)). The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 1993 and 2018 that pass the filters described in section 2.3.1. The independent variable Alternate_AOR in the specification (3) and (6) is calculated by taking the difference between the mean absolute overnight returns (-20, -3 days) and mean absolute overnight returns (-40, -20 days) with 0 being the announcement day. The independent variable Alternate_AOR2 in the specifications (4) and (7) is calculated by taking the difference between mean absolute overnight returns measured -20 to -3 days prior to the takeover announcement and CRSP value-weighted index return for the same period with 0 being the announcement day. The dependent variable in the specification (1) is the acquirer 5-day (-2, +2) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The dependent variable in the specification (2) is the acquirer 4-day (0, +3) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. The dependent variables in specifications (3) and (4) are the acquirer 3-day (-1, +1) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return. The dependent variables in specifications (5) - (7) are the abnormal trading volume calculated as the percentage change between mean LOG_VOLUME at the merger announcement period (0, 3 days) and mean LOG_VOLUME calculated over the pre-bid period (-40, -24 days). All firm-level variables are measured at the end of the prior fiscal year t; macroeconomic variables are measured as averages over the prior calendar year t. The definitions of all variables are provided in Appendix A. In all models, we control for Fama–French 48 industry fixed effects and year fixed effects. Heteroscedasticity– robust standard errors clustered by both firm and year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Alternate CARs		**Alternate AOR**		**Acquirer Abnormal Volume**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
AOR	0.352***	0.290*			0.398***		
	(3.400)	(1.830)			(3.574)		
Alternate_AOR			0.275*			0.531***	
			(1.784)			(3.249)	
Alternate_AOR2				0.352**			0.247*
				(2.623)			(2.038)
Firm-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	12,879	12,879	12,846	12,879	12,854	12,846	12,854
Adjusted R square	0.032	0.028	0.037	0.038	0.039	0.040	0.038

Table 8 Returns reversal

Table 8 presents the results of OLS regression analysis for the effect of mean Absolute Overnight Returns (AOR), measured -20 to -3 days prior to the takeover announcement, on acquirer short-run returns (specification (1)) and acquirer long run BHARs (specifications (2) to (4)). The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 1993 and 2018 that pass the filters described in section 2.3.1. The dependent variable in specifications (1) is the acquirer 4-day (4, 8) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return. The dependent variables in specifications (2) to (4) are the acquirer 1-, 2-, and 3-year buy-and-hold abnormal returns (BHARs), respectively, after the completion date. The abnormal returns for long-run analysis are calculated using the matched firm adjusted method suggested by Barber and Lyon (1997) and Lyon, Barber, and Tsai (1999). All firm-level variables are measured at the end of the prior fiscal year t; macroeconomic variables are measured as averages over the prior calendar year t. The definitions of all variables are provided in the Appendix. In all models, we control for Fama–French 48 industry fixed effects and year fixed effects. Heteroscedasticity– robust standard errors clustered by both firm and year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Acquirer Short-Run CARs	**Acquirer Long-Run BHARs**		
	(4, 8)	**(1 Year)**	**(2 Years)**	**(3 Years)**
	(1)	**(2)**	**(3)**	**(4)**
AOR	-0.166**	2.636	2.198	2.505
	(-2.122)	(1.407)	(1.055)	(1.293)
Firm-level controls	Yes	Yes	Yes	Yes
Deal-level controls	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes
Industry Fixed Effect	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes
N	12,879	12,004	12,004	12,004
Adjusted R square	0.004	0.036	0.051	0.064

Table 9 Merger versus normal period

Table 9 presents the results of OLS regression analysis for the effect of mean Absolute Overnight Returns (AOR), measured -20 to -3 days prior to the takeover announcement, on acquirer short-run returns (specifications (1) and (2)) and pre-bid short-run returns (specification (4)). The pre-bid AOR is measured at -40 to -24 days prior to the announcement. The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 1993 and 2018 that pass the filters described in section 2.3.1. The dependent variables in specifications (1) - (3) are the acquirer 3-day (-1, +1) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return. The dependent variable in specifications (4) is the acquirer 3-day (-22, -20) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. All firm-level variables are measured at the end of the prior fiscal year t; macroeconomic variables are measured as averages over the prior calendar year t. The definitions of all variables are provided in the Appendix. In all models, we control for Fama–French 48 industry fixed effects and year fixed effects. Heteroscedasticity– robust standard errors clustered by both firm and year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Acquirer Short-Run CARs			
	(-1, +1)	**(-1, +1)**	**(-1, +1)**	**(-22, -20)**
	(1)	**(2)**	**(3)**	**(4)**
AOR	0.428***			
	(3.125)			
Pre-bid AOR		0.111		0.075
		(1.541)		(0.758)
Difference in AOR coefficient			.317***	
Firm-level controls	Yes	Yes		Yes
Deal-level controls	Yes	Yes		Yes
Macro-level controls	Yes	Yes		Yes
Industry Fixed Effect	Yes	Yes		Yes
Time Fixed Effect	Yes	Yes		Yes
N	12,879	12,846		12,847
Adjusted R square	0.039	0.037		0.005

