

# **Real Effects of Possible Stock Recalls on Acquirer Stocks: Empirical Evidence from Lower Merger and Acquisition Premiums**

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We apply the idea that short sellers infer from private observations of stock recalls that stock lenders intend to sell or vote. To profit from such informational advantage through short selling, we expect that acquirers' short sellers become merger arbitrageurs. Anticipating this, acquirers lower bid premiums. Consistently, in a sample of U.S. deal announcements from 2004 to 2017 we find empirically that a one standard deviation increase of acquirers' short interest (i.e., magnitude of merger arbitrage activity) and institutional ownership concentration (i.e., likelihood of an observable recall) is associated with a 10.53 percent decrease of the one-week premium. In addition, this premium reduction effect is accompanied with positive long-term buy-and-hold abnormal returns for acquirer stocks and tighter arbitrage spreads. As channel of the information about this premium reduction effect we regard advice to acquirers by M&A advisors with high equity capital market expertise. As a result, M&A advisors add value to acquirers consistent with Dessaint, Eckbo, and Golubov (2019). Moreover, this effect is more pronounced for targets with low insider ownership and for acquirers with high active institutional ownership.

**Keywords:** stock recall, short selling, blockholder, takeovers, mergers and acquisitions

**JEL classification:** G14, G23, G34

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## 1. Introduction

In the literature, short sellers are regarded as sophisticated investors who are better informed than other market participants about the true value of a stock (e.g., Asquith, Pathak, and Ritter, 2005; Boehmer, Jones, and Zhang, 2008; Christophe, Ferri, and Hsieh, 2010).<sup>1</sup> Sources of their informational advantage can be illegal insider tipping (e.g., the prominent Boesky case of the 1980s (Schwert, 1996)), or – probably more economically important – efficient processing of public information (Engelberg, Reed, and Ringgenberg, 2012; Boehmer et al., 2008; Dechow, Hutton, Meulbroek, and Sloan, 2001). While the literature treats short sellers’ informational advantage as exogenously given, we suggest an endogenous informational advantage through short selling which originates from a special short selling constraint: recall risk. The term “recall risk” refers to the risk that lenders of a stock may usually recall all units of their lent stock at will.<sup>2</sup> Since short sellers are informed of recalls through private individual notifications, these private observations of recalls lead to an informational advantage about lenders’ imminent behavior such as selling the stock (e.g., D’Avolio, 2002) or voting (Aggarwal, Saffi, and Sturgess, 2015).<sup>3</sup> Given that short sellers might make profits from such informational advantage, it reflects a “bright side” of the recall risk in short selling.

As a trading strategy to profit from such private signals about stock lenders’ imminent behavior, we conjecture a merger arbitrage strategy (e.g., Mitchell, Pulvino, and Stafford, 2004) as follows: short sellers of acquirer’s stock in a recently announced takeover bid purchase target stocks. As soon as they observe a recall on acquirer stocks, they update their private belief about takeover completion downwards whereas other market participants do not. We hypothesize that the reason for it is that recalling stockholders might recall because they intend to trade on the stock to stop the deal (“voting with the feet” as described in, e.g., Admati and Pfleiderer, 2009) or vote against the deal (Aggarwal et al., 2015), both causing a more likely deal termination. Consequently, short sellers of acquirer stocks sell their target shares and even sell target shares short to profit from a possible takeover termination that likely

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<sup>1</sup> One reason for this is that short selling is only profitable if short sellers’ informational advantage offsets its costs due to short selling constraints such as scarce or expensive lending supply (Asquith et al., 2005; Boehme, Danielsen, and Sorescu, 2006; Nagel, 2005; Prado et al., 2016; Jones and Lamont, 2002), high regulatory burdens (Bris, Goetzmann, and Zhu, 2007; Saffi and Sagurdsson, 2011), search frictions (Kolasinski, Reed, and Ringgenberg, 2013), financial constraints of the short seller (Shleifer and Vishny, 1997), and recall risk (Chuprinin and Ruf, 2017; Engelberg et al., 2017).

<sup>2</sup> Due to a stock recall short sellers might have to close out their trades prematurely and consequently might profit only from a fraction of an ongoing stock correction. At worst, recalls might trigger short squeezes that are even more detrimental to their trading profits. Some reasons for stock recalls are that lenders intend or, at least, are prepared to sell the stock (e.g., D’Avolio, 2002; Chuprinin and Ruf, 2017), or want to reclaim their voting rights on the stock (Aggarwal et al., 2015; Christoffersen, Geczy, Musto, and Reed, 2007).

<sup>3</sup> Other reasons for recalling stocks might be the intention to trade as a corporate governance activity which is called “voting with the feet” (the so called Wallstreet rule, e.g., Admati and Pfleiderer, 2009; Edmans, 2009; Edmans and Manso, 2011). Again, short sellers are early on informed about these stock price relevant activities through the private observation of a stock recall.

entails on average negative abnormal returns for target shares (e.g., Malmendier, Opp, and Saidi, 2016; Davidson III, Dutia, and Cheng, 1989; Fabozzi, Ferri, Fabozzi, and Tucker, 1988). Since they benefit in the event of a deal termination contrary to incumbent target shareholders, their expected value of an announced bid is higher than its expected value perceived by those incumbent target shareholders. We interpret the difference of those expected values as the value of an option that is offered from acquirer's stock lenders to acquirer's short sellers and enables short sellers to trade on a valuable recall signal.

Acquirers might anticipate short sellers' appropriation of such an option and thus higher expected value of the deal with a premium set at the incumbent target shareholders' reservation value and thus are able to set their bid price below target shareholders' reservation value because even in the case of a lower premium short sellers are willing to purchase incumbent target shareholders' shares at their higher reservation value. Consequently, short sellers pay for their option obtained from acquirers' stock lenders by paying a higher price for target shares than offered by the acquirers themselves. In this way, we might observe a wealth transfer from short sellers to acquirer shareholders even though only the lenders among acquirer shareholders have originated the option of trading on stock recalls.

To conclude, short sellers as merger arbitrageurs<sup>4</sup> presumably crowd out incumbent target shareholders at lower bid premiums. We expect that acquirers set bid premiums lower that we call the "premium reduction effect" if the following two conditions are met: First, short sellers must be sufficiently motivated to become merger arbitrageurs and purchase target shares. This is the case if stock recalls are likely observable after deal announcements. D'Avolio (2002) states that stock recalls are rare and thus our informational advantage might occur too seldom to render a valuable option. One reason for it is that recalls are diversified away by lending agents through alternative stock lenders before reaching out to short sellers.<sup>5</sup> We expect that such insulation from supply shocks due to stock recalls is less likely if a priori stock supply is low and rather concentrated. Consistent with Prado, Saffi, and Sturgess (2016), we choose as proxy for acquirer institutional ownership concentration the Hirschman-Herfindahl index of institutional shareholdings one trading day before deal announcement. Second, the magnitude of merger arbitrage (i.e., the aggregated number of shorted stocks) should be sufficiently high to reach the threshold of tendered shares necessary for deal completion.<sup>6</sup> Since information about the number of shorted stocks (i.e., short interest) is available to the acquirer at almost any time and in particular shortly before the time of bid announcement, acquirers regard short interest one day prior to deal

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<sup>4</sup> In the entire paper, we assume that merger arbitrageurs are short in acquirer stocks and long in target stocks after deal announcement. Some empirical indication is given in the Section 5.

<sup>5</sup> An example of such a notification can be found in Chuprinin and Ruf (2017).

<sup>6</sup> Once short sellers become target shareholders, they are very likely to tender their stocks to the acquirer of the bid because their informational advantage is linked to this original acquirer and would render worthless if they considered a competing bid from another bidder.

announcement as the expected magnitude of merger arbitrage because pre-announcement short sellers might become very likely post-announcement merger arbitrageurs due to their existing lending agreements.

Our reasoning about the option to trade on stock recalls is used to design an empirical strategy to explore the economic impact of the informational advantage through short selling on firms whose shares are sold short. We analyze a sample of takeover attempts of public U.S. target firms from 2004 to 2017. Our central empirical hypothesis is that the premium is lower, the higher the acquirer institutional ownership concentration and the higher the acquirer short interest.

Consistently, we find that a change in the standard deviation of this interaction term is associated with a decrease of the one-week premium by 10.53 percent and by USD 69.264 million for the average target. We call this finding the premium reduction effect that reflects a significant economic impact by the informational advantage through short selling on firms targeted by short sellers insofar that it enables acquirers to save money in takeover deals.

Consistent with the premium reduction effect, we observe positive buy-and-hold abnormal returns of acquirer stocks from four-month to twelve-month periods after deal announcement indicating that acquirers, in fact, profit from the premium reduction effect. We interpret this finding as indication that wealth is transferred from merger arbitrageurs to acquirer shareholders because the former lose money when acquirer stock prices rise abnormally. In this way, the value of such wealth transfer might also give some idea about the lower bound of the average value of the option to trade on the informational advantage through short selling.

As channel of the information about the premium reduction effect we regard advice to acquirers by M&A advisors with high equity capital market expertise. Goldman Sachs, for instance, might know from its trading desks and its hedge fund clients about this trading option and tell their M&A clients about the real effect caused by such trading option. As a result, M&A advisors add value to acquirers consistent with Dessaint, Eckbo, and Golubov (2019).

In addition, we find that the effect on short-term (i.e., over one- and three-day symmetric event windows) abnormal returns of acquirer stocks and their shorter than four-month period buy-and-hold abnormal returns are negative and positive, respectively, but statistically insignificant. This finding might indicate that merger arbitrageurs' short selling puts short-term price pressure on acquirer stocks (i.e., stock liquidity is too low) neutralizing aforementioned positive wealth transfers over the short term.

Moreover, we provide several empirical indications for our expectation that short sellers become target shareholders. First, the arbitrage spread measured as the relative difference of offer price per share

and post-announcement target share price two trading days after announcement is tighter in the case if institutional ownership concentration and short interest both are high that might be explained by short sellers put upward pressure on the target share price. Simultaneously, we find no such effect for deal completion itself which helps us rule out that the relation on arbitrage spread is driven by a higher likelihood of takeover completion.

Second, we observe that the premium reduction effect is more pronounced if target stocks are held by less insiders who are less likely to sell their stocks to merger arbitrageurs because they are more restricted from trading due to insider trading laws and their involvement in the deal negotiations.

Third, we document that the premium reduction effect is more pronounced if acquirer active institutional ownership is high. This supports our reasoning that the informational advantage through short selling is higher if lenders are well-informed that is more likely for active institutional shareholders that might trade on their presumable informational advantage.

In addition, we show that the premium reduction effect is less pronounced if deal characteristics include an acquirer termination fee provision signaling a higher likelihood of deal completion. This supports our reasoning that the informational advantage conveys information about takeover failure.

Since Prado et al. (2016) detect that high short interest and high institutional ownership concentration might lead to stock overvaluation, our results might be driven by such overvaluation. Contrary to this argument, we find in a subsample test that the premium reduction effect is more pronounced if acquirer stocks are more likely undervalued.

The premium reduction effect also exists if we replace institutional ownership concentration with insider ownership concentration. Though, our main analyses focus on institutional ownership concentration because we expect that insiders do not need to recall stocks for corporate governance purposes due to more options to intervene directly and they face more restrictions in trading caused by insider trading laws.

Our paper contributes to several strands of literature. First, we contribute to the short selling literature and introduce a novel view on the recall risk of short selling: while Chuprinin and Ruf (2017) and Engelberg, Reed, and Ringgenberg (2017) explore the “dark side” of the recall risk as short selling constraint, we suggest a “bright side” that is caused by an informational advantage through short selling that short sellers can trade on. Consequently, we endogenize the informational advantage of short sellers. We use takeover announcements to provide an estimate of a lower bound of such informational advantage because we assume that acquirers anticipate the value of such informational advantage and use the takeover bid premium to extract rents from it. In this way, we demonstrate how mergers and acquisitions methodology can be used to reveal an (formerly unexplored) property of

short selling. Besides, our notion of an informational advantage through short selling might explain why Geczy, Musto, and Reed (2002) reports that acquirer stocks become special (i.e., with high lending fees) in the case of takeover attempts because feasible trading on the informational advantage through short selling attracts many short sellers. Our reasoning might also provide an explanation for Prado et al. (2016) who find that more institutional ownership leads to lower lending supply and higher lending fees: since blockholders are aware of the informational advantage through short selling, they either restrict their lending to avoid revelation of their imminent stock sale or demand higher lending fees to get compensated for the informational advantage through short selling.

Second, we contribute to the blockholder literature who regard blockholders as monitors of firms who are usually well-informed irrespective of being member of the board of directors (Holderness, 2003; Shleifer and Vishny, 1986; Maug, 1998; Demsetz and Lehn, 1985). We assume that short sellers can extract information from blockholders if they lent out shares. Our results indicate that this is the case for takeovers and this seems to be beneficial to acquirer shareholders. Thus, blockholders add value to the firm.

Third, we contribute to the mergers and acquisitions literature which usually sees short sellers as merger arbitrageurs who just hedge their long position in the target stock (Mitchell and Pulvino, 2001; Liu and Wu, 2014). On the contrary, our idea of an informational advantage through short selling provides an alternative explanation for their engagement in short selling of acquirer stocks. In addition, our paper complements Cornelli and Li (2002) who show theoretically an informational advantage through buying target shares by just knowing privately that they are long in target shares and are willing to tender. We suggest rather an informational advantage through short selling of the acquirer stock that is complementary to their informational advantage because merger arbitrageurs buying target shares and shorting acquirer shares know better (i.e., earlier) than other market participants both how the target shareholders will act and how acquirer shareholders will act. In this way, the productivity of our proposed informational advantage increases the productivity of the informational advantage introduced by Cornelli and Li (2002).

Fourth, we contribute to the general question in the finance literature about real effects of financial markets on real investments (e.g., Bond, Edmans, and Goldstein, 2012; Edmans, Goldstein, and Jiang, 2012; Campello, Graham, and Harvey, 2010; Derrien and Kecskés, 2013). Since takeovers are real investments and short selling is just a transaction by speculators in financial markets, short sellers' impact on takeover offered bid price reflect such real effects.

The remainder of this paper is organized as follows. Section two describes our theoretical reasoning, our applied empirical strategy, and our main hypothesis. Section three describes our data sample and

empirical models. Section four presents our empirical results. Section five includes some discussion with additional analyses to support our reasoning and some robustness tests. Section six concludes.

## **2. Theoretical reasoning, empirical strategy and hypotheses**

### **Informational advantage through short selling**

As described by D’Avolio (2002), short sellers usually borrow stocks from beneficial owners (i.e., stock lenders) through intermediaries such as big custody banks and sell them afterwards.<sup>7</sup> They profit when the stock price declines and they purchase the stocks at a lower price. Stock lenders are often institutional investors and blockholders such as pension funds, index funds, mutual funds, public retirement funds, and endowments who generate additional income from lending fees.<sup>8</sup> Instead, short sellers, for instance, are market makers, specialists, option traders, or hedge funds.<sup>9</sup> While market makers and specialists sell short for market liquidity reasons and option traders for hedging risk, hedge funds and other speculators trade on information and must hold their short position for a longer time until the stock price deteriorates (D’Avolio, 2002). Contrary to ordinary cash loans, equity loans that short sellers obtain do not usually have fixed maturity dates (Financial Stability Board, 2012).<sup>10</sup> This means that lenders and borrowers both are allowed to terminate the equity loan on a daily basis. If lenders recall their lent stocks, borrowers incur several costs when they have to close out their trading position prematurely. For example, they might incur opportunity costs because they have to find (locate) new stocks to borrow that can take on average 23 days (D’Avolio, 2002) forcing them to suspend their short sale trade. Besides, they have to buy the stock when the stock price might be adversely high. At worst, when many lenders recall, short squeezes might occur that decimate trading profits even more. Chuprinin and Ruf (2017), for instance, report a negative relation of recalls with trading profits of short sellers in the event of negative earnings announcements. Due to these costs, the recall risk might deter some short sellers reflecting a short selling constraint.

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<sup>7</sup> Short sales can be naked meaning that short sellers have not borrowed and possessed the stock shortly before selling it short. In this case, short sellers have to deliver the stock within ordinary settlement periods such as three days by purchasing them before. Market makers are often such short sellers (Christian, Shapiro, and Whalen, 2006) which we do not expect to trade on informational advantages through short selling, and therefore we do not further address them.

<sup>8</sup> D’Avolio (2002) indicates that retail investors are very unlikely stock lenders because intermediaries are not allowed to lend from non-margin retail investors’ accounts and refers to interviews that show that discount brokers are not the typical source of lending supply.

<sup>9</sup> In practice, prime brokers usually borrow the shares from lenders and then provide hedge funds with the shares because some lenders are unwilling to lend to hedge funds (Reed, 2013).

<sup>10</sup> Reed (2013) states that guaranteed-term loans are rare and borrowers try to mitigate the recall risk by borrowing from lenders with low turnover portfolios like, for instance, index funds.

In the literature, several reasons for recalls are discussed. One reason is that lenders recall their stocks because they intend to sell them. D’Avolio (2002), for instance, reports that subsequent to a recall event the number and percentage of ownership of institutional investors who are obliged to file 13F forms decline. In addition, Chuprinin and Ruf (2017) show a negative relation of recalls and subsequent 13F institutions’ divestments in the recalled stocks.

As another reason, we suggest that recalls might be credible signals to managers of the firms whose stocks are recalled that stock sales by stock lenders are possible at any time to put pressure on those managers in the direction these lenders prefer. This argument is based on the “voting with their feet” idea that shareholders affect firm managers’ decisions by threatening to or even actually sell their shares (e.g., Admati and Pfleiderer, 2009).

A further reason is that lenders intend to vote on subsequent proposals such as takeover proposals. Consistently, Aggarwal et al. (2015) document that lenders reduce lending supply or recall shortly before record dates when they have to possess the stocks to be eligible to vote on subsequent proposals.<sup>11</sup> They report recalls likely occur if institutional owners have greater monitoring incentives, firms exhibit low performance and bad corporate governance. Further, they find less lending supply (i.e., likely recalls) when lenders want to oppose management proposals and support shareholder proposals.

An additional reason is that lenders may try to manipulate stock prices upward by restricting stock lending supply through recalls. Chuprinin and Ruf (2017), for instance, find that stocks exhibit negative abnormal returns subsequent to their recall. Consistently, Prado et al. (2016) show that concentrated ownership leads to less lending supply and also negative abnormal stock returns in case of demand shocks indicating such stock price upward manipulation.

Events of recalls are relatively rare as D’Avolio (2002) observes: only 2 percent of all stocks are recalled on average per month. One reason for it may be as follows: if lenders ask their lending agents (in the usual case there is such intermediary) to return their stocks, lending agents try to find other lenders who replace the former lenders to avoid to issue a recall notification to borrowers. So, lending agents might insulate borrowers from idiosyncratic recalls by some lenders.<sup>12</sup> Due to this behavior, a recall very likely signals that lending supply has diminished (e.g., D’Avolio, 2002), and thus other lenders are also prepared to sell the stock making the informational advantage of the recall even more profitable.<sup>13</sup>

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<sup>11</sup> On the demand side, Christoffersen et al. (2007) also document that borrowers obtain the right to vote from stock lenders at record dates driving utilization of lending supply even higher. They, however, report that the price for one vote is zero on average.

<sup>12</sup> One reason for such behavior might be that they want to maintain their reputation as a reliable source of stock lending to avoid losing clients such as hedge funds (Financial Stability Board, 2012).

<sup>13</sup> Further, we expect that recalls that are observed by bigger short sellers are more valuable because of several reasons. First, although lending agents have discretion to whom they issue a recall notification (Reed, 2013), it is



In addition, we expect that the occurrence of a recall is kept in secret by lenders, lending agents, and borrowers who face the recall to enable lenders and borrowers to camouflage their imminent sales and purchases, respectively.<sup>14</sup>

A reason for stock lenders' stock recall might be that they intend to trade their stocks according to the commonly known "voting with your feet": Admati and Pfleiderer (2009) explain with their model how blockholders (larger shareholders) mitigate agency problems with firm managers by threatening to sell their stake if managers' actions are not pleasant in their view. Similarly, Edmans (2009) presents in his model that a single blockholder's trading impound firm manager's actions into prices so that the manager's equity incentive becomes more efficient.<sup>15</sup>

Another reason for shareholders to recall their stocks is that they want to intervene through voting that is the most prevalent form of intervention (McCahery, Sautner, and Starks, 2016).

In the case of an exogenous reason for takeover deal termination such as a regulatory disapproval that usually leads to a decline in the acquirer stock price (Savor and Lu, 2009), lending shareholders might anticipate such disapproval and thus sell in advance of its notice.

The informational advantage through short selling addresses information about shareholders' private information about their expectation of stock price losses or their intention to exercise corporate governance activities through trading or voting. In any case, this information is likely very valuable for short sellers to trade on it. To conclude, we regard a stock recall as an event to exercise a corresponding option to trade on private information about the recalling lenders' imminent behavior.

