Strategic Aspects in M&A Negotiations

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To my parents

Gudrun & Karl-Heinz

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Richard Schubert

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General Introduction

Corporate acquisitions are among the biggest, most expensive, and most visible investments in the lifecycle of the firm. The primary rationale for their existence is to transfer property rights of assets to the entity which can derive the highest economic value from them. M&A enable firms to grow faster than firms relying solely on organic growth, sometimes significantly alter product market competition and reorganize industries. With substantial resources committed to the takeover process, managers need to think strategically in order to maximize the expected value from M&A and to maximize shareholder wealth. The following four paragraphs outline some fundamental M&A research questions.

Does M&A pay? — Hundreds of academic studies suggest that M&A does not support theories predicting value destruction, at least when analyzing overall combined gains of the involved firms (Eckbo (2009, 2014)). Event studies of abnormal stock price reactions around deal announcement indicate that the target receives the surplus, and that the surplus is even higher if the bidder is publicly listed. Acquiring firms break even on average, yet the takeover of a private target is associated with positive bidder announcement returns. Value creation also largely depends on the method of payment, and a variety of theories have been developed in order to explain this phenomenon (e.g., Jensen and Ruback (1983), Andrade, Mitchell, and Stafford (2001), and Betton, Eckbo, and Thorburn (2008)).

Why and When do M&A Transactions occur? — It is well documented in the literature that mergers occur in waves (e.g., Martynova and Renneboog (2008)): the Great Merger Wave in the late 1890s, the wave towards oligopolies in the 1920s, the conglomerate wave in the 1950s and 1960s, the wave of hostile divestitures in the 1980s, the wave of globalization and technological innovations in the 1990s, and the wave of cross-border and going-private transactions during the last two decades. Neoclassical literature (e.g., Mitchell and Mulherin (1996)) argues that merger waves are the reaction to shocks to an industry's economic, technological, and/or regulatory environment that require large-scale reallocation of assets. Harford (2005) adds to this literature and finds that overall capital liquidity is an important prerequisite and better explains the clustering compared to behavioral models.

Does M&A promote Corporate Innovation? — Phillips and Zhdanov (2013) model and empirically test how an active M&A market and competition affect the decision to conduct R&D. They find that the possibility to sell out to larger firms has a positive impact on small firms' incentives to innovate, and that larger firms choose to acquire successfully innovating targets as a substitute for in-house R&D activities. Frésard, Hoberg, and Phillips (2020) examine determinants of vertical acquisitions and propose that the innovation stage is important in explaining vertical integration. They find that R&D-intensive firms that are at an early stage of unrealized innovation are less likely to become targets of vertical acquisitions, and are more likely to initiate customer and supplier relationships outside the firm. However, if their innovation is realized, i.e., patented, firms are more likely to vertically integrate since incentives to commercialize the innovation increase relative to incentives to innovate.

How are Firms sold? — Recent studies address the selling procedure in M&A. Initiating a firm's sale and determining the sales mechanism are generally deliberate decisions by target's management, and their analysis helps us to better understand strategic interactions of participating firms as well as deal outcomes. Hansen's (2001) theoretical work suggests that in equilibrium, when deciding between auctions and one-to-one negotiations, targets outweigh the benefits of getting more bidders with the (indirect) costs of information revelation. His model helps to explain why we not always observe auctions in practice. In addition, Liu, Mulherin, and Brown (2018) find that takeover auctions have moved behind the scenes, target boards are more likely to initiate them, and that the time period between deal initiation and deal announcement has lengthened significantly over the last two decades. Masulis and Simsir (2018) highlight the role of deal initiation and find that target's economic weakness, financial constraints, and negative economy-wide shocks are important motives to trigger transactions.

Yet some aspects of strategic interactions between acquirers, targets, and market participants are still not fully understood. E.g., the activism of short sellers in M&A transactions could not have been analyzed in full detail due to data availability. On the other hand, databases are known to significantly underreport the incidence of deal protection devices, such as termination fees, prior to 2007. Furthermore, modern algorithms now allow us to analyze tremendous amounts of data stored in credible sources, such as the SEC's EDGAR database. The purpose of this thesis is to fill identified research gaps and to add to the extant literature.

The first chapter — **"The Real Effects of Possible Stock Recalls on Acquirer Stocks: Empirical Evidence from M&A Premiums"** — addresses the role of short sellers and their impact on takeover prices in M&A deals. The traditional argument motivates short sellers' engagement by them bringing (hypothesized inflated) asset prices to their fundamental value. Chapter 1 adds a new motive that has not been analyzed before: merger arbitrageurs (as short sellers in M&A deals are called) can profit from an endogenous informational advantage. By purchasing target stocks and shorting acquirer stocks in an announced takeover, they can profit from private stock recall signals issued by beneficial owners of shorted stocks. Aggarwal, Saffi, and Sturgess (2015) show that these owners likely recall if they later vote against management proposals in corporate control matters. Merger arbitrageurs can then update their trading strategy before all other market participants can, and accept lower deal premiums compared to incumbent target shareholders due to their trading option. The value of this option is higher, the more merger arbitrageurs are positioned and the more likely a stock recall is (this likelihood is proxied by acquirer institutional ownership concentration). Since data about shorted stocks (i.e., the magnitude of merger arbitrageurs) and ownership are especially available to M&A advisors with high equity capital market expertise, I suggest consultation of acquirer managers by these advisors as the primary channel to save premiums in M&A deals.

Another important implication of this chapter is related to acquirer wealth effects at offer announcement: since shorting acquirer stocks in the announced exchange ratio is part of merger arbitrageurs' trading strategy, this shorting volume does not mirror short sellers' traditional motive to bring asset prices back to fundamental values. If one analyzes acquirer announcement returns, one should ideally also adjust for the downward pressure on acquirer stocks caused by merger arbitrageurs, because their trading reflects uninformed short selling.

The second chapter — **"Entrenchment through Discretion over M&A Contractual Provisions"** — also adds to the literature analyzing announcement returns of acquiring firms. By misusing a specific contract clause in M&A contracts, namely by setting bidder termination fees too high, managers of acquiring firms, that are under pressure of being replaced due to bad performance, can make it costly for their shareholders to disapprove the deal after announcement. These managers can thereby entrench themselves through the deal in the sense of Shleifer and Vishny (1989). Announcement reactions of acquirer's stock are significantly

negative if the manager underperformed in the year preceding the announcement (i.e., my proxy for likely and imminent forced CEO turnover) and if the bidder termination fee is relatively high. With relatively high I mean high dollar values of the fee scaled by acquiring firm's market capitalization. In this way, I focus on the potential economic impact on acquirer value if bidder termination fees must be paid, rather than the demand by target managers to compensate targets for information revelation after acquirer-induced deal cancellation, as chapter 3 highlights. Chapter 2 concludes that excessively high bidder termination fees, misused by CEOs with high turnover pressure, possibly signal agency problems. Management boards should thus keep this entrenchment motive in mind when negotiating on this important M&A contract clause.

In general, bidder termination fees exist and are included in merger contracts since the 1980s. Research started to focus on them after their emergence in private equity deals in the mid-2000s, where their original motive for inclusion in merger agreements was to compensate targets for incurred costs if the private equity firm could not secure financing for the deal. Because of decreased practical interest prior to that time, databases are known to significantly underreport their existence and research gaps have not been closed. Today, all public firms are obliged to file official documents with the Securities and Exchange Commission (SEC), where data about bidder termination fees and other merger information not included in traditional databases can be parsed by textual algorithms or hand-selection. Analyzing these contract devices is important to explain their size and economic rationales for inclusion in M&A deals.

The third chapter — **"Intellectual Property Protection in M&A Negotiations"** — contributes to the literature by emphasizing the relevance of bidder termination fees as an incentive compatible contract component for target firms. Targets have an incentive to reveal sensitive private information to the acquirer if the former are compensated in case the latter abandon deals due to reasons under their sphere of control. In contrast to chapter 2, I scale the dollar amount of the bidder termination fee by target firm's market capitalization to focus on the economic impact on target's value, if deals are terminated by the acquirer and fees are paid. I proxy for the component of intellectual property in target firm's market value by applying an updated capitalization model for intangible capital stocks (Ewens, Peters, and Wang (2020)). As hypothezised in chapter 3, I find that the size of the bidder termination fee increases

in the proxy of intellectual property value of the target (R&D capital stock divided by target's market capitalization), suggesting that target managers can utilize their bargaining power in deal negotiations to convince the acquirer to provide an appropriately priced fee. The results suggest that, on average, for every dollar of target firm's R&D capital stock, roughly 16 cents of protective share is incorporated in the bidder termination fee. I further show that the payment of the bidder termination fee has a positive impact on target's market value if the deal is terminated and fees are paid. Chapter 3 hence extends extant research at the intersection of innovation, law, and M&A.

The fourth and last chapter — **"Measuring Competition in M&A Negotiations"** — provides novel insights about takeover competition among bidders in the pre-announcement phase of the deal and its effect on offered deal premiums, bidder announcement returns, and post-bid dynamics. Yet despite the fact that this process is shielded from public scrutiny, recent research indicates that it is surprisingly active (e.g., Liu and Officer (2020), Boone and Mulherin (2007, 2008), Liu, Mulherin, and Brown (2018)). Based on hand-selected data obtained through official SEC documents describing the background of the merger/tender offer, I introduce a measure for competition among bidders: the Proposals-to-CA-Ratio. This ratio relates the number of privately submitted bids to the target at the end of the private takeover process to the number of signed confidentiality agreements with the target. The higher this ratio is, the higher are takeover premiums and the lower are announcement returns of the winning bidder in auctions. The ratio is also positively related to post-bid competition, and helps to explain why competitive private negotiations stay competitive during the public phase of the takeover: if shareholders of the original acquirer react positive on deal announcement (i.e., my proxy for value-creation of the announced deal), I find that this increases the likelihood of receiving a competing offer from a different bidder. I also apply a propensity score matching procedure to analyze differences in takeover premiums between the two types of selling procedure: auctions versus one-to-one negotiations. This has not yet been carried out in the empirical literature. I find that the average premium is slightly higher in auctions compared to one-to-one negotiations, but high standard deviations of the premium in both subsamples do not indicate a statistically significant difference.

I conclude this thesis with some remarks and suggestions for future research.

Chapter 1

The Real Effects of Possible Stock Recalls on Acquirer Stocks: Empirical Evidence from M&A Premiums[‡]

I apply the idea of Strych (2020) that short sellers of acquirer stocks infer from their private observations of stock recalls that the deal will be more likely terminated. To profit from such an informational advantage through short selling, I expect that acquirers' short sellers become merger arbitrageurs after deal announcement in order to obtain a trading option on possible acquirer stock recalls. The higher this trading option value is, the more are merger arbitrageurs willing to pay for target shares, compared to the premium required by incumbent target shareholders. Anticipating this, I expect that acquirers reduce bid premiums accordingly. Consistently, in a sample of U.S. takeover announcements from 2004 to 2017, I find that a one-standard deviation increase of acquirer's short interest (i.e., magnitude of merger arbitrage activity) and institutional ownership concentration (i.e., likelihood of an observable recall) is associated with a 3.46% decrease of the one-week target share price 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. The effect is more pronounced, if targets exhibit low insider ownership and if acquirers have high active institutional ownership. As a channel of the information about this premium reduction effect, I regard advice to acquirers by investment banks with high equity capital market expertise. Hence, M&A advisors add value to acquirers, consistent with the findings of Dessaint, Eckbo, and Golubov (2019).

Keywords: Stock Recall, Short Selling, Blockholder, Takeover Premium, Mergers and Acquisitions.

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1.1 Introduction

In the literature, short sellers are regarded as sophisticated investors who are better informed about the true value of a stock than other market participants (e.g., Asquith, Pathak, and Ritter (2005), Boehmer, Jones, and Zhang (2008), Christophe, Ferri, and Hsieh (2010))[1]. 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 these studies treat short sellers' informational advantage as exogenously given, Strych (2020) suggests an endogenous informational advantage through short selling that 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 out stock at will[2]. Since short sellers are informed about recalls through private individual notifications, Strych (2020) hypothesizes that 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))[3]. Since short sellers can make profits through such an informational advantage, it reflects a "bright side" of recall risk in short selling.

[1] 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, Saffi, and Sturgess (2016), Jones and Lamont (2002)), high regulatory burdens (Bris, Goetzmann, and Zhu (2007), Saffi and Sigurdsson (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, Reed, and Ringgenberg (2018)).

[2] 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)).

[3] 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), and Edmans and Manso (2011)). Again, short sellers are informed early on about these stock price-relevant activities through their private observation of a stock recall.

As a trading strategy to profit from such private signals about stock lenders' imminent behavior, Strych (2020) suggests a merger arbitrage strategy (e.g., Mitchell, Pulvino, and Stafford (2004)) as follows: short sellers of acquirer's stock purchase target stocks in a recently announced takeover bid. 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. He shows that the reason for this is that stockholders recall because they intend to trade on the stock in order to *stop* the deal ("voting with the feet", as described in, e.g., Admati and Pfleiderer (2009)), or to *vote against* the deal (Aggarwal et al. (2015)). Both cause a more likely deal termination.

Consequently, short sellers of acquirer stocks sell their target shares and even sell them short to profit from a possible takeover termination. They sell short, because a deal cancellation likely entails, on average, significantly negative abnormal returns for target's stock (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, I assume that their expected value of an announced bid is higher than the expected value perceived by incumbent target shareholders.

I 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 this option enables short sellers to trade on a valuable recall signal. Then, I expect that acquirers anticipate short sellers' appropriation of such an option and their associated higher expected value from the deal, with a premium set at the incumbent target shareholders' reservation value. Acquirers are thus 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.

As a result, short sellers pay for their option obtained from acquirer's stock lenders by paying a higher price for target shares than offered by the acquirer himself. In this way, I 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[4] presumably crowd out incumbent target shareholders at lower bid premiums. I expect that acquirers anticipate this and set bid premiums lower – what I call the "premium reduction effect" – if the following two conditions are met: first, short sellers must be sufficiently motivated to become merger arbitrageurs and to purchase target shares. This is the case if stock recalls are likely observable after deal announcement. D'Avolio (2002) states that stock recalls are rare, and therefore an informational advantage might occur too seldom to render a valuable option. One reason for this is that recalls are diversified away by lending agents through alternative stock lenders before reaching out to short sellers[5]. I expect that such an 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), I choose the Hirschman-Herfindahl index of acquirer institutional shareholdings one trading day prior to deal announcement as a proxy for its beneficial lender concentration. Second, the magnitude of merger arbitrage (i.e., the aggregated share of shorted stocks) should be sufficiently high to reach the threshold of tendered shares necessary for deal completion[6]. Since information about the percentage share of shorted stocks (i.e., short interest as a percentage of outstanding shares) is available to the acquirer at almost any time, and particularly shortly before the time of bid announcement, acquirers regard short interest one trading day prior to deal announcement as the expected magnitude of merger arbitrage. This is because pre-announcement short sellers might become very likely post-announcement merger arbitrageurs due to their existing lending agreements.

My 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. I analyze a sample of takeover attempts of public U.S. target firms from 2004 to 2017. Thus, my central empirical prediction is the following:

[4] In the entire chapter, I assume that merger arbitrageurs are short in acquirer stocks and long in target stocks after deal announcement. Some empirical indication is given in Section 1.5.

[5] An example of such a notification can be found in the Appendix (Figure A3). Figure A1 in the Appendix illustrates how short selling works and which parties participate to facilitate the transaction.

[6] 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.

The higher the value of the trading option, determined by the probability of observing acquirer stock recalls and the magnitude of acquirer short sellers, the lower M&A premiums.

Main Findings

Consistently, I find that a one-standard deviation increase from the sample mean of this interaction term is associated with a decrease of the one-week premium by 3.46% and by USD 69.264 million for the average target. I call this finding the premium reduction effect which reflects a significant economic impact by informational advantages through short selling on firms targeted by short sellers insofar, that it enables acquirers to save money in takeover deals.

Based on the premium reduction effect, I observe positive buy-and-hold abnormal returns of acquirer stocks from four-month to twelve-month periods after deal announcement. This indicates that acquirers profit from the premium reduction effect. I interpret this finding as an indication that wealth is transferred from merger arbitrageurs to acquirer shareholders since the former lose money if acquirer stock prices rise abnormally. Hence, the value of such a 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.

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

In addition, I 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 could 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, I provide several empirical indications for the 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 both institutional ownership concentration and short interest are high. This can be explained by short sellers putting upward pressure on target stocks. Simultaneously, I find no such effect for deal completion itself, which helps me to rule out that the relation on arbitrage spread is driven by a higher likelihood of takeover completion.

Second, I observe that the premium reduction effect is more pronounced if target stocks are held by less insiders. Insiders 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 deal negotiations.

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

In addition, I show that the premium reduction effect is less pronounced if deal contracts include an acquirer termination fee provision, signaling higher incentives for the acquirer to close the deal, all else equal. This supports my 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, my results could be driven by such overvaluation. In a subsample test, I find, contrary to this argument, that the premium reduction effect is more pronounced if acquirer stocks are more likely undervalued.

The effect also exists if I replace institutional ownership concentration with insider ownership concentration. Yet my main analyses focuses on institutional ownership concentration, because I expect that insiders do not need to recall stocks for corporate governance purposes. In addition, insiders have more options to intervene directly, and they face more restrictions in trading caused by insider trading laws.

Contribution to the Literature

This chapter contributes to the extant literature in several ways. First, I contribute to the short selling literature. While Chuprinin and Ruf (2017) and Engelberg et al. (2018) explore the "dark side" of recall risk as a short selling constraint, I explore Strych's (2020) idea of a "bright side" that is caused by an informational advantage through short selling on which short sellers can trade on.

Second, I append the blockholder literature that regards blockholders as monitors of firms that are usually well-informed, irrespective of them being member of the board of directors (Holderness (2003), Shleifer and Vishny (1986), Maug (1998), Demsetz and Lehn (1985)). Strych (2020) assumes that short sellers can extract information from blockholders if they lend out shares. My results indicate that this is the case for takeovers, by showing that it is beneficial to acquirer shareholders. Consequently, blockholders add value to the firm.

Third, I add to the M&A literature which usually regards short sellers as merger arbitrageurs who just hedge their long position in target's stock (Mitchell and Pulvino (2001), Liu and Wu (2014)). The idea of an informational advantage through short selling provides an alternative explanation for their engagement in shorting acquirer stocks. Consistently, I show that acquirers can benefit from those merger arbitrageurs by lowering bid premiums.

Fourth, I 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 bid prices offered in takeovers reflect such real effects.

The remainder of this chapter is organized as follows. Section 1.2 describes my theoretical reasoning, the applied empirical strategy, as well as my main hypothesis. Section 1.3 describes the data sample and empirical models. Section 1.4 presents the baseline empirical results. Section 1.5 includes a discussion with additional analyses to support my reasoning and contains some robustness tests. Section 1.6 concludes.

1.2 Theoretical Reasoning, Empirical Strategy, and Central Hypothesis

1.2.1 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[7]. They profit when the stock price declines and they repurchase 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 aim to generate additional income from lending fees[8]. To the contrary, short sellers are market makers, specialists, option traders, or hedge funds[9]. While market makers and specialists usually sell short for market liquidity reasons and option traders short to hedge 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 usually do not have fixed maturity dates (Financial Stability Board (2012))[10]. This means that lenders and borrowers are both allowed to unilaterally terminate the equity loan on a daily basis, without prior notice and without specifying the reason. If lenders recall their lent out 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, which can take 23 days on average (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

[7] 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 (usually three trading days) by purchasing them before. Market makers are often such short sellers (Christian, Shapiro, and Whalen (2006)), which I do not expect to trade on informational advantages through short selling, and therefore I do not further address them. See Figure A1 in the Appendix for a detailed illustration how short seeling works.

[8] 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.

[9] 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)).

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

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.

1.2.2 Reasons for Stock Recalls

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

As another reason, Strych (2020) suggests that recalls might be credible signals to managers of firms whose stocks are recalled. Stock sales by stock lenders are possible at any time. This is done in order to put pressure on those managers in the direction these stock lenders prefer. The argument is based on the "voting with the feet"-idea which states that shareholders affect firm managers' decisions by threatening to sell or even actually selling their shares (e.g., Admati and Pfleiderer (2009)).

Moreover, Strych (2020) analyzes that lenders intend to vote on subsequent takeover proposals. Consistent with this notion, 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[11]. They report that 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[12]) in case lenders want to oppose management proposals and support shareholder proposals. Lenders recall their stocks to intervene through voting, which represents the most prevalent form of intervention (McCahery, Sautner, and Starks (2016)).

[11] 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.

[12] Figure A2 (Appendix) illustrates lending supply, borrowing demand, and utilization in case of recalls.

In addition, lenders may try to manipulate stock prices upward by restricting stock lending supply through recalls. E.g., Chuprinin and Ruf (2017) 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 negative abnormal stock returns in case of demand shocks. This indicates such upward stock price manipulation.

As an alternative rationale for stock lenders' recall, Strych (2020) outlines that lenders intend to trade their stocks according to the commonly known Wallstreet-rule "voting with the feet": Admati and Pfleiderer (2009) explain with their model how blockholders (i.e., 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 is likely to be more effective than the firm's manager in impounding information into prices, so that the manager's equity incentive becomes more efficient.

In the case of an exogenous reason for takeover deal termination, such as a regulatory disapproval that usually leads to a decline in acquirer's 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 regarding their expectation of stock price losses or their intention to exercise corporate governance activities through trading or voting. In any case, it is likely very valuable for short sellers to trade on this information. To conclude, following the literature surveyed above, I regard a stock recall as an event to exercise a corresponding option to trade on private information about the recalling lenders' imminent behavior.

1.2.3 Empirical Strategy and Central Hypothesis

In this chapter, I explore the informational advantage through short selling that originates from private observations of stock recalls by short sellers. Since I expect lending shareholders of borrowed stocks to know that short sellers are able to profit from recalls, I explore if this anticipation has any impact on these shareholders, their firms, and their firms' short sellers. As an empirical strategy, I investigate takeover attempts of publicly listed targets by publicly listed acquirers. This setting provides short sellers of acquirer stocks a possible trading

strategy 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 in the announced exchange ratio during a pending takeover attempt (e.g., Mitchell et al. (2004)). Given that takeover attempts are obviously extraordinary events, I expect that they possess the advantage for a feasible trading strategy because the content of the informational advantage through short selling can be interpreted very precisely: if short sellers observe recalls on acquirer stocks, they infer that a takeover termination is very likely and imminent. This is consistent with Aggarwal et al. (2015), who show that a decrease in lending supply prior to a voting event on a corporate control matter is associated with a higher likelihood of a negative vote by shareholders. Since acquirer shareholders vote only sometimes on a takeover[13], Strych (2020) concludes 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 a very likely deal termination from the recall.

If short sellers of acquirer stocks are also target shareholders (i.e., if they are merger arbitrageurs) and learn about takeover termination before all other market participants, Strych (2020) suggests that they can profit by selling their target shares at higher current prices (i.e., prior to deal termination announcement), because market prices hitherto still 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 can be likened to 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, I expect that merger arbitrageurs' expected value of the bid is higher than the expected value perceived by incumbent target shareholders, because the latter are exposed to deal termination risk and hence incorporate this negative outcome in their expected value of the bid. As a result, merger arbitrageurs would require a lower premium p_{low}

[13] In an additional analysis I find that approximately a quarter of all takeover attempts with public targets requires acquirer shareholder approval.

for the same expected value of the bid as in the case of the higher premium p_{high} demanded by incumbent target shareholders[14]. Nevertheless, merger arbitrageurs must pay p_{high} to incumbent target shareholders to purchase target stocks[15].

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

I regard pre-announcement acquirer's short interest (i.e., total number of shorted stocks as a percentage of all outstanding shares)[16] as a proxy for the expected magnitude of merger arbitrage. Since post-announcement short selling is likely constrained, reflected by usually rising lending fees after deal announcement (Geczy, Musto, and Reed (2002)), pre-announcement short sellers might be less exposed to such constraints due to their existing borrowing agreements. Thus, they might profit more from my proposed merger arbitrage strategy than short sellers setting up their strategy only after announcement of the deal.

In addition, short sellers only accept to pay a higher price including p_{high} to incumbent target shareholders, if merger arbitrageurs' informational advantage through short selling is sufficiently valuable. This 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 proxy 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

[14] To keep it simple, I differentiate in only two groups of target shareholders who have to vote on the takeover proposal: short sellers of acquirer stocks (merger arbitrageurs) and incumbent target shareholders with identical reservation values that determine p_{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 the majority shareholder, as Burkart, Gromb, and Panunzi (1998) show.

[15] I assume that the trading profits through the informational advantage are sufficiently high, so that their expected value including p_{low} offered by the acquirer is larger than p_{high}.

[16] Short interest is reported and published every two weeks, daily short sale volume is available since 2009.

finds that stock lenders are often institutional investors, such as pension funds, index funds, mutual funds, public retirement funds, and endowments[17].

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 my central, testable hypothesis:

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

1.3 Data Sample and Empirical Models

1.3.1 Data Sample

I obtain my dataset from Standard & Poor's Capital IQ database. The basic sample consists of 1,304 M&A transactions, and the sample period starts in January 2004 and ends in May 2017. I 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 a dilution of the informational advantage through short selling by other co-investors or bidder syndicates. Both the acquirer and the target are publicly traded and their headquarters are located in the United States.

1.3.2 Empirical Models

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

[17] I do not directly use lending supply and lender concentration data provided by data vendors such as IHS Markit, because my premium reduction effect occurs more likely if all involved parties in the M&A game possess data about recall observability. Since Markit data are very expensive, I 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. In Section 1.5, I discuss my preference of institutional ownership concentration over insider ownership concentration.

$$
\begin{aligned}
Premium_{i,t}^{1\ Week\ /\ 3\ Day\ /\ 1\ Day} = {} & \alpha_{i,t} + \beta_1\ Acq\ Short\ Interest_{i,t-1} \times Acq\ Instit\ Own\ Herf_{i,t-1} \\
& + \beta_2\ Acq\ Short\ Interest_{i,t-1} + \beta_3\ Acq\ Instit\ Own\ Herf_{i,t-1} \\
& + \gamma\ Acq\ and\ Tgt\ Ownership\ Characteristics_{i,t-1} \\
& + \delta\ Deal\ Characteristics_{i,t} \\
& + \vartheta\ Acq\ and\ Tgt\ Firm\ Characteristics_{i,t-1} \\
& + \varphi\ Acq\ Industry \times Year\ FE_{i,t} + \lambda\ Tgt\ Industry\ FE_{i,t} + \varepsilon_{i,t}
\end{aligned}
$$

The dependent variable is 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 prior to deal announcement. I also test with the three- and one-day premium, $Premium_{3\ Day}$ *and* $Premium_{1\ Day}$, defined accordingly[18]. The index i denotes the observation, i.e., the respective transaction, whereas t denotes the day of offer announcement. β_1 is the coefficient of primary interest.

My variable of interest is the interaction term, $Acq\ Short\ Interest_{i,t-1} \times Acq\ Instit\ Own\ Herf_{i,t-1}$ (abbreviated as *Acq SI* × *Acq Instit Herf* throughout this chapter), which consists of the short interest of the acquiring firm one trading day prior to deal announcement, *Acq SI*, expressed as a percentage of the latest number of total common shares outstanding, and the concentration of acquirer institutional ownership one trading day prior to deal announcement, *Acq Instit Herf*. Given that insider trading laws and regulatory burdens restrict insiders from strategic lending and recalling stocks, I use institutional ownership concentration as my primary proxy for the value of the trading option on the informational advantage through short selling: it is measured as a Hirschman-Herfindahl index, calculated as the sum of the squares of each individual institutional investor's percentage share in the acquiring firm. To support my hypothesis, I should find a negative coefficient on *Acq SI* × *Acq Instit Herf*.

Ownership Characteristics consist of seven variables, all obtained one trading day prior to deal announcement: *Acq Instit Sum* is the sum of institutional ownership of the acquirer,

[18] I also provide estimates with the one-month premium but focus on the one-week premium and three-day and one-day premium, because practitioners and filings for takeover attempts indicate that the final decision on the premium is made one week before announcement, and latest information about short interest and ownership structure is incorporated in the offered premium. All time indices in this chapter refer to trading days.

Acq Insider Herf measures the concentration of acquirer insider ownership (also measured as a Hirschman-Herfindahl index), and *Acq Insider Sum* is the sum of acquirer insider ownership. *Tgt Instit Herf*, *Tgt Instit Sum*, *Tgt Insider Herf*, and *Tgt Insider Sum*, respectively, are defined likewise for the target firm.

Besides these variables I include the following control variables in my models that are widely used in the M&A literature (see, e.g., Eckbo's (2009) detailed survey). *Deal Characteristics* comprise deal controls. The variable *Transaction Value (TV)* is the total transaction value net assumed liabilities and expressed in billions of USD. *Stock (% of TV)* measures the percentage share of the total transaction value that is paid with acquirer's stock. *BTF Dummy* is an indicator variable equal to 1 if the acquirer agrees to pay a bidder (buy-side) termination fee to the target firm in specific breakup events as negotiated in the merger agreements, and 0 otherwise. The similar definition applies to *TTF Dummy*, which is set to 1 if a target (sell-side) termination fee exists, and 0 if not (e.g., Bates and Lemmon (2003), Bodnaruk, Massa, and Simonov (2009)). *Friendly* is an indicator variable set to one if the deal attitude on the announcement day is friendly, and 0 otherwise. *Horizontal Takeover* is a dummy variable equal to 1 if both the acquirer and the target are assigned to the same industry (i.e., in case of horizontal takeovers, see similar, e.g., Betton, Eckbo, and Thorburn (2008)) as defined by the first of the four SIC digits, and 0 if not (diversifying takeover).

Acq Characteristics consist of numerous variables describing the characteristics of the acquirer (all obtained on the last trading day prior to announcement), such as: *ln Acq Market Cap*, the natural logarithm of the market capitalization of the acquirer, expressed in millions of USD. *ln Acq Vola LTM* is the one-year stock return volatility, i.e., the annualized standard deviation of weekly log-normal price returns of acquiring firm's stock over the past year (last twelve months). $Acq\ Performance\ LTM_{(Div.\ adj.)}$ is the performance of acquirer's share price, dividend adjusted and expressed in percentage terms, measured from the last twelve months until one trading day prior to deal announcement. I choose this control variable to account for possible rumors and stock price run-ups (Schwert (1996)). *Acq MTB* 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 of the acquirer on the corresponding day[19].

Tgt Characteristics is a set of control variables of target firm characteristics (*Tgt Performance LTM* $_{(Div.\ adj.)}$ and *Tgt MTB* $_{-22}$[20]) which are defined in the same way and account for the same effects as described for their acquirer counterparts[21].

To control for aggregate shocks to takeover activity in certain industries and across years, I estimate the regressions including acquirer industry-year fixed effects and target industry fixed effects. Both 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), Gormley and Matsa (2014))[22]. All variables are additionally defined in detail in Table A1 in the Appendix.

[19] I include turnover of 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.

[20] I choose to measure target's market-to-book ratio 22 trading days (i.e., one calendar month) prior to deal announcement to get rid of any stock price run-up (e.g., Schwert (1996)).

[21] The following variables are winsorized at the 1st and 99th percentile to reduce the influence of outliers (e.g., Edmans et al. (2012), Malmendier et al. (2016)): *Premium* $_{1\ Week}$, *Premium* $_{3\ Day}$, *Premium* $_{1\ Day}$, *Premium* $_{1\ Month}$, *Acq CAR* $_{[-1,+1]}$, *Acq CAR* $_{[-3,+3]}$, *Acq SI*, *Acq Performance LTM* $_{(Div.\ adj.)}$, *Acq Turnover* $_{1\ Month}$, *ln Acq Turnover* $_{1\ Month}$, and *Tgt Performance LTM* $_{(Div.\ adj.)}$. Instead, I winsorize *Arbitrage Spread* $_{2\ Day}$ at the 3rd and 97th percentile, and *Acq MTB* and *Tgt MTB* $_{-22}$ at the 99th percentile due to a larger number of outliers.
Despite the large number of explanatory variables, I 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.

[22] All my results are robust even if I include target industry-year fixed effects instead of target industry fixed effects alone (see, e.g., Table 2, columns (3), (5), (7), and (9)) for the different measures of target premiums) and remain qualitatively the same if I include industry fixed effects based on the first two SIC digits.

1.4 Empirical Results

1.4.1 Descriptive Statistics

The summary statistics of the sample (presented in Table 1) show that the mean of *Deal Completion* is 0.879, indicating that 87.9% of the deals in my dataset are comsummated and have been closed before end of May 2017. I further observe weekly target share price premiums of 32.8% on average, which is consistent with the literature, such as Malmendier et al. (2016) and Officer (2003). The median of $Premium_{1\ Week}$ is 28%, revealing that the distribution is right-skewed and has a minimum of −83.4% and a maximum of 260%. The distribution parameters are similar and comparable across all four measures of the target share price premium.

Buy-and-hold abnormal returns, *BHARs*, are measured from one trading day before until several months after announcement. Means and medians for all *BHARs* are negative, consistent with Savor and Lu (2009), although they split their sample in cash- vs. stock-financed bids, whereas I do not. In extreme cases, values for *BHARs* fall below −400% and on the other side exceed +360%, which is not a reason for concerns 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 these usually short event windows (Barber and Lyon (1997)). The number of observations for *BHARs* drops from 1,182 for the one-month *BHAR* to 1,166 for the twelve-month *BHAR*. This can be explained by acquirers being delisted or dropping out of the sample because of other reasons, such as, e.g., bankruptcy.

Short interest of the acquirer, *Acq SI*, averages at around four percent, with heavily shorted acquirer stocks culminating in more than 20% of common 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.

Table 1
Summary Statistics

Table 1 reports summary statistics of the sample consisting of 1,304 transactions announced between January 2004 and May 2017. All variables are obtained one trading day prior to deal announcement, unless otherwise noted (through an added time index). Indices display the point in time (i.e., trading day) relative to the transaction announcement date when the variable was measured. Cumulative abnormal returns (*CAR*) are measured from one trading day prior 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 (TV)*, all deal control dummy variables, *Acq Market Cap*, *Acq MTB*, *Acq Turnover* $_{1\ Month}$, and *Tgt MTB* $_{-22}$ are reported in percentage terms. All variables are defined in detail in Table A1 in the Appendix.

	Summary Statistics					
Variables	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Panel A: Target Share Price Premium, Announcement Returns, and Deal Outcomes						
Premium $_{1\ Week}$	1,304	32.820	28.005	34.789	−83.392	260.000
Premium $_{3\ Day}$	1,304	32.298	27.372	34.255	−83.132	250.980
Premium $_{1\ Day}$	1,304	30.960	25.644	33.249	−80.890	229.546
Premium $_{1\ Month}$	1,304	36.278	30.426	37.440	−83.556	276.800
Acq CAR $_{[-1;+1]}$	1,294	−1.022	−0.724	6.030	−21.253	25.184
Acq CAR $_{[-3;+3]}$	1,294	−1.246	−1.091	7.199	−32.383	27.296
Acq BHAR $_{[-1;+21]}$	1,182	−1.343	−1.413	14.088	−93.553	80.763
Acq BHAR $_{[-1;+42]}$	1,182	−1.976	−2.126	17.047	−85.985	69.235
Acq BHAR $_{[-1;+63]}$	1,180	−1.838	−2.066	21.627	−117.170	232.080
Acq BHAR $_{[-1;+84]}$	1,179	−1.949	−1.944	24.321	−147.499	102.504
Acq BHAR $_{[-1;+126]}$	1,179	−1.937	−1.334	30.606	−265.464	180.125
Acq BHAR $_{[-1;+189]}$	1,174	−2.382	−2.821	40.277	−315.142	314.622
Acq BHAR $_{[-1;+252]}$	1,166	−2.667	−1.644	46.041	−433.169	369.578
Arbitrage Spread $_{2\ Day}$	1,303	3.952	2.718	9.687	−34.843	35.029
Deal Completion	1,273	0.879	1	0.326	0	1
Panel B: Short Interest, Variables of Interest, and Ownership Controls						
Acq SI	1,304	3.799	2.510	3.809	0.012	21.198
Acq SI × Acq Instit Herf	1,304	0.092	0.036	0.187	0.000	3.936
Acq SI × Acq Insider Herf	1,304	0.019	0.001	0.094	0.000	1.640
Acq Instit Herf	1,304	0.026	0.016	0.064	0.000	0.869
Acq Instit Sum	1,304	49.887	49.682	21.141	0.327	99.828
Acq Instit Sum Active	1,304	10.010	8.243	7.053	0.000	38.003
Acq Insider Herf	1,304	0.007	0.001	0.028	0.000	0.304
Acq Insider Sum	1,304	5.713	1.474	9.815	0.000	70.897
Tgt Instit Herf	1,304	0.033	0.023	0.053	0.000	0.710
Tgt Instit Sum	1,304	52.229	53.968	28.385	0.009	99.894
Tgt Insider Herf	1,304	0.010	0.001	0.039	0.000	0.425
Tgt Insider Sum	1,304	7.559	2.609	11.734	0.000	75.819
Panel C: Deal Characteristics						
Transaction Value (TV)	1,304	3.086	0.401	9.100	0.002	111.702
Stock (% of TV)	1,304	35.807	29.068	36.982	0.000	100.000

BTF Dummy	1,304	0.252	0	0.434	0	1
TTF Dummy	1,304	0.867	1	0.340	0	1
Friendly	1,304	0.989	1	0.103	0	1
Horizontal Takeover	1,304	0.824	1	0.381	0	1
Panel D: Acquiring Firm Characteristics						
Acq Market Cap	1,304	19,814.810	2,554.978	47,441.640	9.648	538,896.00
ln Acq Market Cap	1,304	8.006	7.846	2.060	2.267	13.197
Acq Vola LTM	1,304	32.034	27.172	21.811	4.322	500.185
ln Acq Vola LTM	1,304	3.343	3.302	0.468	1.464	6.215
Acq Performance LTM (Div. adj.)	1,304	17.722	12.107	39.460	−72.143	300.753
Acq MTB	1,304	3.226	2.155	4.052	0.250	34.624
Acq Turnover $_{1\ Month}$	1,304	0.008	0.006	0.006	0.000	0.036
ln Acq Turnover $_{1\ Month}$	1,304	0.007	0.006	0.006	0.000	0.035
Acq Financial Advisor Top 8 Equity & Equity Linked	1,003	0.565	1	0.496	0	1
Panel E: Target Firm Characteristics						
Tgt Performance LTM (Div. adj.)	1,304	18.140	10.912	61.375	−86.108	391.228
Tgt MTB $_{-22}$	1,304	2.925	1.827	4.074	0.102	33.071

(Table 1 continued)

As mentioned above, I restrict the sample to transactions whose transaction value (TV) exceeds 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 *BTF Dummy* is 0.252, meaning that in around 25% of the transactions both parties agreed on such a clause, similar to Chen, Mahmudi, Virani, and Zhao (2020). On the other hand, 86.7% of the transactions include 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 use either pure cash or pure stock as deal currency. 82.4% of all transactions involve acquirer-target pairs within the same one-digit SIC industry. Comparing the values for acquiring firms' market capitalization and *Transaction Value (TV)* as a proxy for target firms' size signifies that the average acquirer is around ten times larger than the average target firm, congruent with Bodnaruk et al. (2009).

1.4.2 Main Regression Results

The coefficient on *Acq SI* × *Acq Instit Herf* is negative and statistically significant at the 5% level for *Premium* $_{1\ Day}$, and negative and statistically highly significant at the 1%

Table 2

Effect of the 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 trading day prior to the announcement date, *Acq SI*, and institutional ownership, *Acq Instit Herf*, one trading day prior to the announcement date (1) and on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* (2) as defined in Section 1.3. Column (3) repeats the regression in column (2) but applies target industry-year fixed effects. I 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 trading day prior to offer announcement. I furthermore control for deal features as well as acquirer and target characteristics as defined in Section 1.3. All independent variables are obtained one trading day prior to deal announcement, unless otherwise noted (through an added time index). All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Premium								
	1 Week			3 Day		1 Day		1 Month	
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Var. of Interest/Ownership Controls									
Acq SI	0.152	0.629	0.247	0.619	0.231	0.617	0.291	0.663	0.383
	(0.383)	(0.442)	(0.531)	(0.415)	(0.486)	(0.408)	(0.456)	(0.477)	(0.533)
Acq SI × Acq Instit Herf		−18.485***	−12.850**	−17.961***	−12.441**	−16.680**	−12.546**	−9.233	−3.154
		(6.224)	(6.243)	(6.495)	(5.698)	(6.378)	(5.364)	(10.027)	(8.033)
Acq Instit Herf	6.124	24.932	16.282	23.552	13.602	21.702	13.054	44.510	40.449
	(27.790)	(27.779)	(30.751)	(27.181)	(28.839)	(27.528)	(28.316)	(33.041)	(36.603)
Acq Instit Sum	−0.083	−0.051	−0.044	−0.022	−0.015	−0.002	0.001	−0.115*	−0.129*
	(0.062)	(0.062)	(0.064)	(0.063)	(0.067)	(0.065)	(0.067)	(0.068)	(0.071)
Acq Insider Herf	93.000	89.455	11.366	71.501	0.292	55.450	−5.324	115.026*	39.431
	(63.782)	(63.908)	(63.788)	(63.229)	(63.378)	(59.043)	(57.192)	(68.610)	(76.708)
Acq Insider Sum	−0.235	−0.216	−0.115	−0.153	−0.065	−0.112	−0.033	−0.201	−0.111
	(0.185)	(0.184)	(0.207)	(0.176)	(0.202)	(0.169)	(0.190)	(0.185)	(0.213)
Tgt Instit Herf	10.081	9.738	−4.110	18.108	3.463	17.187	8.406	−0.197	−7.219
	(28.139)	(27.628)	(17.737)	(25.892)	(15.194)	(20.857)	(14.198)	(24.647)	(19.347)
Tgt Instit Sum	−0.267***	−0.271***	−0.273***	−0.278***	−0.281***	−0.277***	−0.283***	−0.298***	−0.319***
	(0.057)	(0.056)	(0.051)	(0.056)	(0.050)	(0.051)	(0.047)	(0.063)	(0.060)
Tgt Insider Herf	−39.435	−39.636	−12.902	−24.178	−1.176	−10.382	−0.497	−55.080**	−19.811
	(24.045)	(24.090)	(27.158)	(25.152)	(28.863)	(23.462)	(25.698)	(25.713)	(28.933)

Tgt Insider Sum	−0.056	−0.056	−0.160	−0.086	−0.171	−0.107	−0.166	0.046	−0.062
	(0.109)	(0.110)	(0.109)	(0.113)	(0.117)	(0.101)	(0.103)	(0.113)	(0.112)
Deal Characteristics									
Transaction Value (TV)	−0.409***	−0.401***	−0.350***	−0.391***	−0.349***	−0.422***	−0.376***	−0.529***	−0.496***
	(0.140)	(0.139)	(0.125)	(0.137)	(0.126)	(0.142)	(0.131)	(0.192)	(0.178)
Stock (% of TV)	−0.097**	−0.094**	−0.087**	−0.074*	−0.067*	−0.077**	−0.071*	−0.097**	−0.096**
	(0.044)	(0.044)	(0.044)	(0.038)	(0.039)	(0.035)	(0.036)	(0.044)	(0.047)
BTF Dummy	−3.831**	−3.742**	−5.241***	−4.503**	−5.938***	−4.553***	−5.617***	−3.645*	−4.632**
	(1.872)	(1.875)	(1.893)	(1.773)	(1.858)	(1.635)	(1.772)	(2.021)	(2.109)
TTF Dummy	8.792*	8.618*	7.716	7.605*	6.439	9.196**	8.412*	9.050	8.084
	(4.774)	(4.770)	(4.891)	(4.460)	(4.597)	(4.308)	(4.399)	(5.805)	(6.029)
Friendly	−20.027*	−19.189*	−19.353*	−21.088*	−21.243*	−21.864**	−22.648**	−11.613	−12.089
	(10.714)	(10.671)	(10.856)	(11.124)	(11.365)	(10.824)	(11.029)	(8.541)	(9.019)
Horizontal Takeover	3.796	3.616	5.565**	4.372*	5.129**	4.804**	5.983***	5.232*	5.783***
	(2.767)	(2.762)	(2.310)	(2.570)	(2.187)	(2.409)	(2.144)	(2.754)	(2.172)
Acquiring Firm Characteristics									
ln Acq Market Cap	1.904***	1.910***	1.708**	2.052***	1.818**	1.859**	1.674**	3.133***	3.056***
	(0.698)	(0.696)	(0.743)	(0.754)	(0.742)	(0.747)	(0.760)	(0.786)	(0.840)
ln Acq Vola LTM	4.172	4.399	4.991	4.502	4.683	4.239	4.443	3.119	2.898
	(3.804)	(3.838)	(4.305)	(3.891)	(4.294)	(3.756)	(3.901)	(4.060)	(4.506)
Acq Performance LTM (Div. adj.)	0.006	0.007	0.008	0.013	0.018	0.005	0.008	0.008	0.006
	(0.032)	(0.033)	(0.039)	(0.031)	(0.038)	(0.030)	(0.035)	(0.037)	(0.044)
Acq MTB	−0.009	0.002	0.007	−0.016	−0.028	0.079	0.077	0.158	0.227
	(0.185)	(0.187)	(0.224)	(0.186)	(0.228)	(0.184)	(0.222)	(0.220)	(0.249)
ln Acq Turnover 1 Month	−229.236	−229.526	−64.903	−161.574	7.710	−137.215	20.653	−247.620	−56.166
	(248.017)	(248.750)	(281.176)	(282.843)	(316.397)	(275.708)	(298.913)	(258.126)	(297.870)
Target Firm Characteristics									
Tgt Performance LTM (Div. adj.)	−0.063***	−0.070***	−0.076***	−0.076***	−0.083***	−0.077***	−0.087***	−0.013	−0.017
	(0.018)	(0.018)	(0.020)	(0.019)	(0.021)	(0.019)	(0.021)	(0.025)	(0.026)
Tgt MTB −22	−0.401	−0.400	−0.398	−0.267	−0.264	−0.204	−0.228	−0.666**	−0.667**
	(0.259)	(0.261)	(0.291)	(0.268)	(0.302)	(0.255)	(0.286)	(0.274)	(0.274)
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	No	Yes	No	Yes	No	Yes	No
Tgt Industry × Year FE	No	No	Yes	No	Yes	No	Yes	No	Yes
Observations	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,304
Adjusted R^2	0.080	0.083	0.126	0.077	0.112	0.087	0.125	0.077	0.102

(Table 2 continued)

level for $Premium_{3\,Day}$ and $Premium_{1\,Week}$, respectively (depicted in Table 2, column (2), (4), and (6), respectively)[23]. This finding indicates that the higher acquirer short interest and the higher acquirer institutional ownership concentration, the lower is the one-week and three- and one-day bid premium. Thus, my central hypothesis is supported. An increase of $Acq\ SI \times Acq\ Instit\ Herf$ by one standard deviation (0.187) is associated with a decrease of the one-week premium by 3.46 percent ($= 0.187(-18.485)$) and by USD 69.264 million for the average target with a market capitalization of USD 2,003.760 million. This is economically significant.

In addition, I find a positive and statistically insignificant coefficient on the separate short interest variable and no statistically significant coefficient on acquirer institutional ownership concentration (specification (1)), supporting my expectation that both conditions of a high short interest and a high value of the informational advantage are reflected by the interaction term[24]. Both must be met in order to enable the premium reduction. Using stock in a transaction yields a negative and statistically highly significant relation to $Premium_{1\,Week}$, similar to comparable regressions in, e.g., Bates and Lemmon (2003). The market capitalization of the acquiring firm one trading day prior to offer announcement is highly and positively related to $Premium_{1\,Week}$, consistent with Officer (2003).

Table A2 (deferred to the Appendix for brevity) shows the results obtained from a modular regression setup. Column (1) regresses the one-week premium on the interaction term and its components alone. The effect of $Acq\ SI \times Acq\ Instit\ Herf$ is statistically significant at the 5% level. The inclusion of *Ownership Controls* does not change this result (see column (2)). Once I 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 I control for these potential

[23] For the one-month premium, I obtain an insignificant coefficient, indicating that my 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.

[24] The further descriptions refer to the specification with the one-week premium.

sources of omitted variable bias. Furthermore, comparing regressions (4) with (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 with changing fixed-effects[25]. Regression (7) depicts that the inclusion of acquirer industry-year fixed effects increases the marginal effect of $Acq\ SI \times Acq\ Instit\ Herf$ on $Premium_{1\ Week}$ slightly.

1.5 Discussion and Robustness Tests

1.5.1 Value Effects on Acquirer Stocks

To analyze value effects on acquirer stocks caused by the premium reduction effect, I conduct both a short-term and a long-term stock performance event study. In the first step, I regress the acquiring firm's cumulative abnormal return, measured from one trading day before until one trading day after announcement, and based on dividend adjusted day close prices, $Acq\ CAR_{[-1,+1]}$, on the interaction term and other controls as depicted in Table 3, columns (1)–(3). Cumulative abnormal returns are calculated applying a Carhart (1997) four-factor model. The model parameter estimation period begins twelve months before and ends two trading days prior to announcement. 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 the premium reduction effect instantaneously in acquiring firms' stock prices. Regressions (4)–(6) repeat analysis (1)–(3), but replace the dependent variable with the seven-day symmetric abnormal return, $Acq\ CAR_{[-3,+3]}$[26].

[25] 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), I perform a classical Hausman specification test (Hausman (1978)) which always rejects the null in favor of a fixed effects model. I therefore allow for arbitrary dependence between these industry-year effects and the observed explanatory variables.

[26] My 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.

Table 3
Acquirer Short-Term Value Effects

Table 3 depicts linear fixed effects regressions of acquirer cumulative abnormal returns (CAR) on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* (1) and other controls as defined in Section 1.3, including acquirer industry-year fixed effects. All independent variables are obtained one trading day prior to deal announcement, unless otherwise noted (through an added time index). 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 include 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 firm's 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 firm's cumulative abnormal return from three trading days before until three trading days after announcement. The results are robust to whether or not I 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. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acq CAR					
Event Window	[−1;+1]			[−3;+3]		
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Acq SI	−0.018	−0.047	−0.026	0.061	0.000	0.049
	(0.089)	(0.072)	(0.088)	(0.107)	(0.084)	(0.105)
Acq SI × Acq Instit Herf	−1.405		−0.800	−2.361		−1.925
	(1.213)		(1.243)	(1.621)		(1.722)
Acq Instit Herf	0.935	−0.498	0.313	2.904	0.565	2.516
	(3.483)	(3.119)	(3.401)	(5.362)	(4.916)	(5.549)
Deal Characteristics						
Premium $_{1\ Month}$	−0.011**	−0.012**	−0.012**	−0.021**	−0.023**	−0.023**
	(0.005)	(0.005)	(0.005)	(0.010)	(0.010)	(0.010)
Transaction Value (TV)	−0.079***	−0.078***	−0.078***	−0.074***	−0.074***	−0.073***
	(0.015)	(0.014)	(0.014)	(0.020)	(0.021)	(0.021)
Stock (% of TV)	−0.039***	−0.039***	−0.039***	−0.035***	−0.035***	−0.035***
	(0.006)	(0.006)	(0.006)	(0.008)	(0.008)	(0.008)
Target Firm Characteristics						
Tgt Performance LTM $_{(Div.\ adj.)}$		0.010***	0.010***		0.011**	0.010**
		(0.003)	(0.003)		(0.004)	(0.004)
Tgt MTB $_{-22}$		−0.117***	−0.117***		−0.178***	−0.178***
		(0.039)	(0.039)		(0.057)	(0.056)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	No	Yes	Yes	No	Yes	Yes
Observations	1,294	1,294	1,294	1,294	1,294	1,294
Adjusted R^2	0.065	0.079	0.078	0.052	0.062	0.063

Since I do not find an incorporation of the premium reduction effect in acquiring firms' stock prices, at least in the short run, I additionally perform a long-term event study 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, I cannot rely on normal return models, such as Carhart's (1997) four-factor model. Performance analyses multiple months or even years after the event date are then likely biased, especially when changes in an event portfolio, e.g., as in a calendar-time portfolio approach, occur (Mitchell and Stafford (2000), Fama (1998)). Due to these problems of appropriate post-event risk-adjusting for long-term abnormal returns, I cannot apply a short-term factor model approach 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 to use (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 my purpose of analysis, because I do not want to evaluate if event firms *in general* earn abnormal returns which 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 ten matched firms as a benchmark.