Table 10 Propensity score matching (PSM) analysis

Table 10 presents the results of propensity score matching (PSM) analysis of the effect of Absolute Overnight Returns (AOR), measured -20 to -3 days prior to the takeover announcement, on acquirer short-run returns and abnormal trading volume. The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 1993 and 2018 that pass the filters described in section 2.3.1. The treatment group consists of bidders that generated high attention, while the control group consists of firms that did not receive high attention. We match firms using one-to-one nearest neighbor propensity score matching without replacement. Panel A reports univariate comparisons between the treatment and control firms' characteristics and their corresponding t-statistics. Panel B reports the OLS regressions on the matched sample. The dependent variable in Panel B specifications (1) is the acquirer 3-day (-1, +1) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return. The dependent variables in Panel B specification (1) is the abnormal trading volume calculated as the percentage change between mean LOG_VOLUME at the merger announcement period (0, 3 days) and mean LOG_VOLUME calculated over the pre-bid period (-40, -24 days). All firm-level variables are measured at the end of the prior fiscal year t; macroeconomic variables are measured as averages over the prior calendar year t. The definitions of all variables are provided in the Appendix. In all models, we control for Fama–French 48 industry fixed effects and year fixed effects. Heteroscedasticity– robust standard errors clustered by both firm and year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A	**Mean**		**T-test**		
	Treated	**Control**	**% Bias**	**T value**	**P-Value**
Size	4.309	4.331	-1.300	-0.510	0.612
Book Leverage	0.201	0.184	7.500	2.750	0.006
Market to book value	2.534	2.92	-14.500	-4.420	0.000
Return on asset	-0.053	-0.063	4.400	1.230	0.217
Firm age	1.971	1.987	-2.000	-0.790	0.429
Firm Volatility	0.039	0.04	-0.700	-0.280	0.777
Stock deal	0.062	0.074	-2.000	-0.690	0.491
Cash deal	0.233	0.245	-2.700	-1.100	0.271
Public	0.158	0.169	-3.000	-1.200	0.231

Panel B: Regression on the matched sample	**Acquirer Short-Run CARs (-1,+1)**	**Acquirer Abnormal Volume**
	(1)	**(2)**
AOR	0.292***	0.387***
	(3.980)	(3.617)
Firm-level controls	Yes	Yes
Deal-level controls	Yes	Yes
Macro-level controls	Yes	Yes
Industry Fixed Effect	Yes	Yes
Time Fixed Effect	Yes	Yes
N	5,781	5,754
Adjusted R square	0.069	0.057

Table 11 Instrumental variable (IV) analysis

Table 11 presents the results of a two-stage instrumental variable (IV) regression analysis using as an instrumental in the first stage regression, the percentage of home broadband owners provided by PEW research agency to instrument the mean Absolute Overnight Returns (AOR), measured -20 to -3 days prior to the takeover announcement. The sample consists of all merger and acquisition announcements reported in the Securities Data Corporation (SDC) database between 2000 and 2018 that pass the filters described in section 2.3.1. The dependent variable in the specification (2) is the acquirer 3-day (-1, +1) cumulative abnormal returns (CARs) with day 0 being the M&A announcement day. The abnormal returns are calculated using the market model with the market model parameters estimated over the period starting 255 days and ending 46 days prior to the announcement. CRSP value-weighted index return is the market return. The dependent variable in the specification (4) is the abnormal trading volume calculated as the percentage change between mean LOG_VOLUME at the merger announcement period (0, 3 days) and mean LOG_VOLUME calculated over the pre-bid period (-40, -24 days). All firm-level variables are measured at the end of the prior fiscal year t; macroeconomic variables are measured as averages over the prior calendar year t. The definitions of all variables are provided in the Appendix. In all models, we control for Fama–French 48 industry fixed effects and year fixed effects. Heteroscedasticity– robust standard errors clustered by both firm and year are reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Two-stage IV analysis	**First stage**	**Second stage**	**First stage**	**Second stage**
	(1)	**(2)**	**(3)**	**(4)**
Percentage of home broadband users	0.004***		0.004***	
	(6.15)		(6.15)	
Instrumented AOR		3.859**		4.356***
		(2.27)		(2.68)
Firm-level controls	Yes	Yes	Yes	Yes
Deal-level controls	Yes	Yes	Yes	Yes
Macro-level controls	Yes	Yes	Yes	Yes
Kleibergen-Paap rk	37.76		37.76	
LIML size of nominal 10% Wald	16.38		16.38	
Industry fixed effects	Yes	Yes	Yes	Yes
Time Fixed Effect	Yes	Yes	Yes	Yes
N	7,509	7,509	7,509	7,509