### **Empirical strategy and hypothesis**

In this paper, we suggest an informational advantage through short selling that originates from private observations of stock recalls by short sellers. Since we expect that lending shareholders of the borrowed stocks know that short sellers are able to profit from recalls, we explore if this anticipation has any impact on these shareholders, their firms, and their firms' short sellers. As an empirical strategy we observe takeover attempts that provide short sellers of acquirer stocks a possible trading strategy

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likely that smaller borrowers first receive a recall notification before bigger borrowers because the former are supposed to be less valuable than the latter. Second, if it were sufficient to just borrow one stock, the prices of the informational advantage through short selling would be so low that many market participants would obtain it rendering any informational advantage through short selling as economically irrelevant.

<sup>14</sup> For example, D'Avolio (2002) shows that institutional ownership declines several months after a recall event indicating camouflage as very important. Further, one of the biggest stock lending agents in the U.S. confirmed to us that they issue recall notifications only privately to the borrowers who are supposed to return the stocks.

<sup>15</sup> Edmans and Manso (2011) show in their model that in the case of multiple blockholders this process is even more efficient. McCahery et al. (2016) document with survey data that trading is the most prevalent governance mechanism. Duan and Jiao (2016) show that mutual funds choose to sell even though voting is possible. Parrino et al. (2003) find that CEO turnover is preceded by sales of institutional investors reflecting effectiveness of trading as governance mechanism.

to profit from the informational advantage through short selling: merger arbitrage. This refers to the investment strategy of buying target shares and selling short acquirer shares of a pending takeover attempt (e.g., Mitchell et al., 2004). Though takeover attempts are obviously extraordinary events, we expect that they have the advantage for a feasible trading strategy because content of the informational advantage through short selling can be interpreted very precisely: we assume if short sellers observe recalls on acquirer stocks, they infer that a takeover termination is very likely and imminent. One indication for it is that Aggarwal et al. (2015) show that a decrease of supply before a voting event on a corporate control matter is associated with a higher likelihood of a negative vote by shareholders. Since acquirer shareholders only sometimes vote on a takeover,<sup>16</sup> we assume that selling (or at least the threat of selling) the stock by blockholders is more likely to induce the acquirer to abandon the takeover. In both cases, stock lending acquirer shareholders would recall their stocks and short sellers can infer from the recall a very likely deal termination.

If short sellers of acquirer stocks as merger arbitrageurs are also target shareholders and learn about takeover termination before all other market participants, they can profit by selling their target shares at higher current prices because current market prices incorporate a higher likelihood of deal completion than the now better informed short sellers estimate. Moreover, these short sellers might instantaneously sell short target shares to even further profit from usually declining target share prices after announcement of takeover failure (e.g., Malmendier et al., 2016; Davidson III et al., 1989; Fabozzi et al., 1988). This profit in the case of deal termination is the payoff of an insurance against the negative outcome of falling target shares originated from the informational advantage through short selling. Thus, given a certain bid premium, merger arbitrageurs' expected value of the bid is higher than its expected value perceived by incumbent target shareholders because the latter are exposed to deal termination risk and due to this incorporate its negative outcome in their expected value of the bid. As a result, merger arbitrageurs would require a lower premium  $p_{\text{low}}$  for the same expected value of the bid as in the case of the higher premium  $p_{\text{high}}$  demanded by incumbent target shareholders.<sup>17</sup> Nevertheless, merger arbitrageurs must pay  $p_{\text{high}}$  to incumbent target shareholders to purchase the target stock.<sup>18</sup>

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<sup>16</sup> In an additional analysis, we find that approximately a quarter of all takeover attempts with public targets requires shareholder approval.

<sup>17</sup> To keep it simple, we differentiate only two groups of target shareholders who have to vote on the takeover proposal: short sellers of acquirer stock (merger arbitrageurs) and incumbent target shareholders with identical reservation values that determines  $p_{\text{high}}$ . These reservation values can incorporate all synergy gains by the takeover (Grossman and Hart, 1980) or only a part of it if the supply curve of target stocks is upward-sloping caused by the existence of private benefits of control to the acquirer as majority shareholder as Burkart, Gromb, and Panunzi (1998) show.

<sup>18</sup> We assume that the trading profits through the informational advantage are sufficiently high that their expected value including  $p_{\text{low}}$  offered by the acquirer is larger than  $p_{\text{high}}$ .

If the magnitude of merger arbitrage is sufficiently large, enough target shares are held by merger arbitrageurs who are willing to tender at  $p_{\text{low}}$ . Otherwise, acquirer managers must bid  $p_{\text{high}}$  to all target shareholders to succeed in the deal. Consistently, we expect that a lower premium is more likely if the potential magnitude of merger arbitrage is large enough to reach the threshold for tendered stocks.

As proxy for the expected magnitude of merger arbitrage, we regard pre-announcement acquirer's short interest (i.e., total number of shorted stocks relative to stocks outstanding).<sup>19</sup> Since post-announcement short selling is likely constrained reflected by usually rising lending fees after deal announcement (Geczy et al., 2002), pre-announcement short sellers might be less exposed to such constraints due to their existing borrowing agreements and thus might profit more from our proposed merger arbitrage strategy than post-announcement short sellers.

In addition, short sellers only accept to pay a higher price including  $p_{\text{high}}$  to incumbent target shareholders if merger arbitrageurs' informational advantage through short selling is sufficiently valuable that is the case if a stock recall is more likely observable which in turn is the case if lending supply is not too excessive and lender concentration is high measured by high values of acquirer institutional ownership concentration. This choice is motivated by Prado et al. (2016) who show that institutional ownership concentration is negatively related to lending supply. This assumption is, for instance, supported by D'Avolio (2002) who finds that stock lenders are often institutional investors such as pension funds, index funds, mutual funds, public retirement funds, and endowments.<sup>20</sup>

To conclude, both conditions, i.e., high institutional ownership concentration and high short interest, must be met to allow a lower premium so that merger arbitrageurs crowd out incumbent target shareholders. This leads to our central hypothesis:

*Hypothesis: The higher acquirer institutional ownership concentration and the higher acquirer short interest before deal announcement, the lower the bid premium is.*

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<sup>19</sup> Short interest is reported and published publicly every two weeks, daily short sale volume is available since 2009.

<sup>20</sup> We do not use directly lending supply and lender concentration data provided by data vendors such as IHS Markit because our reduction premium effect occurs more likely if all involved parties in our M&A game possess data about recall observability. Since Markit data are very expensive, we doubt that a lot of those parties access such data and more likely rely on publicly available data such as short interest and institutional ownership. Later in this paper, we discuss our preference of institutional ownership concentration over insider ownership concentration.

### 3. Data sample and empirical models

#### Data sample

We obtain our dataset from Standard & Poor's Capital IQ database. The basic sample consists of approximately 1,300 M&A transactions and the sample period started in January 2004 and ended in May 2017. We set the minimum total transaction value and the minimum market capitalization of the acquirer one trading day prior to the announcement date of the transaction to USD 1 million. Each transaction includes only one acquirer to rule out dilution of the informational advantage through short selling by other co-investors or bidder syndicates. Both acquirers and targets are publicly-held and their headquarters are geographically located in the United States.

#### Empirical models

To analyze our hypothesis if the bid premium is lower the higher acquirer institutional ownership concentration and the higher the acquirer short interest is, we apply the following linear fixed effects regression model:

$$\begin{aligned} Premium_{i,t}^{1 Week / 3 Day / 1 Day} = & \alpha_{i,t} + \beta_1 Acq SI_{i,t-1} * Acq Instit Herf_{i,t-1} \\ & + \beta_2 Acq SI_{i,t-1} + \beta_3 Acq Instit Herf_{i,t-1} + \beta_4 Ownership Controls_{i,t-1} \\ & + \beta_5 Deal Controls_{i,t} + \beta_6 Acq Controls + \beta_7 Tgt Controls \\ & + \gamma_{i,j,T} + \delta_{i,k} + \varepsilon_{i,t} \end{aligned}$$

The dependent variables are the one-week premium,  $Premium_{1 Week}$ , defined as the relative difference of the offer price on announcement and the target share price five trading days before deal announcement, and the three- and one-day premium,  $Premium_{3 Day}$  and  $Premium_{1 Day}$ , defined accordingly.<sup>21</sup> The index  $i$  denotes observation, i.e., the respective transaction, whereas  $t$  denotes the day of offer announcement.  $\beta_1$  is the coefficient of primary interest.

Our variable of interest is the interaction term,  $Acq SI_{-1} * Acq Instit Herf_{-1}$  which consists of the short interest of the acquiring firm one trading day before deal announcement,  $Acq SI_{-1}$ , expressed in percentage terms relative to the latest number of shares outstanding, and the concentration of acquirer institutional ownership one trading day prior to deal announcement,  $Acq Instit Herf_{-1}$ .

Given insider trading laws and regulatory burdens restricting insiders from strategic lending and recalling stocks, we use institutional ownership concentration as our primary measure for the value of

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<sup>21</sup> We also provide estimates with one-month premium but focus on the one-week premium and three-day and one-day premium because practitioners and filings for takeover attempts suggest that the final decision on the premium is done one week before announcement and latest information about short interest and ownership structure is incorporated in the offered premium. All time indices refer to trading days.

the trading option on the informational advantage through short selling: it is measured as a Hirschman-Herfindahl index which is calculated as the sum of the squares of each individual institutional investor's percentage share in the firm one trading day before announcement. To support our hypothesis, we should find a negative coefficient on  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$ .

*Ownership Controls* consists of seven variables, all obtained one trading day prior to deal announcement:  $Acq\ Instit\ Sum_{-1}$  is the sum of institutional ownership of the acquirer,  $Acq\ Insider\ Herf_{-1}$  measures the concentration of acquirer insider ownership (also measured as a Hirschman-Herfindahl index), and  $Acq\ Insider\ Sum_{-1}$  is the sum of acquirer insider ownership.  $Tgt\ Instit\ Herf_{-1}$ ,  $Tgt\ Instit\ Sum_{-1}$ ,  $Tgt\ Insider\ Herf_{-1}$ , and  $Tgt\ Insider\ Sum_{-1}$ , respectively, are defined likewise for the target firm.

Besides these variables we include the following control variables in our models that are widely used in M&A literature (see, e.g., Eckbo, 2009). *Deal Controls* comprise deal characteristics. The control variable *Transaction Value (TV)* is the total gross transaction value in billions of USD. *Stock (% of TV)* measures the percentage share of the total gross transaction value that is paid with acquirer stock. *Acq Termination Fee Dummy* is an indicator variable equal to 1 if the acquirer agrees to pay a buy-side termination fee to the target firm in specific events as negotiated in the merger agreements, and 0 otherwise. The similar definition applies to *Tgt Termination Fee Dummy*, which is 1 for an existing sell-side termination fee and 0 if no such provision exists (e.g., Bates and Lemmon, 2003; Bodnaruk, Massa, and Simonov, 2009). *Friendly Deal Dummy* is an indicator variable set to one if the deal attitude on the announcement day is friendly, and 0 otherwise. *Same Industry Dummy (SIC1)* is a dummy variable equal to 1 if both the acquirer and the target are assigned to the same industry (i.e., horizontal takeover, see similar, e.g., Betton, Eckbo, and Thorburn, 2008) as defined by the first of the four SIC digits, and 0 if not.

*Acq Controls* consist of numerous variables describing the characteristics of the acquirer, such as:  $\ln Acq\ Market\ Cap_{-1}$ , the natural logarithm of the market capitalization of the acquirer in millions of USD one trading day prior to the announcement of the transaction,  $\ln Acq\ Vola\ LTM_{-1}$  is the one year price volatility, i.e., the annualized standard deviation of weekly log-normal price returns over the past year, also obtained one trading day prior to deal announcement.  $Acq\ Performance\ LTM_{-1}\ (Div.\ adj.)$  is the performance of the acquirer's share price, dividend adjusted and expressed in percentage terms, from the last twelve months until one trading day prior to deal announcement. We choose this control variable to account for possible rumors and stock price run-up (Schwert, 1996) effects on pre-announcement short interest and ownership structure of both the acquirer and the target.  $Acq\ MTB_{-1}$  is the market-to-book ratio of acquirer's equity and is supposed to account for overvaluation or growth related to both short interest and ownership structure.  $\ln Acq\ Turnover_{1\ Month}$  is the natural logarithm of one plus

the one-month average of the daily quotient of the dollar value traded divided by the market capitalization on the corresponding day.<sup>22</sup>

*Tgt Controls* is a set of control variables of target characteristics (*Tgt Performance LTM*<sub>-1 (Div. adj.)</sub>, and *Tgt MTB*<sub>-22</sub><sup>23</sup>) which are defined in the same way and account for the same effects as described for their acquirer counterparts.<sup>24</sup>

To control for aggregate shocks to takeover activity in certain industries and across years, we include following fixed effects:  $\gamma_{i,j,T}$  are acquirer industry-year fixed effects,  $\delta_{i,k}$  are target industry fixed effects, and are based on the first digit of the Standard Industrial Classification (SIC) code and the year of deal announcement, respectively (e.g., Betton et al., 2008; Malmendier et al., 2016).<sup>25</sup> All variables are additionally defined in Table A1 in the appendix.

## 4. Empirical results

### Descriptive statistics

The summary statistics of our sample (presented in Table 1) show that the mean of *Deal Completion* is 0.879 indicating that 87.9 percent of the deals in our dataset are consummated and have been closed before the end of May 2017. We further observe weekly target share premiums of 32.8 percent on average, which is consistent with the literature such as Malmendier et al. (2016) and Officer (2003). The median of *Premium*<sub>1 Week</sub> is 28 percent, revealing that the distribution is right-skewed and has a minimum of -83.4 percent and a maximum of 260 percent. The distribution parameters are similar and comparable among all four measures of the target share price premium. Buy-and-hold abnormal returns, *BHAR*, are measured from one trading day before until several months after announcement. Mean and median for all *BHAR* are negative which is consistent with Savor and Lu (2009) although they

<sup>22</sup> We include turnover of the acquiring firm's stock since it is a proxy to measure dispersion of opinion among investors and because it is positively related to short interest (see, e.g., D'Avolio, 2002); an analysis of pairwise correlation reveals a statistically significant correlation coefficient between these two variables of 0.51.

<sup>23</sup> We choose target market-to-book ratio of 22 trading days (i.e., one calendar month) before deal announcement to get rid of any stock run-up influence (e.g., Schwert, 1996).

<sup>24</sup> The following variables are winsorized at the 1 % and 99 % level to reduce the influence of outliers (e.g., Edmans et al., 2012; Malmendier et al., 2016):

*Premium*<sub>1 Week</sub>, *Premium*<sub>3 Day</sub>, *Premium*<sub>1 Day</sub>, *Premium*<sub>1 Month</sub>, *Acq CAR*<sub>[-1,+1]</sub>, *Acq CAR*<sub>[-3,+3]</sub>, *Acq SI*<sub>-1</sub>, *Acq Performance LTM*<sub>-1 (Div. adj.)</sub>, *Acq Turnover*<sub>1 Month</sub>, *ln Acq Turnover*<sub>1 Month</sub>, and *Tgt Performance LTM*<sub>-1 (Div. adj.)</sub>. Instead, we winsorize *Arbitrage Spread*<sub>2 Day</sub> at the 3 % and 97 % level, *Acq MTB*<sub>-1</sub> and *Tgt MTB*<sub>-22</sub> at the 99 % level due to a larger number of outliers.

Despite our large number of explanatory variables, we do not expect problems due to multicollinearity because variance inflation factors of the majority of variables are below eight and for all variables of interest always below three. Besides, analysis of pairwise correlations of all variables lead to the same conclusion.

<sup>25</sup> All our results are robust even if we include target industry-year fixed effects instead of target industry fixed effects alone – see, e.g., Table 2 columns (3), (5), and (7) for the different measures of target premiums – and remain qualitatively the same if we apply industry fixed effects measures based on the first two SIC digits.

split their sample in cash- vs. stock-financed bids whereas we do not. In extreme cases the values for *BHAR* fall below -400% and on the other side exceed 360% which is not problematic given that it is common that sample firms can have annual abnormal returns in excess of +200% or -200%. In comparison, for cumulative abnormal returns (*CAR*) it is not common to observe a return on the market index, i.e., reference (normal) return, in excess of 100% during that time (Barber and Lyon, 1997). The number of observations for *BHAR* drops from 1,182 for the one-month *BHAR* to 1,166 for the twelve-month *BHAR* which is explained by acquirers being delisted or dropped out of sample because of other reasons such as, e.g., bankruptcy.

[Insert Table 1 about here]

Short interest of the acquirer one trading day before bid announcement, *Acq SI<sub>-1</sub>*, averages at around 4 percent with heavily shorted acquirers' stock short interest culminating in more than 20 percent of the shares outstanding, consistent with Prado et al. (2016), Chuprinin and Ruf (2017), and Aggarwal et. al. (2015). Hirschman-Herfindahl indices describe the ownership concentration and peak in values close to 0.87 for acquirers but are on average higher for targets, no matter if institutional or insider ownership is being considered.

As mentioned above, we restrict the sample to transactions whose total (gross) transaction value (*TV*) exceeded USD 1 million to focus on economically meaningful transactions. The average value for *TV* is USD 3.09 billion. Another interesting point is the use of termination fee provisions: the mean for *Acq Termination Fee Dummy* amounts to 0.252 which states that in around 25 percent of the transactions both parties agreed on such a clause, which is consistent with Chen, Mahmudi, Virani, and Zhao (2018). On the other hand, 86.7 percent of the transactions had agreements for target termination fees (comparable to, e.g., Boone and Mulherin, 2007). The mean and median of *Stock (% of TV)* are quite similar, but the standard deviation is relatively high as well, indicating that a lot of deals used either high amounts of cash or stock as currency. 82.4 percent of all transactions involve acquirer-target pairs within the same one-digit SIC industry. Comparing the values for the acquiring firms' market capitalization and *Transaction Value* as a proxy for the target firms' size signifies that the average acquirer is around ten times larger than the average target firm, congruent with Bodnaruk et al. (2009).

## Empirical results

The coefficient on *Acq SI<sub>-1</sub> \* Acq Instit Herf<sub>-1</sub>* is negative and statistically significant at the 1 percent level for *Premium<sub>1 Week</sub>* and negative and statistically significant at the 5 percent for *Premium<sub>3 Day</sub>* and

$Premium_{1\text{ Day}}$ , respectively (shown in Table 2, column (2), (4), and (6), respectively).<sup>26</sup> This finding indicates that the higher the acquirer short interest and the higher acquirer institutional ownership concentration, the lower the one-week and three- and one-day bid premiums are. Thus, our central hypothesis is supported that the higher acquirer institutional ownership concentration and the higher pre-announcement acquirer short interest are, the lower the bid premium is. An increase of  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  by one standard deviation (0.187) is associated with a decrease of the one-week premium by 10.53 percent ( $= -18.485 * 0.187 / 32.820$ ) and by USD 69.264 million for the average target with market capitalization of USD 2,003.760 million (average one-week premium included in the calculation).

In addition, we find a positive and statistically insignificant coefficient on the separate short interest variable and no statistically significant coefficient on acquirer institutional ownership concentration that supports our expectation that both conditions of a high short interest and high value of informational advantage are reflected by our interaction term.<sup>27</sup> Using stock in a transaction yields a negative and statistically highly significant relation to  $Premium_{1\text{ Week}}$ , similar to comparable regressions in, e.g., Bates and Lemmon (2003). They do not report a highly statistical significance which might be due to measurement differences as outlined in the paragraph above. The market capitalization of the acquiring firm one trading day prior to offer announcement is highly and positively related to  $Premium_{1\text{ Week}}$ , consistent with Officer (2003).

[Insert Table 2 about here]

Table 3 shows the results obtained from a modular model setup. Column (1) regresses the one-week premium on the interaction term and its components alone. The effect of  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  is statistically significant at the five percent level. The inclusion of ownership controls does not change this result (see column (2)). Once we additionally control for deal characteristics (column (3)), the magnitude and significance of the effect of the interaction term on the one-week premium noticeably rise from -8.161 to -13.661. Column (4) adds acquirer and target firm characteristics but drops deal features, which does not change the inferences fundamentally. Regression (5) includes a set of fixed effects for the announcement-year, acquirer industry, and target industry, and exhibits a strong increase in the magnitude of the coefficient (-17.379) once we control for these potential sources of omitted variable bias. Furthermore, comparing regressions (4) – (5) shows that the inclusion of year, acquirer industry, and target industry fixed effects significantly increases the  $R^2$ , which suggests that these fixed effects account for a large amount of variation in the data. Columns (6) – (8) apply the full model but

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<sup>26</sup> For the one-month premium we obtain an insignificant coefficient indicating that our effect impacts only the final stages of the determination of the bid premium because the latest short interest numbers give the best estimate of the short interest at deal announcement.