I 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, I 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)):

$$\begin{aligned} BHAR^{i}_{t_1,t_2} &= BH^{i}_{t_1,t_2} - BH^{i,match}_{t_1,t_2} \\ &= \prod_{t=t_1}^{t_2-1}\left(1 + R^{i}_{t,t+1}\right) - \prod_{t=t_1}^{t_2-1}\left(1 + R^{i,match}_{t,t+1}\right) \end{aligned}$$

whereas in my case, $BH^{i}_{t_1,t_2}$ is the (daily) continuously compounded buy-and-hold investment return of the acquiring firm, t_1 is the day when the investment is made, i.e., going long in acquirer's stock one trading day prior to 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. I calculate all single returns on a daily basis by using respective dividend adjusted day close prices. $BH^{i,match}_{t_1,t_2}$ 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, I match the control firm in the following way: first, I identify all public firms with the same one-digit SIC code and market value of equity, 22 trading days prior to offer announcement, between 50% and 150% of the market value of equity of the sample acquiring firm. Second, I choose the same size restriction for control firms as I do for acquiring (event) firms: market values of equity one trading day prior to announcement (t_1) and at the end of the holding period (t_2) both must exceed USD 1 million. I 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, I then choose the final control (matched) firm as the firm with the market-to-book ratio 22 trading days prior to announcement nearest to that of the acquiring (event) firm on the same day. I do this 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 I analyze buy-and-hold abnormal returns until twelve months after announcement, I drop

all observations announced after the end of April 2016, which explains why the sample size is reduced from 1,304 to 1,182 observations. In contrast to Savor and Lu (2009), I do not exclude control firms that were involved in a merger bid over the previous three years. I am 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 4
Acquirer 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* × *Acq Instit Herf* and other controls as defined in Section 1.3. 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 include all control variables. 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) with different buy-and-hold abnormal return periods. The results are robust to changes in the point in time when the buy-and-hold strategy was formed (i.e., to the point in time prior to deal announcement). All regressions include fixed effects for acquirer's and target's industry, year fixed effects as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acq BHAR						
Event Window	[–1;+21]	[–1;+42]	[–1;+63]	[–1;+84]	[–1;+126]	[–1;+189]	[–1;+252]
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Acq SI	−0.160	−0.208	−0.061	−0.250	−0.566	−1.223**	−1.717***
	(0.220)	(0.235)	(0.265)	(0.305)	(0.382)	(0.535)	(0.605)
Acq SI × Acq Instit Herf	2.200	1.946	1.203	13.15**	18.968**	25.789**	23.505*
	(3.740)	(4.437)	(5.160)	(5.825)	(9.497)	(11.960)	(13.585)
Acq Instit Herf	−3.449	−4.572	−16.86*	−30.8**	−45.81***	−63.65***	−67.41***
	(9.651)	(7.112)	(9.192)	(14.714)	(15.370)	(21.475)	(24.210)
Deal Characteristics							
Premium $_{1\ Month}$	−0.016	−0.010	−0.012	−0.016	−0.002	0.013	0.069
	(0.018)	(0.017)	(0.019)	(0.020)	(0.027)	(0.034)	(0.044)
Transaction Value (TV)	−0.055	−0.12**	−0.16**	−0.123	−0.060	0.045	0.196
	(0.043)	(0.056)	(0.067)	(0.076)	(0.104)	(0.149)	(0.157)
Stock (% of TV)	−0.06***	−0.05**	−0.033	−0.059*	−0.098**	−0.104**	−0.144**
	(0.017)	(0.020)	(0.028)	(0.030)	(0.038)	(0.052)	(0.059)
BTF Dummy	0.758	1.771	3.528**	3.015*	3.291	2.946	3.667
	(1.114)	(1.306)	(1.709)	(1.831)	(2.315)	(2.939)	(3.590)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acq Ind., Tgt Ind. & Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,182	1,182	1,180	1,179	1,179	1,174	1,166
Adjusted R^2	0.041	0.031	0.013	0.018	0.021	0.016	0.022

Table 4 shows the results for regressions of several buy-and-hold abnormal returns (*BHAR*) on the interaction term, $Acq\ SI \times Acq\ Instit\ Herf$, and the full set of control variables. All regressions include standard errors which are adjusted for heteroskedasticity and within-cluster correlation (White (1980)), as well as year, acquirer industry, and target industry fixed effects. The latter is done to control for unobserved heterogeneity within certain industries and common year-specific shocks.

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, I 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 4, column (4)). This marginal effect increases in magnitude with the buy-and-hold investment time horizon until nine months after announcement, as column (6) with $BHAR_{[-1,+189]}$ as the dependent variable represents[27].

I 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, I 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.

For the short-term analyses, liquidity issues could also explain the insignificant returns, because merger arbitrageurs sell acquirer stocks short and thus neutralize value creation. Given the pervasive statistical significance of the coefficient of the interaction term across several months, I infer that the premium reduction effect, in fact, has a positive long-term effect on acquiring firm's value.

I interpret this as an indication that wealth is transferred from merger arbitrageurs to acquirer shareholders, because the former lose if acquirer stocks appreciate.

[27] I 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, because long-term buy-and-hold abnormal returns might be driven by unobserved factors in the year subsequent to deal announcement. Anyway, I obtain similar qualitative results after excluding announcement-year fixed effects and including deal resolution-year fixed effects.

1.5.2 Acquirers' Deal Advisors' Capital Market Expertise

I expect that acquirer managers might not be aware of my 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[28], and expertise to predict merger arbitrageurs' and shareholders' behavior properly. Thus, I assume that deal advisors, such as investment banks[29] with equity capital market expertise, might fill this void and provide missing information.

I 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 year prior to the deal announcement year as published by Bloomberg. The cut-off value of eight is chosen following Fang (2005) and Golubov, 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[30]. Though, this equity league table is just a proxy for my notion of equity capital market expertise regarding short selling and lending information, because it lists investments banks who advise in IPOs and SEOs and are not directly involved as lending agents. However, I assume that investment banks that perform well with equity capital market advising more likely possess this kind of information I refer to, for example when they also act as lending agents[31].

Since acquirers might use this kind of information to lower bid premiums, I expect empirically that the relation of *Acq SI* × *Acq Instit Herf* and premiums is more pronounced, if acquirers' deal advisors have high equity capital market expertise.

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[28] 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 takeover announcement. Relevant is the short-term proprietary information of lending agents that are more likely part of deal advisory firms with a high ranking in the chosen equity league table. Some prominent examples for such firms are, e.g., Goldman Sachs, J.P. Morgan, Morgan Stanley, and Bank of America Merrill Lynch.

[29] Bao and Edmans (2011), for instance, document better outcomes for deals with investment banks as advisors.

[30] Since the number eight as the cut-off value looks arbitrarily chosen, I also take the Top 10 list (although also arbitrary) and get the same qualitative results.

[31] Due to Chinese walls, I cannot expect a direct information transfer, but I expect that some legal information spillover effects exist, as it is suggested by some literature (e.g., Griffin, Shu, and Topaloglu (2012)).

For each deal, I retrieve all financial advisors of the acquirer from the Capital IQ database and choose the advisor with the highest equity capital market expertise as ranked in the above-mentioned league table of the year preceding the deal announcement. I 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. I then split the sample based on this indicator variable and find that the coefficient on the interaction term is only statistically significant for the subsample with advisors that have a high equity capital market expertise (see Table 5, columns (2), (4), and (6)).

Table 5
Effect of the Informational Advantage through Short Selling on Target Premiums: Presence of a Top-ranked Equity Capital Market Financial Advisor

Table 5 presents the results of linear fixed effects regressions of $Premium_{1\ Week}$, $Premium_{3\ Day}$, and $Premium_{1\ Day}$ on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* as defined in Section 1.3. Columns (2), (4), and (6) show the results for deals where at least one financial advisor of the acquiring firm was listed in the Top 8 U.S. league table "Equity & Equity Linked" as reported by Bloomberg in the 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 trading day prior to offer announcement. I furthermore control for deal features as well as acquirer and target characteristics as defined in Section 1.3. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Premium					
	1 Week		3 Day		1 Day	
Acq Financial Advisor Top 8 Equity & Equity Linked	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Acq SI	0.572	0.373	0.632	0.317	0.446	0.373
	(0.746)	(0.606)	(0.675)	(0.637)	(0.601)	(0.635)
Acq SI × Acq Instit Herf	2.505	−19.965**	6.795	−21.935**	7.843	−22.943**
	(28.112)	(9.297)	(24.975)	(9.310)	(21.748)	(9.409)
Acq Instit Herf	−20.981	104.391***	−25.064	102.903***	−31.320	99.451***
	(38.339)	(31.249)	(38.650)	(32.975)	(36.339)	(34.025)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	436	567	436	567	436	567
Adjusted R^2	0.147	0.111	0.154	0.091	0.166	0.086

This supports my hypothesis that the premium reduction effect is more pronounced for better advised acquirers. In addition, the insignificant results from the low expertise advisor subsample indicate that the choice of high expertise advisors 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 that the positive time effect in acquirer announcement returns is likely linked to deal advice: they might add value to their advice and thus to their acquirer clients through their proprietary knowledge of the premium reduction effect.

1.5.3 Indication of Short Sellers becoming Merger Arbitrageurs

Since I cannot directly observe if short sellers become merger arbitrageurs as I assume in this chapter, I explore how short sellers and their informational advantage might be correlated with post-announcement target stock reactions. As a measure for these reactions, I choose the so-called arbitrage spread, $Arbitrage\ Spread_{2\ Day}$ (e.g., Mitchell and Pulvino (2001), Jindra and Walkling (2004), and Liu and Wu (2014)), defined as the ratio between the difference of the offer price per share on the announcement date and the last sale price of target's stock on the second trading day after bid announcement, and the offer price per share on announcement, expressed in percentage terms:

$$Arbitrage\ Spread_{2\ Day} = \frac{Offer\ Price\ per\ Target\ Share_t - Last\ Sale\ Price\ of\ Target\ Share_{t+2}}{Offer\ Price\ per\ Target\ Share_t}$$

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.

As I 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 in the market after announcement. Consequently, I expect that target stock prices are closer to the premium, reflected by tighter arbitrage spreads, the more merger arbitragers (acquirers' short interest) with a more valuable informational advantage (acquirers' concentration of institutional ownership) exist. My results (exhibited in Table 6, columns (1)–(4)) show that the relation is negative and statistically significant at the

Table 6

Post-Announcement Target Stock Reactions

Table 6 presents the results of linear fixed effects regression models without and with interaction term regressing *Arbitrage Spread* $_{2\ Day}$ on acquirer short interest one day prior to the announcement date, *Acq SI*, and institutional ownership, *Acq Instit Herf*, one day before the announcement date ((1) and (3)) and on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* ((2) and (4)) as defined in Section 1.3. Columns (5)–(8) show the results of seemingly unrelated regressions (Zellner (1962)) of both *Arbitrage Spread* $_{2\ Day}$ and *Deal Completion* on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* and the same set of control variables: ownership controls contain Hirschman-Herfindahl indices and the sums of both institutional and insider ownership one trading day prior to offer announcement. I furthermore control for deal features as well as acquirer and target characteristics as defined in Section 1.3. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Regression Type	Linear Fixed Effects Regression				Seemingly Unrelated Regression			
Dependent Variable	Arbitrage Spread $_{2\ Day}$				Arbitrage Spread $_{2\ Day}$	Deal Completion	Arbitrage Spread $_{2\ Day}$	Deal Completion
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acq SI	−0.040	0.056	−0.038	0.052	0.044	−0.001	0.038	−0.000
	(0.102)	(0.116)	(0.120)	(0.133)	(0.094)	(0.003)	(0.095)	(0.003)
Acq SI × Acq Instit Herf		−3.709**		−3.437**	−3.612*	−0.014	−3.466*	−0.022
		(1.875)		(1.699)	(2.030)	(0.063)	(2.027)	(0.062)
Acq Instit Herf	15.110*	18.896*	12.190*	16.152**	18.579***	0.242	16.185***	0.259
	(8.865)	(9.772)	(7.148)	(8.116)	(5.228)	(0.162)	(5.473)	(0.169)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	No	No	Yes	Yes	No	No
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry × Year FE	No	No	Yes	Yes	No	No	Yes	Yes
Observations	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303
Adjusted R^2	0.221	0.222	0.233	0.234	0.347	0.445	0.396	0.489

5% level[32]. This supports my reasoning that merger arbitrageurs pay higher prices after announcement to acquire target shares.

Since the arbitrage spread also mirrors the likelihood of takeover completion and to control for deal completion as a component of the arbitrage spread, I test this relation in a Zellner (1962) seemingly unrelated regression model with the two dependent variables *Arbitrage Spread* $_{2\,Day}$ and *Deal Completion*. My results (exhibited in Table 6, columns (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 the market's assessment of the probability of deal completion.

The insignificant result regarding deal completion is not surprising, because merger arbitrageurs are only able to influence target shareholders' approval[33], 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.

Table A3 (deferred to the Appendix for brevity) shows the modular regression setup analogous to Table A2 but with *Arbitrage Spread* $_{2\,Day}$ as the dependent variable. The negative coefficient on the interaction term increases and becomes statistically more significant after I include fixed effects, which can be seen by comparing column (2) with column (4) and column (3) with column (6), respectively. Once I include acquirer characteristics, the statistically significant coefficient on *Acq SI* for *Arbitrage Spread* $_{2\,Day}$ disappears in all regression setups. Another interesting point is the positive coefficient on *Acq Instit Herf*, 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

[32] Contrary to my basic models, I include the one-month premium to control for all price-related deal characteristics.

[33] Merger arbitrageurs can prefer to approve deals (e.g., Cornelli and Li (2002)), particularly in stock deals when they want to close out their short position through the deal-induced stock exchange (Mitchell et al. (2004)).

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 Strych (2020) and Aggarwal et al. (2015).

Table 7
Effect of the 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 $Premium_{1\ Week}$, $Premium_{3\ Day}$, and $Premium_{1\ Day}$ on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* as defined in Section 1.3. Columns (1), (3), and (5) show the results for deals where the sum of insiders' holdings in the target firm one trading day prior to deal announcement is below the sample median (*Tgt Insider Sum Median = 0*); columns (2), (4), and (6) show the results if the sum was above the sample median (*Tgt Insider Sum Median = 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 trading day prior to offer announcement. I furthermore control for deal features as well as acquirer and target characteristics as defined in Section 1.3. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Premium					
	1 Week		3 Day		1 Day	
Tgt Insider Sum Median	*0*	*1*	*0*	*1*	*0*	*1*
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Acq SI	−0.081	1.194*	−0.057	1.206*	0.075	1.132*
	(0.745)	(0.701)	(0.724)	(0.634)	(0.727)	(0.574)
Acq SI × Acq Instit Herf	−23.199**	−15.701	−25.794**	−12.220	−27.382**	−10.412
	(11.557)	(22.902)	(10.575)	(22.422)	(10.540)	(19.539)
Acq Instit Herf	21.373	−31.494	21.714	−27.425	23.096	−32.457
	(21.367)	(33.166)	(18.504)	(36.214)	(18.466)	(33.989)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	652	652	652	652	652	652
Adjusted R^2	0.105	0.085	0.099	0.080	0.116	0.081

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, I expect that the premium reduction effect is less pronounced, if target shareholders include high insider ownership that is greater than the median of target insider ownership in the sample, denoted as $Tgt\ Insider\ Sum\ Median = 1$. I interpret this as a case of lower post-announcement liquidity of target stocks from the merger arbitrageurs' perspective. Consistently, I find that the coefficient on $Acq\ SI \times Acq\ Instit\ Herf$ is only statistically significant for low target insider ownership (exhibited in Table 7, column (1), (3), and (5)). This result indicates an obstacle for short sellers to become merger arbitrageurs as investors in target stocks if target insider ownership is high.

1.5.4 Variation of the Value of the Option to Trade on the Informational Advantage

Since recalls convey information about lenders' behavior privately to short sellers, the value of the option to trade on that informational advantage likely differs among certain types of lenders: to know if lenders, which are usually well-informed about their 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 ownership in the firm (e.g., Rubin (2007), Boehmer and Kelley (2009)). The reasoning for this is that investors who hold a high fraction of the 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, as described above, blockholders that are very likely stock lenders might recall their stock to be able to sell it, because they anticipate imminent stock losses.

To 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 (Strych (2020))[34]. The reason for this is that passive investors, that, e.g., just mimic indexes, have no incentive to gather information about underlying stocks and are thus 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 I follow this reasoning, I expect that the effect of the interaction term on premiums is more pronounced, if passive institutional ownership of acquirer stock is low, i.e., when active investors' percentage share is high[35].

I identify active and passive institutional investors of acquirer stocks according to Standard and Poor's Capital IQ database. Capital IQ provides information about the investment style orientation of the institutional investor[36]. I sum up all active institutional investors' percentage share in acquiring firm's stock one trading day prior to deal announcement in a variable named *Acq Instit Sum Active*. The sample is then split into two subsets, based on the variable *Acq Instit Sum Active Median*, which is a dummy variable equal to one if the sum is above the median of *Acq Instit Sum Active*, and 0 otherwise.

The results are shown in Table 8. The coefficient on *Acq SI* $\times$ *Acq Instit Herf* is statistically significant at the 5% level for $Premium_{1\ Week}$, as depicted in column (2), and significant at the 1% level for both the three- and one-day premium, shown in columns (4) and (6), respectively. If *Acq Instit Sum Active* is below the median, i.e., for firms with low active – or conversely high passive – institutional ownership, the coefficient on the interaction term is statistically insignificant. Both results indicate that with low active institutional ownership, the value of the informational advantage through short selling might be too low that short

[34] Due to this reason, passive investors are considered to be "safer" stock lenders (D'Avolio (2002)).
[35] Alternatively, consistent with Prado et al. (2016), passive investors restrict lending supply less severely than active investors. This might also produce my stronger results for less passive ownership acquirers.
[36] Since institutional investors are often stockholders through a fund structure, some institutions, such as BlackRock, have actively and passively managed funds and I do not know the name of the directly investing fund: the classification should be seen as a likely estimate of the real investment style orientation of the fund that directly holds 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 form SEC's N-SAR filings.

sellers as merger arbitrageurs might not be attracted due to no feasible trading on such an "advantage".

Table 8
Effect of the 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 $Premium_{1\ Week}$, $Premium_{3\ Day}$, and $Premium_{1\ Day}$ on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* as defined in Section 1.3. Columns (1), (3), and (5) show the results for deals where the sum of active institutional investors' holdings in the acquiring firm one trading day prior to deal announcement is below the sample median (*Acq Instit Sum Active Median = 0*); columns (2), (4), and (6) show the results if the sum is above the sample median (*Acq Instit Sum Active Median = 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 prior to offer announcement. I furthermore control for deal features as well as acquirer and target characteristics as defined in Section 1.3. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Premium					
	1 Week		3 Day		1 Day	
Acq Instit Sum Active Median	*0*	*1*	*0*	*1*	*0*	*1*
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Acq SI	0.387	0.747	0.290	0.856	0.166	0.935
	(0.693)	(0.851)	(0.610)	(0.807)	(0.590)	(0.746)
Acq SI × Acq Instit Herf	−11.907	−26.003**	−7.240	−26.457***	−3.827	−29.049***
	(10.204)	(11.191)	(9.525)	(9.949)	(9.592)	(10.132)
Acq Instit Herf	−15.917	40.307	−29.240	39.011	−23.022	42.403
	(76.923)	(27.324)	(69.001)	(27.045)	(72.740)	(27.906)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	652	652	652	652	652	652
Adjusted R^2	0.079	0.083	0.067	0.075	0.075	0.076

As an alternative driver for the value of the informational advantage, I suggest the likelihood of deal completion measured prior to deal announcement, i.e., before acquirer shareholders assess the deal proposal and might incorporate their information in acquirer and target stock prices. My intuition for this is that merger arbitrageurs might profit from private signals of deal failure more often, and thus render the expected value of such an informational advantage higher, if 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), Chen et al. (2020)), I suggest that recalls as signals of imminent deal failures occur less likely if an acquirer termination fee provision, indicated by the binary variable *BTF Dummy*, exists. In this case, short sellers less often profit from their informational advantage. Hence, I expect that the relation of the interaction term and premiums is more pronounced, if the deal does not include an acquirer termination fee provision. Consistently, I only find in the case of no negotiated acquirer termination fee provision a negative and statistically significant coefficient on *Acq SI* × *Acq Instit Herf* (Table 9, column (1), (3), and (5))[37].

Table 9
Effect of the Informational Advantage through Short Selling on Target Premiums: Inclusion of Acquirer Termination Fee Provisions

Table 9 presents the results of linear fixed effects regressions of $Premium_{1\ Week}$, $Premium_{3\ Day}$, and $Premium_{1\ Day}$ on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* as defined in Section 1.3. Columns (1), (3), and (5) show the results for deals without an acquirer termination fee (*BTF* = *No*); columns (2), (4), and (6) show the results if such a fee was agreed on in the merger agreement (*BTF* = *Yes*), 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. I furthermore control for deal features as well as acquirer and target characteristics as defined in Section 1.3. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Premium					
	1 Week		3 Day		1 Day	
BTF	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Acq SI	0.371	1.016	0.336	0.918	0.456	0.863
	(0.565)	(0.983)	(0.524)	(0.923)	(0.492)	(0.852)
Acq SI × Acq Instit Herf	−19.777**	−3.029	−16.428**	−4.474	−16.657**	−2.789
	(7.619)	(27.027)	(7.684)	(25.500)	(7.791)	(21.994)
Acq Instit Herf	39.338	−18.478	37.166	−28.268	36.680	−38.697
	(28.694)	(37.378)	(28.678)	(37.384)	(28.005)	(29.569)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	975	329	975	329	975	329
Adjusted R^2	0.076	0.207	0.068	0.190	0.072	0.202

[37] Though it should be taken with caution because this result may suffer from a selection bias. Bates and Lemmon (2003), for instance, report that bidder terminations fee provisions are positively correlated with stock deals. Future research should remedy this by applying a Heckman (1979) two-stage model.

1.5.5 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)), I might measure a relation of a lower bid premium with overvaluation rather than short sellers' merger arbitrage activities[38]. If this were true, I would, however, expect that the coefficient on the interaction term would be positive rather than negative as I find. The reason for this might be that overvaluation gives acquirers financial strength that target shareholders might exploit by requiring higher bid premiums.

Table 10
Effect of the Informational Advantage through Short Selling on Target Premiums: Under- vs. Overvalued Acquirers

This table presents the results of linear fixed effects regressions of $Premium_{1\ Week}$, $Premium_{3\ Day}$, and $Premium_{1\ Day}$ on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* as defined in Section 1.3. 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 = 0*); columns (2), (4), and (6) show the results if the acquiring firm was overvalued (*Acq Overvaluation Median = 1*), respectively. Several control variables are included in the regression (Section 1.3). All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Premium					
	1 Week		3 Day		1 Day	
Acq Overvaluation Median	*0*	*1*	*0*	*1*	*0*	*1*
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Acq SI	1.736**	−0.237	1.751**	−0.127	1.493**	−0.066
	(0.703)	(0.504)	(0.697)	(0.489)	(0.682)	(0.487)
Acq SI × Acq Instit Herf	−42.245**	−8.411	−46.155***	−4.958	−38.897**	−2.769
	(16.722)	(7.991)	(16.908)	(7.579)	(16.181)	(7.956)
Acq Instit Herf	36.417	−24.926	41.141	−43.540	36.185	−63.430
	(31.721)	(64.943)	(31.925)	(64.209)	(32.937)	(65.268)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	652	652	652	652	652	652
Adjusted R^2	0.129	0.070	0.123	0.054	0.138	0.058

[38] Though I control for overvaluation by including market-to-book ratios and one-year stock price performance in the regression models.

Despite these theoretical considerations, I want to rule out that overvaluation drives my results by splitting the sample into acquirers with low vs. high market-to-book ratios one trading day prior to deal announcement, delimited by the median of this ratio, *Acq Overvaluation Median*. My results (shown in Table 10, column (1), (3), and (5)) show that the coefficients on the interaction term are statistically significant only for presumably lower valued acquirers. This indicates that overvaluation does not drive my results.

1.5.6 Insider Ownership Concentration

Since insiders, such as directors and executives (as Capital IQ classifies insiders in the database), are well-informed about the true value of their firm, I also examine if there is a negative relation of acquirer insider ownership concentration[39] interacted with acquirer short interest and bid premiums.

Table 11
Effect of the Informational Advantage through Short Selling on Target Premiums: Acquirer Insider Ownership Concentration

This table presents the results of linear fixed effects regressions of *Premium 1 Week*, *Premium 3 Day*, and *Premium 1 Day* replicated from Table 2, columns (2), (4), and (6), except that I replace *Acq SI* × *Acq Instit Herf* with *Acq SI* × *Acq Insider Herf* 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. I furthermore control for deal features as well as acquirer and target characteristics as defined in Section 1.3. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Premium					
	1 Week		3 Day		1 Day	
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Acq Instit Herf	7.072	26.729	6.259	25.404	5.500	23.173
	(27.718)	(27.666)	(26.956)	(27.058)	(27.290)	(27.434)
Acq SI × Acq Instit Herf		−19.240***		−18.739***		−17.298***
		(6.353)		(6.673)		(6.539)
Acq SI	0.276	0.783	0.283	0.777*	0.286	0.743
	(0.415)	(0.488)	(0.398)	(0.459)	(0.398)	(0.450)
Acq SI × Acq Insider Herf	−19.904*	−21.624*	−20.612*	−22.287*	−16.160	−17.706
	(11.518)	(11.842)	(12.046)	(12.351)	(11.881)	(12.123)

[39] Measured as the Hirschman-Herfindahl index of all insider owners one trading day before deal announcement.

Acq Insider Herf	129.728*	129.211*	112.980	112.476	88.468	88.003
	(71.798)	(71.695)	(72.013)	(72.027)	(69.521)	(69.711)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,304	1,304	1,304	1,304	1,304	1,304
Adjusted R^2	0.081	0.085	0.075	0.078	0.085	0.088

(Table 11 continued)

I also find a negative coefficient on *Acq SI* × *Acq Insider Herf*, though statistically weaker at the 10% level (shown in Table 11, specification (1)). In addition, my premium reduction effect is greater for *Acq SI* × *Acq Instit Herf* ($0.187(-18.485) = -3.457$) than for *Acq SI* × *Acq Insider Herf* ($0.094(-19.904) = -1.871$), indicating that the informational advantage through short selling might be greater when institutional shareholders instead of insiders determine lending supply. This supports my preference of using institutional investor concentration over insider investor concentration, because I assume insider trading laws and insiders' involvement in deal negotiations prevent them from trading, and as such from strategically lending and recalling their shares.

1.6 Conclusion

Summary and Discussion

This chapter explores the informational advantage through short selling introduced by Strych (2020). Since short sellers can trade on it, it represents a "bright side" of recall risk that stands in contrast to the costly "dark side" promoted in the current literature (Chuprinin and Ruf (2017), Engelberg et al. (2018)).

To profit from such an informational advantage, this chapter assumes 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, I expect lower bid premiums. Consistently, I find that the higher the concentration of institutional ownership and the higher the short interest, the lower the bid premium is. Further, I find positive long-term buy-and-hold abnormal returns of acquirer stocks, indicating a wealth

transfer from merger arbitrageurs to acquirer shareholders. In addition, I 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. I also find that my premium reduction effect is more pronounced if target insider ownership is low. Further, I document that this effect is more pronounced if acquirer active institutional ownership is high, suggesting that active blockholders' recalls can be exploited more profitably by merger arbitrageurs, consistent with Strych (2020). 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 my study are relevant to managers involved in mergers and acquisitions, because I document that short sellers' bets on acquirer stocks with more concentrated institutional ownership are correlated with takeover premiums. Thus, managers of acquirers and targets should take acquirers' short interest and ownership structure into account when they negotiate or decide on bid premiums, because I report that an increase of the interaction term by one standard deviation is associated with a decrease of the one-week premium by 3.46% and by USD 69.264 million for the average target.

The fact that my results are more pronounced for deals involving investments banks with high equity market expertise as acquirers' deal advisors shows that M&A advisors add value to the takeover process, which might, in part, justify their usually high fees (e.g., McLaughlin (1990, 1992)). This might also partially explain Dessaint, Eckbo, and Golubov (2019), who find a positive time effect in acquirer announcement returns. Song, Wei, and Zhou (2013) 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 mine, because M&A boutiques usually do not undertake equity market activities and thus likely have lower equity capital market expertise[40]. Generally, my findings indicate that M&A league tables do not capture all

[40] It should be noted that boutiques are usually founded by, or consist of, former investment bank employees that might have some (equity) capital market expertise. Though, in most cases, 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.

information of M&A expertise of deal advisors, as far as my 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[41].

Future Research

My reasoning might provide a possible mechanism how overvalued stocks can maintain their overvaluation, as established 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 for target stocks to get compensated for bearing this stock price risk. This idea might be fruitful to explore in future research.

[41] To the contrary, studies such as Golubov et al. (2012) and Kale, Kini, and Ryan (2003) show that top-ranked M&A advisors lead to better deal outcomes if target deal advisors have relatively low expertise according to M&A league tables.

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1.8 Appendix

Appendix – Table A1
Variable Definitions

Table A1 presents the definitions of all variables used throughout this chapter. All variables are obtained from Standard & Poor's Capital IQ database, except *Acq Financial Advisor Top 8 Equity & Equity Linked*, which I retrieved from Bloomberg's annually published League Tables.

Variable	Definition
Panel A: Target Share Price Premiums, Announcement Returns, and Deal Outcomes	
Premium 1 Week	Difference of the announced offer price per share and target's last sale share price five trading days prior to offer announcement, divided by target's last sale share price five trading days prior to offer announcement, and expressed in percentage points.
Premium 1 Day	Defined as *Premium 1 Week*, but instead measured with target's last sale share price one trading day prior to offer announcement as the premium's reference.
Premium 3 Day	Defined as *Premium 1 Week*, but instead measured with target's last sale share price three trading days prior to offer announcement as the premium's reference.
Premium 1 Month	Defined as *Premium 1 Week*, but instead measured with target's last sale share price 22 trading days prior to offer announcement as the premium's reference.
Acq CAR [−1;+1]	Three-trading-day cumulative abnormal announcement return (in percentage points) of target firm's stock calculated using the Carhart (1997) model to model normal returns. The model parameters are estimated over the period −250 to −23 trading days (prior) to offer announcement. Security prices are dividend adjusted day close prices, further adjusted for stock splits, cash dividends, rights offerings, and spin-offs.
Acq CAR [−3;+3]	Defined as *Acq CAR [−1;+1]*, but instead measured for the seven-trading-day window around offer announcement.
Acq BHAR	One-month buy-and-hold abnormal return of acquiring firm's stock, measured relative to a public size-, market-to-book-, and industry-matched control firm headquartered in the U.S. in the same time period. The numbers in brackets denote trading days relative to the deal announcement date when the investment in acquiring firm's stock is made, and terminated, respectively: [−1;+21] measured one trading day before until one month after deal announcement, [−1;+42] until two months, [−1;+63] until three months, [−1;+84] until four months, [−1;+126] until six months, [−1;+189] until nine months, and [−1;+252] until one year after deal announcement.
Arbitrage Spread 2 Day	Ratio between the difference of the offer price per share on the announcement date and the last sale price of target's stock on the second trading day after bid announcement, and the offer price per share on announcement, expressed in percentage terms.
Deal Completion	Dummy variable that is set to 1 if the deal is closed successfully before end of May 2017, and 0 otherwise.
Panel B: Short Interest, Variables of Interest, and Ownership Controls	
Acq SI	Short interest of acquiring firm's stock, expressed in percentage points of the latest number of common shares outstanding, measured one trading day prior to announcement.
Acq Instit Herf	Concentration of institutional ownership in acquiring firm's 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 firm's stock.
Acq Instit Sum	Percentage sum of institutional ownership in acquiring firm's stock, measured one trading day prior to deal announcement.
Acq Instit Sum Active	Percentage sum of active institutional ownership in acquiring firm's stock, measured one trading day prior to deal announcement. S&P Capital IQ classifies the investment style of the holder of a firm's stock into active and passive.
Acq Insider Herf	Concentration of insider ownership in acquiring firm's 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 firm's stock.

Acq Insider Sum	Percentage sum of insider ownership in acquiring firm's stock, measured one trading day prior to deal announcement.
Tgt Instit Herf	Defined as *Acq Instit Herf*, but instead measured for target firm's stock.
Tgt Instit Sum	Defined as *Acq Instit Sum*, but instead measured for target firm's stock.
Tgt Insider Herf	Defined as *Acq Insider Herf*, but instead measured for target firm's stock.
Tgt Insider Sum	Defined as *Acq Insider Sum*, but instead measured for target firm's stock.

Panel C: Deal Characteristics

Transaction Value (TV)	Total transaction value in billions of USD, historical nominal value. It is calculated as the total consideration to target shareholders + total other consideration, net assumed liabilities, and adjustment size, plus cash and short-term investments.
Stock (% of TV)	Percentage share of the total transaction value that is paid with acquirer's stock.
BTF Dummy	Dummy variable that equals 1 if the merger agreement includes a bidder (acquirer) termination fee provision, and 0 otherwise.
TTF Dummy	Dummy variable that equals 1 if the merger agreement includes a target termination fee provision, and 0 otherwise.
Friendly	Dummy variable that equals 1 if the deal attitude is friendly on the announcement day of the deal, and 0 otherwise.
Horizontal Takeover	Dummy variable that equals 1 if both the acquiring and the target firm are primarily assigned to the same industry as defined by the first SIC digit, and 0 otherwise.

Panel D: Acquiring Firm Characteristics

ln Acq Market Cap	Natural logarithm of the value of acquiring firm's market capitalization. Market capitalization is last sale price of the acquiring firm's stock (adjusted for stock splits) multiplied with the latest number of common shares outstanding, measured one trading day prior to offer announcement and expressed in millions of USD.
ln Acq Vola LTM	Natural logarithm of 1 plus the standard deviation of weekly log-normal price returns of acquiring firm's stock over the year preceding the offer announcement, annualized with a factor of 52 for the 52 trading weeks in a year, and measured one trading day prior to offer announcement.
Acq Performance LTM $_{(Div.\ adj.)}$	Price performance of acquirer's stock based on dividend adjusted day close prices, further adjusted for stock splits, cash dividends, rights offerings, and spin-offs: relative difference of acquirer's dividend adjusted day close price one trading day prior to deal announcement to acquirer's dividend adjusted day close price one year before deal announcement, and expressed in percentage points.
Acq MTB	Market-to-book ratio of acquirer's stock, calculated as *Acq Market Cap* divided by the latest available value of total common equity (= common stock & additional paid in capital + retained earnings + treasury stock & other) one trading day prior to offer announcement.
ln Acq Turnover $_{1\ Month}$	Natural logarithm of one plus acquiring firm's share turnover, which is the one-month average of the daily quotient of the dollar value traded (= acquirer's 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.
Acq Financial Advisor Top 8 Equity & Equity Linked	Dummy variable that equals 1 if (at least one of) acquirer's deal advisor(s) is in the Top 8 of Bloomberg's annually published Equity & Equity Linked league tables in the (calendar) year preceding the (calendar) year of deal announcement, and 0 otherwise.

Panel E: Target Firm Characteristics

Tgt Performance LTM $_{(Div.\ adj.)}$	Defined as *Acq Performance LTM* $_{(Div.\ adj.)}$, but instead measured for target firm's stock.
Tgt MTB $_{-22}$	Defined as *Acq Market-to-Book*, but instead measured for target firm's stock 22 trading days prior to offer announcement.

(Table A1 continued)

Appendix — Table A2

Modular Regression Setup — Effect of the Informational Advantage through Short Selling on the One-week Target Premium

This table presents the results of linear fixed effects regressions of *Premium 1 Week* on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* (1) as defined in Section 1.3. 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 trading day prior to 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. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Premium 1 Week							
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acq SI	0.402	0.524	0.628*	0.636	0.841*	0.738*	0.629	0.247
	(0.327)	(0.325)	(0.322)	(0.429)	(0.449)	(0.442)	(0.442)	(0.531)
Acq SI × Acq Instit Herf	−8.812**	−8.161**	−13.661***	−11.158***	−17.379***	−15.460***	−18.485***	−12.850**
	(4.423)	(4.099)	(4.343)	(4.163)	(4.595)	(4.433)	(6.224)	(6.243)
Acq Instit Herf	−21.429***	−17.303***	11.855	−15.908*	20.799	18.967	24.932	16.282
	(6.262)	(6.666)	(14.661)	(9.436)	(18.020)	(17.742)	(27.779)	(30.751)
Other Ownership Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal Characteristics	No	No	Yes	No	No	Yes	Yes	Yes
Acquiring Firm Characteristics	No	No	No	Yes	Yes	Yes	Yes	Yes
Target Firm Characteristics	No	No	No	Yes	Yes	Yes	Yes	Yes
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 × Year FE	No	No	No	No	No	No	Yes	Yes
Tgt Industry × Year FE	No	No	No	No	No	No	No	Yes
Observations	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,304
Adjusted R^2	0.002	0.013	0.073	0.039	0.101	0.120	0.083	0.126

Appendix — Table A3
Modular Regression Setup — Post-Announcement Target Stock Reactions: Arbitrage Spread

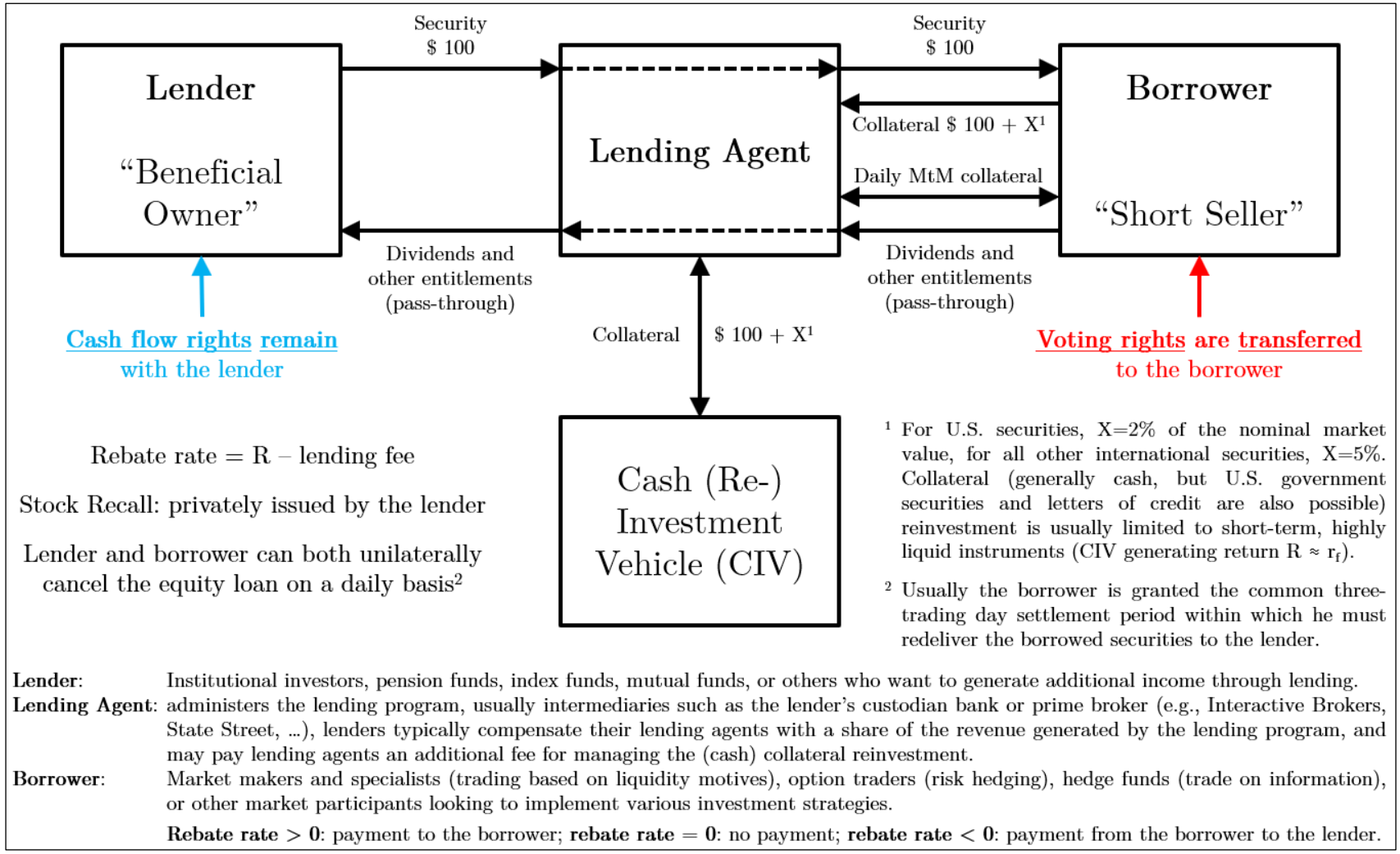
Table A3 depicts the results of linear fixed effects models regressing *Arbitrage Spread* $_{2\ Day}$ on acquirer short interest one day before the announcement date, *Acq SI*, and institutional ownership, *Acq Instit Herf*, one day before the announcement date and on the variable of interest, the interaction term *Acq SI* × *Acq Instit Herf* (1) as defined in Section 1.3. 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. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Arbitrage Spread $_{2\ Day}$								
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acq SI	0.191**	0.243***	0.082	0.245***	0.180**	0.063	0.087	0.056	0.052
	(0.086)	(0.086)	(0.097)	(0.092)	(0.082)	(0.097)	(0.116)	(0.116)	(0.133)
Acq SI × Acq Instit Herf	−2.562*	−2.260*	−2.758**	−3.832**	−4.087***	−4.044***	−3.808**	−3.709**	−3.437**
	(1.351)	(1.350)	(1.373)	(1.541)	(1.418)	(1.382)	(1.849)	(1.875)	(1.699)
Acq Instit Herf	10.820***	13.504***	11.577***	23.788***	20.450***	18.617***	19.874**	18.896*	16.152**
	(3.417)	(3.512)	(2.725)	(6.756)	(4.869)	(5.161)	(9.551)	(9.772)	(8.116)
Other Ownership Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Deal Characteristics	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Acquiring & Target Firm Charact.	No	No	Yes	No	No	Yes	Yes	Yes	Yes
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 × Year FE	No	No	No	No	No	No	Yes	Yes	Yes
Tgt Industry × Year FE	No	No	No	No	No	No	No	No	Yes
Observations	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303	1,303
Adjusted R^2	0.004	0.020	0.224	0.060	0.246	0.252	0.211	0.222	0.234

Appendix – Figure A1

Stylized Short Selling Process and Transactions

Figure A1 illustrates the stylized short selling process and its associated transactions.



Lender: Institutional investors, pension funds, index funds, mutual funds, or others who want to generate additional income through lending.

Lending Agent: administers the lending program, usually intermediaries such as the lender's custodian bank or prime broker (e.g., Interactive Brokers, State Street, ...), lenders typically compensate their lending agents with a share of the revenue generated by the lending program, and may pay lending agents an additional fee for managing the (cash) collateral reinvestment.

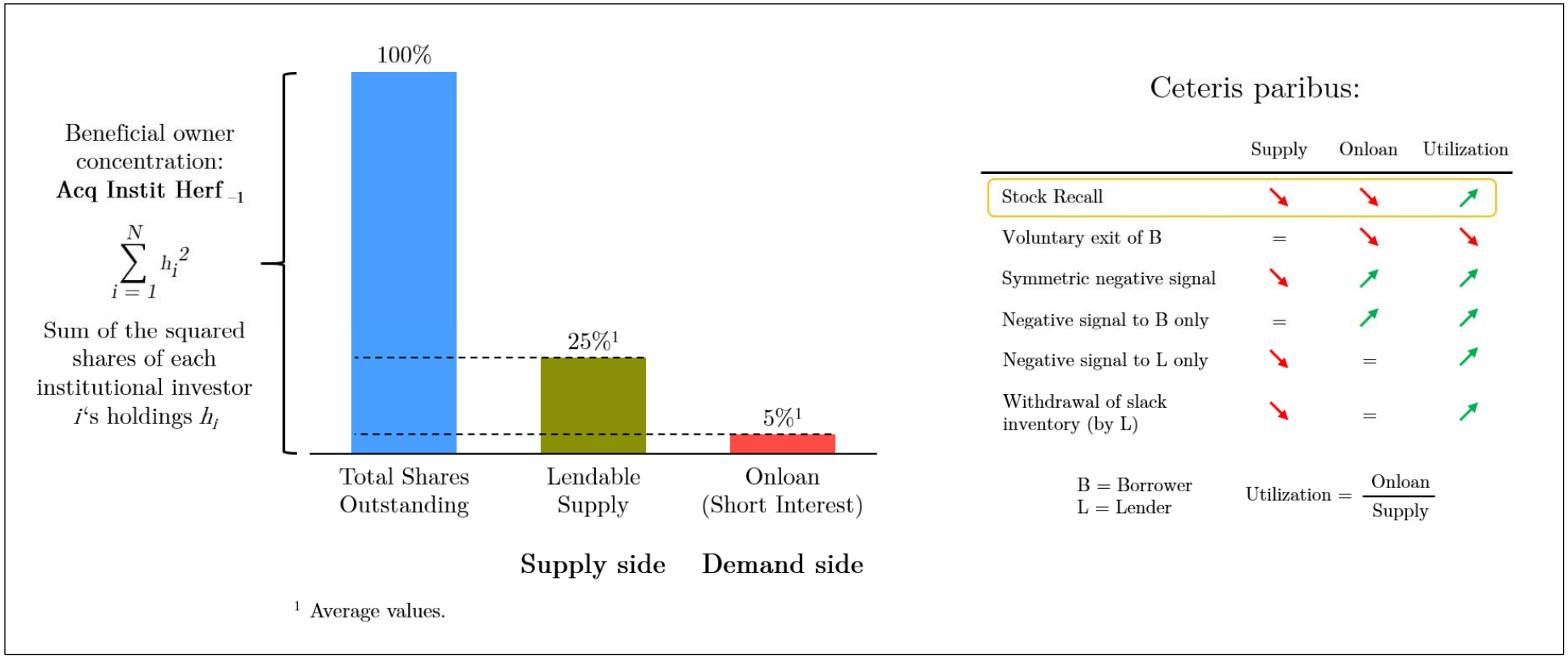
Borrower: Market makers and specialists (trading based on liquidity motives), option traders (risk hedging), hedge funds (trade on information), or other market participants looking to implement various investment strategies.

Rebate rate > 0: payment to the borrower; **rebate rate = 0**: no payment; **rebate rate < 0**: payment from the borrower to the lender.

Appendix – Figure A2

The Market for Borrowing Stock – Supply, Demand, and Utilization

The figure on the left side depicts the average percentage of shares available for lending and onloan (short interest). The graphic on the right side shows the change in utilization for different scenarios.



Appendix – Figure A3
Example of a Stock Recall Notice

Figure A3 shows an example of a buy-in notice (due to a stock recall) of GoPro, Inc. (NasdaqGS: GPRO) common stock. The notice was sent by Interactive Brokers (IB – the lending agent) to short sellers of GoPro common shares on November 14th, 2014 (Chuprinin and Ruf (2017)).

SHORT STOCK POSITION BOUGHT IN

This alert is to inform you that due to a recall IB is unable meet your settlement delivery obligations for the short stock position(s) listed below for account [redacted] As current SEC regulations require that all transactions be settled on the standard settlement date, these short stock positions have been bought-in. While IB makes every effort to give advanced notice of a possible buy-in, due to the time frame of this fail, in this instance we were unable to do so. The positions listed below have been bought-in:

GPRO [redacted]

Please note, IB will be unable to make further attempts to locate the shares for the above position. This notification will serve as a final buy-in notification.

Please click here for additional information on the buy-in process.

Interactive Brokers Customer Service

Chapter 2

Entrenchment through Discretion over M&A Contractual Provisions[§]

I apply the idea that managers of acquiring firms intend to entrench themselves through M&A in the sense of Shleifer and Vishny's (1989) entrenchment strategy through manager-specific investments. I propose that these managers implement bidder termination fee provisions in M&A contracts to make it costly for acquirers' shareholders to disapprove the deal after announcement and to prevent the manager from such entrenchment through M&A. In such cases, managers announce M&A deals before getting dismissed after bad performance. Consistently, I find that the market reacts on average negatively to deal announcements if bidder termination fees are high and if the likelihood of imminent forced CEO turnover is high. For these firms I detect significant increases in their level of entrenchment post offer announcement. This finding is economically significant and is more pronounced, if the CEO's motivation for entrenchment is high, if subordinated managers are not motivated to intervene, if directors are busy, and if the deal is characterized as a diversifying takeover. The results suggest that small- to medium-sized bidder termination fees might serve as efficiency enhancing contractual devices, whereas excessively high fees destroy shareholder value and possibly signal agency problems.

Keywords: Takeovers, Mergers and Acquisitions, Managerial Entrenchment, Bidder Termination Fees, Reverse Termination Fees.

JEL classification: G14, G34

[§] This chapter is the outcome of a joint research project in collaboration with Jan-Oliver Strych. The research paper on which this chapter is based on was featured on the Columbia Business School Law Blog in October 2019 (https://clsbluesky.law.columbia.edu/2019/10/18/entrenchment-through-discretion-over-ma-contractual-provisions/ (permanent link)). I thank Audra Boone, Jean-Gabriel Cousin, David Feldman, Manuela Geranio, SeungHun Han, Chloe Ho, Mark Humphery-Jenner, Gael Imad'Eddine, Dan Li, Gilberto Loureiro, Ronald Masulis, Martin Ruckes, Rik Sen, Peter Swan, and seminar participants at the University of Lille, the 28th Annual Meeting of the European Financial Management Association (EFMA) – "Merton H. Miller" Doctoral Seminar in 2019 in Ponta Delgada, the UNSW Brown Bag Research Seminar in Sydney, and the 32nd Australasian Finance and Banking Conference (AFBC) in Sydney for their valuable and very helpful comments.

2.1 Introduction

It has been shown that managerial entrenchment is detrimental to shareholder value (Faleye (2007), Cohen and Wang (2013, 2017)) and can be accomplished by CEOs making specific investments, which make it costly for shareholders to replace them (Shleifer and Vishny (1989)). By investing the firms' resources in a complex investment whose value is higher under them than under the next-best alternative CEO, CEOs can counter the disciplinary forces of the market for corporate control. These CEOs might also extract higher wages in the future, gain more discretion over the strategy of the firm, and reduce the probability of being replaced by other managers, at least over the short run. One of the largest physical investments a CEO seeking entrenchment can undertake is buying another firm or division through M&A.

If CEOs performed poorly in the past, they are more likely to be replaced by other managers, and thus have an incentive to increase entrenchment in order to further collect their rents in the form of secured compensation. In this chapter, I propose a strategy CEOs, who are currently under the threat of being replaced, can carry out to make it costly for shareholders to replace them and to increase their level of entrenchment. By announcing a large physical investment such as a takeover, they intend to increase the size of the firm and undertake an investment which secures their position at least over the medium term, given that the replacement of CEOs during a pending merger would be detrimental to shareholder value. As pointed out by Shleifer and Vishny (1989), top managers, such as CEOs, have discretion over the contracts of their firm, i.e., contracts with suppliers and customers, employees and other outside stakeholders. In order to increase the likelihood of successfully closing the deal or at least incentivizing incumbent acquiring firms' shareholders to not disapprove the deal, I propose that CEOs can make use of a specific contractual provision that makes it costly to abandon this investment: bidder termination fees. Bidder termination fees – also known as reverse or acquirer termination fees[1] – are cash payments from the bidder to the target firm, if the deal is terminated due to reasons under bidder's sphere of control, including exogenous reasons. They are usually negotiated by target management to compensate them for the costs incurred

[1] The terms "bidder termination fee (BTF)", "acquirer termination fee (ATF)", and "reverse termination fee (RTF)" can be used interchangeably. I use the term "bidder termination fee" throughout this chapter.

in such a case[2]. Once the merger agreement is signed by the merging parties, termination provisions become legally binding, which reflects an important attribute of manager-specific investments, namely its irreversibility (Shleifer and Vishny (1989)). Acquiring firms' CEOs seeking entrenchment can thus apply their discretion over the firms' contracts and can misuse high bidder termination fees in deal negotiations to make abandoning these investments costly. High fees provide a strong incentive for acquirers to abide by the merger agreement and incentivize them to close the deal. Given that information about the size of termination fees is disclosed in SEC filings published on or shortly after public offer announcement, outside investors then incorporate this information into prices and should react accordingly. This leads to my central value destruction prediction:

If a CEO is under high turnover pressure and announces a deal with a high, irreversible bidder termination fee, I expect significantly negative acquirer announcement returns.

Main Findings

In a sample of 852 U.S. deal announcements between 2004 and 2015, including public acquirers and public as well as private targets, I find that the market reacts significantly negative on average to deal announcements if bidder termination fees are high and the acquirer's one-year stock price performance is negative (i.e., my proxy for a higher likelihood of imminent forced CEO turnover). All results hold if I restrict my analysis to public targets. Moreover, I find that my findings are even more pronounced if the target is public. This indicates that the entrenchment strategy is more easy to implement for acquirer CEOs if target managers are less aligned with their shareholders, as I assume is the case with public firms. I find the relation on acquirer announcement returns to be more pronounced, if the CEO's wealth is less sensitive to firm's stock price changes, if the CEO is not close to retirement age, if the acquiring firm has not implemented a staggered board, if the acquiring firm's management

[2] Reasons typically include failure of the bidder to obtain (debt) financing, failure of the bidder to obtain shareholder approval or regulatory approval by the Department of Justice Antitrust Division (DoJ) or the Federal Trade Commission (FTC), the emergence of a competing bid with the primary bidder as the target firm ("bid-for-bidder"), the breach of representations, warranties and/or covenants by the bidder, failure of the acquirer to close before the "drop dead date", and the exercise of a pure termination option by the bidder (see, e.g., Chen, Mahmudi, Virani, and Zhao (2020), and Quinn (2010)).

executives (all VPs, CEO excluded) have low equity-based alignment incentives, if the board is busy, and if the deal is characterized as a diversifying takeover. This suggests that such a proposed entrenchment-increasing strategy is easier and more likely being pursued by CEOs, if their incentives to do so are high and if they more likely profit from future entrenchment.

Additionally, I find strong evidence that the level of entrenchment is increasing in the years after offer announcement, as measured by acquiring firm's entrenchment index changes (Bebchuk, Cohen, and Ferrell (2009)). Underperforming acquirers conducting such investments with high bidder termination fees also seem to lose value over the months and even years following the deal.

I also conduct a variety of robustness checks. First, I add controls for agency problems between the CEO, other board members, and outside investors. Studies such as Weisbach (1988) show that CEOs face more intense monitoring when the board of directors is controlled by independent or outside directors. In addition, Jensen's (1986) free cash flow hypothesis predicts that firms with excess cash flows but few value-increasing investment opportunities are more likely to conduct value-destroying acquisitions. After including the size of the board of directors, the percentage of outside directors on the board, and free cash flow of the acquiring firm scaled by its assets, I find that my results still hold which helps me to rule out that my finding is driven by these types of agency problems.

Second, I split the size of the bidder termination fee into size quantiles and find qualitatively similar results. I detect that my result is driven by excessively high amounts of bidder termination fees and not driven by potential nonlinearities. This suggests that low- or moderate-sized fees might serve as efficient contractual devices, whereas large fees are most detrimental to shareholder value and therefore suggest potential agency conflicts.

Third, I alleviate concerns for potential alternative explanations: my finding might be driven by high bidder termination fees required or negotiated in horizontal takeovers that, by their nature of increasing potential collusion among firms in the same industry, face a higher probability of being challenged by antitrust authorities. After further allowing for the flexibility in the definition of horizontal takeovers, I find that my results remain robust and the inferences are unchanged.

Contribution to the Literature

I contribute to current research in a variety of ways. First, I contribute to the classical M&A literature that focuses on shareholder wealth effects around merger announcements and long-term value creation. I extend prior research that mainly addresses the use and impact of target termination fees on deal outcomes. Seminal articles in this strand of literature comprise Officer (2003) and Bates and Lemmon (2003), who regard the inclusion of target termination fee provisions as an efficient contractual device rather than a means by which they deter competitive bidding after deal announcement. They both test two competing hypothesis for the use of these fees: first, the "managerial entrenchment" or "managerial discretion" hypothesis, that claims that target fees are being implemented in takeover contracts to truncate an otherwise natural bidding process. Second, target fees might be used as a device that improves the incentives for bidding by providing potential bidders compensation for negotiating costs ("efficiency hypothesis" or "shareholder interest hypothesis"). Adding target termination fees in merger agreements has been found to result in higher takeover premiums and deal completion rates compared to deals without such clauses. Bates and Lemmon (2003) find that bidder termination fees are more likely incorporated in transactions where the costs of negotiation, including price discovery, are high. These fees are more likely implemented in relatively large deals and deals financed with stock. Chen, Mahmudi, Virani, and Zhao (2020) develop an option framework for the inclusion of bidder termination fee provisions and liken these fees to real options on targets' assets. The value of this option lies in facilitating the termination of takeovers that are not optimal for the bidder to pursue at the time of completion. They find that the inclusion of such provisions is more likely the longer the ex-post realized time-to-completion of the merger as a proxy for the ex-ante anticipation of the time the takeover takes to complete. I add to this literature by investigating the relation of bidder termination fees and firm value with regard to acquiring firms' abnormal announcement returns.

Second, I extend the corporate governance literature with an additional motive for implementing bidder termination fees in merger agreements. If managers are under pressure of being replaced by another manager, they might make use of such contractual provisions to make it costly for their shareholders to abandon the deal after announcement. I hence demonstrate how CEOs can exploit their discretion over contracts between their firms and third

parties for their own advantage. I thereby extend the literature with the motive of implementing high bidder termination fees as a means by which managers can increase their level of entrenchment through M&A, i.e., entrenching themselves through the deal, which complements Masulis, Wang, and Xie (2007) and adds empirical evidence to prior theoretical work as done by Shleifer and Vishny (1989).

Third, I add to the growing literature at the intersection of law and finance. Prior research in this field mainly focuses on the legal and economic role and limitation of the use of target termination fees in takeovers. Driven by the results, I deliver an argument to closely monitor the setting and to restrict the size of the bidder termination fee, if a takeover might be alienated as an empire-building tool. My study hence contributes to the general debate and fundamental questions at the intersection of law and finance, whether a particular contractual device, such as a bidder termination fee, harms shareholders by entrenching incumbent management or instead acts in shareholders' interest. As an efficient contract clause, these deal provisions should incentivize both parties to invest their time and effort in the pending takeover and to reveal private information to each other. I furthermore introduce a novel measure to better capture potential wealth effects in case bidder termination fees are paid. Prior literature scales termination fees – irrespectively of being paid by the bidding or target firm – by transaction value: I scale bidder termination fees by acquiring firms' market capitalization to assess the potential negative economic impact on acquirer value.

The remainder of this chapter is organized as follows: Section 2.2 describes the theoretical reasoning, key assumptions, and develops the main hypotheses. Section 2.3 describes the data sample, the empirical specification and variables used. Section 2.4 presents the main empirical results with additional subsample tests where I find the relation to be more pronounced. Section 2.5 includes some discussion and robustness tests to support my central hypotheses. Section 2.6 concludes.

2.2 Theoretical Reasoning, Key Assumptions, and Hypothesis Development

It is widely known and well documented in the literature that managers who underperform their industry peers are under high pressure of being replaced by either an outside or inside successor (e.g., Huson, Malatesta, and Parrino (2004), Warner, Watts, and Wruck (1988), Huson, Parrino, and Starks (2001), Jenter and Lewellen (2019), and Jenter and Kanaan (2015)). Jenter and Kanaan (2015) show that CEOs are fired after bad firm performance that might also be caused by factors beyond their control, which is against standard economic theory that suggests that boards filter out any exogenous shocks to performance before deciding on CEO retention. I apply their findings about the inverse relationship between firm performance and forced CEO turnover.

Managers of firms experiencing strong negative returns during their tenure face, all else equal, the highest probability of imminent dismissal. Such managers might be prone to strengthen their job positions by pursuing investments that have the highest value under them, and thereby seek entrenchment (Shleifer and Vishny (1989)). Acquisitions of firms or divisions are among the largest, most expensive, and most visible forms of corporate investments. CEOs that seek entrenchment through such investments then might enjoy private benefits of control, have a larger latitude and more leeway in deciding on corporate strategy, and face less discipline by the market for corporate control.

In this chapter, I suggest an entrenchment-increasing strategy through M&A that can be made costly for acquiring firm's shareholders to abandon, and thus serves as an above-mentioned entrenchment project. CEOs under replacement pressure can proactively implement relatively high bidder termination fee provisions in M&A contracts, i.e., merger agreements. By relatively high I mean high values of the dollar termination fee amount scaled by acquiring firm's market capitalization. Termination fees are in general the outcome of merger negotiations between acquiring and target firm, whereby both parties want to get compensated if the other party backs out of the deal. These fees should cover potential direct and indirect costs[3] associated with abandoning the deal.

[3] Direct costs are costs such as fees for financial and legal deal advisors, consulting firms, opportunity costs of the assets involved and other transaction fees, and indirect costs are, e.g., costs of information

By focusing on the bidder termination fee, size-scaled by acquiring firm's market capitalization, I concentrate on the potential negative economic impact on acquirer value rather than the demand of target managers in negotiations[4].

A key assumption is that the CEO has discretion to select legal as well as financial advisors for M&A deals, and both parties have an incentive to close the deal: the CEO seeks entrenchment through a successful acquisition and advisors aim to collect fees once deals are closed. I further assume that the board of directors is usually busy, does not audit all provisions in the merger agreement, and awaits the market reaction on deal announcement to evaluate the proposal (i.e., additional information revelation after deal announcement). If CEOs under pressure of losing their jobs announce deals with high bidder termination fees, shareholders have to outweigh the costs the acquiring firm incurs between (1) get the CEO to abandon the deal, pay the bidder termination fee to the target firm, and replace their incumbent CEO, and (2) retain their CEO, not paying the bidder termination fee and thereby accepting entrenchment of the CEO and granting her further employment. Notwithstanding how the shareholders or board of directors will act, I expect that announcement returns will be significantly negative in both cases. This leads to my first central hypothesis:

Hypothesis 1: *If the acquiring firm underperformed during the last year and if the bidder termination fee is high, the lower are acquirer cumulative abnormal announcement returns.*

Given that above mentioned deals are announced as a means to improve acquiring CEOs job prospects, I hypothesize that these investments increase entrenchment through the deal. This leads to my second central hypothesis:

Hypothesis 2: *If the market evaluates the announced takeover from underperforming acquirers as value destroying, and if the bidder termination fee is high, the higher the increase of acquirer's entrenchment index after the deal.*

expropriation, i.e., private information about future synergies and intellectual property other market participants can potentially free ride on. It mostly depends on their relative bargaining power if fees are implemented and how high the dollar amount is.

[4] To draw inferences about and to assess economic impacts on target firms, one should scale termination fees with deal value or other measures for target firm size, such as its market capitalization.

2.3 Data and Methodology

2.3.1 Data Sample

I extract my M&A sample from Standard & Poor's Capital IQ database. I identify 852 transactions between January 01, 2004 and December 31, 2015[5] that meet the following criteria commonly applied in empirical M&A literature (see, e.g., Masulis et al. (2007)):

1. The acquisition is announced and either completed or withdrawn in the sample period.
2. The acquirer is a publicly listed U.S. firm, holds less than 50% of target's outstanding shares prior to offer announcement, and aims for a change in control in the target firm (acquirer must seek a majority stake in the target firm). The target firm is either a public or a private firm and also headquartered in the U.S. (no cross-border deals).
3. The total transaction value exceeds USD 1 million (historical value).
4. There must not be a CEO turnover in the acquiring firm between the last fiscal year end date prior to offer announcement and the offer announcement date itself[6]. Tenure of acquiring firm's CEO (measured at offer announcement) must exceed one calendar year.

My M&A dataset is extended by data on acquiring firms' Investor Responsibility Research Center (IRRC) governance provisions (staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments) as published in the Securities and Exchange Commission (SEC) DEF14A filings, provided by the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) website[7].

I further obtain data on acquiring firm's CEO age, tenure, equity alignment incentives, duality, the firm's board size, and percentage of independent directors on the board from the SEC EDGAR database. One advantage of my study in comparison to older studies applying

[5] As shown in Table 1, I am not concerned with any possible sample selection biases. The effect also holds "univariately", i.e., if I only include the proposed interaction term and its components. Table A2 in the Appendix shows the detailed sample selection process with the number of remaining observations after applying respective filters.

[6] I require that condition since a lot of control variables (acquiring firms' CEO characteristics, measures of entrenchment, board characteristics, etc.) are published only at the end of each fiscal year in respective SEC reports.

[7] https://www.sec.gov/edgar/searchedgar/companysearch.html (permanent link).

measures such as the governance index (Gompers, Ishii, and Metrick (2003)) or the entrenchment index (Bebchuk et al. (2009)), is that I am able to track all governance provisions on a yearly basis with no interruptions between firm-years. Older studies rely on data provided by IRRC that have been published only every second or third year[8]. Stock price and accounting data, as well as data on institutional and insider ownership, are also obtained from Standard & Poor's Capital IQ database. Factor returns come from Kenneth French's website[9].

2.3.2 Empirical Specification and Variables

The core specification to measure the relation of bidder termination fees implemented by underperforming acquirers and their cumulative abnormal announcement returns is the following fixed effects regression model:

$$\begin{aligned} Acq\ CAR_{[-k;+k]i,t} = \alpha_{i,t} &+ \beta_1\ Acq\ Underperformance_{i,t} \times BTF\ Size_{i,t} \\ &+ \beta_2\ Acq\ Underperformance_{i,t} + \beta_3\ BTF\ Size_{i,t} + \beta_4\ TTF\ Size_{i,t} \\ &+ \beta_5\ Acq\ E\text{-}Index_{i,t} + \gamma\ Acq\ CEO\ Characteristics_{i,t} \\ &+ \delta\ Acq\ Firm\ Characteristics_{i,t} + \vartheta\ Deal\ Characteristics_{i,t} \\ &+ \varphi\ Acq\ Industry \times\ Year\ FE_{i,t} + \lambda\ Tgt\ Industry\ FE_{i,t} + \varepsilon_{i,t} \end{aligned}$$

Where i indexes the unique transaction (i.e., the unique acquirer-target-combination), t indexes the time, k indexes the trading days relative to offer announcement, and β_1 is the coefficient of primary interest – the estimate of the relation of bidder termination fee size implemented by underperforming acquirers and their cumulative abnormal announcement returns. The dependent variable is the acquiring firm's cumulative abnormal announcement return, measured in symmetric trading day event windows $[-k;+k]$ around the trading-day-adjusted announcement date[10]. I apply the Carhart (1997) four-factor model to model normal

[8] IRRC has published data for the years 1990 to 2006 in eight volumes: 1990, 1993, 1995, 1998, 2000, 2002, 2004, and 2006. Studies often assume that during the years between the publications firms have the same provisions in place as in the previous publication year (i.e., assuming a certain "stickyness").

[9] https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html (permanent link).

[10] I focus on the seven-trading-day window around offer announcement, $Acq\ CAR_{[-3;+3]}$, given that Coates, Palia, and Wu (2018) find that in about one in five cases the filing with the SEC (and thereby disclosure of the merger agreement which contains information about the dollar amount of both bidder and target termination fees) takes one or more days after offer announcement. I also provide additional

returns and set the estimation period of the parameters to (−250;−23) trading days prior to offer announcement to rule out any dilution caused by potential stock price run-ups. My variable of interest is the interaction term, *Acq Underperformance* × *BTF Size*, which consists of *Acq Underperformance*[11], a dummy variable that equals 1 if the acquiring firm's share price performance during the year preceding the offer announcement is negative, 0 otherwise, and *BTF Size*, the USD (mm) amount of the bidder termination fee divided by the market capitalization (also in USD mm) of the acquiring firm 22 trading days prior to offer announcement, expressed in percentage points[12]. To support hypothesis 1, I should find a negative and statistically significant coefficient on *Acq Underperformance* × *BTF Size*.

The baseline regression model[13] also controls for the size of the target termination fee, *TTF Size*, which is the USD (mm) amount of the target termination fee divided by the total transaction value (TV, also in USD mm) and expressed in percentage points. Recent research has shown that the use of both types of termination fees is highly positively correlated, i.e., deals that include a bidder termination fee provision almost always include a target termination fee provision (see, e.g., Chen et al. (2020))[14]. I include the entrenchment index of the acquiring firm, *Acq E-Index*, constructed by Bebchuk et al. (2009), in my baseline regressions since Masulis et al. (2007) show that a high acquirer E-Index significantly negatively affects respective firm's announcement returns. Beyond that, a reason to include the E-Index is that it is also a more direct measure of managerial entrenchment. The E-Index is constructed based on

regression results for smaller ($Acq\ CAR_{[-1;+1]}$) and larger ($Acq\ CAR_{[-5;+5]}$) event windows: the results are qualitatively and quantitatively similar (see Table 2 and Table 10).

[11] The use of negative past performance as a proxy for imminent CEO dismissal is motivated by Jenter and Kanaan (2015) and Huson et al. (2001), who show that a variety of firm performance measures are negatively and statistically significantly related to forced CEO turnover.

[12] Figure A1 in the Appendix shows the average size of the BTF over time: increases during the '08-'09 financial crisis, mainly due to lower market valuations and higher uncertainty, can be detected. Omitting this period does not change my results.

[13] I do not industry-adjust all variables but instead include industry-year fixed effects (Gormley and Matsa (2014)). Table A3 in the Appendix shows the empirical relation between the inclusion of bidder termination fees and certain control variables and justifies their implementation in the main regression model.

[14] Chen et al. (2020) find in their sample that about 96 percent of deals with bidder termination fee provisions also include target termination fee provisions, and in about 65 percent these fees are of equal size as scaled by the transaction value.

the existence of the following governance provisions each year, whereas each provision equivalently counts 1: staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for (1) mergers and (2) charter amendments.

Acq CEO Characteristics is a vector consisting of the following variables that might affect, or are at least correlated with, the level of managerial entrenchment (all obtained at the last fiscal year end date prior to offer announcement, unless otherwise noted): *ln Acq CEO Total Current Compensation*, the natural logarithm of 1 plus the USD (000s) amount of acquiring firm CEO's total current cash compensation (salary and bonus), a proxy for managerial quality[15] (Harford, Humphery-Jenner, and Powell (2012), and Masulis et al. (2007)). *Acq CEO Tenure* is the number of years since the appointment of the CEO in the acquiring firm, measured from the day of the appointment until the day of offer announcement, and *Acq CEO Age* is the age of the CEO of the acquiring firm (Guo and Masulis (2015))[16]. I further control for CEO pay-performance sensitivity (Delta), as well as the sensitivity of CEO wealth to stock volatility (Vega): *Acq CEO Delta* is the expected USD change in acquiring firm CEO's wealth associated with a 1% change in acquiring firm's stock price (in USD 000s), calculated following Core and Guay (2002), and *Acq CEO Vega* is the expected USD change in acquiring firm CEO's wealth associated with a 1% change in the standard deviation of acquiring firm's stock returns (in USD 000s) and calculated following Guay (1999). A high Delta is seen as better aligning the incentives of managers with the interests of shareholders, but an increased Delta may also expose the manager to more risk. I therefore additionally control for the CEO's risk-taking behavior given that Coles, Daniel, and Naveen (2006) find that a high prior Vega implements riskier firm policy choices[17]. *Acq CEO Duality* is a dummy variable that equals 1 if

[15] E.g., Fee and Hadlock (2003) find that larger firms, that – ceteris paribus – usually pay higher salaries and bonuses, more likely attract executives taking on the CEO position, and suggest that managers of large firms are more highly desired in the labor market (perhaps because a high-level position in a big firm is a relatively more credible signal of managerial quality, or alternatively because there are more opportunities to develop managerial expertise in a large enterprise).

[16] Prior literature has interpreted the decline of forced CEO turnover over CEO tenure as evidence of increasing managerial entrenchment (see, e.g., Hermalin and Weisbach (1998), Dikolli, Mayew, and Nanda (2014), and Jenter and Lewellen (2019)).

[17] Coles et al. (2006) find that higher sensitivity to stock volatility (Vega) in the managerial compensation scheme gives executives an incentive to invest in riskier assets and implement a more aggressive debt policy. They also find that stock-return volatility is positively correlated with both Delta and Vega.

the acquiring firm's CEO is also chairperson of the board of directors, and 0 otherwise, as disclosed at the last fiscal year end date prior to announcement[18].

Acq Firm Characteristics is comprised of subsequent covariates (also obtained at the last fiscal year end date prior to offer announcement, unless otherwise noted): *Acq Executive Board Size* is the total number of management executives on the acquiring firm's board. Theoretical articles such as Jensen (1993) and Lipton and Lorsch (1992) have identified board size as an important determinant of corporate governance effectiveness[19]. *Acq Institutional Own Sum* $_{[OA-1]}$ is the sum of institutional holdings in acquiring firm's stock and *Acq Insider Own Sum* $_{[OA-1]}$ is the sum of insider holdings in respective stock, both measured one trading day prior to offer announcement and expressed in percentage points. Monitoring problems are less severe if the shareholder base is less dispersed as is the case if (multiple) blockholders exist. By including insider ownership, I control for the stock based incentive alignment of acquiring firm's management executives and its affiliated and linked directors. *Acq Market Cap* $_{[OA-22]}$ is the last sale price of acquiring firm's stock (adjusted for stock splits) multiplied with the latest number of shares outstanding, both obtained 22 trading days prior to offer announcement and expressed in millions of USD. I control for acquiring firm's size since Moeller, Schlingemann, and Stulz (2004) show that larger acquirers earn abnormal announcement returns of about two percent less than smaller acquirers[20]. *Acq Market-to-Book* $_{[OA-22]}$ is the market-to-book ratio of acquirer's stock, calculated as *Acq Market Cap* $_{[OA-22]}$ divided by the latest available value of the firm's total common equity 22 trading days prior to offer announcement, and is included to rule out a simple low-growth effect on acquirer returns[21]. I include measures related to acquiring firm's financial constraints in every regression. This helps me to mitigate concerns that high bidder termination fees, as a simple outcome of takeover negotiations in which targets

[18] I also control for duality since prior work has shown that it is correlated with CEO tenure (Kini and Williams (2012)), and since it is an important characteristic of CEO overall power, mostly within the board of the firm.

[19] Yermack's (1996) study shows a significantly negative relation between board size and firm value. He further finds that CEO disciplining mechanisms, such as the threat of dismissal, lose power as board size increases.

[20] The authors suggest that this might be due to a hubris effect: managers of larger acquirers tend to be overconfident about their acquisition strategies (Roll (1986)). Replacing market capitalization with total assets or their respective natural logarithms as a control for firm size does not change my results.

[21] In untabulated regressions I include acquiring firm's Tobin's Q as an alternative measure for growth and overvaluation and receive qualitatively and quantitatively similar results.

force acquirers to provide high fees, drive announcement returns, since these acquirers might have problems to obtain financing for the deal. The set of these variables include *ln Acq 1YR Stock Return Volatility* $_{[OA-1]}$, which is the natural logarithm of one plus the standard deviation of weekly log-normal stock price returns of the acquiring firm over the year preceding the offer announcement, annualized with a factor of 52 for the 52 trading weeks in a year, and expressed in percentage points. I include volatility not simply because it is a measure captioning uncertainty, but also since Guo and Masulis (2015) show that stock volatility is significantly positively correlated with forced CEO turnover. *Acq Market Leverage* $_{[OA-22]}$ is book value of total debt divided by the market value of acquiring firm's total assets. Market value of total assets is calculated in the following way: *Acq Total Assets* + *Acq Market Cap* $_{[OA-22]}$ − *Acq Total Common Equity*, all measured 22 trading days prior to offer announcement. It is widely known that leverage serves as an important governance mechanism, since it forces managers to make timely debt payments and thereby limits managerial discretion (Masulis et al. (2007)). *Acq Dividend Payer* is a dummy variable that equals 1 if the acquiring firm paid positive dividends during the fiscal year preceding the offer announcement, and 0 otherwise (Farre-Mensa and Ljungqvist (2016), and Whited and Wu (2006)).

Besides these variables I include the following *Deal Characteristics* in the baseline regression model, which are widely used in empirical M&A literature, especially when analyzing announcement returns (Betton, Eckbo, and Thorburn (2008)): *Transaction Value (TV)* is the historical nominal value of the total transaction value in millions of USD. *Friendly* is a dummy variable that equals 1 if the deal attitude is friendly on the announcement day of the deal, and 0 otherwise. *Stock* $_{[\%\ of\ TV]}$ is the percentage share of the transaction value that is paid with acquirers' stock. *Horizontal Takeover* is a dummy variable that equals 1 if both the acquiring and the target firm are primarily assigned to the same industry, as defined by all four SIC digits, and 0 otherwise (see, e.g., Eckbo (1983), Betton et al. (2008), Fee and Thomas (2004), and Shahrur (2005)). *Private Target* is a dummy variable that equals 1 if the target firm is private, i.e., if there are no stock price data available one trading day prior to offer announcement, and 0 otherwise (Masulis et al (2007)). Fuller, Netter, and Stegemoller (2002) find in their sample of firms that make multiple acquisitions that acquirers' abnormal announcement returns are significantly positive if they target private firms. *Ln Time-to-Resolution (Actual)*

is the natural logarithm of one plus the ex-post number of calendar days between the date the takeover is announced and the date on which the takeover is either completed or withdrawn, divided by 365 (Chen et al. (2020), Officer (2006), and Houston and Ryngaert (1997)). I include this variable since Chen et al. (2020) find that the length of this time span is significantly positively correlated with the size of the bidder termination fee and serves as a good proxy for the ex-ante expected length of time it will take for the deal to close. I also include *Acquirer Industry* × *Year Fixed Effects* and *Target Industry Fixed Effects*, based on the first digit of the Standard Industrial Classification (SIC) code and the year of deal announcement (e.g., Betton et al. (2008), Malmendier, Opp, and Saidi (2016)) to control for aggregate shocks to takeover activity in certain industries and across years, regulation changes, and further unobserved heterogeneity (Gormley and Matsa (2014)).

2.4 Main Empirical Results and Additional Subsample Tests

2.4.1 Descriptive Statistics

Abnormal Returns, Antitakeover Provision Index, and Termination Fees

Table 1 presents summary statistics of the M&A sample. Acquiring firms' cumulative abnormal announcement returns are measured in percentage points and are slightly negative on average (Betton et al. (2008) and Officer (2003)), except for the [−1;+1] trading day window around offer announcement, consistent with Moeller, Schlingemann, and Stulz (2005). Buy-and-hold abnormal returns vary stronger in extreme values, which is typical due to their longer time window of up to three years after announcement. All abnormal return variables are additionally winsorized at the 1st and 99th percentile to rule out the effect of outliers. The acquiring firm's entrenchment-index, *Acq E-Index*, takes on values between zero and six with a mean (median) value of 2.89 (3), which is consistent with the findings of Bebchuk et al. (2009), who additionally observe an increasing positive trend in the E-Index over time. Since I am not able to find filings for all firm-years in my study, the number of observations of both *Acq E-Index* and Δ *Acq E-Index* $_{3YR}$ is slightly less than 852 (the number of observations of the main sample). The mean of *Acq Div Adj Performance LTM* $_{[OA-1]}$, the continuous variable on which the

dummy variable *Acq Underperformance* is based on, is positive, yet there are firms that significantly underperformed in the year preceding the offer announcement, with returns down to −88%. The size of the bidder termination fee, *BTF Size*, varies from 0 to more than 8% of acquiring firm's market capitalization 22 trading days prior to offer announcement. My variable of interest, the interaction term *Acq Underperformance* × *BTF Size*, culminates in values of up to 6%. *TTF Size* is the dollar amount of the target termination fee scaled by transaction value and is included in approximately 44% of all observations. The size of *TTF* is comparable to summary statistics obtained in Officer (2003) and Neyland and Shekhar (2018).

Acquirer CEO Characteristics

Ln Acq CEO Total Current Compensation, the natural logarithm of acquiring firm CEO's cash compensation, has a mean of around 7, similar to Humphery-Jenner et al. (2016) and Kale, Reis, and Venkateswaran (2009). The average CEO in my study is 56 years old, has a tenure of 8.2 years, and is in 58% of the cases also chairperson of the board of directors: all mean, median and standard deviations are comparable to Coles, Daniel, and Naveen (2014), and Cai, Fang, and Li (2019). The values for *Acq CEO Delta* and *Acq CEO Vega* are about twice to thrice the size in comparison to the values obtained in Kini and Williams (2012), which I explain by the firms being acquirers. These firms are on average significantly bigger in terms of market capitalization and CEO pay in comparison to the average firm, and thus a higher value should be expected. My variable proxying for overall alignment of the CEO with the firm, i.e., *Acq CEO Alignment*, takes on values between 0 and 25 with a mean (median) of 1.425 (0.594), smaller than the average value and median obtained in Kale et al. (2009), which I again explain with the average acquirer being larger than the average firm in their data sample[22]. My results for *Acq VP Alignment* come closer to their results: mean and median values are 0.164 and 0.099, respectively, and *Acq CEO Turnover* increases from year to year following the offer announcement, which is what one would expect.

[22] Kale et al. (2009) analyze equity-based (alignment) incentives on firm performance for a broader sample of firms, not a subsample of acquiring firms as in my study. One important point to keep in mind here is, that the alignment variable measures the sum of stock and option sensitivities to a USD 100 change in shareholder wealth. This, all else equal, mechanically results in lower values of *Acq CEO Alignment* for larger firms in comparison to smaller firms.

Table 1
Summary Statistics

Table 1 reports summary statistics of the sample consisting of 852 transactions announced and either closed or withdrawn between January 01, 2004 and December 31, 2015. Indices display the point in time (i.e., trading day) relative to the offer announcement date when the variable was measured. Acquirer cumulative abnormal announcement returns (*Acq CARs*) are measured in symmetric event windows from five, three, and one trading day before until five, three, and one trading day after offer announcement, respectively, applying a Carhart (1997) four-factor-model to model normal returns. Acquirer buy-and-hold abnormal returns (*Acq BHARs*) are measured from one trading day prior until 250, 500, and 750 trading days after offer announcement, respectively, applying the CRSP® value-weighted market return to model normal returns. *Acq E-Index*, *Acq CEO Total Current Compensation*, *Acq CEO Age*, *Acq CEO Delta*, *Acq CEO Vega*, *Acq CEO Duality*, *Acq CEO Alignment*, *Acq Executive Board Size*, *Acq VP Alignment*, *Acq Staggered Board*, *Acq Board of Directors Size*, *Acq Percentage of Independent Directors*, and *Acq Dividend Payer* are measured on the last fiscal year end date prior to offer announcement. *Acq CEO Tenure* is measured from the day of the appointment of acquiring firm's CEO until the day of offer announcement. All *Acq CARs* and *Acq BHARs*, *Acq Market-to-Book* $_{[OA-22]}$, *Tgt Market-to-Book* $_{[OA-22]}$, *Tgt Premium* $_{1\ Month}$, *Relative Size Market Cap* $_{[OA-22]}$, *Acq Div Adj Performance LTM* $_{[OA-1]}$, and *Tgt Div Adj Performance LTM* $_{[OA-1]}$ are winsorized at the 1st and 99th percentiles. All variables are additionally defined in detail in the Appendix (Table A1).

	Summary Statistics					
Variables	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Panel A: Abnormal Returns, Anti-takeover Provision Index, and Termination Fees						
Acq CAR $_{[-1;+1]}$	852	0.041	−0.067	4.848	−20.719	23.916
Acq CAR $_{[-3;+3]}$	852	−0.155	−0.069	6.157	−26.889	23.665
Acq CAR $_{[-5;+5]}$	852	−0.124	−0.089	6.808	−29.097	27.530
Acq BHAR $_{[-1;+250]}$	852	−1.176	−2.410	26.416	−90.970	138.060
Acq BHAR $_{[-1;+500]}$	852	−0.055	−2.490	43.235	−103.830	290.430
Acq BHAR $_{[-1;+750]}$	852	−0.263	−3.860	54.451	−132.440	336.190
Acq E-Index	772	2.890	3	1.291	0	6
∆ Acq E-Index $_{3YR}$	720	0.479	0	1.069	−3	4
Acq Div Adj Performance LTM $_{[OA-1]}$	852	17.770	14.407	33.051	−88.486	225.702
Acq Underperformance	852	0.275	0	0.447	0	1
Acq Underperformance × BTF Size	852	0.066	0.000	0.481	0.000	5.890
BTF Size	852	0.203	0.000	0.816	0.000	8.128
TTF Size	852	1.422	0.000	1.854	0.000	14.312
Acq Neg OA Reaction	852	0.506	1	0.500	0	1
Panel B: Acquirer CEO Characteristics						
Acq CEO Total Current Compensation	852	1,548.071	1,030.713	1,505.113	0.001	9,249.000
ln Acq CEO Total Current Compensation	852	7.012	6.939	0.943	0.001	9.132
Acq CEO Tenure	852	8.247	6.367	6.854	1.000	42.792
Acq CEO Age	852	56.116	56	6.592	39	83
Acq CEO Delta	852	4,529.250	437.539	33,747.13	8.272	486,621.0
Acq CEO Vega	852	371.646	151.981	776.105	0.000	9,442.926
Acq CEO Duality	852	0.575	1	0.495	0	1
Acq CEO Alignment	852	1.425	0.594	2.971	0.000	24.947
Acq CEO Turnover $_{1YR}$	852	0.147	0	0.354	0	1

Acq CEO Turnover $_{2YR}$	852	0.293	0	0.456	0	1
Acq CEO Turnover $_{3YR}$	852	0.440	0	0.497	0	1
Panel C: Acquiring Firm Characteristics						
Acq Executive Board Size	852	5.668	5	0.999	3	13
Acq VP Alignment	852	0.164	0.099	0.206	0.000	2.213
Acq Staggered Board	772	0.467	0	0.499	0	1
Acq Board of Directors Size	746	10.184	10	2.743	5	24
Acq Percentage of Independent Directors	746	76.662	77.777	11.857	27.277	94.118
Acq Board Busyness	772	28.994	28.571	21.467	0.000	100.000
Acq Institutional Own Sum $_{[OA-1]}$	852	48.363	47.699	15.699	0.481	98.430
Acq Insider Own Sum $_{[OA-1]}$	852	3.238	0.715	6.603	0.000	54.368
Acq Market Cap $_{[OA-22]}$	852	24,851.16	5,014.216	47,910.96	58.765	346,124.5
Acq Market-to-Book $_{[OA-22]}$	852	3.609	2.618	5.239	0.429	76.642
Acq 1YR Stock Return Volatility $_{[OA-1]}$	852	29.994	27.350	13.488	10.186	132.648
ln Acq 1YR Stock Return Volatility $_{[OA-1]}$	852	3.354	3.345	0.392	2.415	4.895
Acq Market Leverage $_{[OA-22]}$	852	0.122	0.099	0.111	0.000	0.617
Acq Dividend Payer	852	0.612	1	0.488	0	1
Acq Free Cash Flow to Total Assets $_{[OA-22]}$	369	0.054	0.057	0.050	−0.102	0.243
Acq Run-up CAR $_{[-22;-2]}$	852	−0.324	−0.237	7.828	−37.337	36.372
Acq Run-up CAR $_{[-22;-4]}$	852	−0.354	−0.423	7.368	−34.367	31.966
Acq Run-up CAR $_{[-22;-6]}$	852	−0.318	−0.413	6.981	−33.115	31.980
Panel D: Deal Characteristics						
Transaction Value (TV)	852	1,975.077	281.130	7,292.306	3.000	98,684.41
Friendly	852	0.995	1	0.068	0	1
Stock $_{[\% \text{ of TV}]}$	852	16.155	0.000	30.095	0.000	100.000
Horizontal Takeover	852	0.322	0	0.467	0	1
Horizontal Takeover × BTF Size	852	0.098	0.000	0.536	0.000	4.993
Horizontal Takeover $_{SIC\ 3}$	852	0.502	0	0.500	0	1
Horizontal Takeover $_{SIC\ 3}$ × BTF Size	852	0.129	0.000	0.625	0.000	6.652
Private Target	852	0.613	1	0.487	0	1
Time-to-Resolution (Actual)	852	0.242	0.156	0.238	0.000	1.734
ln Time-to-Resolution (Actual)	852	0.201	0.145	0.168	0.000	1.006
Tgt Premium $_{1\ Month}$	362	40.066	32.460	41.080	−89.056	383.871
Relative Size Market Cap $_{[OA-22]}$	363	90.925	12.655	266.159	0.541	1,792.928
Deal Completion	852	0.947	1	0.224	0	1
Panel E: Target Firm Characteristics						
Tgt Div Adj Performance LTM $_{[OA-1]}$	355	25.230	14.475	70.383	−91.579	409.849
Tgt Market-to-Book $_{[OA-22]}$	351	3.506	2.168	4.952	0.191	35.653
Tgt 1YR Stock Return Volatility $_{[OA-1]}$	350	48.031	39.785	59.715	13.075	1,057.783
ln Tgt 1YR Stock Return Volatility $_{[OA-1]}$	350	3.721	3.708	0.513	2.644	6.965

(Table 1 continued)

Acquiring Firm Characteristics, Target Firm Characteristics, and Deal Characteristics

Summary statistics of the two measures of board size, *Acq Executive Board Size* and *Acq Board of Directors Size*, are in line with Faleye (2007), Guo and Masulis (2015), and Fich and Shivdasani (2006). Approximately every second board is staggered, i.e., elects only a portion of directors (usually a third) each year. The percentage of independent directors on acquiring firm's board is larger than 75, consistent with Harford et al. (2012). Other acquirer and target characteristics, such as institutional and insider holdings in acquiring firm's stock, as well as its market capitalization, market-to-book ratio, stock return volatility and leverage, are all consistent with prior research. The average value of *Transaction Value (TV)* is close to USD 2 billion, right skewed with a median value of USD 281 million. Almost every deal is friendly (as classified by Standard & Poor's Capital IQ database), similar to Harford et al. (2012), who also find that 99% in their sample is classified as friendly. The average share of stock as transaction currency equals 16.2%. Similar to Fu, Lin, and Officer (2013), I find that the target is private in more than 60% of the deals. The average one-month target share price premium for public targets is 40%, right skewed, and comparable to Officer (2003) and Malmendier et al. (2016). The actual time-to-resolution of the deal, measured as the ex-post time difference between the offer announcement day and the day the deal is either closed or withdrawn, as well as deal completion rates, are similar to Chen et al. (2020) and Jeon and Ligon (2011).

2.4.2 Short-Term Acquirer's Firm Value Change

Table 2 depicts the baseline regression results. I test my central hypothesis (hypothesis 1) by regressing acquirer cumulative abnormal announcement returns with varying symmetric event windows on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), *BTF Size*, the size of the bidder termination fee as a fraction of acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variable of interest, the interaction term *Acq Underperformance* × *BTF Size* as defined in Section 2.3. In regressions (1), (4), and (7), respectively, I first omit the interaction term to test whether acquirer's underperformance or

the size of the bidder termination fee by itself show any significant relation to announcement returns, which does not seem to be the case. I then add the interaction term in regressions (2), (5), and (8), respectively, and obtain a negative and statistically highly significant coefficient on *Acq Underperformance* × *BTF Size*.

The relation of bidder termination fee size implemented by underperforming acquirers and their announcement returns becomes even stronger if I add acquiring firm's entrenchment index, *Acq E-Index*, as an additional control variable (regressions (3), (6), and (9)). The coefficient of −3.650 on the interaction term is not only statistically significant at the 1% level, it is also economically significant: a one-standard deviation increase in this interaction term results in a reduction of $Acq\ CAR_{[-3;+3]}$ of about 1.76 percentage points (= 0.481(−3.650)), which translates to a decrease of acquiring firms' market capitalization of about USD 436 million for the average acquirer with a market capitalization of USD 24,851.16 million. The reason I include *Acq E-Index* in all my regressions is because Masulis et al. (2007) find that managers of acquirers with more antitakeover provisions are more insulated from the discipline imposed by the market for corporate control and are thus more likely to display self-serving behavior. Consistent with their study of the relation of corporate governance mechanisms and the profitability of acquisitions, I also find a negative and statistically significant coefficient on *Acq E-Index*. I thus find strong support for hypothesis 1.

Acq Management Board Size is negatively related to $Acq\ CAR_{[-3;+3]}$, but only weakly statistically significant, suggesting that smaller boards might be better monitors. Consistent with Officer (2003), I find a negative and significant coefficient on $Acq\ Market\text{-}to\text{-}Book_{[OA-22]}$ and a weakly significant and negative coefficient on $ln\ Acq\ 1YR\ Stock\ Return\ Volatility_{[OA-1]}$, proposing that, on average, shareholders react negatively, if ex-ante uncertainty over the acquiring firm's value is high. $Acq\ Institutional\ Own\ Sum_{[OA-1]}$ loads positively on announcement returns, which is in line with prior research finding that increased monitoring by blockholders also improves acquisition performance. *Friendly* is significantly negatively related to $Acq\ CAR_{[-3;+3]}$ (Harford et al. (2012)). Paying for the target with a high stock percentage share gives rise to negative announcement reactions fueled by overvaluation concerns (Sokolyk (2015)). Larger deals that usually take a longer time to completion also relate to lower announcement returns, the acquisition of a private firm, however, positively affects returns since

Table 2

Relation of Bidder Termination Fees implemented by Underperforming Acquirers on Acquirer Cumulative Abnormal Announcement Returns

Table 2 presents the results of linear fixed effects regressions of different symmetric-window acquirer cumulative abnormal announcement returns (*Acq CAR*) on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), *BTF Size*, the size of the bidder termination fee as a fraction of acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variable of interest, the interaction term *Acq Underperformance* × *BTF Size* as defined in Section 2.3. The set of control variables for the baseline regressions include *Acquirer CEO Characteristics*, *Acquiring Firm Characteristics*, *Deal Characteristics*, and a control variable for share price run-up (*Acq Run-up CAR*). Regression (1) shows the isolated effect of *Acq Underperformance* and *BTF Size* on $Acq\ CAR_{[-5;+5]}$ alone. I include the interaction term *Acq Underperformance* × *BTF Size* in regression (2) and further add acquiring firm's entrenchment index, *Acq E-Index*, in regression (3). I repeat regressions (1)–(3) for different event windows, a seven-trading-day symmetric event window ($Acq\ CAR_{[-3;+3]}$, regressions (4)–(6)) as well as a three-trading-day symmetric event window ($Acq\ CAR_{[-1;+1]}$, regressions (7)–(9)). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acq CAR								
Event Window	[−5;+5]			[−3;+3]			[−1;+1]		
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acq Underperformance	1.045	1.516**	1.838***	0.311	0.875	1.207**	−0.044	0.311	0.639
	(0.639)	(0.628)	(0.636)	(0.583)	(0.531)	(0.509)	(0.437)	(0.392)	(0.401)
Acq Underperformance × BTF Size		−2.431**	−3.114***		−2.924***	−3.650***		−1.835**	−2.471***
		(0.930)	(0.983)		(0.969)	(1.030)		(0.854)	(0.855)
BTF Size	−0.142	0.790	0.887	−0.210	0.912	0.893	−0.052	0.653	0.803
	(0.655)	(0.623)	(0.643)	(0.672)	(0.609)	(0.637)	(0.618)	(0.680)	(0.654)
TTF Size	−0.097	−0.090	−0.300	−0.050	−0.043	−0.130	0.220	0.224*	0.129
	(0.348)	(0.348)	(0.346)	(0.305)	(0.304)	(0.319)	(0.134)	(0.133)	(0.116)
Acq E-Index			−0.145			−0.298*			−0.051
			(0.253)			(0.171)			(0.134)
Acquirer CEO Characteristics									
ln Acq CEO Total Current Compensation	−0.045	−0.063	−0.165	0.074	0.053	−0.141	0.087	0.073	−0.142
	(0.407)	(0.417)	(0.476)	(0.303)	(0.316)	(0.362)	(0.228)	(0.235)	(0.280)
Acq CEO Tenure	0.052	0.052	0.037	0.049	0.049	0.047	0.013	0.014	0.013
	(0.051)	(0.050)	(0.050)	(0.043)	(0.041)	(0.042)	(0.031)	(0.030)	(0.032)

Acq CEO Age	−0.022	−0.031	−0.023	−0.011	−0.021	−0.014	0.016	0.010	0.027
	(0.052)	(0.054)	(0.052)	(0.043)	(0.044)	(0.041)	(0.030)	(0.031)	(0.033)
Acq CEO Delta	0.000	0.000	0.000	−0.000	0.000	0.000	−0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Acq CEO Vega	0.000	0.000	0.000	0.000	0.000	0.000	0.000**	0.000*	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Acq CEO Duality	0.910	1.028*	1.025*	0.672	0.814	0.768	0.401	0.490	0.399
	(0.552)	(0.545)	(0.535)	(0.540)	(0.533)	(0.557)	(0.364)	(0.353)	(0.358)
Acquiring Firm Characteristics									
Acq Executive Board Size	−0.347	−0.426	−0.414	−0.323	−0.418*	−0.343	−0.101	−0.161	−0.120
	(0.258)	(0.258)	(0.260)	(0.255)	(0.250)	(0.239)	(0.193)	(0.195)	(0.196)
Acq Institutional Own Sum [OA−1]	0.037*	0.038*	0.025	0.035**	0.037**	0.027*	0.037***	0.038***	0.031***
	(0.020)	(0.020)	(0.019)	(0.015)	(0.015)	(0.014)	(0.012)	(0.012)	(0.012)
Acq Insider Own Sum [OA−1]	−0.001	−0.004	−0.020	0.016	0.012	0.002	0.046	0.043	0.026
	(0.052)	(0.052)	(0.055)	(0.044)	(0.044)	(0.045)	(0.033)	(0.033)	(0.029)
Acq Market Cap [OA−22]	0.000	0.000	−0.000	−0.000	0.000	−0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Acq Market-to-Book [OA−22]	−0.038	−0.039	−0.110*	−0.036	−0.037	−0.098**	0.036	0.035	−0.005
	(0.059)	(0.058)	(0.060)	(0.065)	(0.064)	(0.049)	(0.038)	(0.038)	(0.022)
ln Acq 1YR Stock Return Volatility [OA−1]	−0.513	−0.458	−0.604	−0.921	−0.857	−1.601*	0.317	0.360	−0.038
	(1.036)	(1.039)	(1.024)	(0.881)	(0.873)	(0.944)	(0.680)	(0.675)	(0.680)
Acq Market Leverage [OA−22]	5.462**	5.582**	6.665**	3.705	3.846	3.856	2.476	2.569	2.764
	(2.731)	(2.628)	(2.869)	(2.452)	(2.338)	(2.393)	(1.915)	(1.844)	(1.878)
Acq Dividend Payer	0.292	0.297	0.319	−0.071	−0.067	0.081	0.139	0.143	0.306
	(0.759)	(0.744)	(0.749)	(0.592)	(0.578)	(0.590)	(0.439)	(0.432)	(0.417)
Acq Run-up CAR [−22;−6]	0.058	0.060*	0.033						
	(0.036)	(0.036)	(0.037)						
Acq Run-up CAR [−22;−4]				0.028	0.031	0.031			
				(0.030)	(0.030)	(0.032)			
Acq Run-up CAR [−22;−2]							0.007	0.008	0.003
							(0.020)	(0.020)	(0.019)
Deal Characteristics									
Transaction Value (TV)	−0.000	−0.000	−0.000	−0.000	−0.000	−0.000*	−0.000**	−0.000***	−0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Friendly	−3.428	−3.283	−6.436**	−7.118**	−6.947**	−8.174**	−5.820**	−5.714**	−5.164
	(3.155)	(3.244)	(3.132)	(2.837)	(3.066)	(3.919)	(2.617)	(2.767)	(3.491)
Stock [% of TV]	−0.015	−0.014	−0.012	−0.021**	−0.020**	−0.017	−0.017***	−0.017***	−0.020***
	(0.010)	(0.010)	(0.012)	(0.009)	(0.009)	(0.011)	(0.006)	(0.006)	(0.006)

Horizontal Takeover	−0.328	−0.215	−0.134	−0.155	−0.017	0.090	0.003	0.089	0.156
	(0.590)	(0.568)	(0.593)	(0.545)	(0.523)	(0.496)	(0.421)	(0.411)	(0.376)
Private Target	0.602	0.707	0.197	0.069	0.195	0.173	1.422***	1.501***	1.344***
	(0.957)	(0.951)	(0.962)	(0.848)	(0.846)	(0.911)	(0.522)	(0.507)	(0.436)
ln Time-to-Resolution (Actual)	−0.698	−1.327	−1.551	−1.684	−2.441	−2.297	1.174	0.700	0.860
	(2.213)	(2.185)	(2.171)	(2.030)	(1.918)	(1.884)	(1.529)	(1.446)	(1.431)
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	852	852	772	852	852	772	852	852	772
Adjusted R^2	0.036	0.051	0.069	0.039	0.069	0.101	0.040	0.058	0.076

(Table 2 continued)

such acquisitions have generally been shown to be associated with value creation (see, e.g., Fuller et al. (2002) and Chang (1998))[23].