<sup>27</sup> The further descriptions refer to the specification with the one-week premium.



with changing fixed-effects.<sup>28</sup> Regression (7) depicts that the inclusion of acquirer industry-year fixed effects increases the marginal effect of  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  on  $Premium_{1\ Week}$  slightly.

[Insert Table 3 about here]

## 5. Discussion and robustness tests

### *Value effects on acquirer stocks*

To analyze value effects on acquirer stocks which is caused by our premium reduction effect, we conduct both a short-term and long-term stock performance event study. In the first step, we regress the acquiring firms cumulative abnormal returns, measured one trading day before until one trading day after announcement and based on dividend adjusted day close prices,  $Acq\ CAR_{[-1,+1]}$  on our interaction term,  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  and other controls as depicted in Table 4, columns (1) – (3). Cumulative abnormal returns are calculated applying a Carhart (1997) four-factor model with parameter estimation period comprising the last twelve months before until two trading days before announcement to model normal returns. The first model includes acquirer industry-year fixed effects and consists of all variables except target characteristics and respective industry fixed effects. The coefficient on the interaction term is negative and statistically insignificant, indicating that the market does not incorporate our premium reduction effect instantaneously in acquiring firms stock prices. Regressions (4) – (6) repeat analysis (1) – (3) but replace the dependent variable with a three-day event window,  $Acq\ CAR_{[-3,+3]}$ .<sup>29</sup>

[Insert Table 4 about here]

Since we do not find an incorporation of the premium reduction effect in acquiring firms' stock prices – at least in the short run – we additionally perform a long-term event study approach to examine if any positive effects occur via this proposed channel in the near future. Given that a merger announcement significantly changes the factor loadings on risk factors that verifiably explain cross-sectional expected returns in normal return models for both the acquirer and target, we cannot rely on normal return models such as Carhart's (1997) four-factor model for performance analyses multiple months or even years after the event date because abnormal returns are likely biased, especially when changes in an event portfolio, e.g., as in calendar-time portfolio approaches, occur (Mitchell and Stafford, 2000;

<sup>28</sup> Given that the fixed effects residuals are correlated with the fixed effects predicted values (which suggests that the model is a poor candidate for random effects), we performed a classical Hausman specification test (Hausman, 1978) which always rejects the null in favor of a fixed effects model. We therefore allow for arbitrary dependence between these industry-year effects and our observed explanatory variables.

<sup>29</sup> Our results hold independently of the applied normal return model (e.g., the Fama-French (1993) three-factor model), the inclusion of ownership controls and changes in the short-term event window to  $[-5,+5]$  trading days around deal announcement.

Fama, 1998). Due to these problems of appropriate post-event risk-adjusting for long-term abnormal returns, we cannot apply short-term factor model approaches where risk adjustment is straightforward and usually less important. The proper methodology for long-term performance event studies has been widely debated in the literature, mainly because of ambiguities concerning the decision which long-run return benchmark should be used (Kothari and Warner, 2007). Early attempts have been made by Ritter (1991) who analyzed the long-run performance of IPOs. Barber and Lyon (1997) and Lyon, Barber, and Tsai (1999) propose to apply a buy-and-hold abnormal return model since it best captures investor experience and yields well-specified test statistics in a high variety of sampling situations. Savor and Lu (2009) opt for both the buy-and-hold abnormal return and calendar-time portfolio approach (*CTIME*) in their analysis, also arguing that these methods best mimic investors' actual investment experience. However, the *CTIME* approach does not fit to our purpose of analysis, namely that we do not want to evaluate if event firms in general earn abnormal returns that cannot be explained by common risk factors. Their *BHAR* results remain the same independently of the benchmark model used in the buy-and-hold abnormal return setting, i.e., independently of using a single matched firm return or an equally-weighted portfolio return of 10 matched firms as a benchmark.

We choose the single matched firm approach to mitigate concerns of varying portfolio sizes for special (large) event firms where the number of matches is relatively low. Barber and Lyon (1997) argue that this control firm approach yields well-specified test statistics because it alleviates the new listing, rebalancing, and skewness biases: the new listing bias is eliminated because both the event and matched firm must be listed in the respective investment period, the rebalancing bias is eliminated since both firms' returns are calculated without rebalancing, and the skewness bias is eliminated because both firms are equally likely to experience large positive returns. Thus, we apply the buy-and-hold abnormal return control firm approach.

The buy-and-hold abnormal return (*BHAR*) for the acquiring firm in transaction  $i$  is given by (see, e.g., Savor and Lu, 2009):

$$\begin{aligned} BHAR_{t_1, t_2}^i &= BH_{t_1, t_2}^i - BH_{t_1, t_2}^{i, match} \\ &= \prod_{t=t_1}^{t_2-1} (1 + R_{t, t+1}^i) - \prod_{t=t_1}^{t_2-1} (1 + R_{t, t+1}^{i, match}) \end{aligned}$$

whereas in our case  $BH_{t_1, t_2}^i$  is the (daily) continuously compounded buy-and-hold investment return of the acquiring firm,  $t_1$  is the day where the investment is made, i.e., going long in acquirer stock one trading day before announcement, and  $t_2$  is the number of trading days after announcement to the point of time until this stock is sold, i.e.,  $t_2 - t_1$  is the whole holding period. We calculate all single

returns on a daily basis by using respective dividend adjusted day close stock prices.  $BH_{t_1, t_2}^{i, match}$  is the long-run return benchmark and calculated in exactly the same way, except that the investment is made in a control firm matched by size, market-to-book, and industry. More specifically, we match the control firm in the following way: First, we identify all public firms with the same one-digit SIC code and market value of equity 22 trading days before offer announcement between 50% and 150% of the market value of equity of the sample acquiring firm. Second, we choose the same size restriction for control firms as we do for acquiring (event) firms, i.e., market values of equity one day before announcement ( $t_1$ ) and at the end of the holding period ( $t_2$ ) both must exceed USD 1 million. We thus avoid the case in which the control firm disappears from Capital IQ or is delisted from the stock exchange. Third, the geographic location of the headquarters of the control firm must also be situated in the U.S. Fourth, we then choose the final control (matched) firm as the firm with the market-to-book ratio 22 trading days before announcement nearest to that of the acquiring (event) firm 22 trading days before announcement to rule out any influences of takeover rumors. Firms with negative market-to-book ratios are dropped (Lyon et al., 1999). If there was no match left over, the observation is dropped from the long-term performance analysis. Moreover, given that we analyze buy-and-hold abnormal returns until twelve months after announcement, we have to drop all observations announced after the end of April 2016, which in turn explains why the sample size drops from 1,300 to approximately 1,180 observations. In contrast to Savor and Lu (2009), we do not exclude control firms that were involved in a merger bid over the previous three years since we are not interested in the fact that acquirers create value through successfully closing an M&A deal, but rather through the premium reduction effect caused by merger arbitrageurs lured by the informational advantage through short selling.

Table 5 shows the results for regressions of several buy-and-hold abnormal returns ( $BHAR$ ) on the interaction term,  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$ , and the full set of control variables. All regressions include standard errors which are adjusted for heteroskedasticity and within-cluster correlation, as well as year, acquirer industry, and target industry fixed effects to control for unobserved heterogeneity within certain industries and common year-specific shocks, thereby eliminating this source of omitted variable bias. The effect of the interaction term on short-term buy-and-hold abnormal returns (columns (1) – (3)) is positive but statistically insignificant. After four months after announcement, we obtain estimates that are positive, around ten times the magnitude compared to short-term BHARs,

and statistically significant at the five percent level (see Table 5, column (4)). This marginal effect increases in magnitude with the time buy-and-hold investment horizon until nine months after announcement, as column (6) with  $BHAR_{[-1,+189]}$  as the dependent variable represents.<sup>30</sup>

We suggest that this result is due to market inefficiency; given that the average duration between announcement date and resolution date (i.e., closed or withdrawn date as reported in Capital IQ) of the deal is roughly 80 trading days, we suggest that market participants price in positive effects of the premium reduction effect only if it becomes certain whether the acquirer has succeeded with a lower premium or avoid wealth destruction by abandoning the deal. For our short-term analyses, liquidity issues could also explain the insignificant returns because merger arbitrageurs sell acquirer stocks short and thus neutralize value creation by our effect driven by merger arbitrageurs accepting lower premiums.

Given the pervasive statistical significance of the coefficient of our interaction term across several months, we infer that the premium reduction effect, in fact, has a positive long-term effect on acquiring firms' value. We interpret this as indication that wealth is transferred from merger arbitrageurs to acquirer shareholders, because the former lose when acquirer stocks appreciate.

[Insert Table 5 about here]

#### *Acquirers' deal advisors' capital market expertise*

We expect that acquirer managers might not be aware of our suggestion that merger arbitrageurs enable acquirers to lower premiums, or – even if they know this effect – might not be comprehensively informed about current short sellers' and stock lenders' identity, structure,<sup>31</sup> and expertise to predict merger arbitrageurs' and shareholders' behavior properly. Thus, we assume that deal advisors such as investment banks<sup>32</sup> with equity market expertise might fill this void and provide missing information. We regard deal advisor's equity market expertise as high if the advisor firm belongs to the Top 8 firms in the "U.S. Equity & Equity Linked Annual League Tables" of the previous year before deal announcement as published by Bloomberg. The cut-off value of 8 is chosen following Fang (2005) and Golubov,

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<sup>30</sup> We include announcement-year fixed effects as well as acquirer industry and target industry fixed effects, based on one-digit Standard Industrial Classification (SIC) codes. The inclusion of announcement-year fixed effects is questionable given that long-term buy-and-hold abnormal returns might be driven by unobserved factors in the year subsequent to deal announcement. Anyway, we obtain similar qualitative results after excluding announcement-year fixed effects.

<sup>31</sup> In particular, lender concentration is very crucial for the determination of bid premiums to have the best measure for the value of the informational advantage through short selling shortly before the takeover deal announcement that is in the short term proprietary information of lending agents that are more likely part of deal advisory firms with a high ranking in our chosen equity league table. Some prominent examples for such firms are Goldman Sachs, J.P. Morgan, Morgan Stanley, and Bank of America Merrill Lynch.

<sup>32</sup> Bao and Edmans (2011), for instance, document better outcomes for deals with investment banks as advisors.

Petmezas, and Travlos (2012) who use the Top 8 list of M&A league tables as the top-tier, most reputable advisors whose deals' performance is examined.<sup>33</sup> Though, this equity league table is just a proxy for our notion of equity market expertise regarding short selling and lending information, because it lists investments banks which advise in IPOs and SEOs and are not directly involved as lending agents. However, we assume that investment banks that perform well with equity market advising possess more likely this kind of information we refer to, for example when they also act as lending agents.<sup>34</sup> Since acquirers might use this kind of information to lower bid premiums, we expect empirically that the relation of  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  and premiums is more pronounced if acquirers' deal advisors have a very high equity market expertise.

We retrieve all acquirers' financial advisors in the respective deal from the Capital IQ database and choose for each deal the advisor with the highest equity market expertise as ranked in the above-mentioned league table of the year preceding the deal announcement; we then define a dummy variable, *Acq Financial Advisor Top 8 Equity & Equity Linked*, that is set to 1 (Yes), if the deal advisor with the highest equity market expertise is in the Top 8, and 0 (No) otherwise. We further split our sample based on this indicator variable and find that the coefficient on  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  for all premiums is only statistically significant for the subsample with advisors that have a high equity market expertise (see Table 6, columns (2), (4), and (6)). This supports our hypothesis that our premium reduction effect is more pronounced for better advised acquirers. In addition, the insignificant results from the low expertise advisor subsample indicates that the choice of high expertise advisors pays might be crucial in the process of determining premiums. To conclude, such findings might give some explanation to Dessaint, Eckbo, and Golubov (2019) who find a positive time effect in acquirer stock returns likely linked to deal advice: Through their proprietary knowledge of the premium reduction effect they might add value to their advice and thus their acquirer clients.

[Insert Table 6 about here]

#### *Indication of short sellers becoming merger arbitrageurs*

Since we cannot directly observe if short sellers become merger arbitrageurs as we assume in this paper, we explore how short sellers and their informational advantage might be correlated with post-announcement target stock reactions. As a measure for post-announcement target stock reactions, we choose the so called arbitrage spread, *Arbitrage Spread*<sub>2 Day</sub> (e.g., Mitchell and Pulvino, 2001; Jindra and Walkling, 2004; and Liu and Wu, 2014), that we define as the ratio between the difference of the

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<sup>33</sup> Since the number 8 as the cut-off value looks arbitrarily chosen, we also take the Top 10 list (although also arbitrary) and get the same qualitative results.

<sup>34</sup> Due to Chinese walls, we cannot expect direct information transfer but we expect that some legal information spillover effects as it is suggested by some literature (e.g., Griffin, Shu, and Topaloglu, 2012).

offer price per share on the announcement date and the last sale price of the target's stock on the second trading day after bid announcement, and the offer price per share on announcement, expressed in percentage terms:

$$ArbitrageSpread_{2\text{ Day}} = \frac{OfferPrice\ per\ Target\ Share_t - Last\ Sale\ Price\ Target\ Share_{t+2}}{OfferPrice\ per\ Target\ Share_t}$$

Mitchell and Pulvino (2001) state that it conveys information about the likelihood of takeover completion. Jindra and Walkling (2004) see a relation of it with the length of the takeover attempt and the size of the final premium.

[Insert Table 7 about here]

As we argue above, short sellers as merger arbitrageurs accept a low premium  $p_{low}$  due to their informational advantage whereas incumbent target shareholders would only tender at a high premium  $p_{high}$ . Hence, merger arbitrageurs must pay a higher price than  $p_{low}$  to target shareholders to acquire their stocks on the market after announcement. Consequently, we expect that target stock prices are closer to the premium reflected by tighter arbitrage spreads the more merger arbitrageurs (acquirers' short interest) with more valuable informational advantage (acquirers' concentration of institutional ownership) exist. Our results (exhibited in Table 7, column (1) – (4)) show that the relation is negative and statistically significant at the five percent level.<sup>35</sup> This supports our reasoning that merger arbitrageurs pay high prices to acquire target shares.

Since the arbitrage spread also mirrors likelihood of takeover completion and to control for deal completion as a component of the arbitrage spread, we test this relation in a Zellner (1962) seemingly unrelated regression model with dependent variables *Arbitrage Spread*<sub>2 Day</sub> and *Deal Completion*.<sup>36</sup> Our results (exhibited in Table 7, column (5) – (8)) are qualitatively the same whereas no statistically significant relation with deal completion exists. This indicates that merger arbitrageurs pay high prices to acquire target shares irrespective of deal completion.

The insignificant result regarding deal completion is not surprising because merger arbitrageurs are only able to influence target shareholders' approval<sup>37</sup> but have minor to no influence on acquirer-induced or exogenous deal failures. Even though they might be open to renegotiate deal conditions such as the premium, their main interest is that the acquirer does not change because a change would render their informational advantage worthless.

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<sup>35</sup> Contrary to our basic models, we include the one-month premium to control for all price-related deal characteristics.

<sup>36</sup> In addition to the baseline model in Table 2, we also include the one-month bid premium.

<sup>37</sup> Merger arbitrageurs can prefer to approve deals (e.g., Cornelli and Li, 2002), in particular in stock deals when they want to close out their short position through the deal-induced stock exchange (Mitchell et al., 2004).

Table 8 shows the modular regression setup analogous to Table 3 but with *Arbitrage Spread*<sub>2 Day</sub> as the dependent variable. The negative coefficient on *Acq SI*<sub>-1</sub> \* *Acq Instit Herf*<sub>-1</sub> increases and becomes statistically more significant after we include fixed effects, which can be seen by comparing column (2) with column (4) and column (3) with column (6), respectively. Once we include acquirer characteristics, the statistically significant coefficient on *Acq SI*<sub>-1</sub> for *Arbitrage Spread*<sub>2 Day</sub> disappears in all regression setups. Another interesting point is the positive coefficient on *Acq Instit Herf*<sub>-1</sub>, which is almost always significant at the 1% level. If high arbitrage spreads are interpreted as reflecting high uncertainty about takeover completion, this finding suggests that high institutional ownership concentration in acquirer firms' shares increases this uncertainty, represented by significantly larger arbitrage spreads. This finding is not surprising because a high propensity of the presence of blockholders with strong incentives to monitor acquiring firms' managers need to approve the deal proposal. A denial of a deal is less likely if no such large monitors exist, which in turn is consistent with the intervention argumentation of Aggarwal et al. (2015).

[Insert Table 8 about here]

Even though merger arbitrageurs are willing to pay higher prices for target shares than the offered premium indicates, target insider shareholders will not sell their shares to them because they are restricted from selling due to their involvement in the deal negotiation process or insider trading laws. Consequently, we expect that our premium reduction effect is less pronounced if target shareholders include high insider ownership that is greater than the median of target insider ownership in our sample denoted as *Tgt Insider Sum Median*<sub>-1</sub> = 1. We interpret this as a case of lower post-announcement liquidity of target stocks from the merger arbitrageurs' perspective. Consistently, we find that the coefficient on *Acq SI*<sub>-1</sub> \* *Acq Instit Herf*<sub>-1</sub> is only statistically significant for low target insider ownership (exhibited in Table 9, column (1), (3), and (5)). This result indicates an obstacle for short sellers to become merger arbitrageurs as investors in the target stocks if target insider ownership is high.

[Insert Table 9 about here]

#### *Variation of the value of the option to trade on the informational advantage through short selling*

Since recalls convey information about lenders' behavior privately to short sellers, the value of the option to trade on that informational advantage is likely to differ among certain types of lenders: to know if lenders which are well-informed about a firm intend to sell their stocks is more valuable than knowing that uninformed investors such as index funds or even retail investors plan to sell. If these lenders are also insiders of the firm, this value would be even higher. In the empirical literature, one very prevalent measure of sophistication of investors is their individual fraction of their ownership of the firm (e.g., Rubin, 2007; Boehmer and Kelley, 2009). The reasoning for this is that investors which

hold a high fraction of firm's stocks (i.e., blockholders) are more incentivized to monitor the firm, engage in corporate governance activities (e.g., Admati and Pfleiderer, 2009; Edmans, 2009; Shleifer and Vishny, 1986; Maug, 1998), and gather information about the firm (e.g., Holderness, 2003; Edmans, 2014; Demsetz and Lehn, 1985). Bushee and Goodman (2007) and Parrino, Sias, and Starks (2003), for instance, provide empirical evidence that larger shareholders are better informed. Accordingly, blockholders that are most likely stock lenders as described above might recall their stock to be able to sell it because they anticipate imminent stock losses.

On the contrary, if blockholders are passive investors such as an index funds, a possible stock recall by these blockholders is likely neither related to their opinion about the announced deal nor to any voting on the deal.<sup>38</sup> The reason for it is that passive investors that, e.g., just mimic indexes have no incentive to gather information about underlying stocks and thus are not able to trade them on any information. In this case, recalls triggered by them do not convey information about deal failure, hence the informational advantage through short selling is rendered worthless (i.e., has no value). Conversely, if we follow this reasoning, we expect that the effect of  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  on premiums is more pronounced if passive institutional ownership of acquirer stock is low, i.e., when active investors percentage share is high.<sup>39</sup>

We identify active and passive institutional investors of acquirer stocks according to Standard and Poor's Capital IQ database which provides information about the investment style orientation of the institutional investor.<sup>40</sup> Then, we sum up all active institutional investors' percentage share in the acquiring firm's stock one trading day before deal announcement in a variable named  $Acq\ Instit\ Sum\ Active_{-1}$ . The sample is then split into two subsets, based on a variable called  $Acq\ Instit\ Sum\ Active\ Median_{-1}$ , which is a dummy variable equal to one, if the sum is above the median of  $Acq\ Instit\ Sum\ Active_{-1}$ , and 0 otherwise.

The results are shown in Table 10. The coefficient on  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  is statistically significant at the five percent level for  $Premium_{1\ Week}$  as depicted in column (2), and significant at the one percent level for both the three- and one-day premium, shown in columns (4) and (6), respectively. If  $Acq\ Instit\ Sum\ Active_{-1}$  is below the median, i.e., for firms with low active – or conversely high passive – institutional ownership, the coefficient on  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  is statistically insignificant. Both results

<sup>38</sup> Due to this reason, passive investors are considered to be “safer” stock lenders (D’Avolio, 2002).

<sup>39</sup> Alternatively, consistent with Prado et al. (2016), passive investors restrict lending supply less severely than active investors that might also produce our stronger results for less passive ownership acquirers.

<sup>40</sup> Since institutional investors are often stockholders through a fund structure, some institutions such as Blackrock have actively and passively managed funds and we do not know the name of the directly invested fund, our classification should be seen as a likely estimate of the real investment style orientation of the fund that directly holds the acquirer stocks. A more precise classification is provided by Aggarwal et al. (2015) who, following Evans, Ferreira, and Prado (2017), identify the name of the corresponding fund via the Morningstar database and classify it as passive according to data retrieved from SEC's N-SAR filings.



indicate that with low active institutional ownership the value of the informational advantage through short selling might be too low that short sellers as merger arbitrageurs might not be attracted due to no feasible trading on such an advantage.