Table 3

Relation of Bidder Termination Fees implemented by Underperforming Acquirers on Acquirer Cumulative Abnormal Announcement Returns – Public Targets Only

This table presents the results of linear fixed effects regressions of acquirer cumulative abnormal announcement returns (*Acq CAR* $_{[-3;+3]}$) on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), *BTF Size*, the size of the bidder termination fee as a fraction of acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variable of interest, the interaction term *Acq Underperformance* × *BTF Size* as defined in Section 2.3 for the subsample of public targets. The set of control variables (*Controls*) include *Acquirer CEO Characteristics*, *Acquiring Firm Characteristics*, *Deal Characteristics*, a control variable for share price run-up (*Acq Run-up CAR* $_{[-22;-4]}$), and *Target Firm Characteristics*. Regression (1) shows the isolated effect of *Acq Underperformance* and *BTF Size* on *Acq CAR* $_{[-3;+3]}$ alone. I include the interaction term *Acq Underperformance* × *BTF Size* in regression (2) and further add acquiring firm's entrenchment index, *Acq E-Index*, in regression (3). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acq CAR $_{[-3;+3]}$		
Independent Variables	(1)	(2)	(3)
Acq Underperformance	−1.010	−0.149	−0.268
	(1.195)	(1.089)	(1.226)
Acq Underperformance × BTF Size		−2.812**	−2.685**
		(1.309)	(1.201)
BTF Size	−0.701	0.513	0.117
	(0.870)	(1.029)	(1.017)
TTF Size	−0.322	−0.319	−0.323
	(0.383)	(0.380)	(0.394)
Acq E-Index			−0.947**
			(0.373)
Target Firm Characteristics			
Tgt Div Adj Performance LTM $_{[OA-1]}$	0.004	0.004	0.006
	(0.008)	(0.007)	(0.008)
Tgt Market-to-Book $_{[OA-22]}$	−0.158*	−0.136*	−0.111
	(0.095)	(0.077)	(0.076)
ln Tgt 1YR Stock Return Volatility $_{[OA-1]}$	−0.027	0.015	0.291
	(0.707)	(0.693)	(0.746)
Controls	Yes	Yes	Yes

[23] Despite the large number of control variables I am not concerned with any multicollinearity problems given that variance inflation factors (vifs) are all below four and for my main variables of interest always below three. In untabulated regressions, I additionally include more granular fixed effects and additionally cluster standard errors on the acquiring firm, revealing that the results remain qualitatively and quantitatively the same.

Acq Industry × Year FE	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes
Observations	338	338	311
Adjusted R^2	0.112	0.141	0.207

(Table 3 continued)

As shown in Table 3, I restrict the baseline analysis of the relation between bidder termination fees implemented by underperforming acquirers on acquirer announcement returns to the subsample of public targets. Even after additionally controlling for factors that might influence value and synergy creation in the new bidder-target-combination, my findings still hold. Buying a more likely overvalued target negatively affects acquirer announcement returns, yet the coefficient is not statistically significant in every specification (see similar, e.g., Officer (2003)). The inferences, including the relation of controls on acquirer returns, remain unchanged.

2.4.3 Long-Term Acquirer's Firm Value Change

I so far conclude, that if underperforming acquirer CEOs implement high bidder termination fees in merger agreements, some of their shareholders might interpret this as an entrenchment-increasing and thus value-decreasing investment, and consequently sell their shares, i.e., react negatively on offer announcement. Table 2 and Table 3 show that this is indeed the case, at least if I focus on short-term acquirer's firm value change. Table 4 now extends the main analysis to a longer time horizon. Here, I regress acquiring firms' buy-and-hold abnormal returns over one, two, and three years after offer announcement on the interaction term and all other control variables. Given that the final outcome of the deal (i.e., if the deal is successfully closed or withdrawn) might affect these returns, I additionally include *Deal Completion*, a dummy variable that equals 1 if the deal is closed successfully, and 0 if withdrawn, in all regressions in Table 4. I further control for acquiring firm CEO's turnover in the respective period captured by buy-and-hold abnormal returns. The coefficient on *Acq Underperformance* × *BTF Size* is negative in all specifications and across all time periods, and statistically significant in specification (1) and all regressions for two-year buy-and-hold abnormal returns, $Acq\ BHAR_{[-1;+500]}$. I regard the results in regressions (4)–(6), i.e., the results on

Table 4

Relation of Bidder Termination Fees implemented by Underperforming Acquirers on Acquirer Buy-and-Hold Abnormal Returns – Long-Term Value Effects

Table 4 depicts results of linear fixed effects regressions of acquirer buy-and-hold abnormal returns (*Acq BHAR*) on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), *BTF Size*, the size of the bidder termination fee as a fraction of acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variable of interest, the interaction term *Acq Underperformance* × *BTF Size* as defined in Section 2.3. The set of control variables (*Controls*) include *Acquirer CEO Characteristics*, *Acquiring Firm Characteristics*, *Deal Characteristics*, and a control variable for share price run-up (*Acq Run-up CAR* $_{[-22;-2]}$). I furthermore add dummy variables for *Deal Completion* and *Acq CEO Turnover* for the respective time horizon as captured by *Acq BHAR*. Regression (1) shows the effect of *Acq Underperformance* × *BTF Size* on one-year acquirer buy-and-hold abnormal returns (*Acq BHAR* $_{[-1;+250]}$). I include the acquiring firm's entrenchment index, *Acq E-Index*, in regression (2) and add back *Target Industry Fixed Effects* in regression (3). I repeat regressions (1)–(3) for different time horizons, namely two-year acquirer buy-and-hold abnormal returns (*Acq BHAR* $_{[-1;+500]}$) in regressions (4)–(6) as well as three-year acquirer buy-and-hold abnormal returns (*Acq BHAR* $_{[-1;+750]}$) in regressions (7)–(9). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* (except regressions (2), (5), and (8)) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acq BHAR								
Event Window	[−1;+250]			[−1;+500]			[−1;+750]		
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Acq Underperformance	−1.904	−1.138	−0.852	−1.348	1.249	1.481	−5.092	−3.771	−3.244
	(2.876)	(2.991)	(3.038)	(5.050)	(4.926)	(4.968)	(6.204)	(6.622)	(6.691)
Acq Underperformance × BTF Size	−5.889**	−4.466	−4.268	−7.601**	−8.370*	−8.305*	−6.350	−5.707	−6.099
	(2.786)	(2.892)	(2.958)	(3.654)	(4.339)	(4.429)	(5.227)	(4.854)	(4.977)
BTF Size	0.845	0.078	−0.031	0.931	1.486	1.453	0.162	0.460	0.334
	(1.372)	(1.354)	(1.387)	(2.126)	(2.192)	(2.179)	(3.094)	(3.023)	(3.012)
Deal and Acquirer CEO Characteristics									
Deal Completion	−1.176	−1.196	−2.105	−10.274	−8.423	−8.793	−26.309*	−20.509	−20.459
	(5.338)	(5.374)	(5.491)	(8.805)	(8.216)	(8.314)	(13.458)	(12.363)	(12.379)
Acq CEO Turnover $_{1YR}$	1.281	1.659	1.337						
	(3.002)	(3.449)	(3.397)						
Acq CEO Turnover $_{2YR}$				−3.561	−3.246	−3.481			
				(3.647)	(3.880)	(3.869)			

Acq CEO Turnover $_{3YR}$							−15.224***	−15.028***	−15.484***
							(4.554)	(4.979)	(5.198)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
Observations	852	772	772	852	772	772	852	772	772
Adjusted R^2	0.038	0.048	0.053	0.026	0.032	0.033	0.066	0.050	0.055

(Table 4 continued)

two-year BHARs, as being more convincing since some deals in my sample take more than one year until resolution and no deal in my sample takes more than 1.5 years to resolution. These results strengthen the reasoning that deals with high bidder termination fees implemented by entrenchment-seeking acquirer CEOs are value destroying, not only in the short-run, but also in the long-run.

2.4.4 Level of Entrenchment post Announcement

As announcement returns and buy-and-hold abnormal returns are evaluations of market participants about the value creation of deals, I next strengthen the evidence that deals announced by entrenchment-seeking managers, secured by high bidder termination fees, are really objectively increasing the level of entrenchment. I thus track the level of entrenchment, namely the Bebchuk et al. (2009) E-Index of the acquiring firm, *Acq E-Index*, from shortly before offer announcement until three years after the deal was announced. Bebchuk et al. (2009) find in their study that increases in the entrenchment index level are monotonically associated with economically significant reductions in firm valuations as well as large negative abnormal returns during the 1990–2003 period. The E-index consists of six out of 24 governance provisions put forward by Gompers et al. (2003), namely staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments[24]. All these six provisions have been found to provide incumbent managers, at least nominally, with protection from removal or the consequences of removal. Further, these index constituents are not captured by any other control variable included in my regression. If my proposed strategy with high bidder termination fees is really motivated by increasing the level of entrenchment, I should, all else equal, detect significantly larger positive changes of the E-Index over the years following the deal. Given that it takes time to implement respective constituents of the E-Index, I focus on the three-year change in acquiring firms' E-Index, $\Delta\ Acq$

[24] Here, four out of these six provisions involve constitutional limitations on shareholders' voting power: staggered boards, limits to shareholder bylaw amendments, and supermajority requirements for mergers and charter amendments. The other two provisions, poison pills and golden parachutes, can be regarded as "takeover readiness" provisions that boards sometimes put in place. In their 2009 study, Bebchuk et al. further find that the other 18 provisions, that were not included in their entrenchment index, are uncorrelated with either reduced firm valuation (Tobin's Q) or negative abnormal returns.

E-Index $_{3YR}$, as the dependent variable in Table 5. Specifically, Δ *Acq E-Index* $_{3YR}$ is defined as the difference between *Acq E-Index* $_{OA+3YR}$ (obtained at the end of the fiscal year three years after the last fiscal year end prior to announcement of the deal) and *Acq E-Index* $_{OA}$ (obtained at the last fiscal year end prior to offer announcement). I add the level, *Acq E-Index* $_{OA}$, to every regression in Table 5.

Specification (1) in Table 5 regresses Δ *Acq E-Index* $_{3YR}$ on the variable of interest, the interaction term *Acq Underperformance* $\times$ *BTF Size*, and all other controls from the baseline regression as depicted in Table 2. I obtain a statistically significant and positive coefficient on the interaction term: underperforming acquirers that announce deals with a high bidder termination fee seem to increase their level of entrenchment in the years following the deal[25]. I add *Acq CEO Turnover* $_{3YR}$ as a control to rule out any impact turnover has on implementing governance provisions.

This holds if I include *Deal Completion* as an additional control variable for successfully closing the deal, but also if I analyze the sample of closed deals only (regression (3)). Regressions (2) and (4) interact my variable of interest with *Acq Neg OA Reaction*, a dummy variable that equals 1 if *Acq CARs* $_{[-3;+3]}$ takes on negative values, and 0 otherwise. This is to ensure that I additionally observe the relation of transactions that are overall evaluated as value-destroying by acquirer shareholders at offer announcement and transactions that are probably more motivated by increasing the level of entrenchment.

As predicted by hypothesis 2, the coefficient is positive and highly statistically significant. A one-standard deviation increase in this triple interaction term corresponds to an increase of the E-Index of 0.142 index steps above and beyond their single components' estimates. As one would expect, the coefficient on *Acq E-Index* itself is negative and highly statistically significantly related to Δ *Acq E-Index* $_{3YR}$: firms having a high E-Index already tend to have little or even no increases of the entrenchment index in the near future. Deals where the attitude is hostile also seem to increase entrenchment of the acquirer, as might be the case in tender offers[26].

[25] In Table A3 in the Appendix (specification (3)), I show that already entrenched managers less likely use bidder termination fees as a device to entrench themselves.

[26] In untabulated regressions, I find that my results hold even if I control for serial acquirers.

Table 5

Relation of Bidder Termination Fees implemented by Underperforming Acquirers on the Level of Entrenchment Post Announcement

This table presents the results of linear fixed effects regressions of the change in acquiring firm's entrenchment index three years after offer announcement, Δ *Acq E-Index* $_{3YR}$, on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), *BTF Size*, the size of the bidder termination fee as a fraction of the acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variable of interest, the interaction term *Acq Underperformance* × *BTF Size* as defined in Section 2.3. The set of control variables (*Controls*) include *Acquirer CEO*, *Firm*, and *Deal Characteristics*, and a control variable for share price run-up. I furthermore add dummy variables for *Deal Completion* and *Acq CEO Turnover* $_{3YR}$ for the respective three-year time horizon. Regression (1) shows the effect of *Acq Underperformance* × *BTF Size* on the three-year change in acquiring firm's entrenchment index, Δ *Acq E-Index* $_{3YR}$, which is the difference of *Acq E-Index* at the fiscal year end three years after the last fiscal year end prior to announcement of the deal and *Acq E-Index* at the last fiscal year end prior to offer announcement. Regression (2) additionally interacts *Acq Underperformance* × *BTF Size* with *Acq Neg OA Reaction*, a dummy variable that equals 1 if *Acq CAR* $_{[-3;+3]}$ takes on negative values, and 0 otherwise. I repeat the regressions for the subsample of completed deals ((3) and (4)). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Δ Acq E-Index 3YR			
Sample	All Deals		Completed Deals Only	
Independent Variables	(1)	(2)	(3)	(4)
Acq Underperformance × BTF Size × Acq Neg OA Reaction		0.342***		0.331***
		(0.101)		(0.115)
Acq Underperformance × BTF Size	0.179**	−0.103	0.174**	−0.093
	(0.070)	(0.067)	(0.076)	(0.075)
BTF Size × Acq Neg OA Reaction		−0.004		−0.026
		(0.074)		(0.072)
Acq Underperformance × Acq Neg OA Reaction		−0.145		−0.112
		(0.125)		(0.128)
Acq Underperformance	0.022	0.076	0.035	0.070
	(0.071)	(0.093)	(0.072)	(0.095)
Acq Neg OA Reaction		−0.016		−0.027
		(0.083)		(0.086)
BTF Size	0.040	0.043	0.035	0.050
	(0.042)	(0.039)	(0.041)	(0.047)
TTF Size	−0.004	−0.003	−0.024	−0.022
	(0.027)	(0.027)	(0.035)	(0.035)
Acq E-Index	−0.376***	−0.374***	−0.378***	−0.376***
	(0.032)	(0.033)	(0.034)	(0.035)
Deal Completion	−0.012	−0.037		
	(0.143)	(0.133)		
Controls	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes
Observations	720	720	686	686
Adjusted R^2	0.208	0.207	0.209	0.208

2.4.5 Subsample Tests

Sources of CEO Motivation

CEOs whose wealth is more sensitive to shareholder value are more aligned with the interests of shareholders in a way that they are less motivated to entrench themselves and agency problems tend to be less severe (e.g., Murphy (1999)). I expect that CEOs can anticipate shareholders' reaction to a variety of CEO's actions, and especially negative reactions in the case of entrenchment activities that have been evaluated as value-destroying investments by the market. I thus hypothesize that CEOs more likely conduct entrenchment strategies in the form of value-destroying acquisitions, if the CEO's wealth is less sensitive to acquiring firm's stock price changes:

Hypothesis 1a: *The relation of high bidder termination fees, implemented by underperforming acquirers, with acquiring firms' cumulative abnormal announcement returns is more pronounced,*
if acquirer CEOs' wealth is less sensitive to firms' stock price changes.

I follow Aggarwal and Samwick (2003) and Kale et al. (2009) and split the sample by the median value of *Acq CEO Alignment*, the sum of stock and option sensitivities to a USD 100 change in shareholder wealth. Consistent with their studies, I define *Acq CEO Alignment* in the following way:

$$Acq\ CEO\ Alignment = \frac{Shares\ held\ by\ the\ CEO + (Delta\ of\ Options \times Options\ held\ by\ the\ CEO)}{Total\ Number\ of\ Common\ Shares\ Outstanding} \times 100$$

I use the percentage of stock ownership of the CEO at the last fiscal year end prior to offer announcement to obtain the stock-based sensitivity of the CEO's equity portfolio: this is the reported CEO's shares held as disclosed in the proxy statement on that end of the fiscal year, divided by the total number of common shares outstanding of the acquiring firm, obtained from Standard & Poor's Capital IQ database 22 trading days prior to offer announcement. For option holdings, I use the total accumulated number of options held by the CEO at the same fiscal year end, which by definition also represents option grants made in prior years. To calculate the option delta, I extend Murphy (1999) by determining an average weighted exercise

Table 6
Sources of CEO Motivation

Table 6 presents the results of linear fixed effects regressions of seven-trading-day acquirer cumulative abnormal announcement returns (*Acq CAR* $_{[-3;+3]}$) on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), *BTF Size*, the size of the bidder termination fee as a fraction of acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variable of interest, the interaction term *Acq Underperformance* × *BTF Size* as defined in Section 2.3. The set of control variables (*Controls*) include *Acquirer CEO and Firm Characteristics* , *Deal Characteristics*, and a control variable for share price run-up (*Acq Run-up CAR* $_{[-22;-4]}$). All regressions repeat specification (6) from Table 2, except that the sample is split in low vs. high values of acquiring firm CEO's equity alignment incentives as separated by the sample median value of *Acq CEO Alignment* (regressions (1) and (2)), acquiring firm CEO's age (*Acq CEO Age*) being less than 60 years vs. more or equal than 60 years (acquiring firm's CEO close to retirement age) (regressions (3) and (4)), and acquiring firm's board status as either a traditionally elected board vs. staggered board (regressions (5) and (6)). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acq CAR $_{[-3;+3]}$					
	Acq CEO Alignment		Acq CEO Age		Acq Staggered Board	
	Low	High	< 60 years	≥ 60 years	No	Yes
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Acq Underperformance	1.537***	1.215	1.925***	1.134	1.974**	0.473
	(0.484)	(0.932)	(0.546)	(1.437)	(0.832)	(0.999)
Acq Underperformance × BTF Size	−3.424***	−3.201*	−4.002***	−2.484*	−5.432***	−2.164
	(1.170)	(1.739)	(1.190)	(1.329)	(0.853)	(1.642)
BTF Size	−0.666	1.634**	0.742	0.856	1.368**	0.570
	(0.927)	(0.791)	(0.794)	(1.114)	(0.606)	(1.131)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	386	386	550	222	325	285
Adjusted R^2	0.144	0.141	0.120	0.092	0.146	0.101

price as well as an average weighted expiration date for all previously granted options. I obtain the following variables 22 trading days prior to offer announcement[27]: the risk-free rate (using data from the five-year treasury bill constant-maturity series available from the Federal Reserve Bank's official website[28]), the dividend yield of the acquiring firm, its five-year stock return volatility[29], the last sale price of acquiring firm's stock, and the total number of common shares outstanding from Standard & Poor's Capital IQ database. Using the above information, I compute the delta of prior option grants using the modified Black-Scholes formula.

Table 6 depicts the results of linear fixed effects regressions of $Acq\ CAR_{[-3;+3]}$ on my variable of interest, the interaction term *Acq Underperformance* × *BTF Size*, and all other controls from regression (6) in Table 2. As stated above, I split the sample by the median value of *Acq CEO Alignment* in low vs. high values. Consistent with hypothesis 1a, I find the relation with acquirer cumulative abnormal announcement returns to be more pronounced if *Acq CEO Alignment* is low (regression (1)). This suggests that CEOs are more prone to conduct my proposed entrenchment strategy if their equity alignment incentives are low and shareholders then react more likely negative on average.

Another source of motivation for CEOs seeking entrenchment might be how many remaining years they can stay in their position. One very natural indicator of their residual length of tenure might be how close they are to their potential retirement. Thus, CEOs might be more in need of entrenching themselves and appreciate all advantages of entrenchment, such as personal benefits of control, higher discretion over the strategy of the firm, job security and freedom of action (Shleifer and Vishny (1989)), if CEOs are not close to retirement age:

Hypothesis 1b: *The relation of high bidder termination fees, implemented by underperforming acquirers, with acquiring firms' cumulative abnormal announcement returns is more pronounced,*
if the acquirer CEO is not close to retirement age.

[27] This is to make sure that I use the most recent data that by definition have a significant effect on the option delta and thereby CEO alignment incentives.
[28] https://www.federalreserve.gov/releases/h15/ (permanent link).
[29] Calculated as the standard deviation of weekly log-normal price returns of acquiring firm's stock over the five years preceding the 22nd trading day prior to offer announcement, annualized with a factor of 52 for the 52 trading weeks in a year.

Consistent with the prediction of hypothesis 1b, I find the relation with *Acq CAR* $_{[-3;+3]}$ to be more pronounced (regression (3)) if the CEO is less than 60 years old, i.e., if she is not close to retirement age, which is usually 65 years (see Huson et al. (2001), who also use a dummy if the CEO is less than 60 years old).

A further motive for CEOs undertaking the proposed entrenchment-increasing strategy might be, that prior to implementing such a strategy they were not sufficiently entrenched. Staggered boards (also known as classified boards) can, for instance, protect boards and top management boards from prompt removal through takeovers or proxy contests (Bebchuk and Cohen (2005)). In the case of firms with staggered boards, CEOs might be already sufficiently entrenched in a way that they are not motivated to undertake entrenchment-enhancing takeovers. Hence, I expect that the relation is more pronounced if the firm does not have a staggered board:

Hypothesis 1c: *The relation of high bidder termination fees, implemented by underperforming acquirers, with acquiring firms' cumulative abnormal announcement returns is more pronounced,*
if the acquiring firm has not implemented a staggered board.

Consistent with this prediction, I only find in regression (5) a negative and statistically highly significant coefficient on *Acq Underperformance* × *BTF Size*.

Enabling Channels of the Implementation of High Bidder Termination Fees:
VP Alignment and Busy Boards

As shown above, CEOs seem to be motivated to implement high bidder termination fees to undertake presumably entrenchment-enhancing takeovers, if they are not sufficiently protected from removal due to bad performance. Since entrenchment is in those cases not yet established before the takeover attempt and boards might even look at and approve takeover contracts in advance of their signing, I now investigate how CEOs might nevertheless be able to implement high bidder termination fees in takeover contracts. To enable this, I put forward two possible channels: low VP Alignment and busy boards.

Concerning VP Alignment, I assume that it is easier for the CEO to implement such entrenchment-increasing strategy by high bidder termination fees, if the management board, comprised of all VPs but excluding the CEO, has low equity alignment incentives. The reason for this is that VPs with low equity alignment might only have low incentives to evaluate all relevant clauses in the merger agreement, as is the case with bidder termination fee provisions, and to intervene if the level of such provisions is solely high because of the CEO's intention to make deal termination costly. Even if they are not involved in writing the contract, they can intervene by informing external and thus presumably worse-informed directors, which are likely in the majority (e.g., Acharya, Myers, and Rajan (2011) and Imad'Eddine, Miihkinen, and Strych (2019)) and who are able to disapprove such provisions but do not know about their adverse use by the CEO. In addition, if their equity incentives are low and VPs have been appointed by their CEO in the past and now are willing to show loyalty to them (Landier, Sauvagnat, Sraer, and Thesmar (2012)), they might also be more aligned with their CEO rather than their firms' shareholders, exacerbating this reluctance to intervene. I conclude this reasoning in the following hypothesis:

Hypothesis 1d: *The relation of high bidder termination fees, implemented by underperforming acquirers, with acquiring firms' cumulative abnormal announcement returns is more pronounced,*
if the acquiring firms' VPs have low equity-based alignment incentives.

In Table 7, I split the sample by the sample median value of *Acq VP Alignment*, which is defined as the median value of the alignment variable of all vice presidents in the respective last firm-fiscal-year preceding the offer announcement. I calculate the alignment variable for each VP as I did for the CEO. As shown in regressions (1) and (2) in Table 7, I find support for hypothesis 1d: the coefficient on *Acq Underperformance* × *BTF Size* in the regression for low values of *Acq VP Alignment* is larger and of higher significance compared to the regression with high values of *Acq VP Alignment*.

Concerning busy boards, I expect that independent directors, that are marked as busy if they have more than one outside directorship (Masulis and Zhang (2019)), might be too time-constrained to thoroughly evaluate the entire M&A contract. Hence, their decision on

approval of the takeover contract might rely to a great extent on the information their CEOs present to them. In this case, it is easy for CEOs to implement high bidder termination fees to support entrenchment-enhancing takeovers:

Hypothesis 1e: *The relation of high bidder termination fees, implemented by underperforming acquirers, with acquiring firms' cumulative abnormal announcement returns is more pronounced, if the acquiring firms' board busyness is high.*

Table 7
Enabling Channels of the Implementation of High Bidder Termination Fees

Table 7 presents the results of linear fixed effects regressions of seven-trading-day acquirer cumulative abnormal announcement returns (*Acq CAR* $_{[-3;+3]}$) on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), *BTF Size*, the size of the bidder termination fee as a fraction of acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variable of interest, the interaction term *Acq Underperformance* × *BTF Size* as defined in Section 2.3. The set of control variables (*Controls*) include *Acquirer CEO and Firm Characteristics*, *Deal Characteristics*, and a control variable for share price run-up (*Acq Run-up CAR* $_{[-22;-4]}$). All regressions repeat specification (6) from Table 2, except that the sample is split in low vs. high values of acquiring firm VP's equity alignment incentives as separated by the sample median value of *Acq VP Alignment* (regressions (1) and (2)), and acquiring firm's *Board Busyness* (regressions (3) and (4)). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acq CAR $_{[-3;+3]}$			
	Acq VP Alignment		Acq Board Busyness	
	Low	High	Low	High
Independent Variables	(1)	(2)	(3)	(4)
Acq Underperformance	1.109*	1.242	1.486*	1.442*
	(0.561)	(0.874)	(0.847)	(0.742)
Acq Underperformance × BTF Size	−3.459***	−2.699*	−0.583	−4.346**
	(0.846)	(1.383)	(1.227)	(1.808)
BTF Size	−0.947	1.590**	−0.171	0.394
	(0.740)	(0.665)	(0.718)	(0.647)
Controls	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes
Observations	386	386	377	395
Adjusted R^2	0.119	0.101	0.097	0.157

In Table 7, columns (3) and (4), I split the sample by the sample median of the percentage share of independent directors that are busy, i.e., have more than one outside directorships that I denote as *Acq Board Busyness*. As shown in regressions (3) and (4), I find support for hypothesis 1e: the coefficient on *Acq Underperformance* × *BTF Size* in the regression for high values of *Acq Board Busyness* is statistically highly significant compared to the statistically insignificant coefficient on the interaction term in the case of low values of *Acq Board Busyness*. This finding is consistent with broad empirical evidence in the literature that states that busyness of the board of directors is negatively related to firm performance (e.g., Masulis and Zhang (2019), Falato, Kadyrzhanova, and Lel (2014), and Hauser (2018)).

Diversifying Takeovers

As previous literature (e.g., Jensen (1986, 1993)) points out, managers might pursue negative NPV projects because they derive private benefits of control from controlling more and diverse assets (Aggarwal and Samwick (2006), Morck, Shleifer, and Vishny (1990)). These wasteful empire-building investments might increase the level of entrenchment and are usually assessed as value-destroying by the market. Shleifer and Vishny (1989) motivate their entrenchment model with a CEO making a manager-specific investment by investing excessive resources in the directions suggested by the CEO's talents and experience.

My entrenchment strategy might be more likely pursued by a CEO undertaking a diversifying acquisition, i.e., an acquisition that more likely takes on the form of empire-building to strengthen her level of entrenchment:

Hypothesis 1f: *The relation of high bidder termination fees, implemented by underperforming acquirers, with acquiring firms' cumulative abnormal announcement returns is more pronounced,*
if the deal is characterized as a diversifying takeover.

I split the sample by the level of diversifying investments according to the dummy variable *Horizontal Takeover* that equals 1, if both the acquiring and the target firm are primarily assigned to the same industry as defined by all four SIC digits, and 0 otherwise.

As Table 8 shows, the coefficient is only negative and statistically significant in regression (1), i.e., if the takeover is classified as a diversifying acquisition. Acquiring firms' shareholders seem to punish management if the latter carries out my proposed entrenchment strategy and the takeover more likely leads to empire-building, by putting downward pressure on acquiring firms' stock. I therefore find that hypothesis 1f is supported.

Table 8
Diversification Effect of the Takeover

Table 8 presents the results of linear fixed effects regressions of seven-trading-day acquirer cumulative abnormal announcement returns (*Acq CAR* $_{[-3;+3]}$) on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), *BTF Size*, the size of the bidder termination fee as a fraction of acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variable of interest, the interaction term *Acq Underperformance* × *BTF Size* as defined in Section 2.3. The set of control variables (*Controls*) include *Acquirer CEO and Firm Characteristics*, *Deal Characteristics*, and a control variable for share price run-up (*Acq Run-up CAR* $_{[-22;-4]}$). All regressions repeat specification (6) from Table 2, except that the sample is split in diversifying (regression (1)) vs. horizontal takeovers (regression (2)), whereas a takeover is classified as horizontal if both the acquiring and target firm share the same primary SIC 4-digit industry, and classified as diversifying if not. All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acq CAR $_{[-3;+3]}$	
Takeover Type	Diversifying	Horizontal
Independent Variables	(1)	(2)
Acq Underperformance	1.234*	0.964
	(0.623)	(1.323)
Acq Underperformance × BTF Size	−2.832**	−2.106
	(1.437)	(1.841)
BTF Size	0.999*	−0.183
	(0.595)	(1.500)
Controls	Yes	Yes
Acq Industry × Year FE	Yes	Yes
Tgt Industry FE	Yes	No
Observations	526	246
Adjusted R^2	0.078	0.196

2.5 Discussion and Robustness Tests

I conduct some robustness tests to strengthen my inferences. First, I present extended models that additionally capture acquiring firm's board of directors characteristics, the free-cash-flow problem, and additional deal and target characteristics that include measures for relative bargaining power and overpayment. Second, I dissect the size of the bidder termination fee into different quantiles to rule out that potential nonlinearities in *BTF Size* affect the results. Third, I allow for an additional driver of *BTF Size*, namely takeovers that might require high bidder termination fees because the proposed takeover is horizontal, i.e., acquirer and target share the same industry, and the takeover thus faces a higher probability of being challenged by antitrust authorities.

Additional Control Variables

As put forward in Section 2.2, I assume that boards are too busy to evaluate every contractual provision in merger agreements. As Jensen (1993) and Lipton and Lorsch (1992) have identified, board size is an important determinant of corporate governance effectiveness when it comes to monitoring the CEO. Weisbach (1988) furthermore shows that CEOs face more intense monitoring when the board of directors is controlled by more independent directors that have no significant connection with the firm. Regression (1) in Table 9 shows that my results hold if I include the size of the board of directors and the percentage of outside directors on the board to the baseline specification.

Jensen's (1986) free cash flow hypothesis predicts that firms with excess cash flows but few value-increasing investment opportunities are more likely to conduct value-destroying acquisitions. I control for acquiring firm's free cash flow problem by including the latest available value of free cash flow (FCF) scaled by total assets 22 trading days prior to offer announcement. More specifically, I calculate acquiring firm's FCF to total assets in the following way (Masulis et al. (2007)): operating income before depreciation − interest expenses − income taxes − capital expenditures, all scaled by book value of total assets. Since I do not have valid data for all acquirers, my sample size is reduced, but the results remain unchanged (regression (2) in Table 9).

Table 9
Robustness – Additional Control Variables:
Acquiring Firm's Board Characteristics, Free Cash Flow, Deal and Target Firm Characteristics

This table presents the results of linear fixed effects regressions of seven-trading-day symmetric-window acquirer cumulative abnormal announcement returns (*Acq CAR* $_{[-3;+3]}$) on *Acq Underperformance*, *BTF Size*, and the variable of interest, the interaction term *Acq Underperformance* × *BTF Size* as defined in Section 2.3. The set of control variables (*Controls*) include *Acquirer CEO and Firm Characteristics*, *Deal Characteristics*, and a control variable for share price run-up (*Acq Run-up CAR* $_{[-22;-4]}$). All regressions repeat specification (6) from Table 2, except that the model is extended by additional control variables that characterize the acquiring firm's board of directors (*Acq Board of Directors Size* and *Acq Percentage of Independent Directors*, regression (1)), acquiring firm's free cash flow scaled by total assets 22 trading days prior to offer announcement (*Acq Free Cash Flow to Total Assets* $_{[OA-22]}$, regression (2)), and deal and target firm characteristics (regression (3)). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acq CAR $_{[-3;+3]}$		
Independent Variables	(1)	(2)	(3)
Acq Underperformance	1.045*	0.039	−0.337
	(0.536)	(1.032)	(1.214)
Acq Underperformance × BTF Size	−3.207***	−2.997**	−2.499*
	(1.066)	(1.324)	(1.348)
BTF Size	0.894	1.330*	0.014
	(0.639)	(0.752)	(1.053)
TTF Size	−0.102	0.117	−0.331
	(0.281)	(0.338)	(0.387)
Acq E-Index	−0.275	−0.558	−0.939**
	(0.181)	(0.385)	(0.442)
Additional Acquiring Firm Characteristics			
Acq Board of Directors Size	0.028	0.152	−0.005
	(0.121)	(0.209)	(0.231)
Acq Percentage of Independent Directors	−0.240	−4.041	6.828
	(2.050)	(5.762)	(4.453)
Acq Free Cash Flow to Total Assets $_{[OA-22]}$		−9.500	
		(9.932)	
Additional Deal Characteristics			
Tgt Premium $_{1\ Month}$			−0.017
			(0.020)
Relative Size Market Cap $_{[OA-22]}$			−0.002
			(0.001)
Additional Target Firm Characteristics			
Tgt Div Adj Performance LTM $_{[OA-1]}$			0.004
			(0.008)
Tgt Market-to-Book $_{[OA-22]}$			−0.079
			(0.087)
ln Tgt 1YR Stock Return Volatility $_{[OA-1]}$			0.457
			(0.872)
Controls	Yes	Yes	Yes
Acq Industry × Year and Tgt Industry FE	Yes	Yes	Yes
Observations	732	314	296
Adjusted R^2	0.085	0.122	0.191

The last vector of controls I add to the baseline model are additional deal and target characteristics. To rule out that the size of the bidder termination fee is driven by the relative bargaining power between acquirer and target, I include the relative size of all acquirer-target firm-pairs that have valid data on their market capitalization. I define relative size as the ratio of acquiring firm's market capitalization to target firm's market capitalization, both obtained 22 trading days prior to offer announcement. All else equal, if the target is increasing in its size relative to the acquirer, I assume that it gains bargaining power which can be used to force the acquirer to provide a bidder termination fee. In this case, failure of the acquirer to obtain financing may also increase, all else equal. Despite Chen et al. (2020) find that relative size is on average higher in deals with bidder termination provisions, they find that relative size does not have a statistically significant association with the inclusion of bidder termination fee provisions. I additionally include measures for the price paid to target shareholders, $Tgt\ Premium_{\ 1\ Month}$, as well as the target's prior performance, market-to-book ratio, and stock return volatility in regression (3) in Table 9.

I find that the relation with acquirer announcement returns is not driven by bidder termination fees implemented as a symmetrical response to the implementation of equal-sized target termination fees during merger negotiations, which would be more likely the case in merger-of-equals (Officer (2003)). The coefficient on $Acq\ Underperformance \times BTF\ Size$ remains negative and statistically significant, yet with a slightly reduced t-statistic of 1.854. It is worth noticing that the negative coefficient on *Acq E-Index* also survives this battery of controls (Masulis et al. (2007))[30].

Potential Nonlinearities in BTF Size − Short-Term Acquirer's Firm Value Change

It could be the case that certain-sized bidder termination fees serve as meaningful contractual devices that incentivize the target to reveal private information to the acquirer. In this case, I expect that acquirer shareholders should not punish management by selling their shares on announcement. On the other side, there might be dimensions of fees that are too high, i.e., fees that reflect agency problems between managers and outside investors. These

[30] Even in this regression, variance inflation factors (vifs) are all below three.

excessively high fees might be used as a means to increase entrenchment through M&A as proposed in this chapter.

Table 10
Robustness – Decomposing BTF Size into Quantiles:
Short-Term Value Effects

This table depicts results of linear fixed effects regressions of different symmetric-window acquirer cumulative abnormal announcement returns (*Acq CARs*) on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), terciles and the median of *BTF Size*, the size of the bidder termination fee as a fraction of acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variables of interest, the interaction terms *Acq Underperformance* × *BTF Size* (*terciles or median*) as defined in Section 2.3. The set of control variables (*Controls*) include *Acquirer CEO Characteristics*, *Acquiring Firm Characteristics*, *Deal Characteristics*, and a control variable for share price run-up (*Acq Run-up CAR*). Regression (1) shows the relation between *Acq Underperformance* interacted with *BTF Size* terciles and *Acq CAR* $_{[-5;+5]}$, whereas *High BTF Size* is a dummy variable that equals 1 if *BTF Size* is in the highest tercile, and 0 otherwise. *Medium BTF Size* is a dummy variable that equals 1 if *BTF Size* is in the medium tercile, and 0 otherwise. *Low BTF Size* is a dummy variable that equals 1 if *BTF Size* is in the lowest tercile, and 0 otherwise. Regression (2) depicts the relation between *Acq Underperformance* × *Above Median BTF Size* and *Acq CAR* $_{[-5;+5]}$, whereas *Above Median BTF Size* is a dummy variable that equals 1 if *BTF Size* is above the sample median, 0 otherwise, and *Below Median BTF Size* is a dummy variable that equals 1 if *BTF Size* is below the sample median, and 0 otherwise. The benchmark case in all regressions is *No BTF*, i.e., if there is no BTF included in the merger agreement. Regressions (3)–(6) repeat regressions (1) and (2) for different event windows (*Acq CAR* $_{[-3;+3]}$ and *Acq CAR* $_{[-1;+1]}$, respectively). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Reference Group	No BTF					
Dependent Variable	Acq CAR					
Event Window	[−5;+5]		[−3;+3]		[−1;+1]	
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Acq Underperformance × High BTF Size	−11.558***		−13.775***		−8.941**	
	(4.013)		(4.342)		(3.609)	
Acq Underperformance × Medium BTF Size	0.097		−0.802		−0.175	
	(5.676)		(5.866)		(4.779)	
Acq Underperformance × Low BTF Size	−4.769		−3.719		−0.154	
	(3.518)		(3.245)		(3.654)	
Acq Underperformance × Above Median BTF Size		−8.860***		−10.511***		−6.509**
		(3.171)		(3.318)		(2.566)
Acq Underperformance × Below Median BTF Size		−1.804		−1.239		0.995
		(3.628)		(3.114)		(2.878)
High BTF Size	3.828		4.163		3.002	
	(2.965)		(3.051)		(2.768)	
Medium BTF Size	0.426		0.257		0.312	
	(2.178)		(1.835)		(1.259)	
Low BTF Size	1.717		1.999		1.375	
	(1.284)		(1.224)		(0.977)	

Above Median BTF Size		0.989		0.774		0.333
		(2.365)		(2.154)		(1.794)
Below Median BTF Size		1.946		2.275*		1.807**
		(1.501)		(1.218)		(0.885)
Acq Underperformance	1.834***	1.857***	1.182**	1.218**	0.566	0.598
	(0.639)	(0.648)	(0.521)	(0.531)	(0.412)	(0.419)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	772	772	772	772	772	772
Adjusted R^2	0.063	0.065	0.095	0.099	0.069	0.077

(Table 10 continued)

To reveal what magnitudes of bidder termination fees implemented by underperforming acquirers are regarded as the primary cause of negative announcement returns, I divide the continuous variable *BTF Size* into different quantiles and interact these quantiles with *Acq Underperformance*. First, I split *BTF Size* into terciles, namely *High BTF Size* (*BTF Size* larger than 2.50 percent of acquiring firm's market capitalization 22 trading days prior to offer announcement), *Medium BTF Size* (*BTF Size* between 0.75 and 2.50 percent of the respective market capitalization), and *Low BTF Size* (*BTF Size* smaller than 0.75 percent of the respective market capitalization). Additionally, I define *Above Median BTF Size* as a dummy variable that equals 1 if *BTF Size* is larger than 1.50 percent of the market capitalization, 0 otherwise, and *Below Median BTF Size* as a dummy variable that equals 1 if *BTF Size* is between 0.00 and 1.50 percent of the market capitalization, 0 otherwise. In both cases, the reference group against which I benchmark the results is the group *No BTF*, i.e., if there was no bidder termination fee negotiated between the merging parties. Table 10 shows the results for different event windows.

Most of the interaction terms in Table 10 are negatively related to acquirer cumulative abnormal announcement returns, but the significant effect seems to be driven by excessively high bidder termination fees. Independent of the event window, only the highest quantiles are highly significantly negatively related to announcement returns. It is interesting to mention that, if I compare the coefficients across the event windows, I find that the relation is slightly weaker in *Acq CAR* $_{[-1;+1]}$ regressions (specifications (5) and (6), respectively), but still significant at the 5% level and strongly negative. This might be the effect of some bidder termination

fees being disclosed and filed with the SEC two or three days after announcement, as detected by Coates, Palia, and Wu (2018). In this case, investors should not be able to incorporate these information into prices that are reflected in $Acq\ CAR_{[-1;+1]}$.

Potential Nonlinearities in BTF Size – Level of Entrenchment post Announcement

To further underpin the main story of entrenchment-seeking managers implementing high bidder termination fees, I additionally regress $\Delta\ Acq\ E\text{-}Index_{3YR}$, a measure capturing changes in the entrenchment index post announcement, on respective quantiles of *BTF Size*. This is to investigate if excessively high bidder termination fees are detrimental to shareholder value on announcement, because they might be associated with potential increases in entrenchment after the deal is consummated.

Table 11
Robustness – Decomposing BTF Size into Quantiles:
Effect on the Level of Entrenchment Post Announcement

Table 11 shows the results of linear fixed effects regressions of the change in acquiring firm's entrenchment index three years after offer announcement, $\Delta\ Acq\ E\text{-}Index_{3YR}$, on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), terciles and the median of *BTF Size*, the size of the bidder termination fee as a fraction of acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variables of interest, the interaction terms *Acq Underperformance* × *BTF Size* (*terciles or median*) as defined in Section 2.3. The set of control variables (*Controls*) include *Acquirer CEO Characteristics*, *Acquiring Firm Characteristics*, *Deal Characteristics*, and a control variable for share price run-up ($Acq\ Run\text{-}up\ CAR_{[-22;-4]}$). I furthermore add dummy variables for *Deal Completion* and $Acq\ CEO\ Turnover_{3YR}$ for the respective three-year time horizon. Regression (1) shows the effect of *Acq Underperformance* interacted with *BTF Size* terciles on the three-year change in acquiring firm's entrenchment index, $\Delta\ Acq\ E\text{-}Index_{3YR}$, which is the difference of *Acq E-Index* at the fiscal year end three years after the last fiscal year end prior to announcement of the deal and *Acq E-Index* at the last fiscal year end prior to offer announcement. *High BTF Size* is a dummy variable that equals 1 if *BTF Size* is in the highest tercile, and 0 otherwise. *Medium BTF Size* is a dummy variable that equals 1 if *BTF Size* is in the medium tercile, and 0 otherwise. *Low BTF Size* is a dummy variable that equals 1 if *BTF Size* is in the lowest tercile, and 0 otherwise. Regression (2) shows the effect of *Acq Underperformance* interacted with *BTF Size* median on the three-year change in acquiring firm's entrenchment index, $\Delta\ Acq\ E\text{-}Index_{3YR}$. *Above Median BTF Size* is a dummy variable that equals 1 if *BTF Size* is above the sample median, 0 otherwise, and *Below Median BTF Size* is a dummy variable that equals 1 if *BTF Size* is below the sample median, and 0 otherwise. The benchmark case in all regressions is *No BTF*, i.e., if there is no BTF included in the merger agreement. I repeat regressions (1) and (2) for the subsample of completed deals in regressions (3) and (4), respectively. All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Reference Group	No BTF			
Dependent Variable	Δ Acq E-Index $_{3YR}$			
Sample	All Deals		Completed Deals Only	
Independent Variables	(1)	(2)	(3)	(4)
Acq Underperformance × High BTF Size	0.552**		0.550*	
	(0.259)		(0.291)	
Acq Underperformance × Medium BTF Size	0.065		0.054	
	(0.227)		(0.236)	
Acq Underperformance × Low BTF Size	0.313		0.290	
	(0.197)		(0.197)	
Acq Underperformance × Above Median BTF Size		0.692**		0.657**
		(0.267)		(0.284)
Acq Underperformance × Below Median BTF Size		0.060		0.053
		(0.196)		(0.196)
High BTF Size	0.305		0.273	
	(0.202)		(0.209)	
Medium BTF Size	−0.072		−0.028	
	(0.191)		(0.198)	
Low BTF Size	0.035		0.023	
	(0.138)		(0.144)	
Above Median BTF Size		0.000		−0.000
		(0.184)		(0.180)
Below Median BTF Size		0.118		0.110
		(0.130)		(0.132)
Acq Underperformance	0.020	0.024	0.032	0.037
	(0.072)	(0.072)	(0.074)	(0.074)
TTF Size	−0.004	−0.006	−0.024	−0.025
	(0.027)	(0.027)	(0.035)	(0.035)
Acq E-Index	−0.376***	−0.377***	−0.378***	−0.379***
	(0.032)	(0.032)	(0.034)	(0.034)
Deal Completion	−0.012	−0.010		
	(0.140)	(0.146)		
Controls	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes
Observations	720	720	686	686
Adjusted R^2	0.206	0.205	0.207	0.206

(Table 11 continued)

Table 11 depicts the results from regressions applying the models in Table 5, but instead regress *Δ Acq E-Index $_{3YR}$* on *BTF Size* tercile dummies or dummies capturing values above and below the *BTF Size* median, respectively. Consistent with the results obtained in Table 5 and Table 11, I find that post announcement increases in acquiring firm's entrenchment index are mainly driven by excessively high values of *BTF Size*, even after controlling for sample selection concerns such as *Acq CEO Turnover* and *Deal Completion* in the corresponding time

period after announcement. This confirms that these high fees likely serve as a medium to increase entrenchment levels through M&A as proposed by my strategy.

Taken together, I find that small- or medium-sized bidder termination fees seem to serve as an efficient contractual device, even if the acquirer underperformed in the year preceding the takeover, but excessively high fees are most harmful to shareholder wealth, seem to increase managerial entrenchment, and thus suggest agency problems.

The Interaction of Horizontal Takeovers and BTF Size

It might be possible that high bidder termination fees are the outcome of negotiations between merging parties if both the acquirer and target operate in the same industry. In these cases, the probability that mergers are challenged by antitrust authorities – such as the Department of Justice Antitrust Division (DoJ) or the Federal Trade Commission (FTC) – is on average higher compared to diversifying deals (Gao, Peng, and Strong (2017)). As prior work by legal scholars such as Afsharipour (2010) and Quinn (2010) points out, bidders might be forced to provide high bidder termination fees in negotiations of horizontal mergers to provide the target with a payoff should the bidder fail to obtain regulatory approval for the deal. In these cases, the bidder would be liable for regulatory risk that would otherwise be bourne by and shared among the two parties (Chen et al. (2020)). I control for this possible explanation of high bidder termination fees and their possible impact on announcement returns by interacting the continuous variable, *BTF Size*, with dummy variables identifying horizontal takeovers. First, I interact *BTF Size* with *Horizontal Takeover*, as defined in Section 2.3 (regressions (1)–(4) in Table 12). Second, I additionally allow for a more flexible definition of horizontal mergers by interacting *BTF Size* with *Horizontal Takeover* $_{SIC3}$, a dummy variable that equals 1 if both the acquiring and the target firm are primarily assigned to the same industry as defined by their first three SIC digits, and 0 otherwise (regressions (5)–(8) in Table 12).

Regression (1) shows the isolated estimates of *Horizontal Takeover* × *BTF Size* on *Acq CAR* $_{[-3;+3]}$, which suggests a negative but insignificant relation. Next, I add *Acq Underperformance* × *BTF Size* and find a strongly negative and statistically highly significant coefficient on this interaction term (regression (2)). I then add acquiring firm's entrenchment index, *Acq E-Index*, and all target characteristics in regressions (3) and (4), respectively, and find my

Table 12

Robustness – The Effect of Horizontal Takeovers and Bidder Termination Fee Size on Acquirer Cumulative Abnormal Announcement Returns

This table shows the results of linear fixed effects regressions of acquirer cumulative abnormal announcement returns (*Acq CAR* $_{[-3;+3]}$) on *Acq Underperformance*, a dummy variable that equals 1 if the acquirer performed negatively in the year preceding the offer announcement (0 otherwise), *BTF Size*, the size of the bidder termination fee as a fraction of acquiring firm's market capitalization 22 trading days prior to offer announcement, and the variable of interest, the interaction term *Acq Underperformance* × *BTF Size* as defined in Section 2.3. The set of control variables (*Controls*) include *Acquirer CEO Characteristics*, *Acquiring Firm Characteristics*, *Deal Characteristics*, and a control variable for share price run-up (*Acq Run-up CAR* $_{[-22;-4]}$). Regression (1) shows the isolated effect of *Acq Underperformance* and *BTF Size* on *Acq CAR* $_{[-3;+3]}$ alone but includes an interaction term, *Horizontal Takeover* × *BTF Size*. I add the interaction term *Acq Underperformance* × *BTF Size* in regression (2) and further add the acquiring firm's entrenchment index, *Acq E-Index*, in regression (3). Regression (4) depicts the results for the subsample of public targets and adds respective control variables. I repeat regressions (1)–(4) for a less strict classification of horizontal takerovers in regressions (5)–(8). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acq CAR $_{[-3;+3]}$							
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Acq Underperformance	0.312	0.850	1.181**	−0.272	0.281	0.845	1.176**	−0.309
	(0.589)	(0.532)	(0.507)	(1.232)	(0.589)	(0.533)	(0.508)	(1.206)
Acq Underperformance × BTF Size		−2.793***	−3.373***	−2.514*		−2.907***	−3.554***	−2.736**
		(0.994)	(1.099)	(1.276)		(0.972)	(1.103)	(1.241)
BTF Size	0.311	1.180**	1.160**	0.497	0.032	0.991	1.091	0.029
	(0.772)	(0.551)	(0.578)	(0.952)	(0.883)	(0.621)	(0.681)	(0.857)
Horizontal Takeover × BTF Size	−1.203	−0.734	−0.794	−0.666				
	(1.054)	(0.924)	(0.991)	(1.306)				
Horizontal Takeover	0.126	0.148	0.251	1.053				
	(0.547)	(0.545)	(0.539)	(0.939)				
Horizontal Takeover $_{SIC\ 3}$ × BTF Size					−0.452	−0.147	−0.395	0.244
					(1.265)	(0.962)	(1.051)	(1.167)
Horizontal Takeover $_{SIC\ 3}$					0.746	0.682	0.889*	1.996**
					(0.505)	(0.502)	(0.531)	(0.931)
TTF Size	−0.067	−0.053	−0.142	−0.343	−0.056	−0.046	−0.127	−0.286
	(0.301)	(0.303)	(0.317)	(0.402)	(0.300)	(0.301)	(0.314)	(0.399)

Acq E-Index			−0.305*	−0.967**			−0.280	−0.826**
			(0.171)	(0.378)			(0.172)	(0.347)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Firm Characteristics	No	No	No	Yes	No	No	No	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	852	852	772	311	852	852	772	311
Adjusted R^2	0.044	0.070	0.102	0.205	0.041	0.070	0.105	0.220

(Table 12 continued)

results and inferences to be unchanged. Regressions (5)–(8) in Table 12 repeat the same regressions, but replace *Horizontal Takeover* with the above mentioned, somewhat broader measure of horizontal takeovers, *Horizontal Takeover* $_{SIC3}$. My results remain robust even after controlling for *Horizontal Takeover* $_{SIC3} \times$ *BTF Size*.

Overall, this suggests that I do not find empirical evidence that high bidder termination fees, as more likely negotiated in horizontal mergers, drive negative acquirer announcement returns. Again, confirming the results of Masulis et al. (2007), I almost always find *Acq E-Index* being negatively and significantly related to acquirer announcement returns.

2.6 Conclusion

I deliver robust evidence to the idea that excessively high bidder termination fees, implemented by acquirer CEOs with a high probability of being replaced, support an entrenchment-increasing mechanism to strengthen their job position through M&A in the sense of Shleifer and Vishny (1989). In this case, I find that high fees are destroying shareholder value on offer announcement and lead to increasing entrenchment levels post announcement of the transaction.

The negative relation with acquirer cumulative abnormal announcement returns are more pronounced, the less CEOs are aligned with shareholders' interests and the more CEOs are in need of entrenching themselves, identified by them being close to retirement age or the nonexistence of a staggered board. Furthermore, I find the relation being stronger, the less management board members are aligned with shareholders' interests and if the acquiring firm has a busy board. In addition, my proposed strategy is more likely being pursued if the takeover is diversifying, i.e., more likely of empire-building nature.

Additional robustness tests rule out competing alternative explanations, such as the use of high bidder termination fees in horizontal takeovers, where the probability of deal challenge by antitrust authorities is usually higher. I moreover find that small- to medium-sized bidder termination fees might serve as efficiency-enhancing contractual devices, whereas excessively

high fees destroy shareholder value, enable increases of entrenchment, and possibly signal agency problems.

My study furthermore offers implications for practitioners and regulating authorities. First, I suggest that board members should take a close look while negotiating bidder termination fee amounts and should obtain benchmark values of reasonably sized fees in comparable M&A deals. Second, corporate boards must be aware of potential collusion between leading managers of their firm and advisors which might be selected by the CEO. Corporate boards should thus seek CEO-independent legal and financial advisors. Third, shareholders should elect board members with legal deal experience that are not too busy, i.e., have not more than one directorship outside the firm. Lastly, my results should motivate regulating authorities to legally limit the maximum size of bidder termination fees (in relation to acquirer's size) or at least exercise enhanced scrutiny.

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2.8 Appendix

Appendix – Table A1
Variable Definitions

Table A1 presents the definitions of all variables used throughout this chapter, including the source.

Variable	Definition
Panel A: Abnormal Returns, Anti-takeover Provision Index, and Termination Fees	
Acq CAR $_{[-5;+5]}$	Eleven-trading-day cumulative abnormal announcement return (in percentage points) of acquiring firm's stock, calculated using the Carhart (1997) four-factor model to model normal returns. The model parameters are estimated over the period −250 to −23 trading days (prior) to offer announcement. Security prices are dividend adjusted day close prices, further adjusted for stock splits, cash dividends, rights offerings, and spin-offs (*Source: S&P Capital IQ*).
Acq CAR $_{[-3;+3]}$	Defined as *Acq CAR* $_{[-5;+5]}$, but instead measured for the seven-trading-day window around offer announcement.
Acq CAR $_{[-1;+1]}$	Defined as *Acq CAR* $_{[-5;+5]}$, but instead measured for the three-trading-day window around offer announcement.
Acq BHAR $_{[-1;+250]}$	One-year buy-and-hold abnormal return (in percentage points) of acquiring firm's stock, measured from one trading day before until 250 trading days after offer announcement using the CRSP® value-weighted market return to model normal returns (*Source: S&P Capital IQ*).
Acq BHAR $_{[-1;+500]}$	Defined as *Acq BHAR* $_{[-1;+250]}$, but instead measured from one trading day before until 500 trading days (two years) after offer announcement.
Acq BHAR $_{[-1;+750]}$	Defined as *Acq BHAR* $_{[-1;+250]}$, but instead measured from one trading day before until 750 trading days (three years) after offer announcement.
Acq E-Index	Anti-takeover provision index (Bebchuk, Cohen, and Ferrell (2009)) of the acquiring firm, based on six anti-takeover provisions (staggered boards, limits to shareholder bylaw amendments, poison pills, golden parachutes, and supermajority requirements for mergers and charter amendments) as disclosed at the last fiscal year end prior to offer announcement. Higher index levels correspond to more managerial power (entrenchment) (*Source: S&P Capital IQ, SEC filings*).
Δ Acq E-Index $_{3YR}$	Three year change in *Acq E-Index* (Acq E-Index at the fiscal year end three years after the last fiscal year end prior to announcement of the deal − Acq E-Index at the last fiscal year end prior to offer announcement: *Acq E-Index* $_{OA+3YR}$ − *Acq E-Index* $_{OA}$).
Acq Div Adj Performance LTM $_{[OA-1]}$	Price performance of acquiring firm's stock based on dividend adjusted day close prices, (further adjusted for stock splits, cash dividends, rights offerings, and spin-offs): relative difference of acquirer's dividend adjusted day close price one trading day prior to offer announcement to acquirer's dividend adjusted day close price one year prior to offer announcement, expressed in percentage points (*Source: S&P Capital IQ*).
Acq Underperformance	Dummy variable that equals 1 if *Acq Div Adj Performance LTM* $_{[OA-1]}$ is negative, and 0 otherwise.
BTF Size	USD (mm) amount of the bidder termination fee divided by the market capitalization (also in USD mm) of the acquiring firm 22 trading days prior to offer announcement and expressed in percentage points (*Source: S&P Capital IQ*).
TTF Size	USD (mm) amount of the target termination fee divided by transaction value (*TV*, also in USD mm) and expressed in percentage points (*Source: S&P Capital IQ*).
Acq Neg OA Reaction	Dummy variable that equals 1 if *Acq CAR* $_{[-3;+3]}$ takes on a negative value, and 0 otherwise.

Panel B: Acquirer CEO Characteristics	
ln Acq CEO Total Current Compensation	Natural logarithm of 1 plus the USD (000s) amount of acquiring firm CEO's total current compensation (salary and bonus) as disclosed at the last fiscal year end prior to offer announcement (*Source: SEC filings*).
Acq CEO Tenure	Number of years since the appointment of the CEO in the acquiring firm, measured from the day of the appointment until the day of offer announcement (*Source: SEC filings*).
Acq CEO Age	Age (in years) of the CEO of the acquiring firm, as disclosed at the last fiscal year end prior to offer announcement (*Source: SEC filings*).
Acq CEO Delta	Expected USD change in acquiring firm CEO's wealth (in USD 000s) associated with a 1% change in acquiring firm's stock price. Calculated following Core and Guay (2002) (*Source: S&P Capital IQ, SEC filings*).
Acq CEO Vega	Expected USD change in acquiring firm CEO's wealth (in USD 000s) associated with a 1% change in the standard deviation of acquiring firm's returns. Calculated following Guay (1999) (*Source: S&P Capital IQ, SEC filings*).
Acq CEO Duality	Dummy variable that equals 1 if the acquiring firm's CEO is also chairperson of the board of directors, and 0 otherwise, as disclosed at the last fiscal year end prior to offer announcement (*Source: SEC filings*).
Acq CEO Alignment	Sum of stock and option sensitivities to a USD 100 change in shareholder wealth: Acq CEO Alignment = ((number of shares held by the CEO + delta of options × number of options held by the CEO) / total number of shares outstanding × 100). All variables are obtained on the last fiscal year end day prior to offer announcement. Calculated following Aggarwal and Samwick (2003) and Kale et al. (2009) (*Source: S&P Capital IQ, SEC filings, Federal Reserve Bank website*).
Acq CEO Turnover $_{1YR}$	Dummy variable for acquiring firm's CEO turnover, taking the value of 1 if the CEO one year after offer announcement is different from the CEO at offer announcement, and 0 otherwise (*Source: SEC filings*).
Acq CEO Turnover $_{2YR}$	Dummy variable for acquiring firm's CEO turnover, taking the value of 1 if the CEO two years after offer announcement is different from the CEO at offer announcement, and 0 otherwise (*Source: SEC filings*).
Acq CEO Turnover $_{3YR}$	Dummy variable for acquiring firm's CEO turnover, taking the value of 1 if the CEO three years after offer announcement is different from the CEO at offer announcement, and 0 otherwise (*Source: SEC filings*).
Panel C: Acquiring Firm Characteristics	
Acq Executive Board Size	Total number of management executives on acquiring firm's board (*Source: SEC filings*).
Acq VP Alignment	Median value of the alignment variable (see definition for *Acq CEO Alignment*, Panel B) for all VPs (CEO excluded) in a particular acquiring-firm-fiscal-year. Calculated following Aggarwal and Samwick (2003) and Kale et al. (2009).
Acq Staggered Board	Dummy variable that equals 1 if the acquirer has a staggered board (i.e., if only a portion of the board members – usually a third – is elected each year), and 0 otherwise (*Source: SEC filings*).
Acq Board of Directors Size	Total number of directors on acquiring firm's board (*Source: SEC filings*).
Acq Percentage of Independent Directors	Number of independent directors divided by the total number of directors on acquiring firm's board, expressed in percentage terms (*Source: SEC filings*).
Acq Board Busyness	Percentage share of independent directors that are busy, i.e., have more than one outside directorships (director has three or more directorships in total) (*Source: SEC filings*).
Acq Institutional Own Sum $_{[OA-1]}$	Sum of institutional holdings in acquiring firm's stock, measured one trading day prior to offer announcement and expressed in percentage points (*Source: S&P Capital IQ*).
Acq Insider Own Sum $_{[OA-1]}$	Sum of insider holdings in acquiring firm's stock, measured one trading day prior to offer announcement and expressed in percentage points (*Source: S&P Capital IQ*).

Acq Market Cap *[OA−22]*	Last sale price of acquiring firm's stock (adjusted for stock splits) multiplied with the latest number of shares outstanding, measured 22 trading days prior to offer announcement and expressed in millions of USD (*Source: S&P Capital IQ*).
Acq Market-to-Book *[OA−22]*	Market-to-book ratio of acquirer's stock, calculated as *Acq Market Cap* *[OA−22]* divided by the latest available value of total common equity (= common stock & additional paid in capital + retained earnings + treasury stock & other) 22 trading days prior to offer announcement (*Source: S&P Capital IQ*).
ln Acq 1YR Stock Return Volatility *[OA−1]*	Natural logarithm of 1 plus the standard deviation of weekly log-normal price returns of acquiring firm's stock over the year preceding the offer announcement, annualized with a factor of 52 for the 52 trading weeks in a year and measured one trading day prior to offer announcement (*Source: S&P Capital IQ*).
Acq Market Leverage *[OA−22]*	Book value of total debt divided by the market value of acquiring firm's total assets. Market value of total assets is calculated in the following way: *Acq Total Assets* + *Acq Market Cap* *[OA−22]* − *Acq Total Common Equity*, all measured 22 trading days prior to offer announcement. Total Common Equity is defined in the following way: common stock & additional paid in capital + retained earnings + treasury stock & other (*Source: S&P Capital IQ*).
Acq Dividend Payer	Dummy variable that equals 1 if the acquiring firm paid positive dividends during the fiscal year preceding the offer announcement, and 0 otherwise (*Source: S&P Capital IQ*).
Acq Free Cash Flow to Total Assets *[OA−22]*	Acquiring firm's operating income before depreciation − interest expenses − income taxes − capital expenditures, all scaled by book value of total assets. All variables are measured 22 trading days prior to offer announcement (*Source: S&P Capital IQ*).
Acq Run-up CAR *[−22;−6]*	Defined as *Acq CAR* (Panel A), but instead measured for the 16 trading day window (−22;−6) prior to offer announcement.
Acq Run-up CAR *[−22;−4]*	Defined as *Acq CAR* (Panel A), but instead measured for the 18 trading day window (−22;−4) prior to offer announcement.
Acq Run-up CAR *[−22;−2]*	Defined as *Acq CAR* (Panel A), but instead measured for the 20 trading day window (−22;−2) prior to offer announcement.

Panel D: Deal Characteristics

Transaction Value (TV)	Total transaction value in millions of USD, historical nominal value. It is calculated as the total consideration to target shareholders + total other consideration, net assumed liabilities, and adjustment size, plus cash and short-term investments (*Source: S&P Capital IQ*).
Friendly	Dummy variable that equals 1 if the deal attitude is friendly on the announcement day of the deal, and 0 otherwise (*Source: S&P Capital IQ*).
Stock *[% of TV]*	Percentage share of *Transaction Value (TV)* that is paid with acquirers' stock (*Source: S&P Capital IQ*).
Horizontal Takeover	Dummy variable that equals 1 if both the acquiring and the target firm are primarily assigned to the same industry as defined by all four SIC digits, and 0 otherwise (*Source: S&P Capital IQ*).
Horizontal Takeover *SIC 3*	Dummy variable that equals 1 if both the acquiring and the target firm are primarily assigned to the same industry as defined by their first three SIC digits, and 0 otherwise (*Source: S&P Capital IQ*).
Private Target	Dummy variable that equals 1 if the target firm is private, i.e., if there are no stock price data available one trading day prior to offer announcement, and 0 otherwise (*Source: S&P Capital IQ*).
ln Time-to-Resolution (Actual)	Natural logarithm of 1 plus the number of calendar days between the date the takeover is announced and the date on which the takeover is either completed or withdrawn, divided by 365 (*Source: S&P Capital IQ*).
Tgt Premium *1 Month*	Difference of the announced offer price per share and the target's last sale share price 22 trading days prior to offer announcement, divided by the target's last sale share price 22 trading days prior to offer announcement, and expressed in percentage points (*Source: S&P Capital IQ*).

Relative Size Market Cap [OA–22]	*Acq Market Cap* [OA–22] divided by *Tgt Market Cap* [OA–22].
Deal Completion	Dummy variable that equals 1 if the deal is closed successfully, and 0 if withdrawn (*Source: S&P Capital IQ*).
Panel E: Target Firm Characteristics	
Tgt Div Adj Performance LTM [OA–1]	Defined as *Acq Div Adj Performance LTM* [OA–1], but instead measured for target firm's stock.
Tgt Market-to-Book [OA–22]	Defined as *Acq Market-to-Book* [OA–22], but instead measured for target firm's stock.
ln Tgt 1YR Stock Return Volatility [OA–1]	Defined as *ln Acq 1YR Stock Return Volatility* [OA–1], but instead measured for target firm's stock.

(Table A1 continued)

Appendix – Table A2
Sample Selection

Table A2 shows the selection criteria of the final sample with the respective remaining number of observations. After applying filters 1–6, 852 observations are left over. The availability of the six entrenchment index constituents in SEC filings further restricts the sample to 772 observations.

Selection criteria	Number of observations
1. All M&A deals announced between 01/01/2004 and 12/31/2015	393,292
2. Deal status either "closed" or "withdrawn"	373,657
3. Acquirer and Target headquartered in the U.S.	78,628
4. Acquirer publicly listed firm	18,338
5. Acquirer seeks majority stake and change of control in the Target	17,376
6. Total transaction value exceeds USD 1 mm	9,961
7. Availability of SEC filings, control variables, and ownership data	852
8. Valid data on entrenchment index constituents	772

Appendix – Table A3
Determinants of Bidder Termination Fee Inclusion

This table depicts the results of fixed effects logistic regressions of *BTF Dummy*, a dummy variable that equals 1 if the deal includes a bidder termination fee provision, an 0 otherwise, on *Deal Characteristics* and *Acquiring Firm Characteristics* for the samples for which I have all possible data. All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in round parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. All models include odds ratios [in angular parentheses], that relate to the change in the probability of including a bidder termination fee provision for a one-unit increase in a continuous variable, or a shift from zero to one for a dummy variable. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

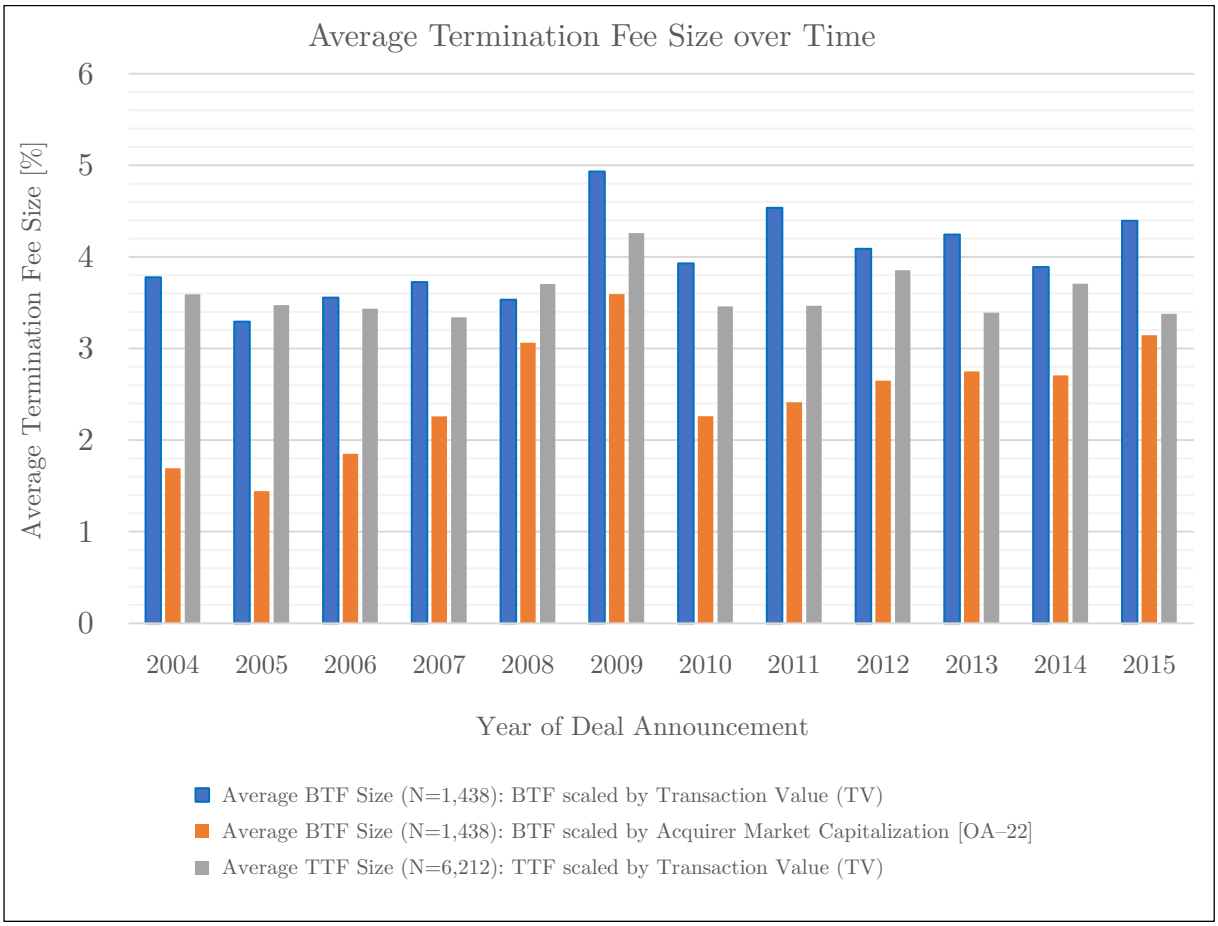
Dependent Variable	BTF Dummy		
Independent Variables	(1)	(2)	(3)
Deal Characteristics			
TTF Dummy	3.003***	2.918***	2.892***
	(0.126)	(0.144)	(0.262)
	[20.151]	[18.505]	[18.036]
Transaction Value (TV)	0.037***	0.034***	0.035***
	(0.011)	(0.010)	(0.010)
	[1.037]	[1.034]	[1.036]
Friendly	0.654	0.583	1.006
	(0.958)	(0.942)	(1.328)
	[1.923]	[1.791]	[2.735]
Stock [% of TV]	0.012***	0.011***	0.013***
	(0.001)	(0.001)	(0.003)
	[1.012]	[1.011]	[1.013]
Horizontal Takeover	0.067	0.035	0.053
	(0.084)	(0.094)	(0.165)
	[1.069]	[1.036]	[1.054]
Private Target	0.279***	0.182*	0.248
	(0.095)	(0.108)	(0.210)
	[1.322]	[1.199]	[1.282]
Time-to-Resolution (Actual)	1.119***	1.458***	1.940***
	(0.150)	(0.195)	(0.340)
	[3.063]	[4.299]	[6.961]
Acquiring Firm Characteristics			
Acq Market Cap [OA–22]	−0.015***	−0.011***	−0.007
	(0.004)	(0.004)	(0.005)
	[0.985]	[0.989]	[0.993]
Acq Market-to-Book [OA–22]		−0.017**	−0.020
		(0.009)	(0.014)
		[0.983]	[0.980]
ln Acq 1YR Stock Return Volatility [OA–1]		0.534***	0.720***
		(0.124)	(0.273)
		[1.705]	[2.054]
Acq Market Leverage [OA–22]		1.083***	2.605***
		(0.367)	(0.725)
		[2.952]	[13.534]
Acq Dividend Payer		−0.282**	−0.095
		(0.115)	(0.199)
		[0.754]	[0.909]

Acq E-Index			−0.123* (0.070) [0.885]
Acq Industry × Year FE	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes
Observations	7,788	6,217	2,725
Pseudo R^2	0.293	0.298	0.340

(Table A3 continued)

Appendix — Figure A1
Average Termination Fee Size over Time

Figure A1 depicts the average size of termination fees over the sample period (2004–2015) for which I have valid data. The blue bars show the annual average percentage value of *BTF* scaled by *Transaction Value (TV)* and the orange bars show the annual average percentage value of *BTF* scaled by acquiring firm's market capitalization 22 trading days prior to offer announcement. The grey bars represent the annual average percentage value of *TTF* scaled by *Transaction Value (TV)*. The number of observations for *BTF Size* (N=1,438) is lower than the number of observations for *TTF Size* (N=6,212) because of two reasons: first, *BTF Size* is shown for public acquirers only (i.e., acquirers that have a non-zero market capitalization to better compare the annual average percentage values to *BTF* scaled by *Transaction Value (TV)*), and second, the use frequency of bidder termination fees is generally lower compared to target termination fees.



Chapter 3

Intellectual Property Protection in M&A Negotiations[¶]

In this chapter, I show that a major share of the value of target firm's intellectual property can be protected from expropriation by the acquirer through negotiating a compensating bidder termination fee (BTF), which is paid to the target in case the acquirer abandons the deal. I apply a capitalization model for intangible capital stocks to proxy for the component of intellectual property in target firm's market value. The results suggest that, on average, for every dollar of target firm's R&D capital stock, roughly 16 cents of protective share is incorporated in the BTF. I strengthen my causal interpretation with an instrument variables approach that exploits exogenous industry-level variation in R&D worker quota. The relation between target firm's innovation activity and BTF size is more pronounced, if the target is a pioneer in its technology sector, if the target operates in an industry that sells unique products, if the target is assigned to the hightech or healthcare industry, and if the target mentions "trade secrets" in its 10-K report filed with the SEC prior to deal announcement. The effect is further increasing in the degree of technological proximity as well as product market rivalry between acquirer and target. Extending prior research at the intersection of innovation, law, and M&A, this chapter concludes that BTFs serve as a contract mechanism that provide target firms compensation for revelation of sensitive information in M&A negotiations if acquirers terminate deals. The option to include BTFs in M&A contracts thereby increases acquirers' incentives to close the deal and increases targets' ex-ante incentives to reveal innovative secret information.

Keywords: Intellectual Property, Innovation, Intangible Capital, Takeovers, Mergers and Acquisitions, Product Market Competition, Industrial Organization, Bidder Termination Fees.

JEL classification: G14, G34, O34

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3.1 Introduction

"In recent decades, for example, the fraction of the total output of our economy that is essentially conceptual rather than physical has been rising. This trend has, of necessity, shifted the emphasis in asset valuation from physical property to intellectual property and to the legal rights inherent in intellectual property."

Keynote Speech by Alan Greenspan, former Chair of the Federal Reserve of the United States, about Intellectual Property Rights at the Stanford Institute for Economic Policy Research Economic Summit, Stanford, California, February 27, 2004.

"The future of the nation depends in no small part on the efficiency of industry, and the efficiency of industry depends in no small part on the protection of intellectual property."

Richard A. Posner, Judge on the U.S. Court of Appeals for the Seventh Circuit, in Rockwell Graphic Systems, Inc. v. DEV Industries, Inc., 925 F.2d 174 (1991) [Nr. 17].

Since the late 1970s, intangible assets have become an increasingly important factor of production, whereas physical and financial assets more and more became commodities. At the same time, intellectual property evolved to play a more central role in mergers and acquisitions, where synergistic gains in product markets and technological innovations have found to be among the main reasons why these corporate acquisitions take place (e.g., Bena and Li (2014), Frésard, Hoberg, and Phillips (2020), and Hoberg and Phillips (2010)). Simultaneuously, intellectual property is notoriously hard to value and has traditionally been seen as an asset inextricably linked to the business and revenues of the firm.

Whether it is the trade secret of a beverage producer's unique recipe, the (ongoing) R&D results of a cancer drug developed by a pharmaceutical company, the patent portfolio of a technology company, or the customer data and algorithms of an internet company – intellectual property is nowadays often one of the most important assets of targets in M&A deals and firms in general.

A second trend underlining the significance of intellectual property in M&A is that the market for buying and selling these assets has become more liquid over time. Thus, not only is the value of intellectual property difficult to estimate (e.g., Kogan et al. (2017)), it is also no longer inevitably bound to the firm where it is generated.

Firms have an incentive to invest in innovation and into their organization to generate intellectual property if they can also reap the benefits that are expected to materialize in the future. From a legislator's perspective it is thus important to provide the economy with a functioning legal system on which firms can rely on their intellectual property to be protected. As a consequence, trade secret law has evolved from the common law of unfair competition, and developed over time to prohibit misappropriation of important technology and business secrets[1], and patent law has established rules to protect a particular implementation of an idea[2].

In M&A, acquirers increasingly select targets to gain access to their innovations and to commercialize them (Phillips and Zhdanov (2013), Bena and Li (2014), and Frésard et al. (2020)). Gaining insights into these sensitive information begins with the start of the M&A process and signing of confidentiality/non-disclosure agreements (NDAs): the longer and the more intense the private and public takeover process, the more information about the target firm is revealed to the acquirer. The protection of sensitive information is particularly relevant for R&D-intense targets that might generate major shares of their future revenues through their patents, trade secrets, and other intellectual property.

Intellectual property of the target that should be protected from expropriation in M&A negotiations includes trade secrets, transferable knowledge applied in (not already granted) patents[3], and even so-called "negative" information. Trade secrets – as a special form of intellectual property – encompass any "information, including a formula, pattern, compilation, program, device, method, technique, or process that (1) derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by

[1] Most important legislation in this area comprises the Uniform Trade Secrets Act (UTSA), published by the Uniform Law Commission (ULC) in 1979 and amended in 1985, later enacted in all U.S. states, as well as the Inevitable Disclosure Doctrine (IDD), adopted by many U.S. courts since the mid-1990s. The UTSA does not distinguish between tangible and memorized trade secrets.

[2] See, e.g., Economic Report of the President (2006), and Gould and Gruben (1996). Beyond trade secrets and patents, innovators can also rely on copyrights and trademarks to protect their intellectual property. Legislators often have to outweigh the benefits for innovating firms versus the associated costs for society, such as the potential for creating monopoly power and the restrictions on exploiting useful technologies.

[3] Successfully granted patents itself are already legally protected and give the owner the exclusive right to exclude others from copying, using, and selling the invention for a limited period of time.

proper means by, other persons who can obtain economic value from its disclosure or use, and (2) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy." (National Conference of Commissioners on Uniform State Laws (1985)). I.e., trade secrets only exist if their secrecy is preserved and can comprise both technical as well as business information[4]. "Negative" information refers to, e.g., designs that didn't work[5]: "The definition includes information that has commercial value from a negative viewpoint, for example the results of lengthy and expensive research which proves that a certain process will not work could be of great value to a competitor." (National Conference of Commissioners on Uniform State Laws (1985)). More precisely, these can be dead-ends encountered in research and development, relinquished technical solutions, details of unsuccessful efforts to remedy problems in manufacturing certain products, and also failed attempts to spark sales of the firm's products. If not properly protected, competitors could expropriate it without bearing the costs and risks associated with its development, resulting in an ex-ante deterrent of firms to innovate.

Thus, if mergers are closed successfully, the acquirer obtains all control and property rights of the target firm, including its intellectual property. In these cases, no protection of target firms' intellectual property from expropriation by acquirers would've been needed, since the property rights are de jure transferred.

Nevertheless, it remains an open question how target firms' intellectual property can be protected in – sometimes intense – M&A negotiations, especially if acquirers later terminate deals under their control and walk away with sensitive information about the target's business, that, in some cases, can be vital to its very existence.

[4] Many firms rely on trade secrets, rather than patents, as their primary, most valuable innovation. Reasons to not patent include, e.g., that patenting is costly (especially for small firms – application costs are low, but patent litigation and other legal issues may be expensive), that their most valuable innovation is simply not "patentable", or firms voice concerns about the legal enforcement of patents (see, e.g., Athreye and Fassio (2018) for a comprehensive study on why firms decide to not patent). Besides technical trade secrets, business secrets can be marketing and sales as well as advertising plans, competitors' (re-) actions, (key) personnel information, customer and supplier data, internal cost and pricing information, market analyses, and unannounced financial and business-related information, among others.

[5] Yet, even if it runs directly contrary to the principles of competition in a capitalistic society, "negative" information receives the same protection as trade secrets, although this issue is under current discussion by legal scholars (see, e.g., Khoury (2014)).

This chapter suggests that the protection of target firms' sensitive intellectual property can be achieved in M&A by negotiating a bidder termination fee (BTF). Bidder termination fees[6] are cash payments from the acquirer to the target, in case the acquirer terminates the pending deal due to reasons under his control[7], and are usually negotiated by target firm's management during the private takeover process. BTFs are becoming legally binding with the signing of the merger agreement between the two parties, and are thought to compensate the target for the direct and indirect costs incurred if the deal is terminated. Direct costs are costs such as fees for financial and legal deal advisors, consulting firms, opportunity costs of the assets involved and other transaction fees. Indirect costs are, most important, above mentioned costs of information expropriation, and other private information about future synergies on which competitors can potentially free ride on. This chapter's central prediction hence is:

The higher the value of target firm's intellectual property,
the higher the negotiated bidder termination fee.

Main Findings

I find that – controlling for a wide array of covariates that reliably affect the size of the BTF – the value of target firm's intellectual property, as proxied by accumulated R&D expenses as a fraction of the firm's market value prior to deal announcement, is significantly positively related to the size of the BTF. The estimated relation is also economically important as a one-standard deviation increase in this target firm R&D intensity measure is associated with a 0.57% increase in the size of the BTF. BTF size is defined as the USD (mm) amount of the negotiated bidder termination fee, divided by the market capitalization (also in USD mm) of the target firm 42 trading days prior to offer announcement. A back-of-the-envelope calculation suggests that, on average, for every dollar of target firm's R&D capital stock, roughly 16 cents of protective fee is incorporated in the BTF. I regard this a protective share, since the target receives a legal claim on this compensation payment in case of bidder terminated deals – representing an insurance-like payment for (likely) intellectual property revelation.

[6] The terms "bidder termination fee (BTF)", "acquirer termination fee (ATF)", and "reverse termination fee (RTF)" can be used interchangeably. I use the term "bidder termination fee" throughout this chapter.
[7] Reasons are discussed in Section 3.2.

Further test reveal that the relation between target firm's intellectual property value and BTF size is more pronounced, if the target is a pioneer in its technology sector, as proxied by its knowledge capital stock growth rate prior to offer announcement. At early stages, sensitive R&D outcomes are likely not yet legally protected through patenting[8], so the risk of revealing them at this stage is highest, since without patenting them there exists no claim under patent law. The effect is also stronger if the target is in an industry that produces unique products, if the target is assigned to the hightech or healthcare industry, and if the target mentions "trade secret", "trade secrets" and/or "trade secrecy" in its most recent 10-K report filed with the SEC prior to deal announcement. I moreover find that the relation is increasing in the degree of technological proximity as well as product market rivalry between acquirer and target. This confirms the theoretical prediction that the target's private intellectual property might be of highest value for an acquirer that has a similar knowledge base and is competing with the target in similar product markets.

Utilizing an event study of target firms' stock price reactions at the resolution date of the deal reveals that the stock market reacts, on average, significantly less negative if acquirers abandon deals and if the negotiated bidder termination fee is high. This deal cancellation effect not only holds for bidder's termination announcement and the associated de jure claim of the target to receive the BTF, but also for the announced de facto realized payment of the BTF to the target. This result strengthens the reasoning that the BTF has a protective, insurance-like component priced in, providing the target with a payment if acquirers abandon deals due to reasons under their sphere of control.

Contribution to the Literature

A key methodological contribution of this chapter is the application of an instrumental variables estimation to instrument the value of target firm's intellectual property. I suggest two candidates as valid instruments, but focus on one specifically, namely the share of employees working in strictly R&D-related jobs as a fraction of all jobs in target firm's SIC2 industry.

[8] The average duration from filing a patent (patent application) until receiving a patent grant is roughly 2–3 years (20–32 months, depending on the workload required to process, see the current wait time statistics at the USPTO website: https://www.uspto.gov/dashboards/patents/main.dashxml (permanent link)).

Tests show that this industry-level instrument is likely uncorrelated with deal-level BTF size and only correlated with BTF size through its correlation with target's knowledge capital stock. The results are thus robust to endogeneity concerns, in particular omitted variable bias and reverse causality. Pancost and Schaller (2019) further suggest that, in practice, the instrumental variables approach also resolves a substantial amount of attenuation bias resulting from classical errors-in-variables in linear regressions. Consistent with their findings, I find that the marginal effect between target's knowledge capital stock and BTF size increases with the instrumental variables estimation. Exploiting this source of exogenous variation strengthens the causal interpretation of this chapter.

This chapter belongs to the growing body of work that emphasizes the important role of innovation in mergers and acquisitions. Phillips and Zhdanov (2013) model and empirically test how an active M&A market and competition affect the decision to conduct R&D and innovate. They find that smaller firms optimally may decide to innovate more when they can sell out to larger firms, and larger firms may find it disadvantageous to engage in a "R&D race" with smaller firms, as they can obtain access to innovation through acquisitions. Contrary to standard industrial organization theory (e.g., Dasgupta and Stiglitz (1980)[9]), their model suggests a positive relation between innovation and competitive pressure – but less so for large firms: M&A provides a strong ex-ante incentive for small firms to innovate aggressively, but a competitve market itself decreases large firms' odds of successfully innovating themselves. I add to their findings by hightlighting the role of bidder termination fees in R&D-driven M&A.

Frésard et al. (2020) examine determinants of vertical acquisitions using product text linked to vocabulary from input-output tables and propose that the innovation stage is important in explaining vertical integration. They find that R&D-intensive firms that are at an early stage of unrealized innovation are less likely to become targets of vertical acquisitions[10].

[9] Dasgupta and Stiglitz (1980) suggest that more competition reduces the monopoly rents that reward successful innovators, hence innovation should decline with competition.

[10] They further note: "When innovative assets require further investment and development, it is optimal to leave control to the firms that perform the innovation, as their incentives are most important for the value of the vertical relationship (e.g., Aghion and Tirole 1994), and because their employees may leave in case of acquisition and take the unrealized innovation (i.e., their ideas) with them (e.g., Hart and Moore 1994)." See, e.g., a seminal case on inevitable disclosure of trade secrets of a former employee in

However, if innovation is patented, i.e., realized, and thus legally protected, incentives to innovate decline and incentives to commercialize the innovation increases in importance. Another related paper in this field is the one of Bena and Li (2014), who conclude that synergies obtained from combining innovation capabilities are important drivers of acquisitions. Their results show that, after looking at a unique patent-merger data set, companies with large patent portfolios and low R&D expenses are acquirers, while companies with high R&D expenses and slow growth in patent output are targets. I build on one of their findings – namely that technological overlap between firms' innovation activities has a positive and significant effect on the likelihood of merger pair formation – by demonstrating that the relation between target's intellectual property value and the size of the BTF is increasing in the degree of technological proximity between the merging firms.

The industry-level instrumental variable I suggest in this chapter can be used by researchers to mitigate endogeneity concerns, especially if applied in cases where the variable of interest is related to firm-level (R&D-)intangibles, as in Ewens, Peters, and Wang (2020). They characterize off-balance sheet intangibles – knowledge (R&D) and organizational (SG&A) capital – by using real transaction prices paid in M&A deals. The core of their contribution is the exploitation of market valuations of acquired intangible assets[11]: they validate and update parameter estimates for (1) the depreciation parameters for knowledge capital based on prior R&D spending and (2) the fraction of SG&A capital that represents investment into long-lived organizational capital. I apply their capitalization model to proxy for the component of intellectual property in target firms' market values. This component is expressed by their accumulated and depreciated knowledge and organizational capital stocks scaled by market capitalization, representing my main variable of interest.

PepsiCo, Inc., v. Redmond – 54 F.3d 1262 (1995), available online on LexisNexis: https://www.lexisnexis.com/community/casebrief/p/casebrief-pepsico-inc-v-redmond (permanent link).

[11] Extending their parameter estimates to all publicly listed firms requires that the prices paid for intangible capital in their sample represent a public or market value. Given that prices paid for targets in acquisitions contain private valuations of the acquirer about the intended firm pair combination, the authors properly adjust acquisition prices for over-/underpayment and synergies, and adjust goodwill (using information obtained through purchase price allocations in acquirers' subsequent SEC documents, such as 10-Ks, 10-Qs, 8-Ks, and S-4s).

Besides, another contribution of this chapter is to explain drivers of implementing BTFs in merger agreements as well as drivers of BTFs' relative size, which arise from a legal, regulatory perspective. If mergers are horizontal and/or are thought to significantly alter product market competition by increasing the market power of the combined firm beyond certain limits, the deal stands under augmented scrutiny by regulating (antitrust) authorities. I apply the merger-induced same-industry concentration increase[12] as introduced in Gao, Peng, and Strong (2017) and suggested by the U.S. Department of Justice and the Federal Trade Commission (2010). This "regulatory risk" measure proves to be a significant determinant of both the probability of BTF inclusion and BTF size, and complements the empirical findings related to BTF pricing in Chen et al. (2020b). They further find that both the likelihood of inclusion and the size of the BTF increase in the volatility of target's value to the bidder and with the expected completion time of the takeover. Chen et al. (2020b) note that acquirers cannot easily walk away from an announced deal if no BTF was agreed on, yet exogenous reasons under acquirer's sphere of responsibility or target material adverse changes can still force both parties to abandon the transaction. My findings are also consistent with Choi and Wickelgren's (2019) paper[13], who show theoretically that BTFs act as a commitment device for acquirers.

A direct managerial implication of this chapter is that implementing BTFs in M&A contracts serve as a mechanism that provide target firms compensation for revelation of information in M&A negotiations if acquirers terminate deals. BTFs thereby increase targets' incentives to reveal information and increase acquirers' incentives to close the deal.

This chapter proceeds as follows. In Section 3.2, I develop my hypotheses. I provide a sample overview, describe the empirical methodology and key variables in Section 3.3. I present the main regression results and relations between intellectual property protection and technological proximity as well as product market rivalry in Section 3.4. In Section 3.5, I provide additional robustness and subsample tests to strengthen my reasoning. Section 3.6 concludes.

[12] Defined as the merger-induced change (increase) in industry sales concentration in the same SIC4-industry, whereas I measure industry sales concentration as the Herfindahl-Hirschman Index (HHI), i.e., based on firms' sales (market shares) at the last fiscal year-end date prior to deal announcement.

[13] They are – to my knowledge – the first to analyze bidder termination fees using game theory.

3.2 Theoretical Reasoning, Hypothesis Development, and Predictions

In this chapter, I apply Ewens' et al. (2020) parameter estimates for knowledge and organizational capital stocks, obtained through their novel approach by exploiting acquisition prices paid for intangible assets of M&A targets, to proxy for the share of target firm's intellectual property value in its market valuation. I then relate this ratio to an outcome of the private deal negotiation process, namely the size of the negotiated bidder termination fee (BTF). I show that the higher this value ratio, the higher the BTF (also scaled by target firm's size), which compensates the target with a payment by the acquirer if the latter terminates the deal due to reasons under his control (and walks away with revealed sensitive private information, such as business and trade secrets, among many others). This information revelation represents – sometimes existential – indirect costs incurred by the target in failed M&A negotiations.

As Ewens et al. (2020) highlight in their paper, current accounting standards dictate R&D and SG&A expenditures to be fully expended in the period they occur, and prohibit the disclosure of internally generated intangible capital on firms' balance sheets. These off-balance sheet intangibles – most of all knowledge and organizational capital based on R&D and SG&A expenditures – have become increasingly important over the last few decades. Scholars and GAAP's accounting standards frequently quote their lack of collateral value, the risks associated with estimating their useful life, and uncertainty in measuring their value[14] for the main reasons why R&D and SG&A expenditures cannot be capitalized on the firm's balance sheet[15]. However, these intangible assets are among the most important sources enabling long-term economic growth through innovation. Their lack of capitalization thus results in a downward bias of reported assets, which is one of the main reasons why market-to-book ratios seem to inflate over recent decades[16].

[14] https://asc.fasb.org/section&trid=2127268#topic-730-10-05-subsect-01-108369 (requested: 03/21/2020).

[15] For an intangible asset to be capitalized, i.e., to be identifiable, ASC 805 requires the asset under consideration to meet either the separability criterion (meaning it can be separated from the entity and sold) or the contractual-legal criterion (meaning that the control of future economic benefits arising from the asset is warranted by contractual or legal rights). This is the case for, e.g., computer software. See Ewens et al. (2020) for a detailed discussion of intangible accounting.

[16] See Figure A4 in the Appendix with plots documenting the trend in market-to-book ratios over time, based on estimates obtained in Ewens et al. (2020).

On the other hand, once successfully acquired, intangible assets of the target are recorded as either goodwill (GW) or identifiable intangible assets (IIA) on acquirer's balance sheet. I.e., the acquirer pays for the target the following purchase price[17]:

$$Acq\ Price\ Paid\ for\ Tgt\ =\ P_{Tgt\ Physical\ Assets}\ +\ P_{Tgt\ Financial\ Assets}\ +\ P_{Tgt\ GW}\ +\ P_{Tgt\ IIA}\ +\ P_{Tgt\ UIA}$$

where the index $_{Tgt\ UIA}$ stands for target's unidentifiable intangible assets. On target i's side, its intangible capital can be separated into externally acquired intangible capital, $I^{ext}_{i,t}$, disclosed on its balance sheet in year t, and internally generated intangible capital $K^{int}_{i,t}$:

$$Tgt\ Total\ Intangible\ Capital_{i,t}\ =\ I^{ext}_{i,t}\ +\ K^{int}_{i,t}$$

whereas $K^{int}_{i,t}$ can be separated into knowledge ($G_{i,t}$) and organizational capital ($S_{i,t}$)[18]:

$$K^{int}_{i,t}\ =\ G_{i,t}\ +\ S_{i,t}$$

with knowledge capital stock value defined as accumulated and depreciated R&D expenses using the perpetual inventory method, with industry-specific depreciation factor δ_G:

$$G_{i,t}\ =\ (1-\delta_G)G_{i,t-1}\ +\ R\&D_{i,t}$$

and organizational capital stock value defined as accumulated and depreciated SG&A expenses, also applying the perpetual inventory method, with industry-specific fraction γ representing the share of SG&A invested into long-living organizational capital, and depreciation factor δ_S:

$$S_{i,t}\ =\ (1-\delta_S)S_{i,t-1}\ +\ \gamma\, SG\&A_{i,t}$$

Due to data limitations, especially if the target was not publicly listed before, I calculate the value of intangible capital stocks over the last ten years prior to deal announcement, resulting in the following capitalization model:

$$K^{int}_{i,t}\ =\ \sum_{k=1}^{10}(1-\delta_G)^k\ R\&D_{i,t-k}\ +\ \sum_{k=1}^{10}(1-\delta_S)^k\ \gamma\, SG\&A_{i,t-k}$$

[17] Including a control premium.

[18] As modeled in Ewens et al. (2020), who build on a large empirical literature (e.g., Eisfeldt and Papanikolaou (2013), Peters and Taylor (2017), and Falato, Kadyrzhanova, Sim, and Steri (2020)).

As for physical assets, Ewens et al. (2020) estimate depreciation parameters δ_G for knowledge capital stocks based on prior R&D spending, as well as the share γ of SG&A capital that represents investment into long-lived organizational capital, using the value of 0.2 as the literature's consensus estimate for δ_S. To obtain a measure that is comparable across firms and not diluted with private synergy and over-/underpayment, the final step in creating the value ratio is to relate both capital stock measures to target firm's market value, i.e., market capitalization two months prior to deal announcement[19].

Reasons why BTFs are negotiated and included in merger agreements typically include concerns threatening deal closure under acquirer's area of control as well as exogenous reasons. First, the bidder may fail to obtain (debt) financing and/or fail to obtain shareholder approval. The latter could happen if the deal is planned to be paid with newly issued acquirer stock and the new stock issue exceeds 20% of prior shares outstanding. Second, a breach of representations, warranties and/or covenants by the bidder might occur which triggers the payment of a BTF. Third, a fee can be implemented to terminate the deal if the acquirer fails to close before an ex-ante determined "drop dead date". Fourth, an exogenous reason for termination and under acquirer's responsibility is the failure to obtain regulatory approval by the Department of Justice Antitrust Division (DoJ) or the Federal Trade Commission (FTC). Fifth – although very rarely – a competing bid with the primary bidder as the target firm ("bid-for-bidder") may arise, and sixth, the exercise of a pure termination option by the bidder (Chen et al. (2020b), Afsharipour (2010), and Quinn (2010)).

3.2.1 Target Firm's Intellectual Property Value and Bidder Termination Fees

Ample research emphasizes that satisfying acquirers' innovation needs can be achieved by selecting successfully innovating targets, leveraging innovation synergies, and realizing gains through the commercialization of targets' intellectual property (e.g., Frésard et al. (2020), Phillips and Zhdanov (2013), and Bena and Li (2014)). This intellectual property is sometimes the most important asset a firm has, and some firms might exist only because of one specific

[19] I use market capitalization since asset prices are forward looking. As shown in Section 3.5, my results are robust to other scaling variables, such as deal value and, in untabulated regressions, also total assets (whereas this would be a problematic scaling variable, given that book values do not – as outlined above – appropriately capture the (full) value of intangibles, and especially the intangibles considered here).

idea. A direct implication is that, for the good of society through enabling growth by incentivizing investment in innovation, legislation's duties should entail the protection of it. This is warranted through, e.g., granted patents, copyrights, trademarks, and trade secret law. On an employee-level[20], firms can rely on legal protections such as non-disclosure agreements (NDAs) and non-compete clauses in employment contracts, though they may be time limited.

In merger negotiations, however, bidders gather significant private information about the target's (future) business, its methods and techniques for manufacturing and processes, as well as other technological competitive advantages, *without* the target being protected by above mentioned legally enforcable rules[21]. I assume that the target has full control over the amount and granularity of revealed information, as well as the timing of its disclosure to the bidder. E.g., the target usually provides potential acquirers a data room and the latter conduct various forms of due diligences. These information are important to determine the acquisition price including the deal premium, and to assess post-merger integration, which is vital for merger success (Hoberg and Phillips (2019)). The target has an incentive to disclose certain private information to the acquirer, resulting in an increase of its bargaining power, and could thereby increase the odds of receiving a higher takeover premium, which is beneficial for its shareholders, all else equal. I further expect the target to reveal the most sensitive information not to all potential bidders, but only to the final acquirer once the merger agreement is signed and the bidder termination fee is set. As put forward in the introduction, the revelation of sensitive private information to the acquirer is not a first-order problem if deals are closed successfully, but if deals ultimately fail.

Although there exists no legally defined trigger in bidder termination fee provisions to induce a "sensitive information revelation payment" to the target by the acquirer if the latter abandons the deal, this chapter investigates whether there is a substantial fraction priced into the BTF that reflects this indirect cost component not protected by other law.

[20] For literature related to employee mobility and protection of trade secrets, see, e.g., Klasa et al. (2018), Glaeser (2018), Contigiani, Hsu, and Barankay (2018), and Chen, Gao, and Ma (2020a).

[21] It is common in almost every transaction to sign a non-disclosure agreement (NDA) already well before signing the binding merger agreement, but it is the merger agreement that contains the negotiated BTF. Confidentiality agreements (or non-disclosure agreements) do not provide a compensatory payment to the target if the deal is abandoned by the acquirer. Therefore, these agreements are then worthless.

Since it is difficult – if not impossible – to directly quantify target firm's (private) value of its intellectual property[22], I apply the model above to create a proxy that I claim is highly correlated with this value: the value of target firm's knowledge capital stock based on accumulated and depreciated R&D expenses[23]. As in Ewens et al. (2020), I also calculate each firms' organizational capital stock based on SG&A expenses as described above and scale both capital stock values by target firm's market capitalization 42 trading days prior to offer announcement to enable comparison among deal-level observations. Thus, I obtain two measures: R&D stock value per unit of target firm's value, and SG&A stock value per unit of target firm's value. Theory (e.g., Eisfeldt and Papanikolaou (2013, 2014), and Jovanovic (1979)) has argued that organizational capital is bound to the organization itself and to key employees, thus its efficiency is firm-specific and hard to transfer via mergers. Recent empirical literature (e.g., Li, Li, Wang, and Zhang (2018)) finds that acquirers benefit more when target firms have higher organizational capital, suggesting that it is transferable via mergers. Yet, despite the literature's controversial argumentation, I assume that organizational capital has little "secrecy" value outside the originating firm. Thus, I expect only target firm's knowledge capital stock to be correlated with both inclusion and size of the bidder termination fee. The central hypothesis of this chapter hence is:

Hypothesis 1: *The higher the value of target firm's knowledge capital stock, the higher the negotiated bidder termination fee.*

[22] Including all trade secrets, not yet patented innovation, other business as well as technology secrets, and "negative" information as mentioned in the introduction.

[23] In Table 9 and in Figure A2 in the Appendix, I show – similar to Ewens et al. (2020) – that target knowledge capital stock is a highly significant predictor of both the market value and the scientific value of target's patents, as well as the number of patents granted to the target in the year prior to deal announcement (using data obtained from Kogan et al. (2017)), and total patent stock (all patents that are not yet expired at the last fiscal year-end date prior to deal announcement, calculated using patent data obtained from the University of Virginia (UVA) Darden Global Corporate Patent Dataset, see Bena, Ferreira, Matos, and Pires (2017)). All explanatory variables are lagged, logged and scaled by total assets. Beyond that, in regressions in Table 10, I show, similar to Glaeser (2018), that R&D intensity, measured with my proposed value ratio based on market values, is a reliable and highly statistically significant predictor of both using the word "trade secret", "trade secrets" and/or "trade secrecy" in target's 10-K filing prior to offer announcement, as well as the frequency, i.e., how often the word combinations are mentioned. In both regressions the coefficient is positive and statistically highly significant. Figure A3 in the Appendix shows the respective plot of associated predicted probabilities.

3.2.2 Short-Term Target Firm Value Effects around Deal Resolution

If announced deals are terminated, one central stylized fact is that targets' share prices plummet. The reason behind this is that target firm's shareholders then don't receive the usually significantly positive control premium offered by the acquirer (e.g., documented in the comprehensive survey of Betton, Eckbo, and Thorburn (2008)). However, the negative stock price reaction might differ with the method of payment offered by the acquirer, as cash bids have been found to reveal prior undervaluation of the target: these bids revalue target's market value at deal failure by approximately +15% compared to pre-announcement levels (Malmendier, Opp, and Saidi (2016)).