[Insert Table 10 about here]

As an alternative driver for the value of the informational advantage through short selling, we suggest the likelihood of deal completion measured before deal announcement, i.e., before acquirer shareholders assess the deal proposal and might incorporate their information in acquirer and target stock prices. Our intuition for this is that merger arbitrageurs might profit from private signals of deal failure more often and thus rendering the expected value of such informational advantage higher when deal completion is not very certain. Since an acquirer termination fee is paid if the acquirer or exogenous events such as regulatory burdens lead to deal termination (Bates and Lemmon, 2003), we suggest that recalls as signals of imminent deal failures occur less likely if an acquirer termination fee provision, indicated by the binary variable *Acq Termination Fee Dummy*, exists. In this case, short sellers less often profit from their informational advantage. Hence, we expect that the relation of  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  and premiums is more pronounced if the deal does not include an acquirer termination fee provision. Consistently, we find only in the case of no acquirer termination fee provisions a negative and statistically significant at the 5 percent level coefficient on  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  (exhibited in Table 11, column (1), (3), and (5)).<sup>41</sup>

[Insert Table 11 about here]

### Overvaluation

Since high short interest usually signals stock price overvaluation (e.g., Diether, Lee, and Werner, 2009) and concentrated institutional ownership might even exacerbate it (Prado et al., 2016), we might measure a relation of a lower bid premium with overvaluation rather than short sellers' merger arbitrage activities.<sup>42</sup> If this were true, we would, however, expect that the coefficient on  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  would be positive rather than negative as we find. The reason for it might be that overvaluation gives acquirers financial strength that target shareholders might exploit by requiring higher bid premiums.

[Insert Table 12 about here]

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<sup>41</sup> Though, it should be taken with caution because our results may suffer from a selection bias. Bates and Lemmon (2003), for instance, report that bidder terminations fee provisions are positively correlated with stock deals. Therefore, future research should remedy this bias by applying a Heckman two-stage regression model (Heckman, 1979).

<sup>42</sup> Though, we control for overvaluation by including market-to-book ratios and one-year stock performance in our regression models.

Despite these theoretical considerations, we want to rule out that overvaluation drives our results by splitting our sample into acquirers with low market-to-book ratios one trading day prior to deal announcement and with high market-to-book ratios limited by the median of this ratio, *Acq Overvaluation Median*<sub>-1</sub>. Our results (shown in Table 12, column (1), (3), and (5)) show that only for presumably lower valued acquirers the coefficients on *Acq SI*<sub>-1</sub> \* *Acq Instit Herf*<sub>-1</sub> are statistically significant. This indicates that overvaluation does not drive our results.

#### *Insider ownership concentration*

Since insiders such as directors and executives (as Capital IQ classifies insiders in our sample) are well-informed about the true value of their firm, we also examine if there is a negative relation of acquirer insider ownership concentration<sup>43</sup> interacted with acquirer short interest with bid premiums. Then, we also find a negative coefficient on *Acq SI*<sub>-1</sub> \* *Acq Insider Herf*<sub>-1</sub>, though statistically weaker at the ten percent level (shown in Table 13, specification (1)). In addition, our premium reduction effect is greater for *Acq SI*<sub>-1</sub> \* *Acq Instit Herf*<sub>-1</sub> ( $0.187 * (-18.485) / 32.820 = -0.1053$ ) than for *Acq SI*<sub>-1</sub> \* *Acq Insider Herf*<sub>-1</sub> ( $0.094 * (-19.904) / 32.820 = -0.0570$ ) indicating that the informational advantage through short selling might be greater when institutional shareholders determine lending supply instead of insiders. This supports our preference of using *Acq Instit Herf*<sub>-1</sub> over *Acq Insider Herf*<sub>-1</sub> because we assume insider trading laws and insiders' involvement in deal negotiations prevent them from trading and thus from lending and recalling their shares strategically.

[Insert Table 13 about here]

## **6. Conclusion**

### **Summary and discussion**

Our paper introduces a novel view on the recall risk of short selling that is an informational advantage through short selling. Since short sellers can trade on it, it represents rather a “bright side” of recall risk that is in contrast to the costly “dark side” promoted in the current literature (Chuprinin and Ruf, 2017; Engelberg et al., 2017). In general, we expect that trading on this informational advantage is not very feasible: since we assume that a recall signals that lenders will likely sell their shares and put further pressure on shares, short sellers cannot trade on it because they cannot continue selling short the stock. D’Avolio (2002), however, reports that after a recall the average time to locate new stocks (i.e., find new stocks to borrow) measures 23 days. This renders short sellers’ trading on their informational advantage unprofitable because other market participants have likely learnt this information,

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<sup>43</sup> Again, measured as Hirschman-Herfindahl index of all insider owners one trading day before deal announcement.

e.g., through 13D, 13F, or 13G filings with the SEC before the former can establish new short sales. The very low lending fees of on average 40 bps according to D'Avolio (2002) and the negative relation of recall risk and lending fees found by Engelberg et al. (2017) support this argument because otherwise such informational advantage would increase lending fees.

One exception for a feasible trading strategy is a merger arbitrage trading strategy in the case of takeover attempts: short sellers buy target shares and stay short in acquirer shares. Since this trading behavior is anticipated by the acquirer and the target, we expect lower bid premiums. Consistently, we find that the higher the concentration of institutional ownership and the higher the short interest, the lower the bid premium is. Further, we find positive long-term buy-and-hold abnormal returns of acquirer stocks indicating a wealth transfer from merger arbitrageurs to acquirer shareholders. In addition, we report that the arbitrage spread is then even tighter while deal completion itself is not affected indicating that short sellers become new target shareholders subsequent to bid announcement. We also find that our premium reduction effect is more pronounced if target insider ownership is low. Further, we document that this effect is more pronounced if acquirer active institutional ownership is high indicating that active blockholders' recalls can be exploited more profitably by merger arbitrageurs. Moreover, the premium reduction effect is more pronounced if deal completion is a priori low detected by takeovers with no acquirer termination fee provision.

### **Practical relevance**

The results of our study are relevant to managers involved in mergers and acquisitions, because we document that short sellers' bets on acquirer stocks with more concentrated institutional ownership are correlated with takeover bid premiums. So, managers of possible acquirers and of possible targets should take acquirers' short interest and ownership structure into account when they negotiate or decide on bid premiums because we report that an increase of  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  by one standard deviation is associated with a decrease of the one week premium by 10.53 percent and by USD 69.264 million for the average target.

The fact that our results are more pronounced for deals involving investments banks as acquirers' deal advisors with high equity market expertise shows that deal advisors add value to the takeover deal process which might justify in part their usually high fees (e.g., McLaughlin, 1990; McLaughlin, 1992). This might also explain partially Dessaint, Eckbo, and Golubov (2019) who find a positive time effect in acquirer stock returns. Song, Wei, and Zhou (2010) find that M&A boutiques as deal advisors lead to better deal outcomes and lower premiums if they advise acquirers. Their finding is contrary to ours because M&A boutiques do not undertake equity market activities and thus likely have lower equity

market expertise.<sup>44</sup> Generally, our findings indicate that M&A league tables do not capture all information of M&A expertise of deal advisors as far as our suggested effect driven by merger arbitrageurs is concerned. This could be an explanation why studies such as Fang (2005), Hunter and Jagtiani (2003), and Ismail (2010) find that top advisors ranked according to M&A league tables are associated with adverse deal outcomes from the acquirers' perspective.<sup>45</sup>

Besides, blockholders as stock lenders can learn from our study that there might be an informational advantage in the case they recall their stocks that they should take into account when they agree on lending fees. Moreover, our notion of the informational advantage can give an alternative explanation for Prado et al. (2016) who observe a negative relation between lending supply and concentration of institutional ownership: some blockholders want to avoid giving such advantage to short sellers who can exploit it on blockholders' expense.

Furthermore, our reasoning of our study gives some advice to short sellers how to handle recall risk: in the case of mergers and acquisitions they are able to hedge the recall risk by becoming target shareholders.

### **Future research**

Our reasoning about an informational advantage through short selling provides some interesting ideas for future research.

First, it would be interesting if our results can be replicated with open interest of put options at the money as an intuitive alternative measure for negative sentiment. In this case, we do not expect the same results because put options are immune to recall risk (Engelberg et al., 2017) and therefore no such informational advantage can arise.

Second, our reasoning might provide a possible mechanism how overvalued stocks can maintain their overvaluation as measured in Savor and Lu (2009): since overvalued stocks are correlated with higher short interest (e.g., Diether et al., 2009), a manager might lock in some of the overvaluation by setting lower exchange ratios in stock deals because short sellers as merger arbitrageurs require a lower premium on the target stock to get compensated to bear this stock price risk.

Last, it should be explored if the informational advantage through short selling lures more short sellers, even uninformed and unsophisticated ones, who want to get better informed through it.

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<sup>44</sup> It should be noted that boutiques are usually founded by or consist of former investment bank employees that might have some capital market expertise. Though, they do not have access to very recent capital market data such as short interest and lender concentration that is crucial for negotiating lower premiums.

<sup>45</sup> On the contrary, studies as Golubov et al. (2012) and Kale et. al. (2003) show that top-ranked M&A advisors lead to better deal outcomes if target deal advisors have relatively lower expertise according to M&A league tables.

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TABLE 1 – SUMMARY STATISTICS

Table 1 reports summary statistics of our sample consisting of 1,304 transactions announced between January 2004 and May 2017. Indices display the point in time (i.e., trading day) relative to the transaction announcement date where the variable was measured. Cumulative abnormal returns (CAR) have been measured from one trading day before until one trading day after offer announcement and from three trading days before until three trading days after offer announcement, respectively, applying a Carhart (1997) four-factor-model to model normal returns. All variables except *Deal Completion*, Hirschman-Herfindahl indices and their interaction terms, *Transaction Value*, all deal control dummy variables, *Acq Market Cap*<sub>-1</sub>, *Acq MTB*<sub>-1</sub>, *Acq Turnover*<sub>1 Month</sub>, and *Tgt MTB*<sub>-22</sub> are reported in percentage terms.

		Summary Statistics					
Variables		Obs.	Mean	Median	Std. Dev.	Min.	Max.
Dependent Variables	Premium <sub>1 Week</sub>	1,304	32.820	28.005	34.789	-83.392	260.000
	Premium <sub>3 Day</sub>	1,304	32.298	27.372	34.255	-83.132	250.980
	Premium <sub>1 Day</sub>	1,304	30.960	25.644	33.249	-80.890	229.546
	Premium <sub>1 Month</sub>	1,304	36.278	30.426	37.440	-83.556	276.800
	Acq CAR <sub>[-1,+1]</sub>	1,294	-1.022	-0.724	6.030	-21.253	25.184
	Acq CAR <sub>[-3,+3]</sub>	1,294	-1.246	-1.091	7.199	-32.383	27.296
	Acq BHAR <sub>[-1,+21]</sub>	1,182	-1.343	-1.413	14.088	-93.553	80.763
	Acq BHAR <sub>[-1,+42]</sub>	1,182	-1.976	-2.126	17.047	-85.985	69.235
	Acq BHAR <sub>[-1,+63]</sub>	1,180	-1.838	-2.066	21.627	-117.170	232.080
	Acq BHAR <sub>[-1,+84]</sub>	1,179	-1.949	-1.944	24.321	-147.499	102.504
	Acq BHAR <sub>[-1,+126]</sub>	1,179	-1.937	-1.334	30.606	-265.464	180.125
	Acq BHAR <sub>[-1,+189]</sub>	1,174	-2.382	-2.821	40.277	-315.142	314.622
	Acq BHAR <sub>[-1,+252]</sub>	1,166	-2.667	-1.644	46.041	-433.169	369.578
	Arbitrage Spread <sub>2 Day</sub>	1,303	3.952	2.718	9.687	-34.843	35.029
	Deal Completion	1,273	0.879	1	0.326	0	1
Independent Variables	Acq SI <sub>-1</sub>	1,304	3.799	2.510	3.809	0.012	21.198
	Acq SI <sub>-1</sub> * Acq Instit Herf <sub>-1</sub>	1,304	0.092	0.036	0.187	4.67*10 <sup>-7</sup>	3.936
	Acq SI <sub>-1</sub> * Acq Insider Herf <sub>-1</sub>	1,304	0.019	1.60*10 <sup>-4</sup>	0.094	0.000	1.640
	Acq Instit Herf <sub>-1</sub>	1,304	0.026	0.016	0.064	6.90*10 <sup>-6</sup>	0.869
	Acq Instit Sum <sub>-1</sub>	1,304	49.887	49.682	21.141	0.327	99.828
	Acq Instit Sum Active <sub>-1</sub>	1,304	10.010	8.243	7.053	0.000	38.003
	Acq Insider Herf <sub>-1</sub>	1,304	0.007	5.39*10 <sup>-5</sup>	0.028	0.000	0.304
	Acq Insider Sum <sub>-1</sub>	1,304	5.713	1.474	9.815	0.000	70.897
	Tgt Instit Herf <sub>-1</sub>	1,304	0.033	0.023	0.053	8.54*10 <sup>-9</sup>	0.710
	Tgt Instit Sum <sub>-1</sub>	1,304	52.229	53.968	28.385	0.009	99.894
	Tgt Insider Herf <sub>-1</sub>	1,304	0.010	1.78*10 <sup>-4</sup>	0.039	0.000	0.425
	Tgt Insider Sum <sub>-1</sub>	1,304	7.559	2.609	11.734	0.000	75.819
	Transaction Value [USD bn]	1,304	3.086	0.401	9.100	0.002	111.702
	Stock (% of Transaction Value)	1,304	35.807	29.068	36.982	0.000	100.000
	Acq Termination Fee Dummy	1,304	0.252	0	0.434	0	1
	Tgt Termination Fee Dummy	1,304	0.867	1	0.340	0	1
	Friendly Deal Dummy	1,304	0.989	1	0.103	0	1
	Same Industry Dummy (SIC1)	1,304	0.824	1	0.381	0	1
	Acq Market Cap <sub>-1</sub> [USD mm]	1,304	19,814.810	2,554.978	47,441.640	9.648	538,896.000
	ln Acq Market Cap <sub>-1</sub>	1,304	8.006	7.846	2.060	2.267	13.197
	Acq Vol <sub>a</sub> LTM <sub>-1</sub>	1,304	32.034	27.172	21.811	4.322	500.185
	ln Acq Vol <sub>a</sub> LTM <sub>-1</sub>	1,304	3.343	3.302	0.468	1.464	6.215
	Acq Performance LTM <sub>-1</sub> (Div. adj.)	1,304	17.722	12.107	39.460	-72.143	300.753
	Acq MTB <sub>-1</sub>	1,304	3.226	2.155	4.052	0.250	34.624

	Acq Turnover <sub>1 Month</sub>	1,304	0.008	0.006	0.006	0.000	0.036
	In Acq Turnover <sub>1 Month</sub>	1,304	0.007	0.006	0.006	1.96*10 <sup>-4</sup>	0.035
	Tgt Performance LTM <sub>-1 (Div. adj.)</sub>	1,304	18.140	10.912	61.375	-86.108	391.228
	Tgt MTB <sub>-22</sub>	1,304	2.925	1.827	4.074	0.102	33.071
Subsample dummy	Acq Financial Advisor Top 8 Equity & Equity Linked	1,003	0.565	1	0.496	0	1

(Table 1 continued)

TABLE 2 – EFFECT OF INFORMATIONAL ADVANTAGE THROUGH SHORT SELLING ON TARGET PREMIUMS

Table 2 presents the results of linear fixed effects regressions of  $Premium_{1 Week}$  on acquirer short interest one day before the announcement date,  $Acq SI_{-1}$ , and institutional ownership,  $Acq Instit Herf_{-1}$ , one day before the announcement date (1) and on the variable of interest, the interaction term  $Acq SI_{-1} * Acq Instit Herf_{-1}$  (2) as defined in Section 3. Column (3) repeats the regression in column (2) but contains target industry-year fixed effects. We repeat regression models (2) and (3) in columns (4) – (9) for different measures of the target premium. Several control variables are included in the regression: ownership controls contain Hirschman-Herfindahl indices and the sums of both institutional and insider ownership one day before offer announcement. We furthermore control for deal features as well as acquirer and target characteristics as defined in Section 3. Fixed effects are used in all specifications but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Independent Variables	Dependent Variables								
	Premium <sub>1 Week</sub>			Premium <sub>3 Day</sub>		Premium <sub>1 Day</sub>		Premium <sub>1 Month</sub>	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variable of Interest / Ownership Controls	$Acq SI_{-1} * Acq Instit Herf_{-1}$	-18.485*** (6.224)	-12.850** (6.243)	-17.961*** (6.495)	-12.441** (5.698)	-16.680** (6.378)	-12.546** (5.364)	-9.233 (10.027)	-3.154 (8.033)
	$Acq SI_{-1}$	0.152 (0.383)	0.629 (0.442)	0.247 (0.531)	0.619 (0.415)	0.231 (0.486)	0.617 (0.408)	0.291 (0.456)	0.383 (0.477)
	$Acq Instit Herf_{-1}$	6.124 (27.790)	24.932 (27.779)	16.282 (30.751)	23.552 (27.181)	13.602 (28.839)	21.702 (27.528)	13.054 (28.316)	44.510 (33.041)
	$Acq Instit Sum_{-1}$	-0.083 (0.062)	-0.051 (0.062)	-0.044 (0.064)	-0.022 (0.063)	-0.015 (0.067)	-0.002 (0.065)	0.001 (0.067)	-0.115* (0.068)
	$Acq Insider Herf_{-1}$	93.000 (63.782)	89.455 (63.908)	11.366 (63.788)	71.501 (63.229)	0.292 (63.378)	55.450 (59.043)	-5.324 (57.192)	115.026* (68.610)
	$Acq Insider Sum_{-1}$	-0.235 (0.185)	-0.216 (0.184)	-0.115 (0.207)	-0.153 (0.176)	-0.065 (0.202)	-0.112 (0.169)	-0.033 (0.190)	-0.201 (0.185)
	$Tgt Instit Herf_{-1}$	10.081 (28.139)	9.738 (27.628)	-4.110 (17.737)	18.108 (25.892)	3.463 (15.194)	17.187 (20.857)	8.406 (14.198)	-0.197 (24.647)
	$Tgt Instit Sum_{-1}$	-0.267*** (0.057)	-0.271*** (0.056)	-0.273*** (0.051)	-0.278*** (0.056)	-0.281*** (0.050)	-0.277*** (0.051)	-0.283*** (0.047)	-0.298*** (0.063)
	$Tgt Insider Herf_{-1}$	-39.435 (24.045)	-39.636 (24.090)	-12.902 (27.158)	-24.178 (25.152)	-1.176 (28.863)	-10.382 (23.462)	-0.497 (25.698)	-55.080** (25.713)
	$Tgt Insider Sum_{-1}$	-0.056 (0.109)	-0.056 (0.110)	-0.160 (0.109)	-0.086 (0.113)	-0.171 (0.117)	-0.107 (0.101)	-0.166 (0.103)	0.046 (0.113)
	Transaction Value (TV)	-0.409*** (0.140)	-0.401*** (0.139)	-0.350*** (0.125)	-0.391*** (0.137)	-0.349*** (0.126)	-0.422*** (0.142)	-0.376*** (0.131)	-0.529*** (0.192)
	Stock (% of TV)	-0.097** (0.044)	-0.094** (0.044)	-0.087** (0.044)	-0.074* (0.038)	-0.067* (0.039)	-0.077** (0.035)	-0.071* (0.036)	-0.097** (0.044)
Deal Controls	$Acq Termination Fee Dummy$	-3.831** (1.872)	-3.742** (1.875)	-5.241*** (1.893)	-4.503** (1.773)	-5.938*** (1.858)	-4.553*** (1.635)	-5.617*** (1.772)	-4.632** (2.021)
	$Tgt Termination Fee Dummy$	8.792* (4.774)	8.618* (4.770)	7.716 (4.891)	7.605* (4.460)	6.439 (4.597)	9.196** (4.308)	8.412* (4.399)	9.050 (5.805)
	Friendly Deal Dummy	-20.027* (10.714)	-19.189* (10.671)	-19.353* (10.856)	-21.088* (11.124)	-21.243* (11.365)	-21.864** (10.824)	-22.648** (11.029)	-11.613 (8.541)
	Same Industry Dummy (SIC1)	3.796 (2.767)	3.616 (2.762)	5.565** (2.310)	4.372* (2.570)	5.129** (2.187)	4.804** (2.409)	5.232* (2.144)	5.783*** (2.754)



TABLE 3 – EFFECT OF INFORMATIONAL ADVANTAGE THROUGH SHORT SELLING ON ONE-WEEK TARGET PREMIUM

This table presents the results of linear (fixed effects) regressions of  $Premium_{1\text{ Week}}$  on the variable of interest, the interaction term  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  (1) as defined in Section 3. Column (2) repeats the regression in column (1) but additionally includes Hirschman-Herfindahl indices and the sums of both institutional and insider ownership of the acquiring and target firm one day before offer announcement. Deal controls and acquirer industry and target industry fixed effects are added in column (3). Columns (4) and (5) include acquirer firm and target firm characteristics but no deal controls. Column (6) represents the full regression model with year, acquirer industry, and target industry fixed effects. The last two regressions (7) and (8) control for acquirer industry-year fixed effects and target industry-year fixed effects, respectively. Fixed effects are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Independent Variables		Dependent Variable							
		Premium <sub>1 Week</sub>							
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable of Interest / Ownership Controls	Acq SI <sub>-1</sub> * Acq Instit Herf <sub>-1</sub>	-8.812** (4.423)	-8.161** (4.099)	-13.661*** (4.343)	-11.158*** (4.163)	-17.379*** (4.595)	-15.460*** (4.433)	-18.485*** (6.224)	-12.850** (6.243)
	Acq SI <sub>-1</sub>	0.402 (0.327)	0.524 (0.325)	0.628* (0.322)	0.636 (0.429)	0.841* (0.449)	0.738* (0.442)	0.629 (0.442)	0.247 (0.531)
	Acq Instit Herf <sub>-1</sub>	-21.429*** (6.262)	-17.303*** (6.666)	11.855 (14.661)	-15.908* (9.436)	20.799 (18.020)	18.967 (17.742)	24.932 (27.779)	16.282 (30.751)
	Acq Instit Sum <sub>-1</sub>		-0.024 (0.052)	-0.036 (0.053)	-0.009 (0.051)	-0.100 (0.066)	-0.106 (0.066)	-0.051 (0.062)	-0.044 (0.064)
	Acq Insider Herf <sub>-1</sub>		181.495*** (62.022)	99.027 (64.512)	147.669** (60.614)	111.115* (63.465)	109.754* (66.480)	89.455 (63.908)	11.366 (63.788)
	Acq Insider Sum <sub>-1</sub>		-0.449** (0.177)	-0.196 (0.180)	-0.370** (0.171)	-0.319* (0.185)	-0.291 (0.183)	-0.216 (0.184)	-0.115 (0.207)
	Tgt Instit Herf <sub>-1</sub>		3.999 (30.546)	3.812 (29.643)	11.162 (29.176)	7.097 (28.668)	7.130 (27.218)	9.738 (27.628)	-4.110 (17.737)
	Tgt Instit Sum <sub>-1</sub>		-0.115** (0.047)	-0.193*** (0.045)	-0.169*** (0.050)	-0.210*** (0.049)	-0.250*** (0.049)	-0.271*** (0.056)	-0.273*** (0.051)
	Tgt Insider Herf <sub>-1</sub>		-54.627* (28.189)	-71.701** (30.282)	-68.665** (28.690)	-66.502** (30.540)	-45.851 (30.417)	-39.636 (24.090)	-12.902 (27.158)
	Tgt Insider Sum <sub>-1</sub>		0.170 (0.123)	0.137 (0.127)	0.214* (0.126)	0.099 (0.131)	-0.006 (0.132)	-0.056 (0.110)	-0.160 (0.109)
Deal Controls	Transaction Value (TV)			-0.136 (0.090)			-0.239** (0.113)	-0.401*** (0.139)	-0.350*** (0.125)
	Stock (% of TV)			-0.115*** (0.034)			-0.105*** (0.035)	-0.094** (0.044)	-0.087** (0.044)
	Acq Termination Fee Dummy			-2.852 (1.951)			-2.911 (2.022)	-3.742** (1.875)	-5.241*** (1.893)
	Tgt Termination Fee Dummy			7.151* (3.858)			9.064** (4.083)	8.618* (4.770)	7.716 (4.891)
	Friendly Deal Dummy			-13.114 (9.933)			-17.706 (10.794)	-19.189* (10.671)	-19.353* (10.856)
	Same Industry Dummy (SIC1)			3.274 (2.719)			3.743 (2.605)	3.616 (2.762)	5.565** (2.310)

Acquirer / Target Controls	In Acq Market Cap <sub>-1</sub>			2.639*** (0.654)	1.908*** (0.706)	1.989*** (0.771)	1.910*** (0.696)	1.708** (0.743)
	In AcqVola LTM <sub>-1</sub>			11.446*** (2.833)	3.396 (3.793)	5.908 (3.830)	4.399 (3.838)	4.991 (4.305)
	Acq Performance LTM <sub>-1</sub> (Div. adj.)			-0.002 (0.031)	0.014 (0.031)	0.023 (0.030)	0.007 (0.033)	0.008 (0.039)
	Acq MTB <sub>-1</sub>			-0.140 (0.208)	-0.079 (0.183)	-0.129 (0.191)	0.002 (0.187)	0.007 (0.224)
	In Acq Turnover <sub>1 Month</sub>			-251.881 (267.961)	-280.042 (285.122)	-276.542 (280.171)	-229.526 (248.750)	-64.903 (281.176)
	Tgt Performance LTM <sub>-1</sub> (Div. adj.)			-0.054*** (0.018)	-0.061*** (0.019)	-0.065*** (0.018)	-0.070*** (0.018)	-0.076*** (0.020)
	Tgt MTB <sub>-22</sub>			-0.320 (0.243)	-0.512** (0.255)	-0.471* (0.251)	-0.400 (0.261)	-0.398 (0.291)
	Constant	32.655*** (1.487)	39.648*** (3.538)	48.652*** (11.476)	-14.214 (11.401)	9.752 (18.264)	15.791 (20.726)	14.673 (19.015)
Year FE	No	No	No	No	Yes	Yes	No	No
Acq Industry FE	No	No	Yes	No	Yes	Yes	No	No
Tgt Industry FE	No	No	Yes	No	Yes	Yes	Yes	No
Acq Industry x Year FE	No	No	No	No	No	No	Yes	Yes
Tgt Industry x Year FE	No	No	No	No	No	No	No	Yes
N	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,304
Adjusted R <sup>2</sup>	0.002	0.013	0.073	0.039	0.101	0.120	0.083	0.126

(Table 3 continued)

TABLE 4 – SHORT-TERM VALUE EFFECTS

Table 4 depicts linear (fixed effects) regressions of acquirer cumulative abnormal returns (CAR) on the variable of interest, the interaction term  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  (1) and other controls as defined in Section 3, including acquirer industry-year fixed effects. Cumulative abnormal returns are calculated applying a Carhart (1997) four-factor model to model normal returns. Columns (2) and (3) additionally contain target firm characteristics and industry fixed effects. All regressions contain ownership controls and deal features as well as the one month target share price premium,  $Premium_{1\ Month}$ . The dependent variable in columns (1) – (3) is the acquiring firms cumulative abnormal return, measured one trading day before until one trading day after announcement,  $Acq\ CAR_{[-1,+1]}$ . Columns (4) – (6) repeat regressions (1) – (3) whereas the dependent variable,  $Acq\ CAR_{[-3,+3]}$ , is the acquiring firms cumulative abnormal return from three trading days before until three trading days after announcement. The results are robust whether or not we include ownership controls, apply a Fama-French (1993) three-factor model to model normal returns, and/or change the short-term event window to  $[-5,+5]$  trading days around offer announcement. Fixed effects are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Independent Variables	Dependent Variables					
	Acq CAR $[-1,+1]$			Acq CAR $[-3,+3]$		
	(1)	(2)	(3)	(4)	(5)	(6)
Variable of Interest / Ownership Controls	$Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$	-1.405 (1.213)	-0.800 (1.243)	-2.361 (1.621)		-1.925 (1.722)
	$Acq\ SI_{-1}$	-0.018 (0.089)	-0.047 (0.072)	0.061 (0.107)	0.000 (0.084)	0.049 (0.105)
	$Acq\ Instit\ Herf_{-1}$	0.935 (3.483)	-0.498 (3.119)	0.313 (3.401)	2.904 (5.362)	0.565 (4.916)
	$Acq\ Instit\ Sum_{-1}$	0.010 (0.011)	0.004 (0.011)	0.006 (0.011)	0.002 (0.014)	-0.005 (0.015)
	$Acq\ Insider\ Herf_{-1}$	-16.993 (13.072)	-15.674 (13.080)	-15.822 (13.113)	-17.839 (14.096)	-17.018 (13.074)
	$Acq\ Insider\ Sum_{-1}$	0.052 (0.036)	0.052 (0.035)	0.053 (0.035)	0.028 (0.040)	0.029 (0.039)
	$Tgt\ Instit\ Herf_{-1}$	2.083 (5.301)	1.813 (5.159)	1.796 (5.164)	3.031 (5.797)	2.783 (5.874)
	$Tgt\ Instit\ Sum_{-1}$	-0.000 (0.008)	-0.000 (0.008)	-0.000 (0.008)	-0.010 (0.010)	-0.010 (0.010)
	$Tgt\ Insider\ Herf_{-1}$	4.924 (5.908)	4.083 (6.144)	4.075 (6.148)	9.610 (8.407)	10.355 (8.386)
	$Tgt\ Insider\ Sum_{-1}$	0.005 (0.019)	0.002 (0.019)	0.002 (0.019)	0.004 (0.022)	-0.002 (0.022)
	$Premium_{1\ Month}$	-0.011** (0.005)	-0.012** (0.005)	-0.012** (0.005)	-0.021** (0.010)	-0.023** (0.010)
	Transaction Value (TV)	-0.079*** (0.015)	-0.078*** (0.014)	-0.078*** (0.014)	-0.074*** (0.020)	-0.073*** (0.021)
Deal Controls	Stock (% of TV)	-0.039*** (0.006)	-0.039*** (0.006)	-0.039*** (0.006)	-0.035*** (0.008)	-0.035*** (0.008)
	Acq Termination Fee Dummy	0.047 (0.390)	0.171 (0.400)	0.175 (0.401)	-0.079 (0.451)	0.051 (0.459)
	Tgt Termination Fee Dummy	-0.737 (0.447)	-0.902** (0.455)	-0.909** (0.457)	-1.115 (0.809)	-1.170 (0.822)
	Friendly Deal Dummy	0.836 (1.535)	0.984 (1.452)	1.019 (1.450)	0.566 (1.480)	0.607 (1.405)
	Same Industry Dummy (SIC1)	0.239 (0.492)	0.085 (0.535)	0.077 (0.533)	-0.279 (0.547)	-0.307 (0.625)
Acquirer / Target Controls	$\ln\ Acq\ Market\ Cap_{-1}$	0.065 (0.125)	0.114 (0.126)	0.114 (0.126)	0.085 (0.131)	0.158 (0.139)
	$\ln\ AcqVola\ LTM_{-1}$	-0.694 (0.799)	-0.531 (0.770)	-0.522 (0.772)	-0.901 (0.918)	-0.682 (0.927)
	$Acq\ Performance\ LTM_{-1}\ (Div.\ adj.)$	-0.006 (0.006)	-0.010* (0.006)	-0.010 (0.006)	0.001 (0.009)	-0.003 (0.010)
	$Acq\ MTB_{-1}$	0.056 (0.063)	0.074 (0.062)	0.074 (0.062)	0.033 (0.072)	0.053 (0.070)
	$\ln\ Acq\ Turnover_{1\ Month}$	-16.218 (42.034)	-23.401 (43.186)	-23.331 (43.176)	-103.851* (56.798)	-105.989* (56.402)
	$Tgt\ Performance\ LTM_{-1}\ (Div.\ adj.)$		0.010*** (0.003)	0.010*** (0.003)	0.011** (0.004)	0.010** (0.004)
	$Tgt\ MTB_{-22}$		-0.117*** (0.039)	-0.117*** (0.039)	-0.178*** (0.057)	-0.178*** (0.056)
	Constant	1.817 (3.917)	1.848 (4.370)	1.705 (4.414)	4.720 (3.934)	4.230 (4.448)
Acq Industry x Year FE		Yes	Yes	Yes	Yes	Yes
Tgt Industry FE		No	Yes	Yes	No	Yes



N	1,294	1,294	1,294	1,294	1,294	1,294
Adjusted R <sup>2</sup>	0.065	0.079	0.078	0.052	0.062	0.063

(Table 4 continued)

TABLE 5 – LONG-TERM VALUE EFFECTS

This table depicts linear fixed effects regressions of acquirer buy-and-hold abnormal returns (*BHAR*) on the variable of interest, the interaction term  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  and other controls as defined in Section 3. Buy-and-hold abnormal returns are calculated using a matched-firm approach whereas the corresponding firm is matched on factors explaining abnormal returns, i.e., size, market-to-book, and industry. All regressions contain all control variables as well as year, acquirer industry, and target industry fixed effects. The dependent variable in column (1) is the acquiring firm one month buy-and-hold abnormal return,  $Acq\ BHAR_{[-1,+21]}$ , measured one trading day before until one trading month (21 trading days) after announcement. Columns (2) – (7) repeat regression (1) whereas the dependent variable is now the two-month (2), three month (3), four month (4), six month (5), nine month (6), and twelve month (7) buy-and-hold abnormal return. The results are robust to changes in the point in time when the buy-and-hold strategy was formed. Fixed effects are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

		Dependent Variables						
		Acq BHAR <sub>[-1,+21]</sub>	Acq BHAR <sub>[-1,+42]</sub>	Acq BHAR <sub>[-1,+63]</sub>	Acq BHAR <sub>[-1,+84]</sub>	Acq BHAR <sub>[-1,+126]</sub>	Acq BHAR <sub>[-1,+189]</sub>	Acq BHAR <sub>[-1,+252]</sub>
Independent Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Variable of Interest / Ownership Controls	Acq SI <sub>-1</sub> * Acq Instit Herf <sub>-1</sub>	2.200 (3.740)	1.946 (4.437)	1.203 (5.160)	13.153** (5.825)	18.968** (9.497)	25.789** (11.960)	23.505* (13.585)
	Acq SI <sub>-1</sub>	-0.160 (0.220)	-0.208 (0.235)	-0.061 (0.265)	-0.250 (0.305)	-0.566 (0.382)	-1.223** (0.535)	-1.717*** (0.605)
	Acq Instit Herf <sub>-1</sub>	-3.449 (9.651)	-4.572 (7.112)	-16.868* (9.192)	-30.843** (14.714)	-45.812*** (15.370)	-63.646*** (21.475)	-67.410*** (24.210)
	Acq Instit Sum <sub>-1</sub>	0.024 (0.030)	-0.022 (0.037)	-0.009 (0.046)	0.012 (0.053)	0.033 (0.071)	0.075 (0.093)	0.090 (0.096)
	Acq Insider Herf <sub>-1</sub>	18.109 (39.388)	18.703 (44.008)	25.190 (52.664)	57.109 (59.354)	71.240 (111.832)	16.828 (96.051)	19.298 (91.263)
	Acq Insider Sum <sub>-1</sub>	-0.092 (0.092)	-0.151 (0.110)	-0.167 (0.134)	-0.121 (0.153)	-0.081 (0.235)	-0.057 (0.252)	-0.083 (0.275)
	Tgt Instit Herf <sub>-1</sub>	16.704* (9.404)	19.473 (12.049)	15.526 (15.335)	28.580 (22.793)	22.283 (24.587)	-4.660 (31.298)	-7.264 (27.969)
	Tgt Instit Sum <sub>-1</sub>	-0.026 (0.020)	-0.030 (0.024)	-0.053* (0.028)	-0.041 (0.034)	0.003 (0.043)	0.112* (0.067)	0.131* (0.073)
	Tgt Insider Herf <sub>-1</sub>	12.038 (15.948)	22.658 (18.067)	26.800 (22.320)	44.625* (27.041)	37.322 (31.430)	72.476 (45.918)	136.053*** (51.138)
	Tgt Insider Sum <sub>-1</sub>	0.006 (0.056)	-0.029 (0.068)	-0.089 (0.090)	-0.118 (0.105)	-0.083 (0.131)	-0.156 (0.189)	-0.349 (0.212)
Deal Controls	Premium <sub>1 Month</sub>	-0.016 (0.018)	-0.010 (0.017)	-0.012 (0.019)	-0.016 (0.020)	-0.002 (0.027)	0.013 (0.034)	0.069 (0.044)
	Transaction Value (TV)	-0.055 (0.043)	-0.118** (0.056)	-0.158** (0.067)	-0.123 (0.076)	-0.060 (0.104)	0.045 (0.149)	0.196 (0.157)
	Stock (% of TV)	-0.057*** (0.017)	-0.046** (0.020)	-0.033 (0.028)	-0.059* (0.030)	-0.098** (0.038)	-0.104** (0.052)	-0.144** (0.059)
	Acq Termination Fee Dummy	0.758 (1.114)	1.771 (1.306)	3.528** (1.709)	3.015* (1.831)	3.291 (2.315)	2.946 (2.939)	3.667 (3.590)
	Tgt Termination Fee Dummy	-0.860 (1.498)	-1.591 (1.797)	-0.735 (2.070)	0.417 (2.558)	0.057 (3.311)	-0.751 (4.811)	-2.900 (5.625)
	Friendly Deal Dummy	-5.490* (3.135)	-2.591 (4.612)	-5.245 (6.449)	-7.253 (8.117)	-1.705 (9.901)	0.209 (9.792)	-0.300 (10.562)

Acquirer / Target Controls	Same Industry Dummy (SIC1)	3.858** (1.535)	2.982* (1.671)	1.659 (1.944)	1.518 (2.501)	5.459 (3.390)	4.523 (3.967)	4.148 (4.749)
	In Acq Market Cap <sub>-1</sub>	-0.281 (0.307)	-0.542 (0.366)	-0.750 (0.495)	-0.973* (0.582)	-1.190* (0.709)	-1.713 (1.045)	-2.759** (1.146)
	In AcqVola LTM <sub>-1</sub>	-2.123 (1.742)	-3.065* (1.772)	-4.224* (2.258)	-6.561** (2.884)	-6.004 (4.004)	-2.452 (5.141)	-0.863 (5.482)
	Acq Performance LTM <sub>-1</sub> (Div. adj.)	0.015 (0.017)	0.028* (0.017)	0.025 (0.021)	0.048** (0.023)	-0.016 (0.035)	0.003 (0.042)	-0.031 (0.049)
	Acq MTB <sub>-1</sub>	0.083 (0.156)	0.315* (0.171)	0.309 (0.212)	0.387* (0.231)	0.363 (0.369)	0.376 (0.419)	0.450 (0.417)
	In Acq Turnover <sub>1</sub> Month	23.941 (140.774)	127.731 (138.736)	93.716 (159.645)	106.520 (192.176)	168.281 (228.395)	10.605 (305.918)	163.725 (354.228)
	Tgt Performance LTM <sub>-1</sub> (Div. adj.)	0.010 (0.008)	0.017** (0.009)	0.003 (0.012)	0.008 (0.014)	0.017 (0.017)	0.003 (0.021)	0.016 (0.025)
	Tgt MTB <sub>-22</sub>	-0.131 (0.101)	-0.026 (0.135)	0.144 (0.156)	0.151 (0.194)	-0.133 (0.285)	0.066 (0.290)	-0.206 (0.298)
	Constant	6.432 (8.658)	5.468 (10.016)	16.684 (12.748)	27.047* (16.082)	20.344 (19.875)	0.022 (23.580)	7.592 (24.248)
	Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Acq Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	N	1,182	1,182	1,180	1,179	1,179	1,174	1,166
	Adjusted R <sup>2</sup>	0.041	0.031	0.013	0.018	0.021	0.016	0.022

(Table 5 continued)

TABLE 6 – EFFECT OF INFORMATIONAL ADVANTAGE THROUGH SHORT SELLING ON TARGET PREMIUMS: PRESENCE OF A TOP 8 LEAGUE TABLE FINANCIAL ADVISOR

This table presents the results of linear fixed effects regressions of  $Premium_{1\text{ Week}}$ ,  $Premium_{3\text{ Day}}$ , and  $Premium_{1\text{ Day}}$  on the variable of interest, the interaction term  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  as defined in Section 3. Columns (2), (4), and (6) show the results for deals where at least one financial advisor for the acquiring firm was listed in the Top 8 U.S. league table “Equity & Equity Linked” as reported by Bloomberg one year prior to the year of deal announcement (*Acq Financial Advisor Top 8 Equity & Equity Linked* = Yes); columns (1), (3), and (5) show the results if no such advisor was listed in the corresponding league table (*Acq Financial Advisor Top 8 Equity & Equity Linked* = No), respectively. Several control variables are included in the regression: ownership controls contain Hirschman-Herfindahl indices and the sums of both institutional and insider ownership of the acquiring and target firm one day before offer announcement. We furthermore control for deal features as well as acquirer and target characteristics as defined in Section 3. All regressions contain acquirer industry-year and target industry fixed effects. Fixed effects are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