If the reason of deal termination falls under the acquirer's sphere of control and triggers the payment of a bidder termination fee, I expect, all else equal, a less negative target stock price reaction on the deal termination date[24], given that the cash fee is beneficial for the target. This leads to the second hypothesis:

Hypothesis 2: *If the acquirer cancels the deal and the higher the bidder termination fee, the higher target firm's cumulative abnormal deal resolution returns.*

3.2.3 Interaction between Intellectual Property Protection and Technological Proximity

Innovation needs of acquirers are best satisfied by selecting successfully innovating targets, leveraging the firm's combined innovation synergies, and realizing gains through the commercialization of the merged firm's intellectual property (e.g., Frésard et al. (2020), Phillips and Zhdanov (2013), and Bena and Li (2014)). A successful post-merger integration and realization of synergies is likely, if the acquirer is well integrated and selects a target complementary to his own products and research activities (Hoberg and Phillips (2019)).

Building on their findings as well as the results of Phillips and Zhdanov (2013), I suggest that my proposed relation between target firm's knowledge capital stock value and the size of

[24] Compared to the base case where the acquirer abandons the deal without any negotiated BTF and thus leaves the target as "damaged goods".

the negotiated BTF increases in the degree of both firms' technological proximity. The economic intuition is that the more technologically close the firm pair's knowledge base is, the more likely the fit of the target for acquirer's innovation needs and the ex-post realization of synergies. Furthermore, I claim that intellectual property is easier to ascertain for close technology rivals than for firms totally unrelated in their respective technology space. Thus, building on hypothesis 1, I formulate hypothesis 3a:

Hypothesis 3a: The higher the degree of technological proximity between acquirer and target, the more pronounced the relation between target firm's knowledge capital stock value and the size of the negotiated bidder termination fee.

3.2.4 Interaction between Intellectual Property Protection and Product Market Rivalry

Firms that operate in similar product markets are usually their strongest competitors and could gain the highest advantage from utilizing each other's sensitive private technology and business knowledge. Yet, on the other side, acquirers may have less incentives in exploiting targets' intellectual property if their product markets are completely unrelated to each other. I assert that the proposed relation between target firm's knowledge capital stock value and the size of the negotiated BTF should increase in the degree of both firms' product market rivalry. The economic rationale is that the more likely both firms are product market rivals, the more likely can the acquirer derive the highest economic future value from exploiting target's intellectual property. I.e., secrecy might be highly valuable for both firms, but the relation should be stronger if they are direct competitors. Hence, hypothesis 3b finally states:

Hypothesis 3b: The higher the degree of product market rivalry between acquirer and target, the more pronounced the relation between target firm's knowledge capital stock value and the size of the negotiated bidder termination fee.

3.3 Sample Overview, Methodology, and Key Variables

3.3.1 Sample Overview

To form the M&A sample, I begin by screening all transactions from Standard & Poor's Capital IQ database announced between January 01, 2004 and December 31, 2017[25]. I apply the following filters commonly used in the literature: first, I select all M&A deals that are also either completed or withdrawn in the respective period. Second, I identify all M&A transactions in which the acquirer and the target are both publicly listed U.S. firms[26], the acquirer holds less than 50% of target's outstanding shares prior to offer announcement, and aims for a change in control in the target firm (i.e., the acquirer must seek a majority stake). Third, I require the deal value, i.e., the total transaction value excluding assumed liabilities, to exceed USD 1 million to eliminate the many small and economically less significant transactions. Fourth, since I need the most accurate data on negotiated bidder and target termination fees, I require every transaction-target to have valid merger documents filed with the Securities and Exchange Commission (SEC) at or shortly after the deal announcement date[27]. Fifth, to proxy for the extent to which the target firm has produced (secret) intellectual property, I further restrict the sample to transactions in which the target has valid data on past R&D or SG&A spending[28]. These filters result in a final data sample of 769 unique transactions[29].

[25] I focus on this sample period, since sophisticated trade secret law (mainly the Uniform Trade Secret Act (UTSA) and the inevitable disclosure doctrine (IDD)) has been widely adopted in all U.S. states after 2004 (except Texas (2013), New Jersey (2012), and Wyoming (2006)). Moreover, this is unlikely to negatively affect my results, given that these staggered passages of both the UTSA and IDD are a shock to trade secrecy on an employee-firm-level. This likely positively affects merger incidence justified by information expropriation, because the UTSA and IDD exogenously decreased knowledge-worker mobility. See, e.g., Dey and White (2019), Klasa et al. (2018), Contigiani et al. (2018), and Glaeser (2018).

[26] This is to ensure that SEC EDGAR merger filings are available from which I retrieve data on the exact BTF and the selling method (auction vs. negotiation) in the respective background section.

[27] I manually retrieve the SEC EDGAR filings for the respective transaction since some papers argue that termination fee data in both Standard & Poor's Capital IQ and Refinitiv's SDC Platinum are not convincingly reliable prior to 2007.

[28] Valid data in this case means that I also include all observations in which there is at least one non-missing (i.e., at least one "0" or another positive value) data point on target firm's R&D or SG&A expenses in Compustat in the last ten years prior to offer announcement. I do this in order to avoid sample selection. The results are robust and remain unchanged to including a "missing R&D" dummy.

[29] Table A2 in the Appendix lists the detailed sample selection process with the number of remaining observations after applying respective filters. I obtain qualitatively and quantitatively similar results if

3.3.2 Methodology and Key Variables

The baseline specification to measure the effect of target firm's intellectual property value on the size of the negotiated bidder termination fee is the following linear fixed effects regression model:

$$\begin{aligned} BTF\ Size_{i,t} = {} & \alpha_{i,t} + \beta_1\ Tgt\ Know\ Cap\ Stock_{i,t} + \beta_2\ Tgt\ Org\ Cap\ Stock_{i,t} \\ & + \beta_3\ Tgt\ Total\ Intangibles\ Ratio_{i,t-22} + \beta_4\ Tgt\ Tangibility_{i,t-22} \\ & + \beta_5\ Tgt\ Market\text{-}to\text{-}Book_{i,t-22} + \beta_6\ TTF\ Size_{i,t} \\ & + \eta\ Deal\ Characteristics_{i,t} + \theta\ Acq\ Firm\ Characteristics_{i,t} \\ & + \varphi\ Acq\ Industry \times Year\ FE_{i,t} + \vartheta\ Tgt\ Industry\ FE_{i,t} + \varepsilon_{i,t} \end{aligned}$$

where i indexes the transaction (i.e., the unique acquirer-target-combination), t indexes the time (i.e., announcement date of the transaction), α is an intercept, and β_1 is the coefficient of primary interest – the estimate of the effect of target firm's intellectual property value on the size of the bidder termination fee. The dependent variable is the dollar value of the negotiated bidder termination fee scaled by target firm's market capitalization 42 trading days (i.e., two calendar months) prior to offer announcement. This scaling makes the dependent variable comparable across transactions and captures the potential economic impact on target firm's value should the deal be terminated and triggering a bidder termination fee payment by the acquirer to the target.

Intangible Capital Stock Measures

The main variable of interest in this chapter is *Tgt Know Cap Stock*, the proxy for the value of target firm's intellectual property not yet protected by patents and other law. Applying Ewens' et al. (2020) model for intangible capital stocks, *Tgt Know Cap Stock* is defined as accumulated and depreciated (depreciation factor δ_G) R&D expenses over the last ten years prior to offer announcement, also scaled by target firm's market capitalization 42 trading days

I further restrict the sample to excluding both acquirers and targets from the financial sector (SIC codes 6000–6999) as well as utilities (SIC codes 4900–4999).

(two calender months) prior to offer announcement, to ensure that target's stock prices do not reflect run-up movements of the upcoming bid:

$$Tgt\ Know\ Cap\ Stock_{i,t} = \frac{\sum_{k=1}^{10}(1-\delta_G)^k\ R\&D_{i,t-k}}{Tgt\ Market\ Capitalization_{i,t-42}}$$

Tgt Org Cap Stock is defined likewise, it is equal to the accumulated and depreciated (depreciation factor δ_S) SG&A expenses over the last ten years prior to offer announcement, scaled by target firm's market capitalization 42 trading days prior to offer announcement, where γ represents the share of SG&A expenses invested into long-lived organizational capital:

$$Tgt\ Org\ Cap\ Stock_{i,t} = \frac{\sum_{k=1}^{10}(1-\delta_S)^k\ \gamma\ SG\&A_{i,t-k}}{Tgt\ Market\ Capitalization_{i,t-42}}$$

Other Controls

Tgt Total Intangibles Ratio is the sum of accumulated goodwill and identifiable intangibles[30] from its balance sheet, divided by total assets and obtained 22 trading days prior to deal announcement. *Tgt Tangibility* is net property, plant, and equipment of the target, also scaled by total assets 22 days prior, and controls for target's physical asset intensity. *TTF Size* is – similar to the dependent variable *BTF size* – the dollar value of the negotiated target termination fee scaled by target firm's market capitalization 42 trading days prior to offer announcement. It is important to also control for *TTF Size*, because the TTF is also determined at the end of the private deal negotiation yet comprises legally and economically different triggers[31]. These controls are included to reduce omitted variable bias, because the causal interpretation of the variable of interest should be independent of the structure of target's assets.

Key *Deal Characteristics* variables include, among common M&A controls: *Tgt Initiation*, a dummy variable variable that equals 1 if the target initiated the deal, and 0 otherwise, and is included after considering Masulis and Simsir (2018), who find that targets initiate deals

[30] I.e., those intangible assets that can be separated from other assets and even be sold, such as, e.g., patents, patent licenses, copyrights, trademarks, trade names, and service marks.

[31] It is important to note that the BTF is not a symmetrical response to the TTF from a legal perspective. TTFs are negotiated to compensate the acquirer for out-of-pocket expenses in case the target terminates the deal due to, e.g., receiving and accepting a third-party bid or not obtaining shareholder approval.

motivated by their economic weakness and financial constraints. Under these circumstances, a significant amount of bargaining power is shifted to the acquirer and systematically lowers the odds in persuading him to provide a BTF, all else equal. *Deal Value* is the USD (bn) value of the transaction, i.e., total transaction value excluding assumed liabilities. *Cash Only* is a dummy variable that equals 1 if the payment by the acquirer is made entirely in cash, and 0 otherwise. It is well documented in the literature (e.g., Betton et al. (2008)) that cash deals are usually smaller, i.e., have smaller deal values, and cluster around high relative sizes of the firms involved, meaning that the acquirer is usually much bigger than the target in cash deals. Similar to the economic intuition for target-initiated deals, this creates a natural bargaining power imbalance where one would expect to less likely observe BTFs (in pure cash deals). *Tender Offer* is a dummy variable that equals 1 if the deal is classified as a tender offer, and 0 otherwise. Tender offers are characterized by the acquirer often circumventing target firm's management and directly submitting a takeover bid to target's shareholders. I thus propose that, due to the lack of a direct negotiation between the firms, a BTF is significantly less likely in tender offers, on average. *Post Closing Highly Conc Industry* is a dummy variable that equals 1 if the planned deal results in the SIC4 industry Herfindahl-Hirschman Index (Post Closing Industry HHI) exceeding 0.25, and 0 otherwise. The U.S. Department of Justice (DoJ) and the Federal Trade Commission (FTC) define in their 2010 horizontal merger guidelines an industry as a highly concentrated market if the HHI increases beyond 0.25. Given that proposed deals that would result in a highly concentrated market receive heightened attention from those regulating (antitrust) authorities, I expect a BTF to be more likely included in such deals[32]. *Acq (Tgt) All Financial Advisor Fees* $_{Deal\ Value}$, respectively, is the imputed USD (mm) value of acquirer (target) financial advisor fees irrespective of the deal outcome, i.e., directly assignable out-of-pocket expenses, scaled by *Deal Value*. These advisor fees are sunk cost if deals are terminated and are thus expected to be correlated with both BTF and TTF. Lastly, I control for variables capturing acquirer's bargaining power, financial constraints, and uncertainty over its value. Especially concerns of acquirer's financial soundness are reasons why the acquirer is swayed to provide a BTF. Besides market capitalization, stock return volatility, and market leverage, I include *Acq Dividend Payer*, a dummy variable that equals 1 if the acquiring firm

[32] Included as a proxy for ex-ante (anticipated) regulatory risk.

paid positive dividends[33] during the fiscal year preceding the offer announcement, and 0 otherwise. The intuition for including the dividend payer dummy is, that if the acquirer did pay any dividends during the fiscal year prior to deal announcement, he might not be financially constrained, thus has a lower risk of obtaining financing, hence a BTF should be less likely[34].

I also include *Acquirer Industry* × *Year Fixed Effects* and *Target Industry Fixed Effects*, based on the first digit of the Standard Industrial Classification (SIC) code and the year of deal announcement (e.g., Betton et al. (2008), Malmendier et al. (2016)) to control for aggregate shocks to takeover activity in certain industries and across years, and further unobserved heterogeneity (Gormley and Matsa (2014)). All variables are additionally defined in Table A1 in the Appendix.

3.4 Empirical Results

3.4.1 Key Descriptive Statistics

Table 1 presents summary statistics for the U.S. M&A sample including transactions announced between 2004 and 2017. The mean of *BTF Dummy* is 0.293, suggesting that about 29% of merger agreements include a negotiated bidder termination fee provision. To the contrary, about 97% of transactions are equipped with a target termination fee provision. These values are consistent with the literature, as similar values are obtained in, e.g., Chen et al. (2020b), yet databases are known to underreport their incidence, specifically prior to 2007. The dollar value range for the bidder termination fee peaks in values in the low billions, with the maximum value of USD 3.5 billion paid by the acquirer, Halliburton Company, to the target, Baker Hughes, Inc., for the failed deal in 2016. *BTF Size* (the main dependent variable) and *TTF Size* are the respective dollar values scaled by target firm's market capitalization and average in values of around 1.8% and 5.1%, with maximum values exceeding 43% and 34%, respectively. This emphasizes their economic significance and value effects for the target if

[33] On either common and/or preferred stock.

[34] In additional regressions, I also include commonly known measures of financial constraints for the acquiring firm, such as the indices developed in Hadlock and Pierce (2010) (*SA-Index*), Whited and Wu (2006) (*WW-Index*), and Kaplan and Zingales (1997) (*KZ-Index*).

deals are terminated and fees are paid. The median of *Tgt Know Cap Stock* is zero, suggesting that most of the firms do not invest in R&D, consistent with prior findings as in, e.g., Glaeser (2018), and Bena and Li (2014). Yet, on average, target firm's knowledge capital stock represents about 13% of its total market value. The average value for *Tgt Org Cap Stock* is 35.7%, and maximum values are smaller than maximum values for *Tgt Know Cap Stock*, which peak in values exceeding ten times its market valuations[35]. This suggests a high significance of R&D investments for a substantial number of firms. Since deal values usually exceed market valuations, the ratios for *Tgt Know Cap Stock* $_{Deal\ Value}$ and *Tgt Org Cap Stock* $_{Deal\ Value}$ are somewhat smaller. Deal values average in the low billions, with a median value of USD 441 million.

Table 1
Summary Statistics

Table 1 reports summary statistics of the sample consisting of 769 U.S. M&A transactions announced between January 01, 2004 and December 31, 2017. Number indices display the point in time (i.e., trading day) relative to the offer announcement (OA) date when the variable was measured. Letter indices refer to the variable the non-indexed variable is scaled with, i.e., *BTF Size* $_{Deal\ Value}$ is the USD amount of the bidder termination fee scaled (divided) by the USD amount of *Deal Value*. Cumulative abnormal returns (*CAR*) are measured in symmetric event windows around deal resolution, applying a Carhart (1997) four-factor model (*C4*) to model normal returns, respectively. All variables that are not indexed, i.e., capital stock data (*Cap Stock*), other accounting data, proximity and similarity measures, measures of financial constraints, patent data, and *Tgt SIC2 Industry R&D Worker Ratio*, are measured on the last fiscal year end date (or quarter year end, if available) prior to offer announcement. All CARs, Market-to-Book ratios, and *Relative Size Market Cap* $_{[OA-22]}$ are winsorized at the 1st and 99th percentile. All variables are defined in detail in Table A1 in the Appendix.

	Summary Statistics					
Variables	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Panel A: Termination Fees and Target Intangible Capital Stocks						
BTF Dummy	769	0.293	0	0.455	0	1
TTF Dummy	769	0.970	1	0.170	0	1
BTF $_{Dollar\ Value}$	769	45.805	0.000	213.445	0.000	3,500.000
TTF $_{Dollar\ Value}$	769	75.857	13.000	202.684	0.000	1,920.000
BTF Size	769	1.729	0.000	3.539	0.000	43.184
TTF Size	769	5.069	4.778	2.538	0.000	34.049
BTF Size $_{Deal\ Value}$	769	1.228	0.000	2.465	0.000	30.214
TTF Size $_{Deal\ Value}$	769	3.398	3.387	1.539	0.000	30.171
Tgt Know Cap Stock $_{Dollar\ Value}$	769	74.311	0.000	428.790	0.000	10,856.900
Tgt Org Cap Stock $_{Dollar\ Value}$	769	302.094	46.494	1,199.158	0.000	19,291.560

[35] This extremely research intense target was Icoria, Inc., a pharma/biotech company founded in 1997 that discovers and develops multiparameter biomarkers which enable developing multianalyte diagnostics used to define and grade pathology or disease states. The firm was successfully acquired by Clinical Data, Inc., on December 20, 2005.

Tgt Know Cap Stock	769	0.131	0.000	0.546	0.000	10.074
Tgt Org Cap Stock	769	0.357	0.172	0.677	0.000	8.478
Tgt Know Cap Stock Deal Value	769	0.079	0.000	0.290	0.000	4.553
Tgt Org Cap Stock Deal Value	769	0.231	0.121	0.388	0.000	4.274
Tgt 5YR Avrg Yearly Know Cap Growth	324	13.836	10.474	20.655	−40.494	97.176
Tgt Know Cap Intensity	697	0.184	0.000	0.264	0.000	1.000

Panel B: Deal and Industry Characteristics, and Measures of Technological Proximity and Product Market Rivalry

Tgt Initiation	769	0.322	0	0.468	0	1
Auction	769	0.599	1	0.490	0	1
Deal Value	769	2.657	0.441	6.943	0.010	79.406
Friendly	769	0.996	1	0.062	0	1
Cash Only	769	0.395	0	0.489	0	1
Tender Offer	769	0.156	0	0.363	0	1
Horizontal Takeover	769	0.489	0	0.500	0	1
Relative Size Market Cap [OA–22]	769	40.003	6.576	157.483	0.333	1,792.928
Post Closing Industry HHI	769	0.168	0.118	0.162	0.010	0.995
Post Closing Industry HHI Increase	769	0.011	0.001	0.042	0.000	0.493
Post Closing Highly Conc Industry	769	0.055	0	0.227	0	1
Acq All Financial Advisor Fees Dollar Value	769	7.584	3.515	9.613	0.029	60.000
Tgt All Financial Advisor Fees Dollar Value	769	10.161	4.300	13.468	0.015	94.700
Acq All Financial Advisor Fees Deal Value	769	0.970	0.773	0.801	0.001	9.998
Tgt All Financial Advisor Fees Deal Value	769	1.114	0.997	1.111	0.001	13.026
Technological Proximity (Tech Prox)	233	0.155	0.154	0.096	0.012	0.520
Product Market Similarity (PMS) TNIC1	694	0.190	0.174	0.116	0.000	0.928
Product Market Similarity (PMS) TNIC2	603	0.131	0.114	0.109	0.000	0.848
Product Market Similarity (PMS) TNIC3	525	0.111	0.088	0.108	0.000	0.811
Acq Induced Cancellation	769	0.017	0	0.129	0	1
Third Party Competing Bid Cancellation	769	0.008	0	0.088	0	1
Deal Completion	769	0.950	1	0.217	0	1
Kick-Off vs. AD	398	4.004	3.567	2.254	0.300	12.867
First Board Meeting vs. AD	398	3.672	3.167	2.322	0.167	12.800
Confidentiality Agreement vs. AD	398	3.262	2.500	2.802	0.067	18.200
Kick-Off vs. RD	398	9.859	9.400	3.779	2.467	30.167
First Board Meeting vs. RD	398	9.527	8.767	3.958	2.000	30.033
Confidentiality Agreement vs. RD	398	9.116	8.267	4.098	2.300	28.267
Any Pre-Contact with Acq	398	0.384	0	0.487	0	1

Panel C: Acquiring Firm Characteristics

Acq Market Cap [OA–22]	769	19.293	2.338	46.473	0.014	461.758
Acq Market-to-Book [OA–22]	769	3.454	2.121	5.965	0.429	76.642
Acq 1YR Stock Return Volatility [OA–1]	769	30.303	26.669	15.389	10.401	122.573
ln Acq 1YR Stock Return Volatility [OA–1]	769	3.311	3.283	0.432	2.342	4.809
Acq Market Leverage [OA–22]	769	0.139	0.109	0.131	0.000	0.927
Acq Dividend Payer	769	0.671	1	0.470	0	1
Acq Hadlock-Pierce-Index	751	−4.265	−4.546	0.488	−4.637	−2.228
Acq Whited-Wu-Index	697	0.534	0.369	1.431	−8.594	6.356
Acq Kaplan-Zingales-Index	632	−9.021	−4.841	11.203	−56.194	3.094

Panel D: Target Firm Characteristics

Tgt Market Cap [OA–42]	769	1,960.597	301.480	5,411.878	5.262	62,359.610
Tgt Market-to-Book [OA–22]	769	2.973	1.833	4.305	0.197	35.653
Tgt Total Assets [OA–22]	769	4,071.693	657.784	29,811.820	4.499	782,896.00
Tgt Total Intangibles [OA–22]	769	477.932	20.669	2,242.563	0.000	38,935.000
Tgt Goodwill [OA–22]	739	356.428	10.657	2,066.050	0.000	27,689.000
Tgt Identifiable Intangibles [OA–22]	729	127.606	3.500	649.848	0.000	10,453.000
Tgt Net PPE [OA–22]	769	575.996	24.304	2,252.972	0.000	31,281.000
Tgt Current Assets [OA–22]	513	682.084	189.113	1,482.475	3.680	14,712.000
Tgt Total Intangibles Ratio [OA–22]	769	0.136	0.039	0.187	0.000	0.832
Tgt Goodwill Ratio [OA–22]	739	0.096	0.020	0.141	0.000	0.721
Tgt Identifiable Intangibles Ratio [OA–22]	729	0.042	0.005	0.077	0.000	0.508
Tgt Tangibility [OA–22]	769	0.157	0.058	0.217	0.000	0.953
Tgt Current Assets Ratio [OA–22]	513	0.520	0.532	0.261	0.036	0.994
Tgt C4 CAR RD [–3;+3]	521	0.503	0.058	8.185	−47.611	128.883
Tgt Unique Product Industry	769	0.587	1	0.493	0	1
Tgt FF5 HTHC Industry	769	0.372	0	0.484	0	1
Tgt Patent Value (market-weighted)	190	411.059	20.288	2,058.386	0.199	22,597.090
Tgt Patent Value (citation-weighted)	190	43.398	9.455	118.632	1.000	1,224.381
Tgt Patent Count (recently granted)	190	15.911	4	46.098	1	508
Tgt Patent Count (total stock)	288	20.892	4	52.657	1	514
Tgt Trade Secrecy Mention Count in 10-K	751	1.775	0	2.845	0	27
Tgt SIC2 Industry R&D Worker Ratio	753	0.112	0.097	0.075	0.001	0.286
Tgt Firm Age	742	41.899	24	41.053	2	234

(Table 1 continued)

Approximately 60% of deals are classified as takeover auctions, i.e., transactions in which the private sales process is characterized by two or more prospective acquirers signing non-disclosure agreements with the target firm, nearly the same share as obtained in, e.g., Masulis and Simsir (2018) and Boone and Mulherin (2008). Approximately 16% of all deals are tender offers, and almost half of all deals are classified as horizontal takeovers, i.e., acquirer and target share the same SIC4 industry.

The mean value for *Post Closing Highly Conc Industry* is 5.5%, suggesting that every twentieth deal changes market composition in a way to likely receive extra scrutiny by regulating authorities. When it comes to the resolution of announced deals, nearly 95% of all deals are closed successfully within the sample period, whereas in about 2% of the cases the acquirer terminates the deal.

3.4.2 Baseline Regression Results:

Target Firm's Intellectual Property Value and Bidder Termination Fees

According to hypothesis 1, targets with a high ratio of their knowledge capital stock to market value are assumed to be highly valuable because of their secret, private intellectual property. Acquirers aiming to satisfy their innovation needs could utilize this knowledge by purchasing these successfully innovating targets. Thus, the scaled size of the bidder termination fee, *BTF size*, is hypothesized to increase in *Tgt Know Cap Stock*, since the BTF is providing the target a compensation payment for revealing these private information to the acquirer if the latter abandons the deal. Hypothesis 1 hence predicts a positive relation between *Tgt Know Cap Stock* and *BTF size*. Table 2 depicts the results of linear fixed effects (logit) regressions. First of all, column (1) and (2)[36] show the logit results where the dependent variable is *BTF Dummy*, a dummy variable that equals 1 if the merger agreement includes a bidder termination fee provision, and 0 otherwise. Regressions (3)–(7) then show the results for the baseline regression, the continuous variable *BTF size*. Consistent with hypothesis 1, the coefficient on *Tgt Know Cap Stock* is positive and highly statistically significant at the 1% level across all specifications[37]. The relation is also economically significant as a one-standard deviation increase in this target R&D intensity measure is associated with a 0.57% increase in the size of the BTF. As I argue in Section 3.2, by building on prior research, organizational capital may be transferred through mergers, yet it does not represent a secret component that is highly valuable outside the firm. Of course, investment in key employees through training, advertising, and brand value is important as well and surely enables a organization to be more efficient,

[36] These two regressions only differ in using different measures for acquiring firm's financial constraints. In the first regression, I include general M&A literature controls for the acquirer, such as its market capitalization, stock return volatility, market leverage and a dividend payer dummy to control for acquirer's financial strength that might affect the probability of providing a BTF. In the second regression, I remove these variables and include only the Hadlock and Pierce (2010) *SA-Index*.

[37] Figure A1 in the Appendix plots the relation between the pure values *BTF size (USD mm)* and *Tgt Knowledge Capital (USD mm)*, revealing a positive relation without controlling for other covariates affecting bidder termination fee size and target's knowledge capital stock. Despite the large number of control variables I'm not concerned with any multicollinearity problems given that variance inflation factors (vifs) are all below three and for the main variables of interest always below 1.6. In untabulated regressions, I additionally include more granular fixed effects and additionally cluster standard errors on the acquiring firm, finding that my results are qualitatively and quantitatively unchanged.

but it cannot be directly exploited by competitors[38]. Hence, the coefficient on *Tgt Org Cap Stock* is positive but statistically not different from zero, consistent with above mentioned argumentation and assumption.

Table 2
Target Firm's Intellectual Property Value and Bidder Termination Fees

Table 2 presents the results of fixed effects (FE) logit regressions ((1) and (2)) of *BTF Dummy*, a dummy variable that equals 1 if the merger agreement includes a bidder termination fee provision, and 0 otherwise, on the variable of interest, *Tgt Know Cap Stock*, a variable that captures the accumulated and depreciated R&D expenses of the target firm (in USD mm) over the last ten fiscal years prior to offer announcement, scaled by the market capitalization (also in USD mm) of the target firm 42 trading days prior to offer announcement (regressions (1) and (2)). I further include control variables as defined in Section 3.3. In regressions (3)–(7), the dependent variable is the continuous variable *BTF Size*, the (USD mm) amount of the bidder termination fee divided by the market capitalization (also in USD mm) of the target firm 42 trading days prior to offer announcement and expressed in percentage points. All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. Models (1) and (2) include odds ratios [in angular parentheses], that relate to the change in the probability of including a bidder termination fee provision for a one-unit increase in a continuous variable, or a shift from zero to one for a dummy variable. (7) is a Tobit (censored at zero). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	BTF Dummy		BTF Size				
Regression Type	Logit FE		Linear FE				Tobit FE
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Target Firm Characteristics							
Tgt Know Cap Stock	0.954**	0.816**	1.051***	0.846***	1.004***	1.183***	3.062***
	(0.400)	(0.382)	(0.267)	(0.296)	(0.276)	(0.239)	(0.589)
	[3.528]	[3.189]					
Tgt Org Cap Stock	0.043	0.093	0.178	0.045	0.136	0.139	0.731
	(0.181)	(0.187)	(0.258)	(0.244)	(0.293)	(0.243)	(0.726)
	[1.247]	[1.241]					
Tgt Total Intangibles Ratio [OA–22]	0.115	0.309	1.703**	1.858**	1.688**	1.312*	4.278*
	(0.611)	(0.599)	(0.794)	(0.800)	(0.786)	(0.766)	(2.218)
	[1.250]	[2.324]					
Tgt Tangibility [OA–22]	−0.347	−0.331	0.248	0.275	0.505	0.843	0.668
	(0.656)	(0.675)	(1.176)	(1.171)	(1.272)	(1.282)	(2.680)
	[0.980]	[0.809]					
Tgt Market-to-Book [OA–22]	0.020	0.020	0.009	0.015	0.010	0.026	0.084
	(0.024)	(0.024)	(0.036)	(0.038)	(0.037)	(0.039)	(0.077)
	[1.042]	[1.034]					
Deal Characteristics							
Tgt Initiation	−0.518**	−0.511**	−0.793**	−0.835**	−0.696**	−0.704**	−2.919***
	(0.213)	(0.216)	(0.316)	(0.321)	(0.313)	(0.316)	(0.906)
	[0.564]	[0.587]					

[38] Many intangibles that are driven by organizational (SG&A) capital stocks are by law inextricably bound to the firm and/or simply not exploitable, such as trademarks, brands and brand identity, copyrights, licenses, the firm's reliable vendor and distribution network, and internal technology systems and organizational processes, just to name a few.

Auction	−0.352*	−0.278	−0.119	−0.136	−0.103	−0.274	−0.405
	(0.197)	(0.201)	(0.276)	(0.275)	(0.280)	(0.281)	(0.806)
	[0.655]	[0.659]					
TTF Dummy	2.930***	2.966***					
	(1.071)	(1.098)					
	[18.248]	[22.078]					
TTF Size			0.026	0.015	0.029	0.007	−0.150
			(0.062)	(0.064)	(0.059)	(0.055)	(0.251)
Deal Value	0.042	0.018	0.012	0.017	0.012	0.009	0.069
	(0.030)	(0.017)	(0.031)	(0.031)	(0.024)	(0.023)	(0.068)
	[1.057]	[1.036]					
Friendly	0.062	0.274	−0.634	−0.668	−0.136	−0.429	−0.489
	(0.899)	(0.912)	(1.277)	(1.261)	(1.264)	(1.225)	(3.032)
	[1.175]	[1.286]					
Cash Only	−0.924***	−0.967***	−0.668*	−0.726**	−0.618	−1.062***	−3.116***
	(0.280)	(0.304)	(0.349)	(0.346)	(0.380)	(0.286)	(1.081)
	[0.332]	[0.312]					
Tender Offer	−1.347***	−1.363***	−1.355***	−1.394***	−1.418***	−1.201***	−6.758***
	(0.460)	(0.458)	(0.405)	(0.402)	(0.386)	(0.420)	(1.763)
	[0.181]	[0.178]					
Horizontal Takeover	0.051	0.144	0.128	0.131	0.128	0.136	0.858
	(0.203)	(0.207)	(0.255)	(0.256)	(0.250)	(0.247)	(0.722)
	[1.117]	[1.205]					
Relative Size Market Cap [OA–22]	−0.027	−0.030	−0.001	−0.001	−0.001*	−0.002***	−0.018
	(0.034)	(0.034)	(0.001)	(0.001)	(0.001)	(0.000)	(0.019)
	[0.985]	[0.982]					
Post Closing Highly Conc Industry	0.665*	0.588	2.188**	2.198**	1.909**	1.196*	4.276***
	(0.357)	(0.358)	(0.880)	(0.876)	(0.831)	(0.636)	(1.578)
	[2.675]	[2.337]					
Acq All Financial Advisor Fees Deal Value	−0.007	0.032	−0.126		−0.169	0.032	−0.768
	(0.185)	(0.187)	(0.215)		(0.256)	(0.258)	(0.775)
	[0.980]	[1.039]					
Tgt All Financial Advisor Fees Deal Value	−0.409***	−0.371**	−0.224		−0.213	−0.325**	−0.874
	(0.157)	(0.166)	(0.149)		(0.144)	(0.140)	(0.624)
	[0.620]	[0.654]					
Acquiring Firm Characteristics							
Acq Market Cap [OA–22]	−0.008		0.001	0.002			−0.013
	(0.009)		(0.008)	(0.008)			(0.024)
	[0.992]						
ln Acq 1YR Stock Return Volatility [OA–1]	0.305		0.620	0.586			1.455
	(0.260)		(0.426)	(0.425)			(1.211)
	[1.521]						
Acq Market Leverage [OA–22]	1.084		1.452	1.139			2.866
	(0.773)		(1.099)	(1.094)			(2.991)
	[1.863]						
Acq Dividend Payer	−0.379		−0.874**	−0.843*			−2.014**
	(0.233)		(0.427)	(0.433)			(1.014)
	[0.732]						
Acq Market-to-Book [OA–22]	−0.032	−0.028	−0.040*	−0.041*	−0.046**	−0.035	−0.137*
	(0.024)	(0.022)	(0.021)	(0.021)	(0.020)	(0.024)	(0.076)
	[0.961]	[0.961]					
Acq Hadlock-Pierce-Index		0.403			0.898**		
		(0.280)			(0.430)		
		[1.758]					
Acq Whited-Wu-Index						−0.089	
						(0.101)	

Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	769	751	769	769	751	697	769
Pseudo R^2	0.302	0.298					0.138
Adjusted R^2			0.103	0.100	0.096	0.111	

(Table 2 continued)

The firm's total intangibles that are capitalized on the balance sheet also comprise patents and patent licenses. This intellectual property is protected by law from copying, making, and selling by other parties, and may have been externally acquired through target's prior acquisitions and further developed by the firm. Through its direct proximity to intellectual property, I thus expect *Tgt Total Intangibles Ratio* also to be related to *BTF size*, which is indeed the case, albeit somewhat weaker correlated at the 5% and 10% level (specification (6)). *Tgt Initiation* is negatively and statistically significantly related to *BTF size* in all specifications, consistent with the notion that target's intentions to sell itself and proactively initiate the deal plays a central role (Masulis and Simsir (2018)): in these cases, a significant amount of bargaining power is shifted to the acquirer, which systematically lowers the willingness for the latter to provide a BTF, all else equal. (Pure) cash deals are usually smaller, thus, controlling for relative size between the firms, represent less risky deals in terms of obtaining regulatory approval, acquirer's uncertainty over its ability to pay for the deal and acquirer's shareholder approval. Consistent with this reasoning, the coefficient on the dummy variable *Cash Only* is negative and statistically significantly related to *BTF size*. This is also true for tender offers, since these type of acquisitions sometimes circumvent target firm's management, thereby also bypass deal negotiations and hence reduce the likelihood to provide a BTF.

Since *BTF size* is left-censored (truncated) at zero, I also estimate a fixed effects tobit model (specification (7)). The marginal effect on *Tgt Know Cap Stock* becomes even larger (3.062 vs. 1.051). Additionally, Table A3 in the Appendix provides a modular regression setup, which highlights that the hypothesized positive relation is not a random outcome of an appropriately chosen regression model, but rather an association that is valid and economically meaningful, independent of selected covariates and fixed effects.

Taken together, if looking at off-balance sheet intangibles in M&A, the results suggest that only the "secrecy" component, represented through *Tgt Know Cap Stock* – and not its

organizational capital value – is a reliable and significant driver of BTF inclusion in M&A contracts as well as *BTF size*. This suggests that R&D-intense targets can utilize their bargaining power in deal negotiations to convince the prospective acquirer to provide an appropriately priced bidder termination fee. Consequently, hypothesis 1 is strongly supported.

3.4.3 Identification: Instrumental Variables Approach

A common concern in the empirical finance literature is, that despite controlling for many factors explaining the cross-sectional distribution of the dependent variable, there might be endogeneity concerns. In my case, this might be particularly true if there would exist a reverse causality of *BTF size* affecting target firm's R&D investments[39], omitted variables, and/or error-in-variables, i.e., if I measure my variable of interest with error. To address these concerns and to strenghten the causal interpretation of this chapter, I apply a two-stage least squares (2SLS)[40] instrumental variables estimation. For my instrument to be valid, it has to fulfill two vital conditions: first, the instrument must be relevant, i.e., it must be correlated with the (possibly) endogenous variable *Tgt Know Cap Stock* in the first stage of the regression equation[41], conditionally on the other covariates, and second, the instrument must be exogenous, i.e., the instrument must not be correlated with the error term in the second stage, the structural equation, also conditionally on the other covariates.

I suggest two instruments, but focus on one specifically: *Tgt SIC2 Industry R&D Worker Ratio*. This variable is defined as the ratio of knowledge workers in strictly R&D-related jobs to the total number of surveyed participants in a given SIC2 industry-year. R&D-related jobs are defined as all jobs (occupations, denoted "occsoc" in the survey data) coded between 1510XX and 1940YY in the annual American Community Survey (ACS) of the U.S. Census Bureau. These survey data are included in the Integrated Public Use Microdata Series

[39] Concerning reverse causality, it seems highly unlikely that the size of the negotiated BTF in a M&A deal affects firm-level R&D activity (if empirically existent at all, the effect running from *BTF size* to *Tgt Know Cap Stock* should be negligibly small).

[40] I receive similar results applying LIML or GMM instead of 2SLS.

[41] I.e., it must be a reliable predictor for *Tgt Know Cap Stock*, with a statistically significant non-zero coefficient in the reduced form (first stage) equation. I include *Target Industry Fixed Effects*, since they are based on the first of all four SIC digits, thus sufficient variation remains (instrument is SIC2 level).

(IPUMS USA (2020)). Since IPUMS does not directly provide industry definitions in the SIC code format, I manually assign each census code industry definition to the most suitable SIC2 industry[42] and cross-check each industry assignment with the NAICS definition codes, which are available for both datasets. The R&D worker ratios are mapped on a SIC2 industry-year basis to each target firm in the sample on the last fiscal year end date prior to offer announcement. The economic intuition behind this instrument variable is that *Tgt SIC2 Industry R&D Worker Ratio* represents labor supply in target firm's industry: higher values create an incentive for the firm to invest in R&D given its availability of skilled workers that can create valuable innovation and enables the firm to stay competitive. Therefore, I claim that this ratio is by itself likely directly uncorrelated with deal-level *BTF size*, and only correlated with the dependent variable through its correlation with *Tgt Know Cap Stock*. Although there doesn't seem to exist a theoretical link between the instrument and *BTF size*[43] and given one cannot control for instrument exogeneity directly, I include a second instrument to at least be able to test against the null hypothesis that over-identifying restrictions are valid. The second instrument is *Tgt Trade Secrecy Mention Count in 10-K*, the number of mentions of either "trade secret", "trade secrets" and/or "trade secrecy" in target firm's most recent 10-K report filed with the SEC prior to offer announcement. I expect this variable also to be correlated with *Tgt Know Cap Stock*, since R&D-intense firms are likely to have trade secrets and name it more often, the more relevance it has for their firm. Table 3 shows the 2SLS IV regression results.

As expected, *Tgt SIC2 Industry R&D Worker Ratio* is positively and statistically highly significantly related to *Tgt Know Cap Stock**, the predicted value for targets knowledge capital stock (column (1)). Moreover, the first stage is also strong with an effective F-statistic of 13.701 (applying the STATA™ routine developed in Montiel Olea and Pflueger (2013)), exceeding the rule-of-thumb value of ten. This suggests that the instrument has sufficient explanatory power for *Tgt Know Cap Stock*, thus meeting the relevance condition. In the second stage

[42] Granular SIC2-level data with detailed mapping are available upon request.

[43] Additionally, in untabulated regressions I include both instruments in the baseline regression and find no significant relation between these instruments and *BTF size*, while the strong positive relation between *Tgt Know Cap Stock* and *BTF size* remains. A pairwise correlation test among these variables and *BTF size* reveals only a weak and insignificant correlation, not controlling for other factors. The number of observations drops slightly due to the availability of respective instrumental variables.

Table 3
Instrumental Variables Estimation – Target Firm's SIC2 Industry R&D Worker Ratio

This table reports the results of linear fixed effects two-stage least squares (2SLS) instrumental variables regressions of *BTF Size* on *Tgt Know Cap Stock*. In models (1) and (2), the first stage (*Tgt Know Cap Stock**) is estimated using the target firm's SIC2 industry R&D worker ratio, *Tgt SIC2 Industry R&D Worker Ratio*, as the instrument. In models (3) and (4), I further include the number that counts how often the word group "trade secret", "trade secrets" and/or "trade secrecy" is mentioned in target firm's most recent 10-K report filed with the SEC prior to offer announcement, *Tgt Trade Secrecy Mention Count in 10-K*, as an instrument. All regressions include *Acquirer Industry* × *Year Fixed Effects* and *Target Industry Fixed Effects* but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and automatically adjusted in the 2nd stage (applying the STATA™ *xtivreg2* 2SLS command developed in Schaffer (2010)). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	BTF Size			
	1st Stage	2nd Stage	1st Stage	2nd Stage
Independent Variables	(1)	(2)	(3)	(4)
Target Firm Characteristics				
Tgt Know Cap Stock*		5.073**		3.670**
		(2.141)		(1.643)
Tgt SIC2 Industry R&D Worker Ratio	1.419***		1.297***	
	(0.383)		(0.393)	
Tgt Trade Secrecy Mention Count in 10-K			0.020**	
			(0.009)	
Tgt Org Cap Stock	0.059*	−0.037	0.067*	0.102
	(0.035)	(0.312)	(0.036)	(0.282)
Tgt Total Intangibles Ratio [OA–22]	−0.059	1.775*	−0.071	1.744**
	(0.114)	(0.918)	(0.114)	(0.870)
Intercept	−1.315***	5.221	−1.259***	4.041
	(0.454)	(4.069)	(0.455)	(3.631)
Other Target Firm Characteristics	Yes	Yes	Yes	Yes
Deal Characteristics	Yes	Yes	Yes	Yes
Acquiring Firm Characteristics	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes
Observations	753	753	735	735
Adjusted R^2	0.407	0.102	0.423	0.032
1st Stage F^{eff}-statistic (MOP)	13.701		10.329	
{p-value}	{0.000}		{0.000}	
[Stock-Yogo weak ID F-test 15% critical value]	[8.960]		[11.590]	
χ^2-statistic (Sanderson-Windmeijer (2016))	16.830		25.560	
{p-value}	{0.000}		{0.000}	
J-statistic (Sargan-Hansen) {p-value}				0.780
				{0.377}
Model p-value	0.000	0.000	0.000	0.000

(column (2)), the coefficient on the predicted value, *Tgt Know Cap Stock**, is positive and statistically significant at the 5% level, and even larger than the marginal effect obtained in the baseline regression in column (3) in Table 2[44]. This finding is consistent with the study of Pancost and Schaller (2019), who find that the 2SLS coefficient is in fact larger than the OLS coefficient in 86% of their surveyed cases, even if theory suggests that the OLS coefficient should be inflated relative to the 2SLS coefficient. Their study also shows that the 2SLS approach resolves a substantial amount of attenuation bias resulting from classical errors-in-variables. My inference remains unchanged if I replace the instrument with its lagged values.

I receive qualitatively and quantitatively similar results in the regression setup with both instruments as presented in columns (3) and (4). Both IVs are strongly correlated with the predicted value in the first stage, although exhibit a somewhat weaker effective F-statistic of 10.329. Also, the Sargan-Hansen (Sargan (1958)) over-identification test (see, e.g., Hayashi (2000)) is unable to reject the null hypothesis that the instruments satisfy the exclusion restriction (J-statistic is 0.780 with a p-value of 0.377). Since the Stock and Yogo (2005) weak identification F-test 15% critical value is slightly larger with a value of 11.590 and thus slightly "worse" – though also reliable – compared to the single IV approach, I focus on the results of columns (1) and (2) for causal interpretation. Thus, after exploiting this exogenous source of economically meaningful and directly related R&D-intensity variation, I conclude that my findings are robust to this method of endogeneity correction. The baseline effect likely underestimates the true relation between target's intellectual property value and the size of the negotiated bidder termination fee.

3.4.4 Baseline Regression Results: Short-Term Target Firm Value Effects around Deal Resolution

To logically complete my story of the BTF compensating the target for revealing private information and important business and technology secrets during negotiations, I also need to consider what is happening if acquirers really terminate deals. Although the prospective deal, once officially announced, receives public attention and market participants price in and

[44] Second stage's standard errors are adjusted accordingly, applying STATA™'s *xtivreg2* command.

regularly update their beliefs about the probability of deal completion, acquirer-induced deal failure may be a surprise for target shareholders. This makes an event study approach feasible, since it is then exogenous to target's stock price movement. As put forward in Section 3.2, I expect it to be beneficial for the target if the acquirer abandons the deal and pays a bidder termination fee, in contrast to the benchmark case in which the deal is terminated and no BTF is paid. Following hypothesis 2, this relation should increase in the size of the BTF (i.e., the received payment scaled by target's size). Table 4 presents the results of an event study at deal resolution.

Acq Induced Cancellation is a dummy variable that equals 1 if the acquirer induced the cancellation of the deal, and 0 otherwise. Specification (1) regresses target's cumulative abnormal deal resolution returns on *BTF Dummy* and *Acq Induced Cancellation* alone, which does not indicate a significant relation. In regression (2), however, the coefficient on the included interaction term *Acq Induced Cancellation* × *BTF Dummy* is positive and statistically highly significant at the 1% level.

The results hold if I repeat these two regressions with the continuous variable *BTF Size* instead of its dummy variable (regressions (3) and (4)). Consistent with hypothesis 2, the coefficient on *Acq Induced Cancellation* × *BTF Size* is positive and statistically significant at the 5% level. This supports the view that deal termination by the acquirer and the associated payment of the bidder termination fee is beneficial for the target, and that this relation increases in the size of the BTF, as compared to the case if the deal is terminated and no BTF is agreed on in the merger contract.

By including the dummy variable *Third Party Competing Bid Cancellation*, I additionally control for deal termination by third parties. This usually happens if a topping bid from another bidder emerges. Since target boards have to consider any bid until successful (target) shareholder approval, competing bids, if they arise, are often higher. The positive and statistically significant coefficient across all specifications is in line with this reasoning. The same holds for *Deal Completion*, where I find the relation to target's cumulative abnormal deal resolution returns also to be positive. I include acquirer and target characteristics according to the target cumulative abnormal deal resolution return regressions in Malmendier et al. (2016).

Table 4
Short-Term Target Firm Value Effects around Deal Resolution

Table 4 presents the results of linear fixed effects regressions of target firm's cumulative abnormal deal resolution returns on two variables of interest, first, the interaction term *Acq Induced Cancellation* × *BTF Dummy* (regression (2)), and second, the interaction term *Acq Induced Cancellation* × *BTF Size* (regression (4)). *Acq Induced Cancellation* is a dummy variable that equals 1 if the acquirer induced the cancellation of the deal, and 0 otherwise, *BTF Dummy* is a dummy variable that equals 1 if the merger agreement includes a bidder termination fee provision, and 0 otherwise, and *BTF Size* is USD (mm) amount of the bidder termination fee divided by the market capitalization (also in USD mm) of the target firm 42 trading days prior to offer announcement and expressed in percentage points. *C4 CAR* denote Carhart's (1997) four-factor model to model normal returns (cumulative abnormal returns). *Third Party Competing Bid Cancellation* is a dummy variable that equals 1 if the deal was cancelled due to a third party bid for the target that led to the cancellation of the original bid, and 0 otherwise. *Deal Completion* is a dummy variable that equals 1 if the deal was closed successfully, and 0 if cancelled. *Acq Hadlock-Pierce-Index* is a measure for acquiring firm's financial constraints, proposed by Hadlock and Pierce (2010). I further include *Deal Characteristics* as well as market-to-book ratios and stock return volatility measures for both the target and the acquirer (as outlined in Section 3.3). All regressions include *Target Industry* × *Deal Resolution Year Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Tgt C4 CAR			
Event Window	[–3;+3]			
Independent Variables	(1)	(2)	(3)	(4)
BTF Dummy	1.405	1.193		
	(0.859)	(0.870)		
Acq Induced Cancellation × BTF Dummy		15.632***		
		(5.517)		
Acq Induced Cancellation	1.729	−9.284	1.789	−5.485
	(4.845)	(5.907)	(4.902)	(5.907)
Acq Induced Cancellation × BTF Size				1.832**
				(0.922)
BTF Size			0.125	0.100
			(0.116)	(0.114)
Third Party Competing Bid Cancellation	9.454**	9.397**	9.482**	9.583**
	(4.685)	(4.638)	(4.647)	(4.582)
Deal Completion	10.210***	10.115***	10.255***	10.211***
	(3.478)	(3.498)	(3.527)	(3.536)
Acq Hadlock-Pierce-Index	0.104	0.287	0.056	0.191
	(0.572)	(0.576)	(0.611)	(0.617)
Other Deal Characteristics	Yes	Yes	Yes	Yes
Acq & Tgt: MTB & Stock Return Volatility	Yes	Yes	Yes	Yes
Tgt Industry × Deal Resolution Year FE	Yes	Yes	Yes	Yes
Observations	497	497	497	497
Adjusted R^2	0.113	0.139	0.109	0.126

3.4.5 Interaction between Intellectual Property Protection and Firm Pair Characteristics

Technological Proximity between Acquirer and Target

Building on the theoretical reasoning developed for hypothesis 3a, the relation between target firm's knowledge capital stock value and BTF size should increase in the degree of technological proximity between the acquirer and the target. The more close the merger pair's knowledge base is, the more likely they are competing not only in product market space, but they also more likely compete among applying and developing technological advances to enhance innovation. I furthermore claim that the knowledge capital of the target firm can be better ascertained by an acquirer that innovates in a similar technology space.

To quantify the degree of technological proximity between merging firms, I propose the spillover-adjusted Mahalanobis extension of the Jaffe (1986) technological similarity measure, developed in Bloom, Schankerman, and Van Reenen (2013), which has certain advantages over the generic measure. Jaffe's (1986) measure, in the context of merging firms, is defined as the following positive correlation coefficient, bound between 0 and 1[45]:

$$Tech\ Prox_{Acq,Tgt} = \frac{T_{Acq}T'_{Tgt}}{\sqrt{T_{Acq}T'_{Acq}}\sqrt{T_{Tgt}T'_{Tgt}}}$$

Most important, the Bloom et al. (2013) measure allows for spillovers between different technology classes[46], which are defined by the United States Patent and Trademark Office (USPTO) to classify patents. To measure spillovers, they argue that if two technologies are often located together in the same firm (e.g., "computer input/output" and "computer processing"), spillovers will be greater, because the distance between the technologies is smaller. They proxy for this Mahalanobis distance by the share of times the two technology classes are

[45] First, all of the firm's patents between 1970 and 2006 are allocated into the different 426 USPTO technology classes, defining the scope-of-innovation-activity-vector $T_i = (T_{i1}, T_{i2}, T_{i3}, ..., T_{i426})$ for firm i where $T_{i\tau}$ is the share of firm i's patents in technology class τ, i.e., $T_{i\tau}$ is the ratio of the number of awarded patents to firm i in technology class τ to the total number of awarded patents in all technology classes over the whole period since 1970. The results are robust to using the unadjusted measure instead.