<i>Acq Financial Advisor Top 8 Equity &amp; Equity Linked</i>		Dependent Variables					
		Premium <sub>1 Week</sub>		Premium <sub>3 Day</sub>		Premium <sub>1 Day</sub>	
		No	Yes	No	Yes	No	Yes
		(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables		(1)	(2)	(3)	(4)	(5)	(6)
Variable of Interest / Ownership Controls	Acq SI <sub>-1</sub> * Acq Instit Herf <sub>-1</sub>	2.505 (28.112)	-19.965** (9.297)	6.795 (24.975)	-21.935** (9.310)	7.843 (21.748)	-22.943** (9.409)
	Acq SI <sub>-1</sub>	0.572 (0.746)	0.373 (0.606)	0.632 (0.675)	0.317 (0.637)	0.446 (0.601)	0.373 (0.635)
	Acq Instit Herf <sub>-1</sub>	-20.981 (38.339)	104.391*** (31.249)	-25.064 (38.650)	102.903*** (32.975)	-31.320 (36.339)	99.451*** (34.025)
	Acq Instit Sum <sub>-1</sub>	0.046 (0.114)	-0.210** (0.106)	0.068 (0.111)	-0.183* (0.102)	0.073 (0.108)	-0.165 (0.102)
	Acq Insider Herf <sub>-1</sub>	-127.253 (108.085)	181.277** (79.073)	-186.511* (102.805)	162.246** (80.773)	-182.185* (97.103)	129.719 (84.151)
	Acq Insider Sum <sub>-1</sub>	0.328 (0.285)	-0.485* (0.279)	0.412 (0.274)	-0.428 (0.294)	0.376 (0.250)	-0.291 (0.313)
	Tgt Instit Herf <sub>-1</sub>	61.367** (23.615)	-17.758 (37.300)	57.028** (22.873)	-9.301 (32.120)	61.381*** (21.872)	0.241 (34.536)
	Tgt Instit Sum <sub>-1</sub>	-0.408*** (0.115)	-0.053 (0.078)	-0.407*** (0.112)	-0.064 (0.075)	-0.394*** (0.101)	-0.091 (0.079)
	Tgt Insider Herf <sub>-1</sub>	55.840 (60.269)	-194.281*** (52.531)	96.344 (59.389)	-184.360*** (53.076)	74.917 (51.729)	-162.638*** (54.452)
	Tgt Insider Sum <sub>-1</sub>	-0.447* (0.262)	0.635*** (0.224)	-0.547** (0.265)	0.631*** (0.218)	-0.479** (0.231)	0.569** (0.222)
Deal Controls	Transaction Value (TV)	-1.255* (0.643)	-0.283* (0.161)	-1.208** (0.569)	-0.276* (0.157)	-1.323** (0.641)	-0.319* (0.164)
	Stock (% of TV)	-0.076 (0.082)	-0.123** (0.051)	-0.065 (0.079)	-0.084 (0.051)	-0.065 (0.070)	-0.085 (0.055)
	Acq Termination Fee Dummy	-7.683*** (2.780)	-4.812* (2.640)	-7.866*** (2.612)	-5.710** (2.694)	-7.627*** (2.420)	-4.783 (2.919)
	Tgt Termination Fee Dummy	-0.076 (10.097)	9.534 (6.324)	1.730 (9.749)	6.096 (6.736)	5.512 (8.988)	4.575 (6.786)

Acquirer / Target Controls	Friendly Deal Dummy	-24.268*** (6.739)	-16.821 (17.843)	-20.088*** (6.213)	-21.024 (18.205)	-15.871*** (5.932)	-19.995 (17.470)
	Same Industry Dummy (SIC1)	10.987 (6.670)	3.101 (3.879)	12.880** (6.129)	3.794 (3.568)	12.099* (6.124)	3.311 (3.717)
	In Acq Market Cap <sub>-1</sub>	4.598*** (1.423)	0.791 (1.289)	4.917*** (1.365)	0.992 (1.441)	4.929*** (1.314)	0.639 (1.473)
	In AcqVola LTM <sub>-1</sub>	8.592 (7.798)	-2.560 (4.570)	8.675 (7.348)	-0.322 (4.774)	8.816 (7.169)	-3.569 (5.218)
	Acq Performance LTM <sub>-1</sub> (Div. adj.)	0.004 (0.079)	0.074** (0.037)	0.049 (0.073)	0.062 (0.039)	0.048 (0.071)	0.064 (0.044)
	Acq MTB <sub>-1</sub>	0.740 (0.669)	-0.243 (0.224)	0.424 (0.534)	-0.204 (0.231)	0.553 (0.540)	-0.116 (0.221)
	In Acq Turnover <sub>1 Month</sub>	-1,231.394*** (325.551)	-38.182 (328.553)	-1,246.216*** (285.179)	55.747 (398.168)	-1,098.690*** (258.372)	109.280 (389.901)
	Tgt Performance LTM <sub>-1</sub> (Div. adj.)	-0.146*** (0.051)	-0.074** (0.034)	-0.153*** (0.051)	-0.072** (0.035)	-0.158*** (0.053)	-0.065** (0.032)
	Tgt MTB <sub>-22</sub>	-1.813** (0.907)	-0.108 (0.251)	-1.647** (0.741)	0.017 (0.243)	-1.478** (0.661)	-0.008 (0.236)
	Constant	9.157 (34.532)	45.296* (27.173)	-8.626 (33.902)	39.770 (29.260)	-14.971 (35.725)	46.220 (29.220)
	Acq Industry x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
	Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
	N	436	567	436	567	436	567
	Adjusted R <sup>2</sup>	0.147	0.111	0.154	0.091	0.166	0.086

(Table 6 continued)

TABLE 7 – POST-ANNOUNCEMENT TARGET STOCK REACTIONS

Table 7 presents the results of linear fixed effects regression models without and with interaction term regressing *Arbitrage Spread*<sub>2 Day</sub> on acquirer short interest one day before the announcement date, *Acq SI*<sub>-1</sub>, and institutional ownership, *Acq Instit Herf*<sub>-1</sub>, one day before the announcement date ((1) and (3)) and on the variable of interest, the interaction term *Acq SI*<sub>-1</sub> \* *Acq Instit Herf*<sub>-1</sub> ((2) and (4)) as defined in Section 3. Columns (5) – (8) show the results of seemingly unrelated regressions (Zellner, 1962) of both *Arbitrage Spread*<sub>2 Day</sub> and *Deal Completion* on the variable of interest, the interaction term *Acq SI*<sub>-1</sub> \* *Acq Instit Herf*<sub>-1</sub> and the same set of control variables: ownership controls contain Hirschman-Herfindahl indices and the sums of both institutional and insider ownership one day before offer announcement. We furthermore control for deal features as well as acquirer and target characteristics as defined in Section 3. Fixed effects are unreported. Standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation in columns (1) – (4). \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Independent Variables		Dependent Variables							
		Arbitrage Spread <sub>2 Day</sub>				Arbitrage Spread <sub>2 Day</sub>	Deal Completion	Arbitrage Spread <sub>2 Day</sub>	Deal Completion
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variable of Interest / Ownership Controls	Acq SI <sub>-1</sub> * Acq Instit Herf <sub>-1</sub>		-3.709** (1.875)		-3.437** (1.699)	-3.612* (2.030)	-0.014 (0.063)	-3.466* (2.027)	-0.022 (0.062)
	Acq SI <sub>-1</sub>	-0.040 (0.102)	0.056 (0.116)	-0.038 (0.120)	0.052 (0.133)	0.044 (0.094)	-0.001 (0.003)	0.038 (0.095)	-0.000 (0.003)
	Acq Instit Herf <sub>-1</sub>	15.110* (8.865)	18.896* (9.772)	12.190* (7.148)	16.152** (8.116)	18.579*** (5.228)	0.242 (0.162)	16.185*** (5.473)	0.259 (0.169)
	Acq Instit Sum <sub>-1</sub>	0.010 (0.019)	0.016 (0.018)	0.007 (0.018)	0.013 (0.018)	0.018 (0.016)	-0.001** (0.000)	0.014 (0.016)	-0.001** (0.000)
	Acq Insider Herf <sub>-1</sub>	5.136 (15.984)	4.469 (16.091)	2.247 (17.708)	1.518 (17.758)	4.279 (15.069)	-0.864* (0.466)	1.991 (15.427)	-0.872* (0.475)
	Acq Insider Sum <sub>-1</sub>	0.047 (0.050)	0.050 (0.050)	0.043 (0.054)	0.048 (0.054)	0.051 (0.046)	0.002 (0.001)	0.047 (0.046)	0.002 (0.001)
	Tgt Instit Herf <sub>-1</sub>	-9.142* (5.361)	-9.212* (5.301)	-8.402* (4.979)	-8.379* (4.976)	-8.978* (4.848)	0.193 (0.150)	-8.500* (5.078)	0.333** (0.157)
	Tgt Instit Sum <sub>-1</sub>	0.009 (0.013)	0.008 (0.013)	0.009 (0.014)	0.008 (0.014)	0.007 (0.011)	-0.001*** (0.000)	0.007 (0.011)	-0.001*** (0.000)
	Tgt Insider Herf <sub>-1</sub>	8.358 (5.588)	8.298 (5.608)	11.004 (6.846)	10.640 (6.667)	8.726 (10.225)	0.071 (0.316)	11.753 (11.069)	0.030 (0.341)
	Tgt Insider Sum <sub>-1</sub>	-0.061** (0.028)	-0.061** (0.028)	-0.066** (0.028)	-0.065** (0.028)	-0.057 (0.035)	-0.001 (0.001)	-0.065* (0.036)	-0.001 (0.001)
Deal Controls	Premium <sub>1 Month</sub>	0.106*** (0.012)	0.105*** (0.012)	0.106*** (0.013)	0.105*** (0.013)	0.105*** (0.007)	0.001*** (0.000)	0.105*** (0.007)	0.001*** (0.000)
	Transaction Value (TV)	0.104** (0.049)	0.106** (0.049)	0.101** (0.049)	0.103** (0.050)	0.099*** (0.037)	-0.006*** (0.001)	0.096*** (0.036)	-0.006*** (0.001)
	Stock (% of TV)	0.048*** (0.011)	0.048*** (0.011)	0.047*** (0.011)	0.047*** (0.011)	0.049*** (0.008)	-0.000* (0.000)	0.047*** (0.008)	-0.001** (0.000)
	Acq Termination Fee Dummy	1.417** (0.618)	1.433** (0.624)	1.441** (0.674)	1.444** (0.678)	1.424** (0.587)	0.012 (0.018)	1.464** (0.586)	0.018 (0.018)
	Tgt Termination Fee Dummy	-1.753 (1.551)	-1.784 (1.551)	-1.415 (1.639)	-1.423 (1.635)	-1.883** (0.765)	0.466*** (0.024)	-1.499** (0.764)	0.456*** (0.024)
	Friendly Deal Dummy	-2.347 (2.715)	-2.184 (2.675)	-2.963 (2.865)	-2.804 (2.818)	-2.127 (2.294)	0.396*** (0.071)	-2.724 (2.229)	0.405*** (0.069)

Same Industry Dummy (SIC1)		-0.550 (0.669)	-0.584 (0.659)	0.229 (0.728)	0.159 (0.710)	-0.455 (0.690)	0.029 (0.021)	0.156 (0.827)	0.020 (0.025)
Acquirer / Target Controls	In Acq Market Cap <sub>-1</sub>	-0.340* (0.194)	-0.338* (0.195)	-0.429** (0.204)	-0.426** (0.204)	-0.339* (0.181)	0.029*** (0.006)	-0.418** (0.180)	0.028*** (0.006)
	In AcqVola LTM <sub>-1</sub>	1.769** (0.847)	1.815** (0.852)	1.167 (0.743)	1.217 (0.752)	1.819** (0.828)	-0.005 (0.026)	1.196 (0.837)	-0.016 (0.026)
	Acq Performance LTM <sub>-1</sub> (Div. adj.)	-0.010 (0.008)	-0.010 (0.008)	-0.010 (0.009)	-0.010 (0.009)	-0.009 (0.007)	-0.000 (0.000)	-0.010 (0.007)	-0.000 (0.000)
	Acq MTB <sub>-1</sub>	0.033 (0.081)	0.035 (0.081)	0.019 (0.093)	0.021 (0.094)	0.021 (0.066)	-0.001 (0.002)	0.021 (0.066)	-0.000 (0.002)
	In Acq Turnover <sub>1</sub> Month	62.563 (80.231)	62.422 (80.039)	75.746 (86.158)	75.454 (85.976)	66.827 (52.565)	-0.739 (1.625)	84.155 (52.484)	-0.194 (1.618)
	Tgt Performance LTM <sub>-1</sub> (Div. adj.)	0.007 (0.005)	0.005 (0.005)	0.005 (0.005)	0.004 (0.005)	0.006 (0.005)	-0.000 (0.000)	0.004 (0.005)	-0.000 (0.000)
	Tgt MTB <sub>-22</sub>	-0.054 (0.078)	-0.054 (0.078)	-0.044 (0.084)	-0.045 (0.084)	-0.039 (0.063)	0.003 (0.002)	-0.050 (0.064)	0.004* (0.002)
	Constant	-8.612 (5.196)	-9.274* (5.159)	-0.222 (4.239)	-1.146 (4.275)	-2.292 (6.148)	0.060 (0.190)	0.217 (6.027)	0.105 (0.186)
Tgt Industry FE		Yes	Yes	No	No	Yes	Yes	No	No
Acq Industry x Year FE		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry x Year FE		No	No	Yes	Yes	No	No	Yes	Yes
N		1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303
Adjusted R <sup>2</sup>		0.221	0.222	0.233	0.234	0.347	0.445	0.396	0.489

(Table 7 continued)

TABLE 8 – POST-ANNOUNCEMENT TARGET STOCK REACTIONS: ARBITRAGE SPREAD

This table depicts the results of linear (fixed effects) models regressing *Arbitrage Spread*<sub>2 Day</sub> on acquirer short interest one day before the announcement date, *Acq SI*<sub>-1</sub>, and institutional ownership, *Acq Instit Herf*<sub>-1</sub>, one day before the announcement date and on the variable of interest, the interaction term *Acq SI*<sub>-1</sub> \* *Acq Instit Herf*<sub>-1</sub> (1) as defined in Section 3. Column (2) repeats the regression in column (1) but additionally includes Hirschman-Herfindahl indices and the sums of both institutional and insider ownership of the acquiring and target firm one day before offer announcement. Deal controls and acquirer and target characteristics are added in column (3). Columns (4) – (6) repeat this progressive adding of control variables including year, acquirer industry, and target industry fixed effects. The three last regressions ((7) – (9)) show the full model results with varying fixed effects. Fixed effects are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

		Dependent Variable									
		Arbitrage Spread <sub>2 Day</sub>									
Independent Variables		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
Variable of Interest / Ownership Controls	Acq SI <sub>-1</sub> * Acq Instit Herf <sub>-1</sub>	-2.562* (1.351)	-2.260* (1.350)	-2.758** (1.373)	-3.832** (1.541)	-4.087*** (1.418)	-4.044*** (1.382)	-3.808** (1.849)	-3.709** (1.875)	-3.437** (1.699)	
	Acq SI <sub>-1</sub>	0.191** (0.086)	0.243*** (0.086)	0.082 (0.097)	0.245*** (0.092)	0.180** (0.082)	0.063 (0.097)	0.087 (0.116)	0.056 (0.116)	0.052 (0.133)	
	Acq Instit Herf <sub>-1</sub>	10.820*** (3.417)	13.504*** (3.512)	11.577*** (2.725)	23.788*** (6.756)	20.450*** (4.869)	18.617*** (5.161)	19.874** (9.551)	18.896* (9.772)	16.152** (8.116)	
	Acq Instit Sum <sub>-1</sub>		-0.008 (0.016)	0.002 (0.014)	-0.012 (0.020)	0.012 (0.016)	0.015 (0.016)	0.015 (0.019)	0.016 (0.018)	0.013 (0.018)	
	Acq Insider Herf <sub>-1</sub>		19.750 (18.435)	11.901 (15.565)	23.456 (18.586)	9.237 (15.335)	15.452 (15.660)	3.623 (15.488)	4.469 (16.091)	1.518 (17.758)	
	Acq Insider Sum <sub>-1</sub>		0.010 (0.056)	0.008 (0.048)	0.014 (0.055)	0.047 (0.048)	0.020 (0.048)	0.052 (0.050)	0.050 (0.050)	0.048 (0.054)	
	Tgt Instit Herf <sub>-1</sub>		-9.727 (7.064)	-10.077* (5.768)	-9.240 (6.791)	-7.569 (5.344)	-8.772 (5.468)	-10.902** (5.426)	-9.212* (5.301)	-8.379* (4.976)	
	Tgt Instit Sum <sub>-1</sub>		-0.030*** (0.011)	0.006 (0.011)	-0.030*** (0.011)	0.001 (0.010)	0.007 (0.011)	0.009 (0.013)	0.008 (0.013)	0.008 (0.014)	
	Tgt Insider Herf <sub>-1</sub>		2.706 (6.909)	11.204 (7.266)	2.478 (7.106)	3.714 (7.065)	7.873 (7.026)	3.859 (6.712)	8.298 (5.608)	10.640 (6.667)	
	Tgt Insider Sum <sub>-1</sub>		-0.065** (0.031)	-0.078*** (0.030)	-0.066** (0.031)	-0.049* (0.030)	-0.062** (0.029)	-0.048* (0.029)	-0.061** (0.028)	-0.065** (0.028)	
	Deal Controls	Premium <sub>1 Month</sub>			0.113*** (0.012)		0.112*** (0.013)	0.114*** (0.013)	0.106*** (0.012)	0.105*** (0.012)	0.105*** (0.013)
		Transaction Value (TV)			0.110*** (0.038)		0.074** (0.037)	0.113*** (0.041)	0.108** (0.048)	0.106** (0.049)	0.103** (0.050)
Stock (% of TV)				0.046*** (0.008)		0.053*** (0.009)	0.046*** (0.009)	0.049*** (0.011)	0.048*** (0.011)	0.047*** (0.011)	
Acq Termination Fee Dummy				1.680*** (0.562)		1.933*** (0.562)	1.623*** (0.568)	1.522** (0.647)	1.433** (0.624)	1.444** (0.678)	
Tgt Termination Fee Dummy				-1.841 (1.120)		-2.100* (1.124)	-1.549 (1.126)	-2.109 (1.534)	-1.784 (1.551)	-1.423 (1.635)	
Friendly Deal Dummy				-1.797 (2.873)		-1.336 (2.788)	-1.695 (2.680)	-1.663 (2.773)	-2.184 (2.675)	-2.804 (2.818)	



Acquirer / Target Controls	Same Industry Dummy (SIC1)			0.006 (0.718)	-0.541 (0.684)	-0.657 (0.680)	-0.647 (0.685)	-0.584 (0.659)	0.159 (0.710)	
	In Acq Market Cap <sub>-1</sub>			-0.381** (0.192)		-0.392** (0.198)	-0.316 (0.204)	-0.338* (0.195)	-0.426** (0.204)	
	In AcqVola LTM <sub>-1</sub>			0.894 (0.849)		1.108 (0.927)	1.734* (0.938)	1.815** (0.852)	1.217 (0.752)	
	Acq Performance LTM <sub>-1</sub> (Div. adj.)			-0.010 (0.008)		-0.007 (0.008)	-0.010 (0.008)	-0.010 (0.008)	-0.010 (0.009)	
	Acq MTB <sub>-1</sub>			-0.035 (0.090)		-0.044 (0.086)	0.043 (0.080)	0.035 (0.081)	0.021 (0.094)	
	In Acq Turnover <sub>1 Month</sub>			72.272 (63.612)		78.796 (63.614)	36.540 (80.323)	62.422 (80.039)	75.454 (85.976)	
	Tgt Performance LTM <sub>-1</sub> (Div. adj.)			0.002 (0.005)		0.004 (0.005)	0.006 (0.005)	0.005 (0.005)	0.004 (0.005)	
	Tgt MTB <sub>-22</sub>			-0.028 (0.070)		-0.052 (0.074)	-0.076 (0.076)	-0.054 (0.078)	-0.045 (0.084)	
	Constant	3.185*** (0.396)	5.482*** (0.884)	0.569 (4.405)	5.566*** (1.934)	1.071 (3.305)	-0.219 (4.871)	-3.111 (4.863)	-9.274* (5.159)	-1.818 (4.219)
	Year FE	No	No	No	Yes	Yes	Yes	No	No	No
	Acq Industry FE	No	No	No	Yes	Yes	Yes	No	No	No
	Tgt Industry FE	No	No	No	Yes	Yes	Yes	No	Yes	No
	Acq Industry x Year FE	No	No	No	No	No	No	Yes	Yes	Yes
Tgt Industry x Year FE	No	No	No	No	No	No	No	No	Yes	
N	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303	
Adjusted R²	0.004	0.020	0.224	0.060	0.246	0.252	0.211	0.222	0.234	

(Table 8 continued)

TABLE 9 – EFFECT OF INFORMATIONAL ADVANTAGE THROUGH SHORT SELLING ON TARGET PREMIUMS: LOW VS. HIGH TARGET INSIDER OWNERSHIP

This table presents the results of linear fixed effects regressions of  $Premium_{1\text{ Week}}$ ,  $Premium_{3\text{ Day}}$ , and  $Premium_{1\text{ Day}}$  on the variable of interest, the interaction term  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  as defined in Section 3. Columns (1), (3), and (5) show the results for deals where the sum of the insiders' holdings in the target firm one day prior to deal announcement was below the sample median ( $Tgt\ Insider\ Sum\ Median_{-1} = 0$ ); columns (2), (4), and (6) show the results if the sum was above the sample median ( $Tgt\ Insider\ Sum\ Median_{-1} = 1$ ), respectively. Several control variables are included in the regression: ownership controls contain Hirschman-Herfindahl indices and the sums of both institutional and insider ownership of the acquiring and target firm one day before offer announcement. We furthermore control for deal features as well as acquirer and target characteristics as defined in Section 3. All regressions contain acquirer industry-year and target industry fixed effects. Fixed effects are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

		Dependent Variables					
		Premium <sub>1 Week</sub>		Premium <sub>3 Day</sub>		Premium <sub>1 Day</sub>	
<i>Tgt Insider Sum Median<sub>-1</sub></i>		0	1	0	1	0	1
Independent Variables		(1)	(2)	(3)	(4)	(5)	(6)
Variable of Interest / Ownership Controls	$Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$	-23.199** (11.557)	-15.701 (22.902)	-25.794** (10.575)	-12.220 (22.422)	-27.382** (10.540)	-10.412 (19.539)
	$Acq\ SI_{-1}$	-0.081 (0.745)	1.194* (0.701)	-0.057 (0.724)	1.206* (0.634)	0.075 (0.727)	1.132* (0.574)
	$Acq\ Instit\ Herf_{-1}$	21.373 (21.367)	-31.494 (33.166)	21.714 (18.504)	-27.425 (36.214)	23.096 (18.466)	-32.457 (33.989)
	$Acq\ Instit\ Sum_{-1}$	-0.008 (0.098)	-0.035 (0.095)	0.010 (0.097)	-0.006 (0.100)	0.020 (0.095)	0.018 (0.104)
	$Acq\ Insider\ Herf_{-1}$	-22.460 (90.012)	213.907** (96.840)	-55.438 (93.491)	210.074** (98.226)	-60.761 (89.521)	163.120* (90.781)
	$Acq\ Insider\ Sum_{-1}$	-0.079 (0.315)	-0.590** (0.243)	0.036 (0.315)	-0.547** (0.238)	0.043 (0.295)	-0.439* (0.223)
	$Tgt\ Instit\ Herf_{-1}$	-2.314 (26.145)	6.817 (47.704)	6.609 (21.816)	17.490 (47.357)	10.483 (20.357)	11.772 (38.088)
	$Tgt\ Instit\ Sum_{-1}$	-0.249*** (0.080)	-0.264** (0.104)	-0.260*** (0.074)	-0.261** (0.105)	-0.269*** (0.069)	-0.262*** (0.094)
	$Tgt\ Insider\ Herf_{-1}$	-39,120.020 (26,081.405)	-43.011 (28.649)	-3,445.695 (30,795.312)	-19.650 (27.900)	-22,243.247 (27,767.674)	2.984 (32.533)
	$Tgt\ Insider\ Sum_{-1}$	0.165 (4.006)	0.040 (0.134)	-1.708 (3.955)	-0.026 (0.129)	0.207 (3.727)	-0.125 (0.142)
	Transaction Value (TV)	-0.325* (0.188)	-0.495** (0.247)	-0.337* (0.186)	-0.446* (0.267)	-0.367* (0.195)	-0.297 (0.296)
Deal Controls	Stock (% of TV)	-0.071 (0.059)	-0.115** (0.045)	-0.053 (0.058)	-0.102** (0.043)	-0.069 (0.056)	-0.094** (0.038)
	Acq Termination Fee Dummy	-8.882*** (3.246)	4.283 (2.684)	-8.655*** (3.173)	2.799 (2.575)	-7.417** (3.248)	1.087 (2.365)
	Tgt Termination Fee Dummy	9.293 (6.201)	4.255 (4.978)	7.843 (6.094)	3.883 (5.432)	10.358* (5.551)	5.065 (5.470)
	Friendly Deal Dummy	-19.062 (11.965)	-2.611 (23.700)	-21.527* (12.584)	-4.358 (23.338)	-23.731** (11.198)	-2.788 (21.457)

Acquirer / Target Controls	Same Industry Dummy (SIC1)	5.061 (4.884)	4.770 (3.642)	5.687 (4.324)	5.868* (3.500)	5.215 (3.905)	6.450** (3.203)
	In Acq Market Cap <sub>-1</sub>	0.056 (1.002)	2.553** (1.192)	0.525 (0.978)	2.477** (1.204)	0.515 (0.976)	2.110* (1.138)
	In AcqVola LTM <sub>-1</sub>	3.442 (6.081)	2.926 (6.003)	4.233 (5.835)	2.351 (5.716)	2.851 (5.900)	2.967 (5.072)
	Acq Performance LTM <sub>-1</sub> (Div. adj.)	0.085* (0.047)	-0.006 (0.039)	0.078 (0.048)	0.003 (0.038)	0.063 (0.046)	-0.013 (0.035)
	Acq MTB <sub>-1</sub>	-0.364 (0.336)	0.222 (0.220)	-0.413 (0.316)	0.231 (0.214)	-0.288 (0.294)	0.296 (0.219)
	In Acq Turnover <sub>1 Month</sub>	-80.654 (336.880)	-121.886 (574.736)	30.465 (409.142)	-140.514 (560.014)	67.970 (425.488)	-124.917 (516.931)
	Tgt Performance LTM <sub>-1</sub> (Div. adj.)	-0.110*** (0.037)	-0.066*** (0.021)	-0.111*** (0.037)	-0.072*** (0.022)	-0.110*** (0.036)	-0.075*** (0.022)
	Tgt MTB <sub>-22</sub>	-0.008 (0.422)	-1.060*** (0.316)	0.085 (0.420)	-0.955*** (0.312)	0.078 (0.409)	-0.771*** (0.285)
	Constant	31.188 (32.307)	-8.067 (38.037)	28.876 (32.202)	-8.196 (37.103)	25.093 (31.976)	-16.397 (34.157)
	Acq Industry x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
	Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
	N	652	652	652	652	652	652
	Adjusted R <sup>2</sup>	0.105	0.085	0.099	0.080	0.116	0.081

(Table 9 continued)

TABLE 10 – EFFECT OF INFORMATIONAL ADVANTAGE THROUGH SHORT SELLING ON TARGET PREMIUMS: LOW VS. HIGH ACQUIRER ACTIVE INSTITUTIONAL OWNERSHIP

This table presents the results of linear fixed effects regressions of  $Premium_{1\text{ Week}}$ ,  $Premium_{3\text{ Day}}$ , and  $Premium_{1\text{ Day}}$  on the variable of interest, the interaction term  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  as defined in Section 3. Columns (1), (3), and (5) show the results for deals where the sum of the active institutional investors' holdings in the acquiring firm one trading day prior to deal announcement was below the sample median ( $Acq\ Instit\ Sum\ Active\ Median_{-1} = 0$ ); columns (2), (4), and (6) show the results if the sum was above the sample median ( $Acq\ Instit\ Sum\ Active\ Median_{-1} = 1$ ), respectively. Several control variables are included in the regression: ownership controls contain Hirschman-Herfindahl indices and the sums of both institutional and insider ownership of the acquiring and target firm one day before offer announcement. We furthermore control for deal features as well as acquirer and target characteristics as defined in Section 3. All regressions contain acquirer industry-year and target industry fixed effects. Fixed effects are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

		Dependent Variables					
		Premium <sub>1 Week</sub>		Premium <sub>3 Day</sub>		Premium <sub>1 Day</sub>	
<i>Acq Instit Sum Active Median<sub>-1</sub></i>		0	1	0	1	0	1
Independent Variables		(1)	(2)	(3)	(4)	(5)	(6)
Variable of Interest / Ownership Controls	$Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$	-11.907 (10.204)	-26.003** (11.191)	-7.240 (9.525)	-26.457*** (9.949)	-3.827 (9.592)	-29.049*** (10.132)
	$Acq\ SI_{-1}$	0.387 (0.693)	0.747 (0.851)	0.290 (0.610)	0.856 (0.807)	0.166 (0.590)	0.935 (0.746)
	$Acq\ Instit\ Herf_{-1}$	-15.917 (76.923)	40.307 (27.324)	-29.240 (69.001)	39.011 (27.045)	-23.022 (72.740)	42.403 (27.906)
	$Acq\ Instit\ Sum_{-1}$	-0.065 (0.116)	0.022 (0.091)	-0.057 (0.114)	0.047 (0.093)	-0.037 (0.110)	0.057 (0.083)
	$Acq\ Insider\ Herf_{-1}$	51.717 (119.844)	72.480 (82.005)	27.330 (124.668)	55.676 (81.098)	67.573 (125.203)	29.562 (75.135)
	$Acq\ Insider\ Sum_{-1}$	-0.443 (0.366)	-0.094 (0.260)	-0.361 (0.378)	-0.044 (0.251)	-0.396 (0.375)	0.025 (0.236)
	$Tgt\ Instit\ Herf_{-1}$	3.488 (26.482)	-0.474 (39.469)	2.509 (23.717)	12.373 (38.175)	12.660 (24.496)	7.071 (29.605)
	$Tgt\ Instit\ Sum_{-1}$	-0.220*** (0.081)	-0.281*** (0.067)	-0.214*** (0.078)	-0.284*** (0.062)	-0.220*** (0.077)	-0.273*** (0.056)
	$Tgt\ Insider\ Herf_{-1}$	-92.011** (43.904)	-17.604 (55.732)	-76.736 (46.661)	-6.448 (56.022)	-76.656* (44.749)	22.602 (44.969)
	$Tgt\ Insider\ Sum_{-1}$	0.148 (0.215)	-0.169 (0.194)	0.147 (0.204)	-0.185 (0.199)	0.153 (0.201)	-0.217 (0.170)
Deal Controls	Transaction Value (TV)	-0.312 (0.234)	-0.424** (0.181)	-0.303 (0.233)	-0.395** (0.169)	-0.356 (0.246)	-0.360** (0.175)
	Stock (% of TV)	-0.123 (0.076)	-0.061 (0.051)	-0.080 (0.063)	-0.059 (0.048)	-0.083 (0.060)	-0.051 (0.046)
	Acq Termination Fee Dummy	-7.580*** (2.584)	0.501 (2.827)	-8.419*** (2.561)	-0.089 (2.693)	-7.438*** (2.588)	-1.409 (2.363)
	Tgt Termination Fee Dummy	18.963* (9.594)	1.581 (5.340)	15.719* (8.410)	2.142 (5.136)	14.880* (8.152)	5.204 (5.136)
	Friendly Deal Dummy	7.517 (12.789)	-27.248* (15.127)	9.341 (12.174)	-33.497** (15.922)	7.325 (10.906)	-34.455** (15.234)

Acquirer / Target Controls	Same Industry Dummy (SIC1)	1.443 (3.381)	4.440 (4.542)	2.136 (2.943)	4.336 (4.523)	3.128 (2.966)	4.406 (4.250)
	In Acq Market Cap <sub>-1</sub>	0.991 (1.119)	2.298** (0.949)	0.949 (1.069)	2.214** (0.882)	0.368 (1.095)	2.090** (0.897)
	In AcqVola LTM <sub>-1</sub>	6.597 (5.788)	3.741 (5.471)	5.554 (5.704)	3.130 (5.332)	3.170 (5.446)	3.310 (5.436)
	Acq Performance LTM <sub>-1</sub> (Div. adj.)	-0.025 (0.059)	0.014 (0.041)	-0.016 (0.055)	0.028 (0.038)	-0.022 (0.055)	0.009 (0.036)
	Acq MTB <sub>-1</sub>	-0.069 (0.242)	0.125 (0.340)	-0.082 (0.237)	0.060 (0.337)	-0.090 (0.233)	0.324 (0.337)
	In Acq Turnover <sub>1 Month</sub>	-108.766 (386.414)	-314.838 (365.668)	-57.994 (411.373)	-341.404 (358.329)	-20.487 (413.093)	-271.600 (333.114)
	Tgt Performance LTM <sub>-1</sub> (Div. adj.)	-0.060** (0.030)	-0.067** (0.026)	-0.060* (0.031)	-0.075*** (0.026)	-0.062** (0.030)	-0.078*** (0.027)
	Tgt MTB <sub>-22</sub>	-0.278 (0.323)	-0.344 (0.532)	-0.201 (0.337)	-0.161 (0.508)	-0.219 (0.326)	0.011 (0.429)
	Constant	-23.154 (25.151)	25.393 (26.236)	-19.239 (26.014)	34.617 (25.913)	-8.796 (25.133)	26.929 (25.536)
	Acq Industry x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
	Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
	N	652	652	652	652	652	652
	Adjusted R <sup>2</sup>	0.079	0.083	0.067	0.075	0.075	0.076

(Table 10 continued)

TABLE 11 – EFFECT OF INFORMATIONAL ADVANTAGE THROUGH SHORT SELLING ON TARGET PREMIUMS: USE OF ACQUIRER TERMINATION FEE PROVISIONS

This table presents the results of linear fixed effects regressions of  $Premium_{1\text{ Week}}$ ,  $Premium_{3\text{ Day}}$ , and  $Premium_{1\text{ Day}}$  on the variable of interest, the interaction term  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  as defined in Section 3. Columns (1), (3), and (5) show the results for deals without an acquirer termination fee ( $Acq\ Termination\ Fee\ Dummy = 0$ ); columns (2), (4), and (6) show the results if such a fee was agreed on in the merger agreements ( $Acq\ Termination\ Fee\ Dummy = 1$ ), respectively. Several control variables are included in the regression: ownership controls contain Hirschman-Herfindahl indices and the sums of both institutional and insider ownership of the acquiring and target firm one day before offer announcement. We furthermore control for deal features as well as acquirer and target characteristics as defined in Section 3. All regressions contain acquirer industry-year and target industry fixed effects. Fixed effects are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

		Dependent Variables					
		Premium <sub>1 Week</sub>		Premium <sub>3 Day</sub>		Premium <sub>1 Day</sub>	
<i>Acq Termination Fee Dummy</i>		0	1	0	1	0	1
Independent Variables		(1)	(2)	(3)	(4)	(5)	(6)
Variable of Interest / Ownership Controls	$Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$	-19.777** (7.619)	-3.029 (27.027)	-16.428** (7.684)	-4.474 (25.500)	-16.657** (7.791)	-2.789 (21.994)
	$Acq\ SI_{-1}$	0.371 (0.565)	1.016 (0.983)	0.336 (0.524)	0.918 (0.923)	0.456 (0.492)	0.863 (0.852)
	$Acq\ Instit\ Herf_{-1}$	39.338 (28.694)	-18.478 (37.378)	37.166 (28.678)	-28.268 (37.384)	36.680 (28.005)	-38.697 (29.569)
	$Acq\ Instit\ Sum_{-1}$	0.013 (0.075)	-0.214 (0.129)	0.026 (0.080)	-0.146 (0.117)	0.024 (0.082)	-0.097 (0.116)
	$Acq\ Insider\ Herf_{-1}$	82.219 (63.333)	38.685 (186.147)	73.924 (63.637)	7.157 (178.466)	51.473 (60.229)	25.188 (171.153)
	$Acq\ Insider\ Sum_{-1}$	-0.228 (0.213)	-0.020 (0.398)	-0.196 (0.208)	0.128 (0.353)	-0.177 (0.199)	0.131 (0.347)
	$Tgt\ Instit\ Herf_{-1}$	-10.825 (24.161)	62.956 (43.651)	0.162 (21.159)	73.836* (42.430)	7.496 (20.431)	58.834* (30.355)
	$Tgt\ Instit\ Sum_{-1}$	-0.311*** (0.068)	-0.221*** (0.072)	-0.329*** (0.070)	-0.217*** (0.069)	-0.320*** (0.066)	-0.243*** (0.076)
	$Tgt\ Insider\ Herf_{-1}$	-12.222 (26.943)	2.663 (114.698)	1.138 (27.329)	13.304 (114.674)	4.522 (27.446)	59.585 (103.272)
	$Tgt\ Insider\ Sum_{-1}$	-0.220* (0.125)	0.150 (0.277)	-0.229* (0.130)	0.094 (0.270)	-0.201* (0.117)	-0.086 (0.301)
Deal Controls	Transaction Value (TV)	-0.532** (0.235)	-0.011 (0.137)	-0.491** (0.216)	-0.034 (0.141)	-0.491** (0.232)	-0.123 (0.165)
	Stock (% of TV)	-0.069 (0.058)	-0.142*** (0.050)	-0.050 (0.052)	-0.133*** (0.048)	-0.051 (0.048)	-0.166*** (0.049)
	Tgt Termination Fee Dummy	8.024 (5.171)	4.251 (5.310)	6.998 (4.803)	6.397 (5.570)	8.663* (4.649)	9.197 (6.519)
	Friendly Deal Dummy	-27.925** (10.742)	29.036*** (4.260)	-29.230*** (11.027)	27.683*** (4.133)	-29.954*** (10.751)	27.388*** (4.111)
	Same Industry Dummy (SIC1)	4.549 (2.945)	-1.565 (5.589)	4.967* (2.790)	0.338 (5.218)	5.201* (2.758)	1.234 (5.164)

Acquirer / Target Controls	In Acq Market Cap <sup>-1</sup>	2.168** (0.897)	0.307 (1.656)	2.346** (0.946)	0.274 (1.600)	2.364** (0.981)	-0.646 (1.612)
	In AcqVola LTM <sup>-1</sup>	4.858 (5.475)	5.476 (6.787)	4.500 (5.518)	5.199 (6.314)	5.215 (5.214)	2.012 (5.698)
	Acq Performance LTM <sup>-1</sup> (Div. adj.)	-0.032 (0.044)	0.114* (0.065)	-0.018 (0.043)	0.108* (0.063)	-0.024 (0.038)	0.089 (0.065)
	Acq MTB <sup>-1</sup>	0.000 (0.219)	0.369 (0.661)	-0.032 (0.221)	0.415 (0.630)	0.089 (0.218)	0.430 (0.634)
	In Acq Turnover <sup>1</sup> Month	-158.644 (356.508)	-499.160 (351.684)	-22.521 (415.781)	-448.574 (336.269)	-45.352 (392.921)	-350.627 (314.983)
	Tgt Performance LTM <sup>-1</sup> (Div. adj.)	-0.072*** (0.021)	-0.108*** (0.040)	-0.076*** (0.022)	-0.103** (0.040)	-0.078*** (0.022)	-0.107*** (0.038)
	Tgt MTB <sup>-22</sup>	-0.371 (0.376)	-1.231*** (0.436)	-0.275 (0.396)	-0.886** (0.432)	-0.197 (0.370)	-0.770* (0.394)
	Constant	11.709 (22.823)	-16.388 (36.654)	12.371 (24.595)	-20.249 (34.854)	5.249 (23.759)	-15.589 (38.357)
	Acq Industry x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
	Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
N		975	329	975	329	975	329
Adjusted R <sup>2</sup>		0.076	0.207	0.068	0.190	0.072	0.202

(Table 11 continued)

TABLE 12 – EFFECT OF INFORMATIONAL ADVANTAGE THROUGH SHORT SELLING ON TARGET PREMIUMS: UNDER- VS. OVERVALUED ACQUIRERS

This table presents the results of linear fixed effects regressions of  $Premium_{1\text{ Week}}$ ,  $Premium_{3\text{ Day}}$ , and  $Premium_{1\text{ Day}}$  on the variable of interest, the interaction term  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  as defined in Section 3. Columns (1), (3), and (5) show the results if the acquiring firm was undervalued in relation to the median of the market-to-book ratio of all acquiring firms in the sample one day prior to bid announcement ( $Acq\ Overvaluation\ Median_{-1} = 0$ ); columns (2), (4), and (6) show the results if the acquiring firm was overvalued ( $Acq\ Overvaluation\ Median_{-1} = 1$ ), respectively. Several control variables are included in the regression: ownership controls contain Hirschman-Herfindahl indices and the sums of both institutional and insider ownership of the acquiring and target firm one day before offer announcement. We furthermore control for deal features as well as acquirer and target characteristics as defined in Section 3. All regressions contain acquirer industry-year and target industry fixed effects. Fixed effects are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