[46] This is ruled out by the Jaffe (1986) measure, which assumes technological spillovers only within the same class and no spillovers to and from other classes.

patented within the same firm[47]. In order to make an economically meaningful statement, I calculate their adjusted measure for all acquirer-target firm pairs in my sample by using their algorithm[48], split the sample at the median value for Technological Proximity (*Tech Prox*), generate a dummy that equals 1 if *Tech Prox* is above the sample median, 0 otherwise, and interact this dummy (*Tech Prox Median*) with my variable of interest, *Tgt Know Cap Stock*. Table 5 presents the regression results.

Table 5
Interaction between Intellectual Property Protection and Technological Proximity

This table shows the results of linear fixed effects regressions of *BTF Size* on the variable of interest, the interaction term *Tgt Know Cap Stock* × *Tech Prox Median*. *Tech Prox Median* is a dummy variable that equals 1 if the values for *Technological Proximity* are above the sample median, and 0 otherwise. *Technological Proximity* is defined as the spillover-adjusted correlation coefficient of patenting across United States Patent and Trademark Office (USPTO) technology classes between pairs of firms (i.e., acquirer-target pairs in the sample, see Table A1 (Panel B) in the Appendix for a detailed definition). Regression (2) is the same as regression (1), except that I include *Tech Prox Missing (zero)*, a dummy variable that equals 1 if the acquirer-target pair's value for *Technological Proximity* is zero or if either the acquirer and/or the target firm hasn't been granted a patent from the USPTO since 1970. Data on *Technological Proximity* are obtained from Nicholas Bloom's website (see Lucking, Bloom, and Van Reenen (2018), and Bloom et al. (2013)). As a robustness test, I restrict the sample in regression (3) to observations in which the value for *Technological Proximity* is strictly larger than zero (in Table A4 in the Appendix I additionally fit a Heckman (1979) selection model). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	BTF Size		
	Full Sample		Tech Prox > 0
Independent Variables	(1)	(2)	(3)
Tech Prox Missing (zero)		0.029	
		(0.625)	
Tech Prox Median	−0.650	−0.635	0.242
	(0.569)	(0.587)	(0.351)
Tgt Know Cap Stock × Tech Prox Median	1.545***	1.544***	0.955*
	(0.444)	(0.441)	(0.548)
Tgt Know Cap Stock	0.855***	0.856***	0.715*
	(0.304)	(0.308)	(0.388)

[47] The result is an adjusted technology closeness measure that weights the overlap in patent shares between firms by how close their different patent shares are to each other. "The same patent class in different firms is given a weight of 1, and different patent classes in different firms are given a weight between 0 and 1, depending on how frequently they overlap within firms […].", see the detailed description in their updated paper (Lucking, Bloom, and Van Reenen (2018)).

[48] Provided on Nicholas Bloom's website: https://nbloom.people.stanford.edu/research.

Tgt Org Cap Stock	0.046 (0.261)	0.046 (0.261)	−0.378 (0.612)
Controls	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes
Observations	769	769	233
Adjusted R^2	0.108	0.107	0.384

(Table 5 continued)

As suggested by hypothesis 3a, the coefficients on *Tgt Know Cap Stock* and the interaction term, *Tgt Know Cap Stock* × *Tech Prox Median*, are both positive and statistically highly significant at the 1% level (specification (1)). The results are qualitatively and quantitatively unchanged if I additionally control for acquirer-target firm pairs having a *Tech Prox* correlation coefficient of zero (column (2)), which is the case if one or both firms haven't been granted a patent since 1970. Regression specification (3) shows the results for *Tech Prox* values strictly larger than zero, i.e., only for patenting firms, where I find the inference to also remain unchanged[49]. These results strongly support hypothesis 3a.

Product Market Rivalry between Acquirer and Target

Hypothesis 3b posits that, all else equal, the baseline relation should increase in the degree of competition between the merging firms. The reason is that a directly competing acquirer could gain the most from exploiting target's private information and innovation by successfully capitalizing them and increasing his market share by simultaneously weakening the target as a competitor. On the other hand, if the merging firm pair has no common relation in product market space, incentives to exploit information should be smaller.

Quantifying a comparable degree of product market rivalry at the detailed firm-firm-level is difficult. Well-known industry classifications such as the SIC or NAICS definitions fail to provide firm-firm-specific measures, are somewhat rigid since they are slow to update over time, and are based on production processes and not necessarily the products and services

[49] Although at a somewhat weaker statistical significance level, since the number of observations drop from 769 to 233. Table A4 in the Appendix provides additional support for the results after controlling for sample selection with respect to successfully patenting firm pairs, applying a Heckman (1979) correction model.

finally offered by the firm (Frésard et al. (2020)). To overcome these pitfalls of old classifications, I apply the textual product market similarity score based on firms' 10-K filings, developed by Hoberg and Phillips (2010, 2016), to measure the degree of firm-firm-year-specific competition. Their Text-based Network Industry Classifications (TNIC) are generated by parsing the product descriptions from the firms' 10-Ks and forming word vectors for each firm to compute continuous measures of product similarity for every pair of firms in the CRSP/Compustat universe in each year (a pairwise similarity matrix). This correlation coefficient has the advantage of quickly reacting to changes in product descriptions[50]. The higher their score, the closer the two firms are product market rivals. I match their firm-firm-year-level pairwise similarity score with the merging acquirer-target firm pairs in the sample and define tercile dummies based on their values which are then interacted with *Tgt Know Cap Stock*. TNIC1, TNIC2, and TNIC3 represent calibrations similar to different industry definition granularities: TNIC1 is the complete version and most detailed of the standard TNIC network developed by Hoberg and Phillips (2010, 2016) with all firm pairs included (even those that are very weakly related). TNIC2 matches the granularity of SIC2-level industries, and TNIC3 the granularity of SIC3-level industries. Table 6 depicts the results of regressions including these similarity measures.

As claimed by hypothesis 3b, the coefficient on the interaction term *Tgt Know Cap Stock* × *Top Tercile PMS* $_{TNIC1}$ is positive and highly statistically significant at the 1% level for the baseline *BTF size* regression (specifications (4)–(6), depending on the granularity of industry definitions). Columns (1)–(3) show the results for the fixed effects logit regressions of *BTF Dummy*, an indicator variable that equals 1 if a BTF is negotiated between the merging parties, and 0 otherwise, where the coefficient is also significant at the 5% level. The results from both regression types suggest that the relation between target firm's knowledge capital stock value and the size of the bidder termination fee is increasing in the firm pair's degree of product market rivalry, independent of the ex-ante determined industry granularities, and thus

[50] Hoberg and Phillips state on their data website: "These product descriptions are legally required to be accurate, as Item 101 of Regulation S-K legally requires that firms describe the significant products they offer to the market, and these descriptions must also be updated and representative of the current fiscal year of the 10-K." This is to make sure that the descriptions are reliable. Misuse can be enforced by the SEC, hence firms have a strong ex-ante incentive to report truthfully.

strongly support hypothesis 3b. Taken together, the results indicate that new innovation – generated through R&D – can be most valuable for firms with a similar technology base and firms that are direct competitors.

Table 6

Interaction between Intellectual Property Protection and Product Market Rivalry

Table 6 presents the results of linear fixed effects regressions of *BTF Size* on a set of variables of interest, the interaction terms between *Tgt Know Cap Stock* and different quantiles of *Product Market Similarity (PMS)*. *Top Tercile PMS* is a dummy variable that equals 1 if the value of *Product Market Similarity (PMS)* is in the top (highest) tercile of its distribution, and 0 otherwise. *Product Market Similarity (PMS)* is a yearly firm-by-firm pairwise product market similarity score (real number in the interval [0,1]) calculated for each firm-firm-fiscal-year combination by parsing the product descriptions from the firms' annual 10-Ks and forming word vectors for each firm to compute continuous measures of product similarity for every pair of firms in the sample in each year (a pairwise similarity matrix). A higher score relates to a higher word similarity (i.e., the text of the two firms' business descriptions has more common vocabulary than a pair of firms with a lower score), used as a proxy for product similarity and thus product-market rivalry, i.e., firm pairs with a higher score are "nearer" rivals. The index (TNIC1, TNIC2, and TNIC3) refer to the granularity between the two firms with TNIC1 being of highest (most detailed) granularity which explains the decrease in observations from regression (1) to regression (3), and (4) to (6), respectively (see Table A1 (Panel B) in the Appendix for a detailed definition). All Text-based Network Industry Classifications (TNIC) data are obtained from the Hoberg-Phillips Data Library (Hoberg and Phillips (2010, 2016)). All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	BTF Dummy			BTF Size		
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Top Tercile PMS $_{TNIC1}$	−0.205			−0.194		
	(0.311)			(0.398)		
Med Tercile PMS $_{TNIC1}$	−0.080			−0.120		
	(0.301)			(0.376)		
Tgt Know Cap Stock × Top Tercile PMS $_{TNIC1}$	2.985**			2.220***		
	(1.485)			(0.561)		
Tgt Know Cap Stock × Med Tercile PMS $_{TNIC1}$	−0.823			−0.274		
	(1.224)			(0.516)		
Top Tercile PMS $_{TNIC2}$		−0.585			−0.750*	
		(0.360)			(0.423)	
Med Tercile PMS $_{TNIC2}$		−0.378			−0.571	
		(0.372)			(0.380)	
Tgt Know Cap Stock × Top Tercile PMS $_{TNIC2}$		3.055**			2.359***	
		(1.466)			(0.623)	
Tgt Know Cap Stock × Med Tercile PMS $_{TNIC2}$		1.176			0.008	
		(1.566)			(0.569)	
Top Tercile PMS $_{TNIC3}$			−0.345			−0.490
			(0.367)			(0.466)
Med Tercile PMS $_{TNIC3}$			−0.535			−0.521
			(0.409)			(0.491)
Tgt Know Cap Stock × Top Tercile PMS $_{TNIC3}$			3.511*			1.772*
			(1.851)			(1.038)

Tgt Know Cap Stock × Med Tercile PMS $_{TNIC3}$			3.463			−0.078
			(2.209)			(0.957)
Tgt Know Cap Stock	−0.010	−0.595	−1.230	0.271	0.092	0.525
	(1.127)	(1.089)	(1.684)	(0.505)	(0.613)	(0.924)
Tgt Org Cap Stock	0.070	0.115	0.142	−0.141	−0.040	0.080
	(0.204)	(0.211)	(0.232)	(0.208)	(0.239)	(0.312)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	694	603	525	694	603	525
Pseudo R^2	0.339	0.422	0.415			
Adjusted R^2				0.115	0.195	0.203

(Table 6 continued)

3.5 Robustness Tests

The following results aim to underpin the story developed in this chapter by first discussing subsample regressions where I find the effect between target's intellectual property value and BTF size to be more pronounced. Second, I provide evidence that my regression results are robust to different scaling, i.e., by relating the dollar values of both BTF and target's knowledge capital stock to different reference values, emphasizing the economic magnitude of the relation. Third, I show that target firm's knowledge capital stock is a reliable and highly significant determinant of both its patenting activity as well as the likelihood to mention trade secrets in its 10-K report. Including these innovation outcome variables directly in the main regression would raise a bad control concern (Angrist and Pischke (2008)). Lastly, I show that my results are robust to including proxies controlling for the degree of information diffusion from the target to the acquirer.

3.5.1 Subsample Tests

Table 7 presents a set of subsample regressions that highlight where the effect is stronger or weaker, if not existent at all. First, in regressions (1) and (2), the sample is split by the median value of *Tgt 5YR Avrg Yearly Know Cap Growth*. This growth rate is defined as the average annualized growth rate of *Tgt Know Cap Stock* within the target firm calculated over the last five fiscal years prior to offer announcement. I hypothesize that the effect between

Tgt Know Cap Stock and *BTF size* should be more pronounced, if the target belongs to the pioneers in its technology sector, as proxied by above average investment increases in R&D. At the beginning of a technology wave, innovation is likely not yet protected by patents, and firms should have the highest incentive to increase their R&D investments, since there might only exist – if at all – a limited number of competitors. In turn, the target's private intellectual property then has the highest value for the acquirer in securing significant market shares. As hypothesized, the coefficient is positive and highly statistically significant only in the high growth rate regression (rate above sample median, (1)), and also positive, yet insignificant, in specification (2). This suggests that the relation remains positive during the saturation phase of the innovation wave, though less strong, since the marginal value of innovation effort to add new technology features typically decreases over time, consistent with Frésard et al. (2020).

Next, I expect the effect to be more pronounced for targets that rely very heavily on R&D in general. To gauge this dependency, I define *Tgt Know Cap Intensity* as the percentage share of *Tgt Know Cap Stock* on both intangible capital stocks (knowledge and organizational capital). Regression (3) and (4) depict the results, showing that the effect is positive and highly significant only for firms in the top quartile of the distribution of *Tgt Know Cap Intensity* (3).

Tgt Unique Product Industry is a dummy variable that equals 1 (Yes) if the target firm's industry is in the top quartile of all Fama-French 49 industries annually sorted by industry-median product uniqueness, 0 (No) otherwise, where product uniqueness is defined as all selling expenses scaled by sales[51]. According to Titman and Wessels (1988), firms that sell products with close substitutes are hypothesized to do less R&D since their innovations can be more easily duplicated. In addition, successful R&D projects are hypothesized to lead to new products that differ from those existing in the market. Consistent with this reasoning, the coefficient on *Tgt Know Cap Stock* is positive and statistically highly significant only in regression (5), i.e., for targets assigned to industries selling unique products.

Furthermore, if targets operate in industries where innovation may be one of the most important driving force, the main association claimed in this chapter should also be strongest. I define *Tgt FF5 HTHC Industry* as a dummy variable that equals 1 if the target is assigned to

[51] Calculated following Titman and Wessels (1988) and Masulis, Wang, and Xie (2007).

Table 7
Robustness – Subsample Tests

The following table depicts the results of linear fixed effects regressions of *BTF Size* on *Tgt Know Cap Stock* and all control variables used in the baseline regression in Table 2, column (3), except that the full sample is split by various measures. In regressions (1) and (2), the sample is split by the median value of *Tgt 5YR Avrg Yearly Know Cap Growth*, which is the average annualized growth rate of *Tgt Know Cap Stock* within the target firm calculated over the last five fiscal years prior to offer announcement (given that I require the target firm to have at least full five years of valid R&D data prior to offer announcement, the sample is restricted to 324 observations). Regressions (3) and (4) are split by *Tgt Know Cap Intensity*, which is defined as *Tgt Know Cap Stock* divided by the sum of *Tgt Know Cap Stock* and *Tgt Org Cap Stock*. Regression (3) shows the results for the top quartile, regression (4) shows the results for the other remaining observations. *Tgt Unique Product Industry* (regressions (5) and (6)) is a dummy that equals 1 (Yes) if the target firm's industry is in the top quartile of all Fama-French 49 industries annually sorted by industry-median product uniqueness, 0 (No) otherwise, where product uniqueness is defined as all selling expenses scaled by sales. Regressions (7) and (8) are divided by *Tgt FF5 HTHC Industry*, a dummy variable that equals 1 if the target is assigned to the Fama-French 5 industry classification in either hightech (HT) or healthcare (HC), and 0 otherwise. In regressions (9) and (10), the sample is split by *Tgt Trade Secrecy Mention Count in 10-K*, which is the number of mentions of either "trade secret", "trade secrets" and/or "trade secrecy" in target firm's most recent 10-K report filed with the SEC prior to offer announcement. The reason I chose to split the sample by values strictly larger than (smaller or equal to) 1 is that in some cases the above mentioned words appear only in (standard) headlines in 10-K filings with no further explanantion if trade secrets really exist. All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	BTF Size									
	Tgt 5YR Avrg Yearly Know Cap Growth		Tgt Know Cap Intensity		Tgt Unique Product Industry		Tgt FF5 HTHC Industry		Tgt Trade Secrecy Mention Count in 10-K	
	High	Low	High	Low	Yes	No	Yes	No	> 1	≤ 1
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Target Firm Characteristics										
Tgt Know Cap Stock	1.040***	1.363	1.227***	−0.274	1.201***	−1.115	1.341***	−1.264	1.168***	1.113
	(0.105)	(0.911)	(0.212)	(1.573)	(0.233)	(1.952)	(0.294)	(2.818)	(0.428)	(2.287)
Tgt Org Cap Stock	−0.688	−0.158	1.058*	0.080	0.155	0.208	0.211	0.521	−0.782*	0.990*
	(0.659)	(0.317)	(0.547)	(0.401)	(0.200)	(0.728)	(0.333)	(0.568)	(0.458)	(0.513)
Tgt Total Intangibles Ratio [OA–22]	0.176	0.802	1.127	2.547**	1.607	0.879	1.731	1.923	2.574**	1.870
	(1.448)	(2.275)	(2.479)	(1.090)	(1.026)	(1.844)	(1.118)	(2.124)	(1.204)	(1.207)

Tgt Tangibility [OA–22]	2.793	7.638	4.560	−0.089	0.586	−0.485	5.674**	−0.555	2.040	−0.228
	(3.371)	(5.811)	(4.406)	(1.371)	(2.036)	(1.809)	(2.167)	(1.992)	(2.888)	(1.566)
Tgt Market-to-Book [OA–22]	−0.056	0.091	−0.074***	0.035	0.025	−0.011	0.021	−0.038	−0.021	0.059
	(0.042)	(0.074)	(0.028)	(0.065)	(0.040)	(0.101)	(0.042)	(0.083)	(0.046)	(0.078)
Deal Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acquiring Firm Characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	162	162	195	574	451	318	286	483	273	478
Adjusted R^2	0.301	0.117	0.381	0.078	0.126	0.093	0.206	0.084	0.184	0.109

(Table 7 continued)

the Fama-French 5 industry classification in either hightech (HT) or healthcare (HC), and 0 (No) otherwise. I hypothesize that the coefficient is positive and highly significant in these industries, which is supported, as shown in columns (7) and (8).

Lastly, since it is inherently difficult to quantify the secret value of a single trade secret, there exists at least a possibility to gauge the degree to which firms are relying on them. Following Glaeser (2018), I define *Tgt Trade Secrecy Mention Count in 10-K* as the number of mentions of either "trade secret", "trade secrets" and/or "trade secrecy" in target firm's most recent 10-K report filed with the SEC prior to offer announcement. Firms that use these words frequently are hypothesized to heavily rely on them, and often mention trade secrets in the context of discussing measures they take to protect them. Follwing that notion, I expect the effect to be stronger for firms that mention it more than once in their 10-Ks, since further investigation of these filings revealed that in some cases the word "trade secret" or a wildcard is used in headlines only. The last columns in Table 7, (9) and (10), clearly underpin this reasoning. The coefficient is positive and statistically highly significant only if the word group is used more than once (specification (9)), but also positive, yet insignificant in regression (10).

3.5.2 Different Scaling and Economic Magnitude

As a robustness, I scale all deal-level and intangible capital stock variables with *Deal Value* instead of target's market capitalization. For brevity, the table is deferred to the Appendix (Table A5). The number of observations slightly decreases due to the availability of valid data for acquirer's financial constraints indices. I do this to show that the inferences I draw in this chapter are robust to different scaling methods[52]. The regressions deviate from each other only in the variables included to control for acquirer's financial constraints. Marginal effects are comparable to the baseline specifications in Table 2.

Table 8 regresses the pure dollar value of the BTF on capital stock measures and other deal-level variables in various specifications with and without deal advisor fees, with and without deal-level dummy variables, and a distinction of target's other total intangibles (regression

[52] In untabulated regressions, I additionally scale all capital stocks and termination fees by all off- and on-balance sheet assets, i.e., by the sum of knowledge, organizational, and total assets.

(4))[53]. The intuition behind this table is to receive a real dollar value for the economic magnitude of the claimed relation between target's knowledge capital stock value and *BTF size*. The full specification (column (4)) suggests that, on average, for every dollar worth of target firm's R&D capital stock, 16.3 cents of protective share is priced in the BTF, controlling for all other factors affecting *BTF size* in this chapter. This final result emphasizes the economic relevance of bidder termination fees as incentive-compatible contract clauses in M&A negotiations.

Table 8
Robustness – Unscaled U.S. Dollar Values

Table 8 shows the results of linear fixed effects regressions of *BTF Size* $_{Dollar\ Value}$ on *Tgt Know Cap Stock* $_{Dollar\ Value}$ and all control variables used in the baseline regression in Table 2, column (3). The only difference is, that in this table, all key variables (*BTF Size*, *Tgt Know Cap Stock*, *Tgt Org Cap Stock*, *TTF Size*, *Acq All Financial Advisor Fees*, and *Tgt All Financial Advisor Fees*) are not scaled, i.e., are "pure" U.S. dollar values. Regressions (1)–(3) vary by the inclusion of Financial Advisor Fees, in regression (3), I split target firm's total intangibles into the two main components: goodwill and identifiable intangibles. Regression (4) adds all other controls as a robustness check. All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	BTF Size $_{Dollar\ Value}$			
Independent Variables	(1)	(2)	(3)	(4)
Target Firm Characteristics				
Tgt Know Cap Stock $_{Dollar\ Value}$	0.155***	0.150***	0.170***	0.163***
	(0.043)	(0.050)	(0.045)	(0.042)
Tgt Org Cap Stock $_{Dollar\ Value}$	−0.007	0.000	−0.011	−0.008
	(0.027)	(0.031)	(0.030)	(0.027)
Tgt Total Intangibles $_{[OA-22]}$	0.005	0.002		
	(0.014)	(0.017)		
Tgt Goodwill $_{[OA-22]}$			0.018	0.015
			(0.016)	(0.014)
Tgt Identifiable Intangibles $_{[OA-22]}$			−0.011	−0.013
			(0.038)	(0.035)
Tgt Net PPE $_{[OA-22]}$	−0.002	−0.002	−0.008	−0.009
	(0.010)	(0.012)	(0.008)	(0.008)
Tgt Market-to-Book $_{[OA-22]}$				−4.346
				(3.617)
Deal Characteristics				
Tgt Initiation				−31.234**
				(14.351)
Auction				6.677
				(11.392)
TTF $_{Dollar\ Value}$	0.633*	0.638	1.072*	1.062*
	(0.373)	(0.401)	(0.570)	(0.539)
Deal Value	−1.025	−0.918	−16.951	−16.110
	(7.958)	(8.894)	(13.904)	(12.912)

[53] Observations drop from 769 to 729 given that some firms do not differentiate between goodwill and other identifiable intangible assets, and only report total intangibles instead.

Friendly				−19.836
				(54.088)
Cash Only				2.035
				(11.223)
Tender Offer				−5.610
				(11.997)
Horizontal Takeover				3.879
				(13.490)
Relative Size Market Cap [OA–22]				0.055*
				(0.029)
Post Closing Highly Conc Industry				30.632
				(28.404)
Acq All Financial Advisor Fees Dollar Value	5.658***		4.711***	4.568***
	(2.077)		(1.736)	(1.644)
Tgt All Financial Advisor Fees Dollar Value	−3.972**		−3.040**	−2.405
	(1.647)		(1.483)	(1.504)
Acquiring Firm Characteristics				
Acq Market Cap [OA–22]	−0.535**	−0.636**	−0.468*	−0.426
	(0.250)	(0.276)	(0.250)	(0.315)
ln Acq 1YR Stock Return Volatility [OA–1]				27.056
				(23.919)
Acq Market Leverage [OA–22]				−5.280
				(43.827)
Acq Dividend Payer				−13.747
				(9.244)
Acq Market-to-Book [OA–22]				−1.813
				(1.544)
Acq Industry × Year FE	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes
Observations	769	769	729	729
Adjusted R^2	0.557	0.532	0.570	0.583

(Table 8 continued)

3.5.3 Relation between Knowledge Capital Stock and Patenting Activity

As developed in Ewens et al. (2020), intangible stocks are important production factors for intellectual capital in the form of patents. To show that my results are consistent with theirs, I also regress Kogan's et al. (2017) patent valuation measures obtained from market reactions to patent grants on *Tgt Know Cap Stock*, *Tgt Org Cap Stock*, and controls for already acquired intangibles and firm size. The results are shown in Table 9, suggesting that only *Tgt Know Cap Stock* is a significant driver of patent production in all specifications. All variables are scaled by total assets, given that firm size is a significant factor affecting the number and value of patents. All x-variables are lagged one year and logged. The inclusion of knowledge stocks significantly increases the within-R^2 (up to three to ten times), indicating that they explain a meaningful amount of variation in both patent valuation and patent count. As argued in Kogan et al. (2017), the distinction into market and scientific values is important,

Table 9

Robustness – Relation between Target Firm's Patents and Knowledge Capital Stock

This table presents the results of linear fixed effects regressions of measures of target firm's patents on target firm's knowledge capital stock. The dependent variable in regressions (1)–(3) is *ln Target Patent Value (market-weighted)*, the natural logarithm of target firm's market-weighted patent value, the dependent variable in regressions (4)–(6) is *ln Target Patent Value (citation-weighted)*, the natural logarithm of target firm's citation-weighted patent value, both obtained from Kogan et al. (2017) and their data website. *ln Target Patent Count (recently granted)* is the number of patents recently (i.e., in the whole fiscal year prior to offer announcement) granted to the target firm, and *ln Target Patent Count (total stock)* is the total number of patents the target firm are granted until the fiscal year end prior to offer announcement, i.e., yearly counts of target firm's granted United States Patent and Trademark Office (USPTO) patents. Patents must not be expired in order to be included in *ln Target Patent Count (total stock)*. The data on total stocks are obtained from the University of Virginia (UVA) Darden Global Corporate Patent Dataset (https://patents.darden.virginia.edu/get-data (permanent link)). All variables are scaled by target firm's total assets and logged, all explanatory variables are also lagged one year. All regressions include *Target Industry* × *Year Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

	Target Patent Value						Target Patent Count					
Dependent Variable	ln Target Patent Value (market-weighted)			ln Target Patent Value (citation-weighted)			ln Target Patent Count (recently granted)			ln Target Patent Count (total stock)		
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Lag ln Tgt Know Cap Stock		0.134***	0.122**		0.227***	0.174**		0.142***	0.122***		0.172***	0.163***
		(0.039)	(0.051)		(0.081)	(0.072)		(0.035)	(0.026)		(0.033)	(0.032)
Lag ln Tgt Org Cap Stock			0.024			0.103			0.039			0.021
			(0.037)			(0.081)			(0.026)			(0.037)
Lag ln Tgt Total Intangibles	−0.038	0.026	0.025	−0.243*	−0.135	−0.141	−0.102**	−0.034	−0.036	−0.075**	−0.000	−0.001
	(0.061)	(0.064)	(0.064)	(0.134)	(0.151)	(0.147)	(0.035)	(0.035)	(0.032)	(0.031)	(0.024)	(0.023)
Lag ln Tgt Sales	−0.086*	−0.070	−0.085	−0.069	−0.040	−0.108**	−0.003	0.015	−0.011	−0.018	0.001	−0.010
	(0.045)	(0.042)	(0.054)	(0.052)	(0.053)	(0.052)	(0.021)	(0.019)	(0.018)	(0.018)	(0.016)	(0.015)
Tgt Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	158	158	158	158	158	158	158	158	158	246	246	246
Adjusted R^2	0.012	0.055	0.051	0.027	0.085	0.096	0.055	0.280	0.299	0.033	0.364	0.367
Within R^2	0.025	0.073	0.076	0.040	0.102	0.119	0.067	0.294	0.317	0.041	0.372	0.378

because a patent may represent only a small scientific advance, yet generate large profits and thus private returns to the firm through restricting competition. The obtained coefficients are similar to Ewens et al. (2020), with a 1% increase in target's knowledge capital stock resulting in a 0.122% increase in patent market value, on average[54]. Figure A2 in the Appendix plots the respective bivariate relations between targets' patent values, patent count, and knowledge capital stocks.

3.5.4 Relation between Knowledge Capital Stock and Mentioning Trade Secrets in 10-Ks

Based on the inferences drawn in the preceding subsection, it is also obvious to assume that there should exist a relation between knowledge capital value and the existence of trade secrets. Albeit one cannot directly observe and confirm the presence of trade secrets within a firm, one can at least infer that they likely exist if they are mentioned in official reports. Therefore, as outlined in the paragraph above, I parse the most recent 10-K report of the target firm prior to offer announcement by searching the word group "trade secret" or a respective wildcard. Firms that often mention trade secrets in their SEC reports are hypothesized to rely on them[55], and often describe and discuss safety mechanisms established in the firm to protect them. Table 10 shows the results for logit and linear fixed effects regressions of a dummy coded 1 if trade secrets are mentioned (specification (1)) as well as the number of mentions (continuous measure, specification (2)) on target's knowledge capital stock value, scaled by total assets for comparison. In both regressions, the coefficient is positive and statistically highly significant. In the logit model, I include x-standardized odds ratios [in angular parentheses] that relate to the change in the probability of including the word group "trade secre*" for a one-standard deviation increase in the independent variable. Thus, a one-standard deviation increase from the sample mean of *Tgt Know Cap Stock* $_{[TA]}$ increases the odds of mentioning trade secrets in the 10-K report by the factor of 25, on average. Also, firms that mention them seem to have low leverage and are younger firms, confirming the results of Glaeser (2018).

[54] The results hold if all variables are scaled by target firm's market capitalization instead of total assets. The number of observations drops to 158 and 246, respectively, given that the data from Kogan et al. (2017) cover firms until 2010 (regressions (1)–(9)) and firms that have valid data on patent total stocks obtained from the UVA Darden Global Corporate Patent Dataset (regressions (10)–(12)).

[55] Although mentioning them in 10-Ks do not make them legally enforceable (especially in lawsuits against misappropriation), it is obvious that they fulfill at least a highly indicative function.

Table 10

Robustness – Determinants of Disclosure-based Mentions of Target Firm's Trade Secrets

This table depicts the results of logit (1) and linear (2) fixed effects regressions of proxies of target firm's trade secrecy on target firm's knowledge capital stock and other controls. The dependent variable in specification (1) is the dummy variable *Tgt Trade Secrets Mentioned in 10-K* which equals 1 if the word group "trade secret" or a wildcard [*] are mentioned in target firm's most recent 10-K report filed with the SEC prior to offer announcement. In specification (2), the dependent variable, *Tgt Trade Secrecy Mention Count in 10-K*, is the exact count, i.e., how many times the word groups are mentioned. The first four independent variables with the index [TA] are scaled by target firm's total assets and are lagged one year. Target firm's stock return volatility, market-to-book, and market leverage are defined as for the acquiring firm and measured 42 trading days prior to the 10-K report date. All regressions include *Target Industry Fixed Effects* and *Year Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. Model (1) includes x-standardized odds ratios [in angular parentheses] that relate to the change in the probability of including the word group "trade secre*" for a one-standard deviation increase in the independent variable. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Tgt Trade Secrets Mentioned in 10-K	Tgt Trade Secrecy Mention Count in 10-K
Independent Variables	(1)	(2)
Tgt Know Cap Stock [TA]	14.244*** (3.828) [24.728]	2.182*** (0.489)
Tgt Org Cap Stock [TA]	−0.131 (0.388) [0.948]	−0.170 (0.294)
Tgt Total Intangibles [TA]	3.939*** (0.835) [2.130]	1.210** (0.578)
Tgt Sales [TA]	0.097 (0.238) [1.073]	−0.618*** (0.146)
ln Tgt 1YR Stock Return Volatility [10-K-Date–42]	0.632 (0.467) [1.384]	0.698** (0.274)
Tgt Market-to-Book [10-K-Date–42]	−0.016 (0.047) [0.954]	0.057* (0.032)
Tgt Market Leverage [10-K-Date–42]	−3.010** (1.282) [0.653]	−1.990*** (0.745)
Tgt Firm Age	−0.010** (0.004) [0.670]	−0.006*** (0.002)
Tgt Industry FE	Yes	Yes
Year FE	Yes	Yes
Observations	522	522
Pseudo R^2	0.579	
Adjusted R^2		0.395

Figure A3 in the Appendix additionally plots the predicted probabilities of mentioning trade secrets against *Tgt Know Cap Stock* $_{[TA]}$, visualizing the strong positive association (steeply increasing S-shape of the fitted function).

3.5.5 Degree of Information Diffusion from Target to Acquirer

Although it is not possible to directly assess the degree to which the negotiating firms "qualitatively" exchange information, i.e., how intense negotiations proceed, it is at least possible to proxy for the quantitative component. In an additional test in Table 11, I include deal length measures for both the private takeover process only (regressions (1)–(3)), as well as the whole takeover process, including the public phase (columns (4)–(6)). The start dates are manually parsed from the background sections of the merger agreements filed with the SEC. I define three different start dates for private negotiations between acquirer and target: first, *Kick-Off date* refers to the first date the target and an interested party (i.e., the deal announcing acquirer or a third party) get in contact with each other on deal related matters. This date marks the first date of the coherent private takeover process. Second, *First Board Meeting date* refers to the date when the first board meeting on deal related matters between the deal announcing acquirer and target management board takes place. Third, *Confidentiality Agreement date* refers to the date when the deal announcing acquirer signs a confidentiality (non-disclosure) agreement with the target firm.

As depicted in Table 11, only the deal lengths starting at the confidentiality agreement date are positively and highly statistically significantly related to *BTF size*, suggesting that these measures capture the period in which significant information flows between the parties, and especially from the target to the prospective acquirer. *Any Pre-Contact with Acq* is a dummy variable that equals 1 if the background section of the merger agreement mentions any contact between the final bidding acquirer and target prior to the start of the coherent private takeover process, and 0 otherwise, and is positive and statistically significant at the 5% level in all specifications. Given that one can hypothesize that this acquirer has collected more information about the target, all else equal, this is what one would expect. Including these deal-level controls do not change the inference over and significance of *Tgt Know Cap Stock*.

Table 11
Robustness – Measures of the Length of the Private Takeover Process

Table 11 presents the results of linear fixed effects regressions of *BTF Size* on *Tgt Know Cap Stock* and different measures of deal length (all measured in months). *Private Takeover Process Lengths Only* shows three different deal length measures with different start dates which are all measured until the announcement date (AD) of the deal. *Whole Takeover Process Lengths* depicts three different deal length measures with the same three different starting dates as described above, but are now all measured until the resolution date (RD) of the deal, i.e., the date where the deal was either successfully closed or withdrawn. The sample size is reduced from 769 to 398 observations in order to form a sample where I am able to collect all dates for respective deal length measures. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	BTF Size					
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Tgt Know Cap Stock	1.466***	1.466***	1.543***	1.428***	1.429***	1.483***
	(0.216)	(0.215)	(0.222)	(0.213)	(0.213)	(0.217)
Any Pre-Contact with Acq	1.033**	1.019**	0.934**	1.108**	1.090**	0.981**
	(0.439)	(0.429)	(0.434)	(0.441)	(0.434)	(0.436)
Private Takeover Process Lengths Only						
Kick-Off vs. AD	0.029					
	(0.089)					
First Board Meeting vs. AD		0.011				
		(0.080)				
Confidentiality Agreement vs. AD			0.162**			
			(0.066)			
Whole Takeover Process Lengths						
Kick-Off vs. RD				0.093*		
				(0.052)		
First Board Meeting vs. RD					0.080*	
					(0.048)	
Confidentiality Agreement vs. RD						0.144***
						(0.043)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	398	398	398	398	398	398
Adjusted R^2	0.202	0.202	0.222	0.211	0.209	0.232

Despite the fact that private targets are not obliged to file merger documents with the SEC, and many do not even disclose R&D expenditures – are hence not part of the sample in this chapter, I claim my results to also hold for private transactions, as the possibility to include termination fee provisions in M&A contracts does not depend on the associated firm's listing status.

3.6 Conclusion

This chapter establishes a robust link between target firms' intellectual property value and the size of negotiated bidder termination fees (BTFs) in M&A contracts, that provide targets with a compensation payment for revelation of secret information if acquirers abandon deals due to reasons under their control. Applying Ewens' et al. (2020) model to estimate the capitalized value of target firm's intangible stocks, my findings suggest that, on average, for every dollar of target firm's R&D capital stock, roughly 16 cents of protective share is incorporated in the BTF, controlling for a wide array of factors deemed to affect BTF size. This relation is economically significant.

By utilizing an instrumental variables approach that exploits non-deal-related exogenous variation, I am able to show that my results are robust to endogeneity concerns. The relation between target's R&D intensity and the size of the BTF is more pronounced, if the target invests heavily in R&D, is a pioneer in its technology space, produces unique products, belongs to the hightech or healthcare industry, and frequently uses the term "trade secret" or a wildcard in its 10-K report filed with the SEC prior to deal announcement. The effect is moreover increasing in the degree of technological proximity as well as product market rivalry between the acquirer-target firm pair, suggesting that new innovation, generated through R&D, can be most valuable for firms with a similar technology base and firms that are also direct competitors. An event study at deal resolution indicates that target returns are increasing in the size of the BTF if acquirers abandon deals and pay the fee, underlining the compensating character of bidder termination fees.

Taken together, this chapter suggests that BTFs serve as a contract mechanism that provide target firms compensation for revelation of sensitive information in M&A negotiations if acquirers terminate deals. These fees thereby increase targets' incentives to reveal these information and increase acquirers' incentives to close the deal.

Valuing intangible assets, especially in the form of private trade secrets, remains a inherently difficult phenomenon to study empirically. This chapter hightlights the increasing importance of intellectual property in M&A negotiations, not only for practitioners, but also for future finance research.

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3.8 Appendix

Appendix – Table A1
Variable Definitions

Table A1 presents the definitions of all variables used throughout this chapter, including the source.

Variable	Definition
	Panel A: Termination Fees and Target Intangible Capital Stocks
BTF Dummy	Dummy variable that equals 1 if the merger agreement includes a bidder termination fee provision, and 0 otherwise (*Source: SEC Merger Filings*).
TTF Dummy	Dummy variable that equals 1 if the merger agreement includes a target termination fee provision, and 0 otherwise (*Source: SEC Merger Filings*).
BTF $_{Dollar\ Value}$	USD (mm) amount of the bidder termination fee (*Source: SEC Merger Filings*).
TTF $_{Dollar\ Value}$	USD (mm) amount of the target termination fee (*Source: SEC Merger Filings*).
BTF Size	USD (mm) amount of the bidder termination fee divided by the market capitalization (also in USD mm) of the target firm 42 trading days prior to offer announcement and expressed in percentage points (*Source: SEC Merger Filings, S&P Capital IQ*).
TTF Size	USD (mm) amount of the target termination fee divided by the market capitalization (also in USD mm) of the target firm 42 trading days prior to offer announcement and expressed in percentage points (*Source: SEC Merger Filings, S&P Capital IQ*).
BTF Size $_{Deal\ Value}$	USD (mm) amount of the bidder termination fee divided by *Deal Value* (also in USD mm) and expressed in percentage points (*Source: SEC Merger Filings, Thomson Reuters SDC Platinum*).
TTF Size $_{Deal\ Value}$	USD (mm) amount of the target termination fee divided by *Deal Value* (also in USD mm) and expressed in percentage points (*Source: SEC Merger Filings, Thomson Reuters SDC Platinum*).
Tgt Know Cap Stock $_{Dollar\ Value}$	Knowledge Capital Stock (in USD mm) in the target firm, defined as accumulated and depreciated R&D expenses in the target firm over the last 10 fiscal years before offer announcement, using the perpetual inventory method: $G_{i,t} = \sum_{k=1}^{10} (1-\delta_G)^k \, R\&D_{i,t-k}$ where δ_G is the intangible depreciation rate of R&D. I use the industry-specific estimates for δ_G obtained in Ewens et al. (2020) (*Source: Compustat*).
Tgt Org Cap Stock $_{Dollar\ Value}$	Organizational Capital Stock (in USD mm) in the target firm, defined as accumulated and depreciated SG&A expenses in the target firm over the last 10 fiscal years before offer announcement, using the perpetual inventory method: $S_{i,t} = \sum_{k=1}^{10} (1-\delta_S)^k \, \gamma \, SG\&A_{i,t-k}$ where δ_S is the intangible depreciation rate (set to $\delta_S = 20\%$ following the literature consensus, see, e.g., Li, Qiu, and Shen (2018) and Falato, Kadyrzhanova, Sim, and Steri (2020)) and γ the fraction of SG&A to be capitalized. I use the industry-specific estimates for γ obtained in Ewens et al. (2020). I further measure SG&A net of R&D expense and Research and Development in Process (*Source: Compustat*).
Tgt Know Cap Stock	*Tgt Know Cap Stock* divided by the market capitalization (also in USD mm) of the target firm 42 trading days prior to offer announcement (*Source: Compustat, S&P Capital IQ*).
Tgt Org Cap Stock	*Tgt Org Cap Stock* divided by the market capitalization (also in USD mm) of the target firm 42 trading days prior to offer announcement (*Source: Compustat, S&P Capital IQ*).
Tgt Know Cap Stock $_{Deal\ Value}$	*Tgt Know Cap Stock* divided by *Deal Value* (also in USD mm).
Tgt Org Cap Stock $_{Deal\ Value}$	*Tgt Org Cap Stock* divided by *Deal Value* (also in USD mm).

Tgt 5YR Avrg Yearly Know Cap Growth	Average annualized growth rate of *Tgt Know Cap Stock* within the target firm calculated over the last five fiscal years prior to offer announcement.
Tgt Know Cap Intensity	*Tgt Know Cap Stock* divided by the sum of *Tgt Know Cap Stock* and *Tgt Org Cap Stock*: $$\textit{Tgt Know Cap Intensity} = \frac{\textit{Tgt Know Cap Stock}}{\textit{Tgt Know Cap Stock} + \textit{Tgt Org Cap Stock}}$$

Panel B: Deal and Industry Characteristics, and Measures of Technological Proximity and Product Market Rivalry

Tgt Initiation	Dummy variable that equals 1 if the target initiated the deal, and 0 otherwise (*Source: SEC Merger Filings*).
Auction	Dummy variable that equals 1 if the private sales process is characterized as an auction, and 0 otherwise. As in Boone and Mulherin (2008), I classify the private sales process as an auction, if the target signs confidentiality agreements with more than one prospective acquirer. To the contrary, I classify the sales process as a (1:1) negotiation, if the target firm focuses on a single acquirer throughout the whole private takeover phase, i.e., negotiations are deals with one formal contact, one signed confidentiality agreement, and one private (and later public) bid for the target by the original acquirer (*Source: SEC Merger Filings*).
Deal Value	USD (bn) value of the transaction, i.e., total transaction value excluding assumed liabilities (*Source: Thomson Reuters SDC Platinum*).
Friendly	Dummy variable that equals 1 if the deal attitude is friendly on the announcement day of the deal, and 0 otherwise (*Source: S&P Capital IQ*).
Cash Only	Dummy variable that equals 1 if the payment by the acquirer is made entirely in cash, and 0 otherwise (*Source: Thomson Reuters SDC Platinum*).
Tender Offer	Dummy variable that equals 1 if the deal is classified as a tender offer, and 0 otherwise (*Source: SEC Merger Filings*).
Horizontal Takeover	Dummy variable that equals 1 if both the acquiring and the target firm are primarily assigned to the same industry as defined by all four SIC digits, and 0 otherwise (*Source: S&P Capital IQ*).
Relative Size Market Cap $_{[OA-22]}$	*Acq Market Cap* $_{[OA-22]}$ divided by *Tgt Market Cap* $_{[OA-22]}$.
Post Closing Industry HHI	Value of the Herfindahl-Hirschman Index (HHI) of the primary industry the acquirer is operating in after completing the planned deal and calculated for horizontal takeovers only. The HHI is calculated every fiscal year by summing the squared market shares of each firm in the respective SIC4 industry based on the firms' reported gross sales. *Post Closing Industry HHI* is equal to zero for non-horizontal deals (*Source: Compustat*).
Post Closing Industry HHI Increase	Merger-induced change in SIC4 industry HHI, i.e., increase in concentration through the combination of both the acquiring and target firms' sales. The increase in the HHI is equal to twice the product of the market shares of the merging firms (*Source: Compustat*).
Post Closing Highly Conc Industry	Dummy variable that equals 1 if the planned deal results in the SIC4 industry HHI (*Post Closing Industry HHI*) exceeding 0.25, and 0 otherwise. The U.S. Department of Justice (DoJ) and the Federal Trade Commission (FTC) define an industry as a highly concentrated market if the HHI increases beyond 0.25.
Acq All Financial Advisor Fees $_{Dollar\ Value}$	Imputed USD (mm) value of acquirer financial advisor fees irrespective of the deal outcome, i.e., directly assignable out-of-pocket expenses (*Source: Thomson Reuters SDC Platinum*).
Tgt All Financial Advisor Fees $_{Dollar\ Value}$	Imputed USD (mm) value of target financial advisor fees irrespective of the deal outcome, i.e., directly assignable out-of-pocket expenses (*Source: Thomson Reuters SDC Platinum*).
Acq All Financial Advisor Fees $_{Deal\ Value}$	*Acq All Financial Advisor Fees* $_{Dollar\ Value}$ scaled by *Deal Value*.
Tgt All Financial Advisor Fees $_{Deal\ Value}$	*Tgt All Financial Advisor Fees* $_{Dollar\ Value}$ scaled by *Deal Value*.

Technological Proximity (Tech Prox) is calculated by applying the Mahalanobis generalization method introduced in Bloom, Schankerman, and Van Reenen (2013) to the Jaffe (1986) proximity measure. The measure describes the correlation of patenting across United States Patent and Trademark Office (USPTO) technology classes between pairs of firms (i.e., acquirer-target pairs in the sample). First, all of the firm's patents between 1970 and 2006 are allocated into the different 426 USPTO technology classes, defining the scope-of-innovation-activity-vector $T_i = (T_{i1}, T_{i2}, T_{i3}, ..., T_{i426})$ for firm i where $T_{i\tau}$ is the share of firm i's patents in technology class τ, i.e., $T_{i\tau}$ is the ratio of the number of awarded patents to firm i in technology class τ to the total number of awarded patents in all technology classes over the whole period since 1970. Specifically, technological proximity between acquirer (Acq) and target (Tgt) is defined as the following correlation coefficient:

Technological Proximity (Tech Prox)

$$Tech\ Prox_{Acq,Tgt} = \frac{T_{Acq}T'_{Tgt}}{\sqrt{T_{Acq}T'_{Acq}}\sqrt{T_{Tgt}T'_{Tgt}}}$$

The applied Mahalanobis distance metric extension allows for spillovers between different technology classes, which is ruled out by the Jaffe (1986) metric (which assumes full spillovers within the same class and nothing otherwise). In summary, Mahalanobis measures cross technology class spillovers by using revealed preference. If two technologies are often located together in the same firm (e.g., "computer input/output" and "computer processing") then they infer the distance between the technologies to be smaller, so spillovers will be greater. They proxy this by the share of times the two technology classes are patented within the same firm. See Lucking, Bloom, and Van Reenen (2018) for the extended description and notation. I apply the STATA™ code available on Nicholas Bloom's website (https://nbloom.people.stanford.edu/research) to generate the spillover-adjusted correlation coefficient *Technological Proximity (Tech Prox)*.

Product Market Similarity (PMS) TNIC1

Yearly firm-by-firm pairwise product market similarity score (*PMS*, real number in the interval [0,1]) calculated for each firm-firm-fiscal-year combination by parsing the product descriptions from the firms' annual 10-Ks and forming word vectors for each firm to compute continuous measures of product similarity for every pair of firms in the sample in each year (a pairwise similarity matrix). A higher score relates to higher word similarity (i.e., the text of the two firms' business descriptions has more common vocabulary than a pair of firms with a lower score), used as a proxy for product similarity and thus product-market rivalry, i.e., firm pairs with a higher score are "nearer" rivals. A score near zero indicates that the given pair of firms use effectively unrelated product market text. All Text-based Network Industry Classifications (TNIC1) data obtained from the Hoberg-Phillips Data Library (Hoberg and Phillips (2010, 2016): http://hobergphillips.tuck.dartmouth.edu/). TNIC1 is the highest possible granularity: the score is calculated for every firm-firm-fiscal-year combination during the 1996-2017 period for publicly traded firms (U.S. domestic firms traded on either NYSE, AMEX, or NASDAQ) with a valid GVKEY in Compustat that filed 10-K reports with the SEC at the respective fiscal year end and with valid data in CRSP. The data are then mapped to the M&A sample by using an algorithmically generated one-to-one mapping method with AcqGVKEY-TgtGVKEY-FiscalYear for each individual transaction.

Product Market Similarity (PMS) TNIC2

Calculated in the same way as *Product Market Similarity (PMS) TNIC1*, but calibrated to match the granularity of two-digit SIC codes. All Text-based Network Industry Classifications (TNIC2) data obtained from the Hoberg-Phillips Data Library (Hoberg and Phillips (2010, 2016): http://hobergphillips.tuck.dartmouth.edu/).

Product Market Similarity (PMS) TNIC3

Calculated in the same way as *Product Market Similarity (PMS) TNIC1*, but calibrated to match the granularity of three-digit SIC codes. All Text-based Network Industry Classifications (TNIC3) data obtained from the Hoberg-Phillips Data Library (Hoberg and Phillips (2010, 2016): http://hobergphillips.tuck.dartmouth.edu/).

Acq Induced Cancellation

Dummy variable that equals 1 if the acquirer induced the cancellation of the deal, and 0 otherwise (*Source: Official Press Releases*).

Third Party Competing Bid Cancellation

Dummy variable that equals 1 if the deal was cancelled due to a third party bid for the target that led to the cancellation of the original bid, and 0 otherwise (*Source: Official Press Releases*).

Deal Completion	Dummy variable that equals 1 if the deal was closed successfully, and 0 if cancelled (*Source: S&P Capital IQ*).
Kick-Off vs. AD	Length of the private takeover process, starting at the *Kick-Off date* until announcement date (AD) of the deal and measured in months. *Kick-Off date* refers to the first date the target and an interested party (i.e., the deal announcing acquirer or a third party) get in contact with each other on deal related matters. This date marks the first date of the coherent private takeover process (*Source: SEC Merger Filings, S&P Capital IQ*).
First Board Meeting vs. AD	Length of the private takeover process, starting at the *First Board Meeting date* until announcement date (AD) of the deal and measured in months. *First Board Meeting date* refers to the date where the first board meeting on deal related matters between the deal announcing acquirer and target management board takes place (*Source: SEC Merger Filings, S&P Capital IQ*).
Confidentiality Agreement vs. AD	Length of the private takeover process, starting at the *Confidentiality Agreement date* until announcement date (AD) of the deal and measured in months. *Confidentiality Agreement date* refers to the date where the deal announcing acquirer signs a confidentiality (non-disclosure) agreement with the target firm (*Source: SEC Merger Filings, S&P Capital IQ*).
Kick-Off vs. RD	Defined as *Kick-Off vs. AD* but instead measured until resolution date (RD) of the deal, i.e., the date where the deal was either successfully closed or withdrawn: *Kick-Off vs. RD = Kick-Off vs. AD + Public Takeover Length*.
First Board Meeting vs. RD	Defined as *First Board Meeting vs. AD* but instead measured until resolution date (RD) of the deal, i.e., the date where the deal was either successfully closed or withdrawn: *First Board Meeting vs. RD = First Board Meeting vs. AD + Public Takeover Length*.
Confidentiality Agreement vs. RD	Defined as *Confidentiality Agreement vs. AD* but instead measured until resolution date (RD) of the deal, i.e., the date where the deal was either successfully closed or withdrawn: *Confidentiality Agreement vs. RD = Confidentiality Agreement vs. AD + Public Takeover Length*.
Any Pre-Contact with Acq	Dummy variable that equals 1 if the background section of the merger agreement mentions any contact between the final bidding acquirer and target prior to the start of the coherent private takeover process, and 0 otherwise (*Source: SEC Merger Filings*).