		Dependent Variables					
		Premium <sub>1 Week</sub>		Premium <sub>3 Day</sub>		Premium <sub>1 Day</sub>	
<i>Acq Overvaluation Median<sub>-1</sub></i>		0	1	0	1	0	1
Independent Variables		(1)	(2)	(3)	(4)	(5)	(6)
Variable of Interest / Ownership Controls	$Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$	-42.245** (16.722)	-8.411 (7.991)	-46.155*** (16.908)	-4.958 (7.579)	-38.897** (16.181)	-2.769 (7.956)
	$Acq\ SI_{-1}$	1.736** (0.703)	-0.237 (0.504)	1.751** (0.697)	-0.127 (0.489)	1.493** (0.682)	-0.066 (0.487)
	$Acq\ Instit\ Herf_{-1}$	36.417 (31.721)	-24.926 (64.943)	41.141 (31.925)	-43.540 (64.209)	36.185 (32.937)	-63.430 (65.268)
	$Acq\ Instit\ Sum_{-1}$	-0.023 (0.091)	-0.019 (0.074)	0.015 (0.095)	-0.020 (0.069)	0.029 (0.094)	-0.007 (0.068)
	$Acq\ Insider\ Herf_{-1}$	-123.438 (152.097)	55.905 (51.192)	-128.098 (146.850)	54.531 (52.620)	-105.531 (139.977)	40.239 (50.600)
	$Acq\ Insider\ Sum_{-1}$	0.052 (0.331)	-0.036 (0.230)	0.095 (0.325)	-0.070 (0.223)	0.071 (0.303)	-0.032 (0.218)
	$Tgt\ Instit\ Herf_{-1}$	44.339 (29.906)	-5.992 (35.250)	49.808* (29.768)	0.583 (32.334)	42.417* (22.490)	20.594 (30.907)
	$Tgt\ Instit\ Sum_{-1}$	-0.504*** (0.094)	-0.123* (0.064)	-0.492*** (0.091)	-0.138** (0.062)	-0.476*** (0.084)	-0.156** (0.062)
	$Tgt\ Insider\ Herf_{-1}$	36.366 (40.110)	-60.648 (39.651)	50.192 (38.387)	-51.894 (35.147)	38.570 (33.662)	-23.513 (37.907)
	$Tgt\ Insider\ Sum_{-1}$	-0.302* (0.178)	0.039 (0.178)	-0.332* (0.184)	0.029 (0.158)	-0.290* (0.163)	-0.034 (0.155)
Deal Controls	Transaction Value (TV)	-0.264 (0.179)	-0.470** (0.223)	-0.317 (0.221)	-0.454** (0.214)	-0.371 (0.241)	-0.449* (0.227)
	Stock (% of TV)	-0.105 (0.069)	-0.072 (0.046)	-0.091 (0.066)	-0.049 (0.046)	-0.082 (0.058)	-0.056 (0.042)
	Acq Termination Fee Dummy	1.564 (3.170)	-7.014* (3.682)	0.259 (3.140)	-7.831** (3.617)	0.352 (2.835)	-7.326** (3.437)
	Tgt Termination Fee Dummy	8.452 (8.074)	9.180* (5.190)	8.667 (7.941)	7.963 (5.173)	10.197 (7.640)	9.777** (4.930)
	Friendly Deal Dummy	-49.264 (41.415)	-9.708 (9.989)	-52.638 (44.056)	-11.868 (10.363)	-53.066 (43.691)	-13.866 (9.580)



Acquirer / Target Controls	Same Industry Dummy (SIC1)	6.688* (3.684)	1.400 (3.774)	6.724* (3.750)	2.063 (3.466)	5.336 (3.604)	3.654 (3.388)
	In Acq Market Cap <sub>-1</sub>	3.481*** (1.261)	0.441 (1.079)	3.645*** (1.271)	0.705 (1.113)	3.026** (1.216)	0.686 (1.128)
	In AcqVola LTM <sub>-1</sub>	8.700 (6.642)	-0.686 (4.127)	9.285 (6.275)	0.218 (4.389)	8.803 (5.840)	0.456 (4.276)
	Acq Performance LTM <sub>-1</sub> (Div. adj.)	0.068 (0.073)	-0.042 (0.039)	0.071 (0.073)	-0.029 (0.039)	0.064 (0.070)	-0.034 (0.037)
	Acq MTB <sub>-1</sub>	-3.030 (6.362)	-0.147 (0.211)	-2.768 (6.428)	-0.153 (0.209)	-1.423 (5.864)	-0.041 (0.199)
	In Acq Turnover <sub>1 Month</sub>	-308.916 (655.469)	35.886 (212.130)	-289.775 (661.045)	-0.939 (217.510)	-166.721 (594.973)	-78.287 (224.716)
	Tgt Performance LTM <sub>-1</sub> (Div. adj.)	-0.117*** (0.038)	-0.063** (0.027)	-0.133*** (0.038)	-0.056** (0.027)	-0.133*** (0.041)	-0.056** (0.028)
	Tgt MTB <sub>-22</sub>	-0.839 (0.694)	-0.078 (0.282)	-0.697 (0.732)	-0.009 (0.307)	-0.588 (0.740)	0.006 (0.287)
	Constant	26.784 (49.868)	28.444 (22.977)	26.620 (50.830)	26.564 (23.934)	17.482 (50.518)	24.894 (23.165)
	Acq Industry x Year FE	Yes	Yes	Yes	Yes	Yes	Yes
	Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
	N	652	652	652	652	652	652
	Adjusted R <sup>2</sup>	0.129	0.070	0.123	0.054	0.138	0.058

(Table 12 continued)

TABLE 13 – EFFECT OF INFORMATIONAL ADVANTAGE THROUGH SHORT SELLING ON TARGET PREMIUMS: INSIDER OWNERSHIP CONCENTRATION

This table presents the results of linear fixed effects regressions of  $Premium_{1\text{ Week}}$ ,  $Premium_{3\text{ Day}}$ , and  $Premium_{1\text{ Day}}$  replicated from Table 2, columns (2), (4), and (6), except that we replace  $Acq\ SI_{-1} * Acq\ Instit\ Herf_{-1}$  with  $Acq\ SI_{-1} * Acq\ Insider\ Herf_{-1}$  as the interaction term (specifications (1), (3), and (5)), or include both (specifications (2), (4), and (6)), respectively. Several control variables are included in the regression: ownership controls contain Hirschman-Herfindahl indices and the sums of both institutional and insider ownership of the acquiring and target firm one day before offer announcement. We furthermore control for deal features as well as acquirer and target characteristics as defined in Section 3. All regressions contain acquirer industry-year and target industry fixed effects. Fixed effects are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity and within-cluster correlation. \*, \*\*, and \*\*\* denote significance at the 10%, 5%, and 1% level, respectively.

Independent Variables		Dependent Variables					
		Premium <sub>1 Week</sub>		Premium <sub>3 Day</sub>		Premium <sub>1 Day</sub>	
		(1)	(2)	(3)	(4)	(5)	(6)
Variable of Interest / Ownership Controls	Acq SI <sub>-1</sub> * Acq Instit Herf <sub>-1</sub>		-19.240*** (6.353)		-18.739*** (6.673)		-17.298*** (6.539)
	Acq SI <sub>-1</sub> * Acq Insider Herf <sub>-1</sub>	-19.904* (11.518)	-21.624* (11.842)	-20.612* (12.046)	-22.287* (12.351)	-16.160 (11.881)	-17.706 (12.123)
	Acq SI <sub>-1</sub>	0.276 (0.415)	0.783 (0.488)	0.283 (0.398)	0.777* (0.459)	0.286 (0.398)	0.743 (0.450)
	Acq Instit Herf <sub>-1</sub>	7.072 (27.718)	26.729 (27.666)	6.259 (26.956)	25.404 (27.058)	5.500 (27.290)	23.173 (27.434)
	Acq Instit Sum <sub>-1</sub>	-0.087 (0.063)	-0.054 (0.062)	-0.058 (0.064)	-0.025 (0.063)	-0.034 (0.065)	-0.004 (0.065)
	Acq Insider Herf <sub>-1</sub>	129.728* (71.798)	129.211* (71.695)	112.980 (72.013)	112.476 (72.027)	88.468 (69.521)	88.003 (69.711)
	Acq Insider Sum <sub>-1</sub>	-0.215 (0.188)	-0.193 (0.187)	-0.150 (0.179)	-0.129 (0.179)	-0.113 (0.172)	-0.093 (0.172)
	Tgt Instit Herf <sub>-1</sub>	9.907 (27.913)	9.536 (27.354)	18.261 (26.256)	17.899 (25.620)	17.355 (21.191)	17.021 (20.643)
	Tgt Instit Sum <sub>-1</sub>	-0.266*** (0.057)	-0.270*** (0.056)	-0.273*** (0.057)	-0.277*** (0.056)	-0.272*** (0.052)	-0.276*** (0.051)
	Tgt Insider Herf <sub>-1</sub>	-38.461 (23.719)	-38.586 (23.753)	-22.975 (24.863)	-23.096 (24.839)	-9.410 (23.253)	-9.522 (23.258)
	Tgt Insider Sum <sub>-1</sub>	-0.056 (0.108)	-0.056 (0.109)	-0.085 (0.111)	-0.086 (0.111)	-0.106 (0.100)	-0.107 (0.100)
Deal Controls	Transaction Value (TV)	-0.409*** (0.141)	-0.402*** (0.140)	-0.399*** (0.139)	-0.391*** (0.138)	-0.429*** (0.144)	-0.423*** (0.143)
	Stock (% of TV)	-0.098** (0.044)	-0.095** (0.044)	-0.078** (0.039)	-0.076* (0.038)	-0.080** (0.035)	-0.078** (0.035)
	Acq Termination Fee Dummy	-3.718* (1.886)	-3.616* (1.891)	-4.473** (1.782)	-4.373** (1.783)	-4.542*** (1.648)	-4.450*** (1.650)
	Tgt Termination Fee Dummy	9.019* (4.802)	8.858* (4.797)	8.009* (4.485)	7.852* (4.487)	9.537** (4.332)	9.392** (4.327)
	Friendly Deal Dummy	-20.135* (10.757)	-19.273* (10.713)	-22.013* (11.226)	-21.173* (11.157)	-22.707** (10.872)	-21.932** (10.837)
	Same Industry Dummy (SIC1)	3.765 (2.759)	3.575 (2.752)	4.514* (2.570)	4.329* (2.561)	4.941** (2.417)	4.770** (2.402)
Acquirer / Target Controls	In Acq Market Cap <sub>-1</sub>	1.984*** (0.703)	1.996*** (0.701)	2.128*** (0.761)	2.141*** (0.755)	1.918** (0.751)	1.930** (0.747)
	In AcqVola LTM <sub>-1</sub>	4.266 (3.792)	4.510 (3.827)	4.379 (3.842)	4.617 (3.884)	4.110 (3.714)	4.330 (3.748)
	Acq Performance LTM <sub>-1</sub> (Div. adj.)	0.005 (0.032)	0.006 (0.033)	0.012 (0.031)	0.013 (0.031)	0.003 (0.030)	0.004 (0.030)
	Acq MTB <sub>-1</sub>	0.009 (0.183)	0.022 (0.184)	-0.009 (0.182)	0.004 (0.183)	0.084 (0.179)	0.095 (0.179)
	In Acq Turnover <sub>1 Month</sub>	-229.112 (249.359)	-229.403 (250.388)	-161.164 (284.655)	-161.448 (285.229)	-136.853 (277.366)	-137.115 (277.710)
	Tgt Performance LTM <sub>-1</sub> (Div. adj.)	-0.063*** (0.018)	-0.070*** (0.018)	-0.069*** (0.019)	-0.076*** (0.019)	-0.071*** (0.019)	-0.077*** (0.019)
	Tgt MTB <sub>-22</sub>	-0.405 (0.257)	-0.404 (0.259)	-0.273 (0.263)	-0.272 (0.266)	-0.208 (0.252)	-0.207 (0.254)
Constant		16.872 (18.989)	13.296 (19.072)	15.933 (20.304)	12.450 (20.435)	11.184 (19.989)	7.969 (20.059)
Acq Industry x Year FE		Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE		Yes	Yes	Yes	Yes	Yes	Yes
N		1,304	1,304	1,304	1,304	1,304	1,304
Adjusted R <sup>2</sup>		0.081	0.085	0.075	0.078	0.085	0.088

APPENDIX – TABLE A1 – VARIABLE DEFINITIONS

Dependent Variables	<i>Premium</i> <sub>1 Week</sub>	Difference of the announced offer price per share and the target's last sale share price five trading days before deal announcement, expressed in percentage terms of the target's last sale share price five trading days before deal announcement
	<i>Premium</i> <sub>3 Day</sub>	Difference of the announced offer price per share and the target's last sale share price three trading days before deal announcement, expressed in percentage terms of the target's last sale share price three trading days before deal announcement
	<i>Premium</i> <sub>1 Day</sub>	Difference of the announced offer price per share and the target's last sale share price one trading day before deal announcement, expressed in percentage terms of the target's last sale share price one trading day before deal announcement
	<i>Premium</i> <sub>1 Month</sub>	Difference of the announced offer price per share and the target's last sale share price 22 trading days before deal announcement, expressed in percentage terms of the target's last sale share price 22 trading days before deal announcement
	<i>Acq CAR</i> <sub>[-1,+1]</sub>	Cumulative abnormal return of the acquiring firms' stock, based on dividend adjusted day close prices, measured one trading day before until one trading day after deal announcement using a Carhart (1997) four-factor model to model normal returns
	<i>Acq CAR</i> <sub>[-3,+3]</sub>	Defined as <i>Acq CAR</i> <sub>[-1,+1]</sub> , but instead measured three trading days before until three trading days after deal announcement
	<i>Acq BHAR</i> <sub>[-1,+21]</sub>	One-month buy-and-hold abnormal return of acquiring firms' stock, measured relative to a size-, market-to-book-, and industry-matched control firm. The numbers in brackets denote trading days relative to the deal announcement date where the investment on the acquiring firms' stock is made, and terminated, respectively.
	<i>Acq BHAR</i> <sub>[-1,+42]</sub>	Defined as <i>Acq BHAR</i> <sub>[-1,+21]</sub> , but instead measured one trading day before until two months after deal announcement
	<i>Acq BHAR</i> <sub>[-1,+63]</sub>	Defined as <i>Acq BHAR</i> <sub>[-1,+21]</sub> , but instead measured one trading day before until three months after deal announcement
	<i>Acq BHAR</i> <sub>[-1,+84]</sub>	Defined as <i>Acq BHAR</i> <sub>[-1,+21]</sub> , but instead measured one trading day before until four months after deal announcement
	<i>Acq BHAR</i> <sub>[-1,+126]</sub>	Defined as <i>Acq BHAR</i> <sub>[-1,+21]</sub> , but instead measured one trading day before until six months after deal announcement
	<i>Acq BHAR</i> <sub>[-1,+189]</sub>	Defined as <i>Acq BHAR</i> <sub>[-1,+21]</sub> , but instead measured one trading day before until nine months after deal announcement
	<i>Acq BHAR</i> <sub>[-1,+252]</sub>	Defined as <i>Acq BHAR</i> <sub>[-1,+21]</sub> , but instead measured one trading day before until twelve months after deal announcement
Independent Variables	<i>Arbitrage Spread</i> <sub>2 Day</sub>	Ratio between the difference of the offer price per share on the announcement date and the last sale price of the target's stock on the second trading day after bid announcement, and the offer price per share on announcement, expressed in percentage terms
	<i>Deal Completion</i>	Dummy variable that is set to 1 if the deal is closed successfully before end of May 2017, and 0 otherwise
	<i>Acq SI</i> <sub>-1</sub>	Short Interest of the acquiring firms' stock, expressed in percent of the latest number of shares outstanding, obtained one trading day prior to deal announcement
	<i>Acq SI</i> <sub>-1</sub> * <i>Acq Instit Herf</i> <sub>-1</sub>	Interaction of <i>Acq SI</i> <sub>-1</sub> and <i>Acq Instit Herf</i> <sub>-1</sub>
	<i>Acq SI</i> <sub>-1</sub> * <i>Acq Insider Herf</i> <sub>-1</sub>	Interaction of <i>Acq SI</i> <sub>-1</sub> and <i>Acq Insider Herf</i> <sub>-1</sub>
	<i>Acq Instit Herf</i> <sub>-1</sub>	Concentration of institutional ownership in acquiring firms' stock: measured one trading day prior to deal announcement by calculating the sum of the squares of each individual institutional investors' percentage share in acquiring firms' stock
	<i>Acq Instit Sum</i> <sub>-1</sub>	Percentage sum of institutional ownership in acquiring firms' stock, measured one trading day prior to deal announcement
	<i>Acq Insider Herf</i> <sub>-1</sub>	Concentration of insider ownership in acquiring firms' stock: measured one trading day prior to deal announcement by calculating the sum of the squares of each individual insider investors' percentage share in acquiring firms' stock

Independent Variables	Ownership Controls	<i>Acq Insider Sum</i> <sub>-1</sub>	Percentage sum of insider ownership in acquiring firms' stock, measured one trading day prior to deal announcement
		<i>Tgt Instit Herf</i> <sub>-1</sub>	Defined as <i>Acq Instit Herf</i> <sub>-1</sub> , but instead measured for target firms' stock
		<i>Tgt Instit Sum</i> <sub>-1</sub>	Defined as <i>Acq Instit Sum</i> <sub>-1</sub> , but instead measured for target firms' stock
		<i>Tgt Insider Herf</i> <sub>-1</sub>	Defined as <i>Acq Insider Herf</i> <sub>-1</sub> , but instead measured for target firms' stock
		<i>Tgt Insider Sum</i> <sub>-1</sub>	Defined as <i>Acq Insider Sum</i> <sub>-1</sub> , but instead measured for target firms' stock
	Deal Controls	<i>Transaction Value [USD bn]</i>	Total gross transaction value in billions of USD, historical nominal value
		<i>Stock (% of Transaction Value)</i>	Percentage share of the total gross transaction value that is paid with acquirers' stock
		<i>Acq Termination Fee Dummy</i>	Dummy variable that is set to 1 if the acquirer agrees to pay a buy-side termination fee to the target firm in specific events as negotiated in the merger agreements, and 0 otherwise
		<i>Tgt Termination Fee Dummy</i>	Dummy variable that is set to 1 if the target agrees to pay a sell-side termination fee to the acquiring firm in specific events as negotiated in the merger agreements, and 0 otherwise
		<i>Friendly Deal Dummy</i>	Dummy variable that is set to 1 if the deal attitude is friendly on the announcement day of the deal, and 0 otherwise
		<i>Same Industry Dummy (SIC1)</i>	Dummy variable that is set to 1 if both the acquirer and the target firm are assigned to the same industry as defined by the first of the four SIC digits, and 0 otherwise
	Acquirer / Target Controls	<i>Acq Market Cap</i> <sub>-1</sub> [USD mm]	Last sale price of acquiring firms' stock (adjusted for stock splits) multiplied with the latest number of shares outstanding, measured one trading day prior to deal announcement and expressed in millions of USD
		<i>ln Acq Market Cap</i> <sub>-1</sub>	Natural logarithm of <i>Acq Market Cap</i> <sub>-1</sub>
		<i>Acq Volatility LTM</i> <sub>-1</sub>	Standard deviation of weekly log-normal price returns over the past year, annualized with a factor of 52 for the 52 trading weeks in a year
		<i>ln Acq Volatility LTM</i> <sub>-1</sub>	Natural logarithm of <i>Acq Volatility LTM</i> <sub>-1</sub>
		<i>Acq Performance LTM</i> <sub>-1 (Div. adj.)</sub>	Price performance of acquirers' stock based on dividend adjusted day close prices, further adjusted for stock splits, cash dividends, rights offerings, and spin-offs: relative difference of acquirers' dividend adjusted day close price one trading day prior to deal announcement to acquirers' dividend adjusted day close price one year before deal announcement, expressed in percentage terms
		<i>Acq MTB</i> <sub>-1</sub>	Market-to-book ratio of acquirers' stock, calculated as <i>Acq Market Cap</i> <sub>-1</sub> divided by the latest available value of total common equity (= common stock & additional paid in capital + retained earnings + treasury stock & other)
		<i>Acq Turnover</i> <sub>1 Month</sub>	One-month average of the daily quotient of the dollar value traded (= acquirers' stock last sale price multiplied with the respective trading volume on that day) divided by the market capitalization (as defined above) on the corresponding trading day
		<i>ln Acq Turnover</i> <sub>1 Month</sub>	Natural logarithm of one plus <i>Acq Turnover</i> <sub>1 Month</sub>
		<i>Tgt Performance LTM</i> <sub>-1 (Div. adj.)</sub>	Defined as <i>Acq Performance LTM</i> <sub>-1 (Div. adj.)</sub> , but instead measured for target firms' stock
		<i>Tgt MTB</i> <sub>-22</sub>	Defined as <i>Acq MTB</i> <sub>-1</sub> , but instead measured for target firms' stock and obtained 22 trading days prior to deal announcement to rule out any dilutions caused by takeover rumors

(Table A1 continued)