Panel C: Acquiring Firm Characteristics

Acq Market Cap [OA–22]	Last sale price of acquiring firm's stock (adjusted for stock splits) multiplied with the latest number of shares outstanding, measured 22 trading days prior to offer announcement and expressed in billions of USD (*Source: S&P Capital IQ*).
Acq Market-to-Book [OA–22]	Market-to-book ratio of acquirer's stock, calculated as *Acq Market Cap [OA–22]* divided by the latest available value of total common equity (= common stock & additional paid in capital + retained earnings + treasury stock & other) 22 trading days prior to offer announcement (*Source: S&P Capital IQ*).
ln Acq 1YR Stock Return Volatility [OA–1]	Natural logarithm of 1 plus the standard deviation of weekly log-normal price returns of the acquiring firm's stock over the year preceding the offer announcement, annualized with a factor of 52 for the 52 trading weeks in a year and measured one trading day prior to offer announcement (*Source: S&P Capital IQ*).
Acq Market Leverage [OA–22]	Book value of total debt divided by the market value of the acquiring firm's total assets. Market value of total assets is calculated in the following way: *Acq Total Assets + Acq Market Cap [OA–22] − Acq Total Common Equity*, all measured 22 trading days prior to offer announcement. Total Common Equity is defined in the following way: common stock & additional paid in capital + retained earnings + treasury stock & other (*Source: S&P Capital IQ*).
Acq Dividend Payer	Dummy variable that equals 1 if the acquiring firm paid positive dividends on either common and/or preferred stock during the fiscal year preceding the offer announcement, and 0 otherwise (*Source: Compustat*).

Acq Hadlock-Pierce-Index	Measure for acquiring firm's financial constraints, proposed by Hadlock and Pierce (2010), and calculated in the following way: $$Hadlock\text{-}Pierce\text{-}Index = -0.737 \cdot Size + 0.043 \cdot Size^2 - 0.040 \cdot Age$$ where *Size* equals the natural logarithm of inflation-adjusted book assets (in USD mm), and *Age* is the number of years the firm is listed with a non-missing stock price on Compustat. In calculating this index, *Size* is winsorized (i.e., capped) at (the ln of) USD 4,500 million, and *Age* is winsorized at 37 years. All variables are measured at the last fiscal year end date prior to offer announcement (*Source: Compustat*).
Acq Whited-Wu-Index	Measure for acquiring firm's financial constraints, developed by Whited and Wu (2006), and calculated in the following way: $$Whited\text{-}Wu\text{-}Index = -0.091 \cdot CF - 0.062 \cdot DIVPOS + 0.021 \cdot TLTD - 0.044 \cdot LNTA + 0.102 \cdot ISG - 0.035 \cdot SG$$ where *CF* is the ratio of cash flow to total assets (*CF* = (income before extraordinary items + depreciation and amortization) / total assets), *DIVPOS* is a dummy variable equal to 1 if the firm pays positive dividends on either common and/or preferred stock, 0 otherwise, *TLTD* is the ratio of total long term debt to total assets, *LNTA* is the natural logarithm of total assets (in USD mm), *ISG* is the firm's SIC3 industry sales growth, and *SG* is firm sales growth, whereas sales growth is the percentage growth relative to the preceding fiscal year. All variables are measured at the last fiscal year end date prior to offer announcement (*Source: Compustat*).
Acq Kaplan-Zingales-Index	Measure for acquiring firm's financial constraints, suggested by Kaplan and Zingales (1997), and calculated in the following way: $$Kaplan\text{-}Zingales\text{-}Index = -1.001909 \cdot CF - 39.3678 \cdot TDIV + 3.139193 \cdot TLTD - 1.314759 \cdot CASH + 0.2826389 \cdot Q$$ where *CF* is the ratio of cash flow to total net property, plant, and equipment of the preceding fiscal year, Net PPE $_{t-1}$ (*CF* = (income before extraordinary items + depreciation and amortization) / Net PPE $_{t-1}$), *TDIV* is total dividends scaled by Net PPE $_{t-1}$, *TLTD* is the ratio of total long term debt to total capital (*TLTD* = (total long term debt + debt in current liabilities) / (total long term debt + debt in current liabilities + stockholders equity)), *CASH* is cash and short term investments scaled by Net PPE $_{t-1}$, and *Q* is firm's Tobin's Q (*Q* = (total assets + fiscal year end share price · number of shares outstanding − book value of common equity − deferred taxes) / total assets). All variables are measured at the last fiscal year end date prior to offer announcement (*Source: Compustat*).

Panel D: Target Firm Characteristics

Tgt Market Cap $_{[OA-42]}$	Last sale price of target firm's stock (adjusted for stock splits) multiplied with the latest number of shares outstanding, measured 42 trading days prior to offer announcement and expressed in millions of USD (*Source: S&P Capital IQ*).
Tgt Market-to-Book $_{[OA-22]}$	Defined as *Acq Market-to-Book* $_{[OA-22]}$, but instead measured for target firm's stock.
Tgt Total Assets $_{[OA-22]}$	Total Assets of the target firm measured 22 trading days prior to offer announcement (*Source: S&P Capital IQ*).
Tgt Total Intangibles $_{[OA-22]}$	Total Intangible Assets of the target firm measured 22 trading days prior to offer announcement (*Source: S&P Capital IQ*).
Tgt Goodwill $_{[OA-22]}$	Goodwill of the target firm measured 22 trading days prior to offer announcement (*Source: Compustat*).
Tgt Identifiable Intangibles $_{[OA-22]}$	Identifiable Intangible Assets of the target firm measured 22 trading days prior to offer announcement (*Source: Compustat*).
Tgt Net PPE $_{[OA-22]}$	Net Property, Plant, and Equipment of the target firm measured 22 trading days prior to offer announcement (*Source: S&P Capital IQ*).
Tgt Current Assets $_{[OA-22]}$	Current Assets of the target firm measured 22 trading days prior to offer announcement (*Source: Compustat*).
Tgt Total Intangibles Ratio $_{[OA-22]}$	*Tgt Total Intangibles* $_{[OA-22]}$ scaled by *Tgt Total Assets* $_{[OA-22]}$.

Tgt Goodwill Ratio [OA–22]	*Tgt Goodwill* [OA–22] scaled by *Tgt Total Assets* [OA–22].
Tgt Identifiable Intangibles Ratio [OA–22]	*Tgt Identifiable Intangibles* [OA–22] scaled by *Tgt Total Assets* [OA–22].
Tgt Tangibility [OA–22]	*Tgt Net PPE* [OA–22] scaled by *Tgt Total Assets* [OA–22].
Tgt Current Assets Ratio [OA–22]	*Tgt Current Assets* [OA–22] scaled by *Tgt Total Assets* [OA–22].
Tgt C4 CAR RD [-3;+3]	Seven-trading-day cumulative abnormal return (in percentage points) of target firm's stock calculated using the Carhart (1997) four-factor model to model normal returns. The model parameters are estimated over the period −250 to −23 trading days (prior) to deal resolution date. Security prices are dividend adjusted day close prices, further adjusted for stock splits, cash dividends, rights offerings, and spin-offs (*Source: CRSP*).
Tgt Unique Product Industry	Dummy variable that equals 1 if the target firm's industry is in the top quartile of all Fama-French 49 industries annually sorted by industry-median product uniqueness, 0 otherwise, where product uniqueness is defined as all selling expenses scaled by sales. Calculated following Titman and Wessels (1988) and Masulis, Wang, and Xie (2007) (*Source: Compustat*).
Tgt FF5 HTHC Industry	Dummy variable that equals 1 if the target is assigned to the Fama-French 5 industry classification in either hightech (HT) or healthcare (HC), and 0 otherwise (*Source: Compustat*).
Tgt Patent Value (market-weighted)	Total USD (mm) value $\Theta^{sm}_{i,t}$ of innovation produced by the target firm in the fiscal year prior to offer announcement, by summing up all the values of patents ξ_j that were granted to the target firm (obtained from Kogan et al. (2017), and downloaded from their website: https://paper.dropbox.com/doc/U.S.-Patent-Data-1926-2010-t5nuN-WnTH1InM0gyxkizL): $$\Theta^{sm}_{i,t} = \sum_{j \in P_{i,t}} \xi_j \qquad \text{with} \qquad \xi_j = \frac{1}{(1-\overline{\pi})} \frac{1}{N_j} E\left[v_j \mid R_j\right] M_j$$ where $P_{i,t}$ denotes the set of patents issued to the target firm i in year t, $\overline{\pi}$ is the unconditional probability of a successful patent application ($\overline{\pi}$ is set to 56%, see Carley, Hedge, and Marco (2015)), v_j is the fraction of the idiosyncratic stock return R_j that is attributable to the patent grant, and M_j is the market capitalization of the target firm i that issued patent j on the trading day prior to the announcement of the patent issuance. If multiple patents N_j are issued to the same firm on the same patent issuance announcement day as patent j, each patent is assigned a fraction $1/N_j$. If the target firm i is issued no patent in year t, the variable $\Theta^{sm}_{i,t}$ is set to 0 (see Kogan et al. (2017)).
Tgt Patent Value (citation-weighted)	Target firm's citation weighted (scientific) patent value $\Theta^{cw}_{i,t}$ (obtained from Kogan et al. (2017), and downloaded from their website: https://paper.dropbox.com/doc/U.S.-Patent-Data-1926-2010-t5nuNWnTH1InM0gyxkizL): $$\Theta^{cw}_{i,t} = \sum_{j \in P_{i,t}} \left(1 + \frac{C_j}{\overline{C}_j}\right)$$ where $P_{i,t}$ denotes the set of patents issued to the target firm i in year t, C_j is the number of future citations by patent j until the end of the sample period, and $\overline{C}_j$ is the average number of future citations received by patents granted in the same year as patent j. If the target firm i is issued no patent in year t, the variable $\Theta^{cw}_{i,t}$ is set to 0 (see Kogan et al. (2017)).
Tgt Patent Count (recently granted)	Number of patents the target firm are granted in the whole fiscal year prior to offer announcement. Data come from Kogan et al. (2017), obtained from their website: https://paper.dropbox.com/doc/U.S.-Patent-Data-1926-2010-t5nuN-WnTH1InM0gyxkizL
Tgt Patent Count (total stock)	Total number of patents the target firm are granted until the fiscal year end prior to offer announcement, i.e., yearly counts of United States Patent and Trademark Office (USPTO) patents. Patents must not be expired in order to be included. The data on total stocks are obtained from the University of Virginia (UVA) Darden Global Corporate Patent Dataset (https://patents.darden.virginia.edu/get-data).

Tgt Trade Secrecy Mention Count in 10-K	Number of (wildcard) mentions of either "trade secret", "trade secrets" and/or "trade secrecy" in target firm's most recent 10-K report filed with the SEC prior to offer announcement (*Source: SEC EDGAR 10-K filings*).
Tgt SIC2 Industry R&D Worker Ratio	Ratio of knowledge workers in R&D-related jobs divided by the total number of surveyed participants in a given SIC2 industry-year. R&D-related jobs are defined as all jobs (occupations, denoted "occsoc" in the data, definition online available on: https://usa.ipums.org/usa/volii/acsoccsoc.shtml) coded between 1510XX and 1940YY in the annual American Community Survey (ACS) of the U.S. Census Bureau. The survey size of the ACS is approximately 3.5 million households per year. The ACS data are included in the Integrated Public Use Microdata Series (IPUMS USA, 2020). IPUMS USA collects, preserves and harmonizes U.S. census microdata and provides easy access to this data with enhanced documentation. Data includes decennial censuses from 1790 to 2010, the monthly Current Population Survey (CPS) since 1962, and yearly American Community Surveys (ACS) from 2000 to the present (*Source: https://usa.ipums.org/usa/*). IPUMS does not directly provide industry definitions in the SIC code format. Instead, I manually assign each census code industry definition to the most suitable SIC2 industry and cross-check each industry assignment with the NAICS definition codes, which are available for both datasets. The R&D worker ratios are mapped on a SIC2 industry-year basis to each target firm in the M&A sample on the last fiscal year end date prior to offer announcement.
Tgt Firm Age	Age of the target firm. Measured in years since foundation and obtained at the last fiscal year end date prior to offer announcement (*Source: S&P Capital IQ*).

(Table A1 continued)

Appendix – Table A2
Sample Selection

This table depicts the selection criteria of the final M&A sample with the respective remaining number of observations. After applying filters 1–6, 8,466 observations are left over. The availability of SEC filings, control variables as well as valid data on target firms' past R&D and SG&A spending further restrict the sample to 769 observations.

Selection criteria	Number of observations
1. All M&A deals announced between 01/01/2004 and 12/31/2017	475,458
2. Deal status either "closed" or "withdrawn"	460,243
3. Acquirer and Target headquartered in the U.S.	98,647
4. Acquirer and Target publicly listed firms	9,980
5. Acquirer seeks majority stake and change of control in the Target	8,884
6. Deal value exceeds USD 1 mm	8,466
7. Availability of SEC filings and control variables	935
8. Valid data on Target firm's past R&D and SG&A spending	769

Appendix – Table A3
Modular Regression Setup

Table A3 presents the results of a modular regression setup of linear fixed effects regressions of *BTF Size* on the variable of interest, *Tgt Know Cap Stock*. On a step-by-step basis, I include control variable sets as defined in Section 3.3. As reported, the regressions (except regression (1)) include *Acquirer Industry* × *Year Fixed Effects* as well as an intercept but are unreported. Regressions (3)–(10) include *Target Industry Fixed Effects*. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	BTF Size									
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Target Firm Characteristics										
Tgt Know Cap Stock	0.765**	0.765**	0.755**	0.835***	0.834***	0.931***	1.099***	1.051***	1.048***	1.206***
	(0.313)	(0.307)	(0.319)	(0.314)	(0.311)	(0.274)	(0.256)	(0.267)	(0.272)	(0.260)
Tgt Org Cap Stock		0.000	0.035	0.046	0.070	0.098	0.211	0.178	0.237	−0.006
		(0.289)	(0.265)	(0.258)	(0.262)	(0.257)	(0.272)	(0.258)	(0.257)	(0.300)
Tgt Total Intangibles Ratio [OA–22]				2.085**	2.372**	1.798**	1.691**	1.703**		
				(0.896)	(0.912)	(0.803)	(0.798)	(0.794)		
Tgt Goodwill Ratio [OA–22]									2.713*	−0.566
									(1.426)	(2.827)
Tgt Identifiable Intangibles Ratio [OA–22]									0.039	−4.074
									(2.356)	(3.785)
Tgt Tangibility [OA–22]					1.251	0.291	0.327	0.248	0.626	−2.729
					(1.175)	(1.204)	(1.211)	(1.176)	(1.123)	(2.907)
Tgt Current Assets Ratio [OA–22]										−3.719
										(2.608)
Tgt Market-to-Book [OA–22]					0.001	0.013	0.008	0.009	0.032	0.025
					(0.041)	(0.038)	(0.037)	(0.036)	(0.036)	(0.039)
Other Deal Characteristics	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Financial Advisor Fees	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Acquiring Firm Characteristics	No	No	No	No	No	No	No	Yes	Yes	Yes
Acq Industry × Year FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	769	769	769	769	769	769	769	769	729	493
Adjusted R^2	0.012	0.011	0.012	0.021	0.020	0.087	0.088	0.103	0.112	0.122

Appendix – Table A4
Robustness – Heckman Selection Model: Technological Proximity

The table reports fixed effects Heckman (1979) selection models for the selection (i.e., non-randomly selected sample) whether I observe firms' patenting decisions and thus *Technological Proximity*. In the first stage (selection equation), I instrument with both *Tgt SIC2 Industry R&D Worker Ratio* and *Tgt Trade Secrecy Mention Count in 10-K*. Regression sets (1) with (2), and (3) with (4) only differ in the included fixed effects. The Inverse Mills Ratios λ, Wald χ^2-tests of independent equations ($\rho = 0$), and the estimated empirical corrlations of the error terms (1st and 2nd stage) are reported at the bottom of the table. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Tech Prox non-missing	BTF Size	Tech Prox non-missing	BTF Size
	1st Stage	2nd Stage	1st Stage	2nd Stage
Independent Variables	(1)	(2)	(3)	(4)
Target Firm Characteristics				
Tgt SIC2 Industry R&D Worker Ratio	2.873**		4.135**	
	(1.210)		(1.711)	
Tgt Trade Secrecy Mention Count in 10-K	0.073**		0.080**	
	(0.030)		(0.039)	
Tech Prox Median		−0.101		0.240
		(0.450)		(0.327)
Tgt Know Cap Stock × Tech Prox Median		1.160***		0.969**
		(0.426)		(0.491)
Tgt Know Cap Stock	0.191	0.969***	0.178	0.685*
	(0.123)	(0.305)	(0.137)	(0.397)
Tgt Org Cap Stock	0.128	−0.048	0.092	−0.409
	(0.090)	(0.428)	(0.108)	(0.601)
Inverse Mills Ratio λ		−0.149		−0.162
		(0.378)		(0.451)
Intercept	−1.011	6.079*	−7.013***	2.375
	(1.340)	(3.557)	(1.542)	(2.640)
Other Target Firm Characteristics	Yes	Yes	Yes	Yes
Deal Characteristics	Yes	Yes	Yes	Yes
Acquiring Firm Characteristics	Yes	Yes	Yes	Yes
Acq Industry × Year FE	No	No	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes
Acq Industry FE	Yes	Yes	No	No
Year FE	Yes	Yes	No	No
Observations (selected; non-selected)	735 (233; 502)		735 (233; 502)	
Pseudo R^2	0.531		0.624	
Adjusted R^2		0.239		0.471
Model p-value	0.000	0.000	0.000	0.000
Wald χ^2-test of indep. eqns. ($\rho = 0$) $\chi^2(1)$		0.160		0.130
{p-value}		{0.685}		{0.716}
Correlation of error terms ρ		−0.059		−0.085
		(0.144)		(0.232)

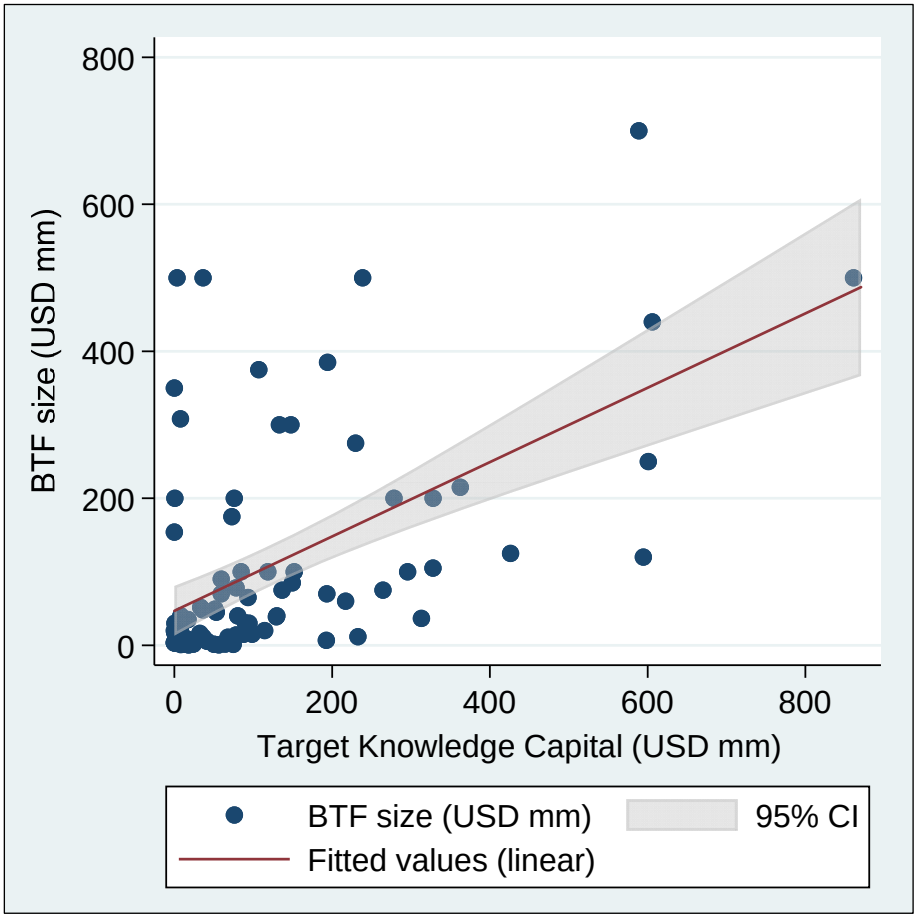
Appendix – Table A5
Robustness – Variables scaled by Deal Value

Table A5 presents the results of linear fixed effects regressions of *BTF Size* $_{Deal\ Value}$ on *Tgt Know Cap Stock* $_{Deal\ Value}$ and all control variables used in the baseline regression in Table 2, column (3). The only difference is, that in this table, all key variables (*BTF Size*, *Tgt Know Cap Stock*, *Tgt Org Cap Stock*, *TTF Size*, *Acq All Financial Advisor Fees*, and *Tgt All Financial Advisor Fees*) are scaled by *Deal Value* instead of target firm's market capitalization. Regression (1) includes the same set of other control variables as in Table 2, column (3), and regressions (2)–(4) are modified by including different measures of acquiring firm's financial constraints. All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	BTF Size $_{Deal\ Value}$			
Independent Variables	(1)	(2)	(3)	(4)
Target Firm Characteristics				
Tgt Know Cap Stock $_{Deal\ Value}$	0.941**	0.906**	1.163***	1.141***
	(0.403)	(0.385)	(0.350)	(0.363)
Tgt Org Cap Stock $_{Deal\ Value}$	0.255	0.218	0.289	0.240
	(0.279)	(0.305)	(0.316)	(0.312)
Tgt Total Intangibles Ratio $_{[OA-22]}$	1.023*	1.008*	0.880	1.245*
	(0.588)	(0.586)	(0.583)	(0.688)
Tgt Tangibility $_{[OA-22]}$	0.031	0.365	0.554	0.548
	(0.817)	(0.919)	(0.928)	(0.938)
Tgt Market-to-Book $_{[OA-22]}$	0.014	0.012	0.023	0.044
	(0.031)	(0.031)	(0.033)	(0.033)
Acquiring Firm Characteristics				
Acq Market Cap $_{[OA-22]}$	−0.003			
	(0.003)			
ln Acq 1YR Stock Return Volatility $_{[OA-1]}$	0.248			
	(0.288)			
Acq Market Leverage $_{[OA-22]}$	0.753			
	(0.857)			
Acq Dividend Payer	−0.641**			
	(0.298)			
Acq Market-to-Book $_{[OA-22]}$	−0.029**	−0.033***	−0.027*	
	(0.012)	(0.012)	(0.014)	
Acq Hadlock-Pierce-Index		0.621**		
		(0.311)		
Acq Whited-Wu-Index			−0.082	
			(0.071)	
Acq Kaplan-Zingales-Index				−0.000
				(0.003)
Deal Characteristics	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes
Observations	769	751	697	632
Adjusted R^2	0.104	0.097	0.109	0.102

Appendix – Figure A1
Relation between BTF Size and Target Firm's Knowledge Capital Stock – Bivariate Plot

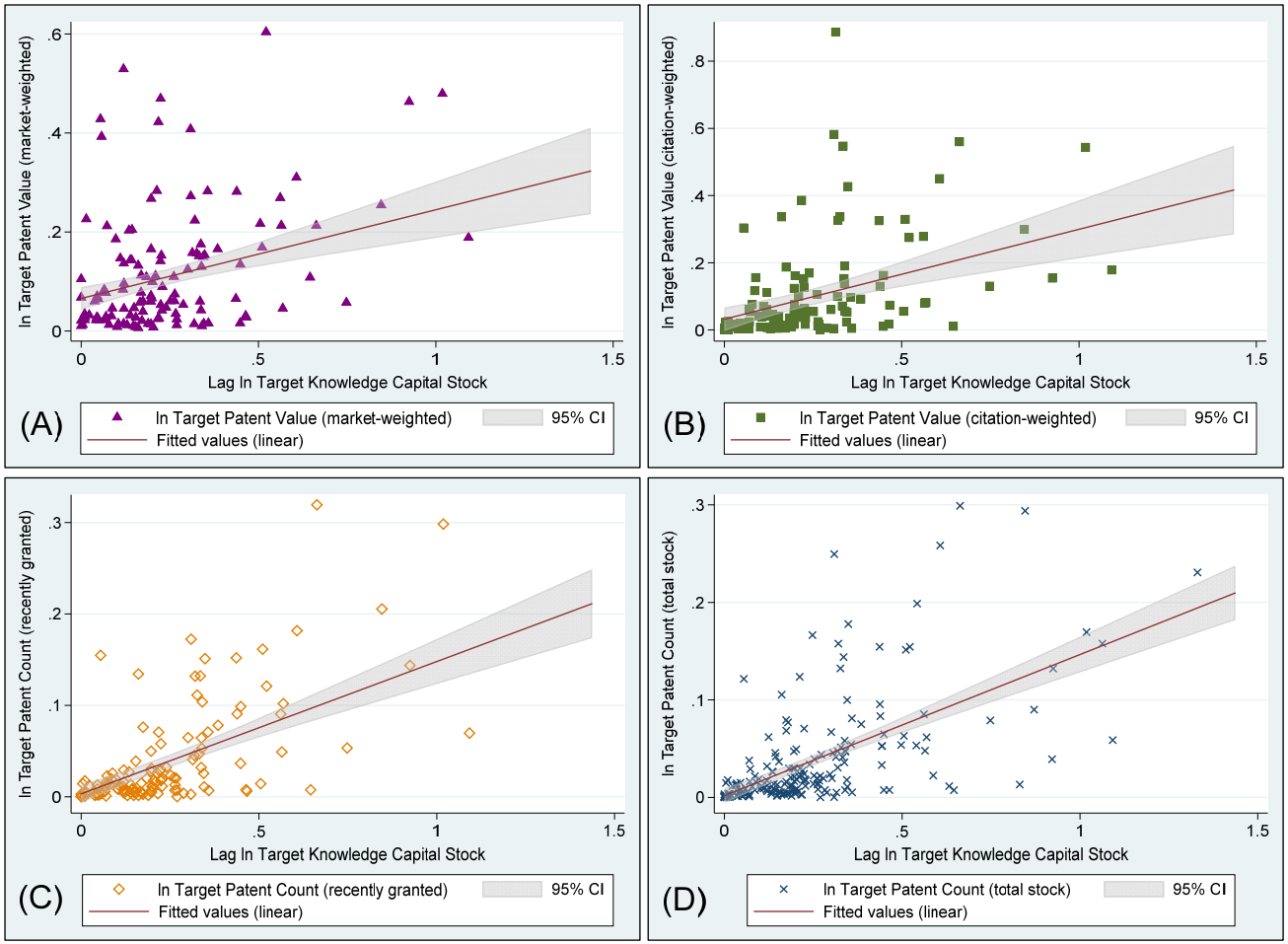
Figure A1 plots *BTF Size* against *Tgt Know Cap Stock*. The data are winsorized at the 1st and 99th percentile.



Appendix – Figure A2

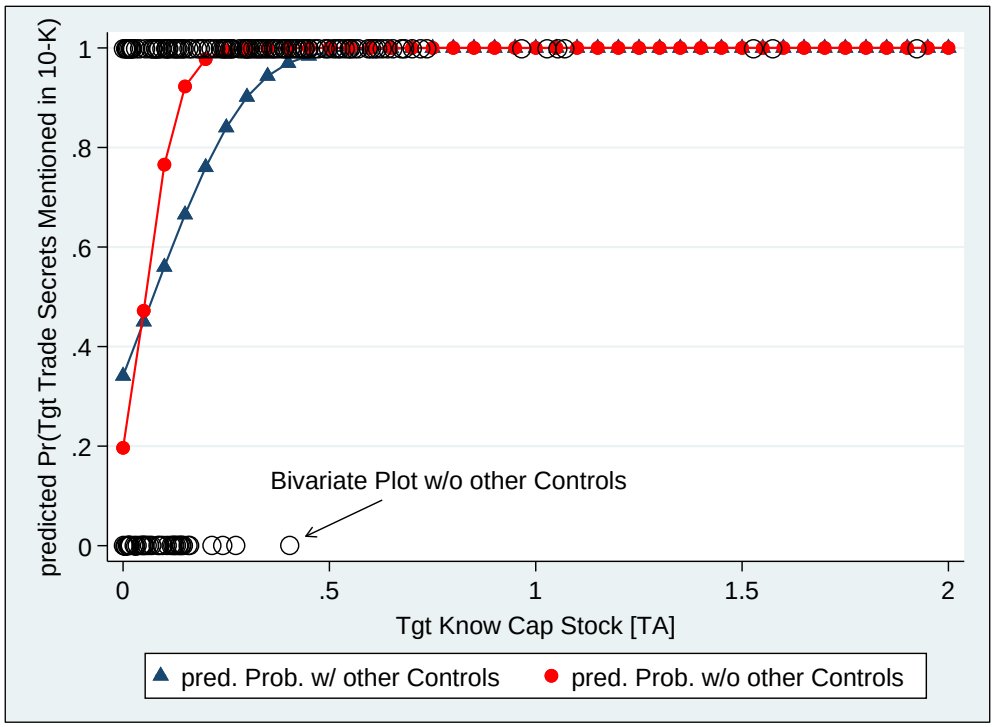
Relation between Target Firm's Patents and Knowledge Capital Stock

This figure shows the plots of various measures of target firm's patent value (*market-weighted* (A) and *citation-weighted* (B)) and patent count (*recently granted* (C) and *total stock* (D)) to its knowledge capital stock. All four patent measures are obtained at the last fiscal year end date prior to offer announcement. *Target Knowledge Capital Stock* is lagged one year and all variables are scaled by target firm's total assets and are logged. All variables are additionally defined in Table A1.



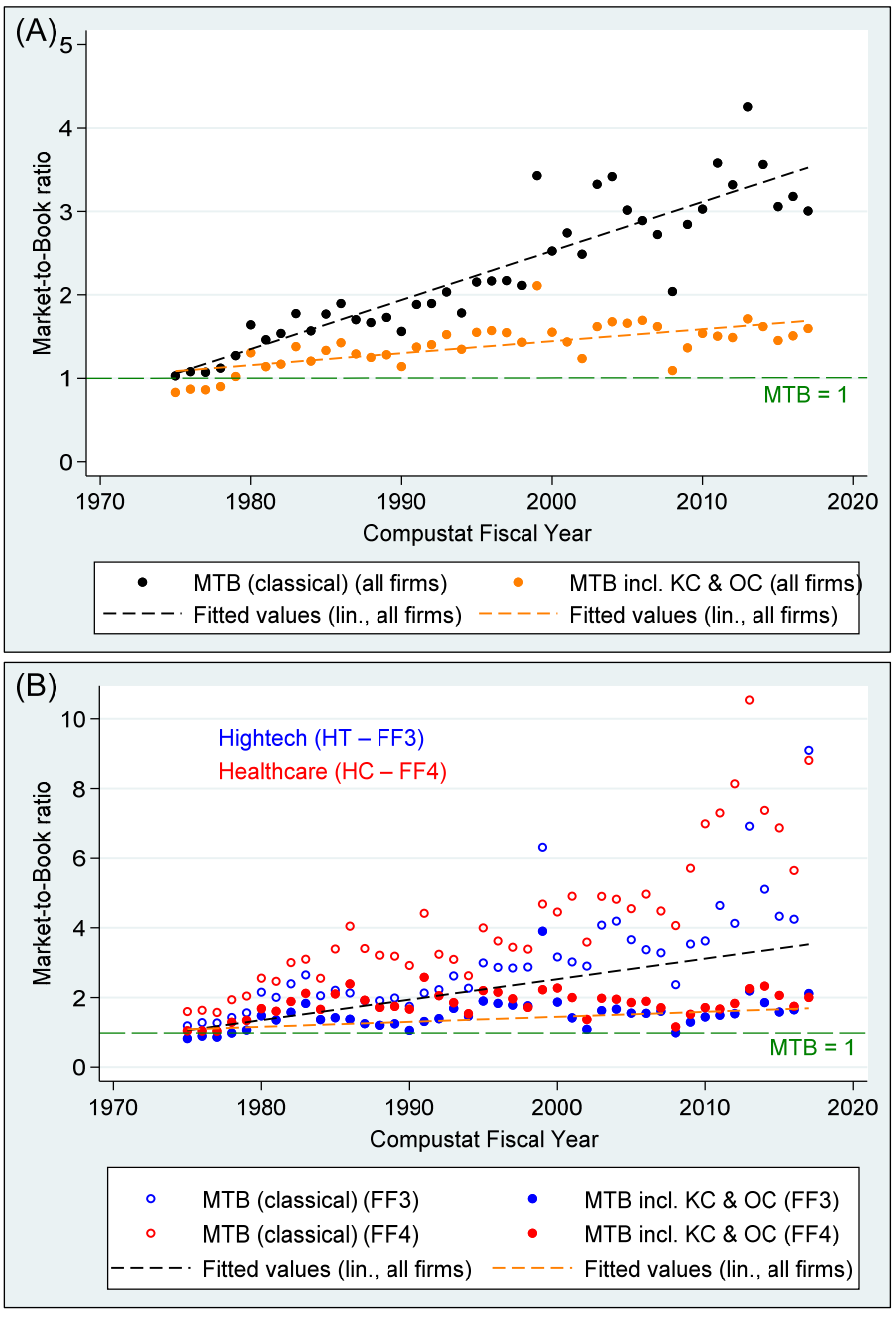
Appendix — Figure A3
Plot of Predicted Probabilities of Mentioning Trade Secrets in Target Firm's 10-K Report

This figure plots the predicted probabilities of mentioning trade secrets in target's annual 10-K report obtained at the last fiscal year end filing date prior to offer announcement, against target firm's knowledge capital stock scaled by total assets, *Tgt Know Cap Stock* $_{[TA]}$, as defined in the text in Table 10. The hollow black circles represent the simple bivariate plot of realized observations. The blue triangles represent associated predicted probabilities after estimating the fixed effects logit model in Table 10, specification (1), whereas all other independent variables are held at their respective sample mean. The red circles represent associated predicted probabilities after estimating a simple univariate logit model with *Tgt Know Cap Stock* $_{[TA]}$ as the only predictor (i.e., without other controls).



Appendix — Figure A4
Market-to-Book Ratios with and without Intangible Capital Stocks (1975–2017)

Figure A4 depicts the plot of the average (2.5% tail winsorized) market-to-book ratios for all Compustat firms during the 1975-2017 period (289,889 firm-years). The numerator in all series is the sum of market value of equity at the end of the firm's fiscal year, total liabilities and book preferred stock. For the black dot series (A), the denominator is total assets (including acquired intangibles, i.e., "classical"). For the orange dot series (A), the denominator also includes the knowledge and organizational capital stocks ("KC & OC") estimated using the parameters obtained in Ewens et al. (2020). The two dashed, black and orange lines present the simple linear fit of each series. The green dashed line represents the hypothetical market-to-book ratio of 1. In (B), the plot shows the series for firms assigned to the Fama-French 5 industries of both hightech (HT – FF3) and healthcare (HC – FF4). The hollow dots represent market-to-book ratios calculated in the "classical" way (in the same way as the black dots in (A)), and the solid dots are calculated including the knowledge and organizational capital stocks ("KC & OC") in the denominator. The black, orange, and green dashed lines in (B) are copied from (A) for comparison.



Chapter 4

Measuring Competition in M&A Negotiations[†]

This chapter provides insights about competition among bidders during the private takeover process, its effect on offered deal premiums, bidder announcement returns, and post-bid dynamics. Exploiting a representative sample of 780 public U.S. transactions, extended with comprehensive hand-collected data from SEC filings, I find that takeover premiums are higher, the higher pre-announcement competition among bidders is. I measure competition during the private sales process with a ratio that relates the number of bids submitted to the target to the number of signed confidentiality agreements with the target, the Proposals-to-CA-Ratio. A one-standard deviation increase of this ratio corresponds to a statistically and economically significant 5.99% increase of the deal initiation premium (Eaton, Liu, and Officer (2020)), 0.87% lower announcement returns for the winning bidder in auctions, a 130% increased probability of receiving a rival bid prior to closing, and a 44.5% increased probability of cancelling the originally announced deal (measured relative to the unconditional probability). The results are robust to endogeneity concerns. The advantages of this competition measure are that (1) it relies on data as reported in target firm's official merger documents filed with the SEC, which creates a strong incentive to report truthfully, and (2) it takes the evolution of bidding into account, controlling for the number of submitted bids. I conclude that competitive private negotiations stay competitive during the public phase of the deal, and that target boards fulfill their fiduciary duties by selecting the highest-bidding acquirer.

Keywords: Takeovers, Mergers and Acquisitions, Private Takeover Process, Bidding Competition, Auction, Negotiation, Takeover Premium, Announcement Returns.

JEL classification: G14, G24, G34

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4.1 Introduction

Ample research focuses on explaining bidding behavior in and competition dynamics of mergers and acquisitions, and how this affects economic outcomes, such as takeover premiums, bidder returns, (post-)announcement reactions of industry competitors, deal completion rates, and observed post-bid competition (e.g., Aktas, de Bodt, and Roll (2010), Boone and Mulherin (2007, 2008), Jennings and Mazzeo (1993), Calcagno and Falconieri (2014), Eckbo (1983), Ruback (1983), Derrien, Frésard, Slabik, and Valta (2020)). Since the introduction of the event study as one of the main workhorses in empirical finance (Fama, Fisher, Jensen, and Roll (1969)), announcement effects of takeovers have been extensively studied in the literature, motivated by their usually large impact on the economic value of involved firms. The official communication to try to gain control over a target firm is often seen as an event that not only captures public attention, but also as an occasion that lures competing bidders that might have even higher reservation values for the target[1].

Prior research deemed the 1980s as a very competitive, often hostile takeover decade which was fueled by the emergence of the high-yield (junk) bond market as a means to ease the financing of transactions, such as LBOs[2]. In the 1990s, however, perceived competition seems to have been decreased, with Andrade, Mitchell and Stafford (2001) characterizing the prototypical takeover as a friendly transaction with only one bidding firm. In a similar manner, Schwert (2000) argues that anti-takeover devices, such as poison pills and state antitakeover laws, might have contributed to this "de-hostilization". If one employs a traditional measure of competition, namely the number of bidders that publicly attempt to acquire the target, this might indeed be true.

[1] Depending on its bargaining power, the target could even negotiate a clause in the merger agreement, signed with the original bidder, enabling it to proactively solicit competing bids during a so-called "go-shop period" (Wang (2017)). This provision defines a period (usually 1–2 months after announcement) during which other proposals can be obtained and generally allows the original bidder to match any competing bid. If negotiated, accepting a competing bid often triggers the payment of a target termination fee: a cash payment from the target to the original bidder to compensate the latter for its costs.

[2] One of the most prominent cases in the history of (hostile) corporate takeovers is the November 1988 LBO of the tobacco and food products conglomerate RJR Nabisco, Inc., by private equity firm Kohlberg Kravis Roberts & Co. (KKR), valued at USD 24.53 bn. The story later even turned into a movie and the 1989 book "Barbarians at the Gate: The Fall of RJR Nabisco" by Bryan Burrough and John Helyar.

Yet, as more recent studies show, public bids only represent the tip of the iceberg. The private phase of a takeover, i.e., the period between deal initiation and public announcement, is remarkably competitive, and research interest in the details of this process has dramatically increased over the last two years. Analyzing a comprehensive sample spanning the time period from 1981 to 2015, Liu, Mulherin, and Brown (2018) show, that over time, deal negotiations have moved from the public sphere to behind the scenes, target boards are much more likely to initiate them, and that the length of the private takeover phase has increased.

This chapter sheds light on the competitiveness of this "black box of merger negotiations" (Liu and Officer (2020)), and contributes to the extant literature by suggesting a reliable measure to quantify the degree of competition among potential acquirers during this private phase: the *Proposals-to-CA-Ratio*. This ratio relates the number of potential acquirers that privately submitted binding written offers (bids) to the target firm, shortly before the deal is publicly announced (i.e., at the end of the private takeover process, with a price proposed to buy target shares), to the number of potential acquirers that signed confidentiality (non-disclosure) agreements with the target firm. The data to construct this competition measure are obtained from official merger documents filed with the Securities and Exchange Commission (SEC), and are publicly available via their Electronic Data Gathering, Analysis, and Retrieval System (EDGAR)[3]. Accessing this proprietary data source has two major advantages over classical M&A databases, such as Standard & Poor's Capital IQ or Refinitiv's Securities Data Corporation (SDC) Platinum: first, the SEC merger filings contain rich data over the whole private takeover process that these providers do not collect. Since machine-readable databases only include information about the outcome of private negotiations, i.e., acquirer and target firm, offer per share, method of payment, termination fees, accounting and valuation data, and financial and legal advisors, among many others, one needs to thoroughly hand-collect additional information from a reliable source to characterize the private process. I.e., to better understand "behind the curtain" M&A negotiations, competition dynamics and the final outcome, it is crucial to know (1) who initiated the deal and when, (2) what were the reasons to do so, (3) how (and why, as such) the private sales process is structured (i.e., as a classical one-to-one negotiation or a takeover auction including multiple potential acquirers), and (4)

[3] https://www.sec.gov/edgar.shtml (permanent link).

how competition and bidding – especially in auctions with multiple bid revisions – evolved during this phase. Second, SEC data are highly accurate. Misreporting by the issuing firm is enforcable by the SEC and can lead to severe fines[4]. This creates a high ex-ante incentive for firms to report accurately and does not leave substantial leeway.

Main Findings

Analyzing hand-collected, novel data from a sample of 780 public U.S. transactions between 2004 and 2017, I find that higher relative competition among bidders leads, on average, to higher takeover premiums and higher cumulative abnormal deal announcement returns for the target. Controlling for the number of submitted proposals as a level control, a one-standard deviation increase in the *Proposals-to-CA-Ratio* is associated with a statistically and economically significant 9.29% increase of the one-month target share price premium, and a 5.99% increase of the initiation premium (Eaton, Liu, and Officer (2020)). Higher relative competition further leads to lower cumulative abnormal deal announcement returns for the winning bidder, and a higher probability of receiving a competing bid from a different bidder post-announcement. The latter result is especially more pronounced, if the stock market reaction of the original bidder is positive around deal announcement. Such a reaction usually proxies, all else equal, for a value-creating – rather than value-destroying – acquisition decision for the bidder, and indicates that competing bidders might learn from this decision and react accordingly through a rival bid[5].

My results are robust to the inclusion of a large set of other covariates that might explain competition among bidders and/or takeover prices. Besides standard deal- and firm-

[4] The SEC is highly active and transparent in detecting misreporting firms and proceeding against responsible key people (see the latest enforcement news online at: https://www.sec.gov/page/enforcement-section-landing and https://www.sec.gov/spotlight/financial-reporting-and-audit-task-force.shtml, leading law firms additionally inform clients on their websites, e.g.: https://www.jonesday.com/en/insights/2020/01/sec-enforcement-2019-yearend-update).

[5] I am wary, however, since the reaction around deal announcement strongly depends on the individual acquirer-target firm pair (given that the value exceeding the stand-alone value of the target consists of both a common value and a private value component). However, untabulated regressions show that the results hold for horizontal deals as well, where synergy gains from the takeover are generally better transferable among these (more similar) bidders, i.e., where the common value component is significantly higher, and acquirers' announcement stock price reactions are on average higher (Eckbo (1983, 2009)).

level controls commonly used in empirical M&A literature, I include a proxy for latent competition in every regression (Aktas et al. (2010)) in addition to fixed effects on both target industry-year- and acquirer industry-level. I do this to control for merger waves, economic recessions, and associated overall capital liquidity shocks that might be correlated with merger premiums. Following the argumentation in Comment and Schwert (1995) and the empirical application in Boone and Mulherin (2008), I further include a variable that controls for targets headquartered in states with strong anti-takeover laws. Comment and Schwert (1995) provide evidence that the more stringent is a state's anti-takeover law, the greater is the target's bargaining power, and this could lead to higher negotiated premiums.

More recent research (Eaton et al. (2020)) argues that traditional measures for the deal premium, such as the one-, two-, and even three-month target share price premium (Schwert (1996, 2000)), lead to a likely underestimation of "real" premiums, i.e., premiums paid above the true stand-alone value of the target firm. The stand-alone value should be unaffected by any early M&A-related event[6] causing share price run-ups. This provides the rationale to additionally test my hypothesis in regressions with the initiation premium as the dependent variable, for which my results continue to hold.

By applying a Heckman (1979) two-stage selection model with instrumented regressors for deal initiation and the sales procedure, I show that my inferences are robust to endogeneity concerns between the degree of relative competition, deal initiation, the sales procedure, and takeover premiums (Aktas et al. (2010)). Besides a propensity score matching approach (tabulated in the Appendix, Table A7), I further conduct additional robustness tests. First, I show that my findings remain qualitatively and quantitatively unchanged when measuring competition for the target with the *Proposals-to-Contacts-Ratio*. *Contacts* is the number of contacted bidders at the beginning of the takeover process. Second, I repeat my baseline regression for a subset of auctions that explicitly exclude tender offers, which does not change my results. I run this test as the sales process for tender offers is usually quicker and not as structured compared to non-tender offer transactions (Hansen (2001), Offenberg and Pirinsky (2015)).

[6] These events can be takeover rumors, news articles, media speculation, 13D filings by a potential bidder, press releases by the target to seek strategic alternatives, and/or the hiring of an investment bank (Eaton et al. (2020)).

Contribution to the Literature

This chapter complements and contributes to the growing literature analyzing the private takeover process, the sales method, announcement effects for participating shareholders, and post-announcement competition. First of all, I add to the growing body of M&A literature that focuses on pre-announcement deal negotiations, competition dynamics, and outcomes for targets (e.g., Boone and Mulherin (2007, 2008), Aktas et al. (2010), Gorbenko and Malenko (2014, 2019), Wang (2017), and Eckbo, Malenko, and Thorburn (2019)). I extend the findings in Aktas et al. (2010) by suggesting target firm- and industry-specific characteristics that seem to determine the decision of firms to sell via auctions. My proposed ratio, based on verifyable information in SEC filings – especially the number of signed confidentiality agreements and the number of finally submitted proposals – more reliably measures competition compared to the number of contacted bidders (as put forward by Schlingemann and Wu (2015)). In the case of contacted bidders, there are several times no individual bidding firm names mentioned in the filings, which makes misreporting unenforcable. This is less credible than naming firms that sign confidentiality agreements or even submit proposals, because doing the latter implies a significantly higher commitment of the willingsness to negotiate and to bid for the target. I.e., I assume less data reliability and more leeway for targets if they report contacted bidders.

Second, my findings indicate that high competition leads to significantly negative announcement returns for the winning bidder. This is particularly more pronounced, if the deal is classified as a diversifying takeover. These types of takeovers might, all else equal, not only exhibit less synergy potential compared to horizontal takeovers, but could also more easily lead to overbidding, as the acquiring firm stems from a different industry. Although I do not claim that winning bidders are cursed[7], it might point in this direction (complementing de Bodt, Cousin, and Roll (2018)).

Third, my findings help to explain why competitive private negotiations stay competitive after public deal announcement. If private competition is high and if the announcement of

[7] Empirical evidence on the existence of the winner's curse problem in M&A is mixed. Some studies fail to detect overbidding (e.g., Moeller, Schlingemann, and Stulz (2004) and Boone and Mulherin (2008)), others report its existence (e.g., Eckbo and Thorburn (2009), de Bodt et al. (2018), and Giliberto and Varaiya (1989)).

the deal leads to positive stock price reactions of the acquiring firm, I find that the probability of receiving an additional competing bid from a different bidder increases significantly. Simultaneuosly, the probability of completing the original announced deal decreases.

Fourth, my suggested competition measure is distinct from prior ones, as it additionally accounts for the "depth" of bidding, i.e., how bidding has evolved during the entire private takeover process. Giliberto and Varaiya (1989) find, as predicted by theory, that winning bids tend to increase as the number of competitors increases. I find their inferences to also hold for my sample, but it also plays a role to consider "where we started from"[8]. Put together, I am not the first to analyze shareholder wealth effects of the sales method, but I contribute by taking the evolution of bidding into account.

The remainder of this chapter is organized as follows. In Section 4.2, I illustrate three cases of varying takeover competition. I then present stylized facts about the pre-public phase of the deal. I develop the main hypotheses in Section 4.3. I describe the sample, the empirical methodology, and main variables in Section 4.4. In Section 4.5, I present the baseline regression results of the effect of competition during private negotiations on takeover outcomes. Section 4.6 includes robustness tests to mitigate endogeneity concerns. I conclude in Section 4.7.

4.2 Private M&A Negotiations: Exemplary Cases and Stylized Facts

4.2.1 Three Exemplary Cases of Private Takeover Competition

To better understand and measure competition among bidders during the private takeover process, the following three cases might provide some tangible insights. Even though all three targets each have received three proposals at the end and one officially announced bid, the way how bidding evolved during this phase shielded from public scrutiny has been remarkably different:

[8] With the lax expression "where we started from" I mean the starting point and evolvement of the bidding process: from the number of contacted potential bidders, to the number of potential bidders that signed confidentiality agreements (NDAs), to the number of submitted proposals to the target at the end of the private takeover process. I include the number of proposals in all regressions to control for this level effect. A rationale for this is given in Figures A3 and A4 in the Appendix.

(1) Low Competition – Takeover of Stratos International, Inc. by Emerson Electric Co. in 2007

"On September 19, 2006, we [the target – Stratos International, Inc.] publicly announced that we expected to postpone our annual meeting while we devoted our attention to the process of exploring strategic alternatives. […] Following the announcement of the strategic alternatives process, approximately 47 potential buyers were contacted. […] Twenty-two potential buyers executed a confidentiality agreement and were provided a confidential offering memorandum. […] In response to the confidential offering memorandum, three potential buyers submitted indications of interest during October 2006. […] On May 14, 2007, Stratos executed the merger agreement with Emerson [the acquirer – Emerson Electric Co. (NYSE:EMR)] and issued a press release publicly announcing that it had agreed to be acquired by Emerson."

In this case[9], the target-initiated deal led to a *Proposals-to-CA-Ratio* of 0.136 (= 3/22), the final one-month-premium was 4.99%, and the deal initiation premium[10] was 19.05%.

(2) Medium Competition – Takeover of Hyperion Solutions Corp. by Oracle Corp. in 2007

"On December 8, 2006, Charles E. Phillips, Jr., Co-President of Oracle [the acquirer – Oracle Corporation (NYSE:ORCL)], called Mr. Sullivan [CEO of the target – Hyperion Solutions Corp.] to express their interest in the possibility of a business combination. […] On December 14, 2006, at a special meeting of the Board, Mr. Sullivan advised the Board of the call he had received from Oracle. He also reviewed the possibility of more substantive discussions with another company (referred to as Company X) and a third Company (referred to as Company Y). [… All three potential acquirers then signed non-disclosure agreements with Hyperion …] During this period, Mr. Sullivan and members of the Company's management also held discussions with the Company's legal and financial advisors on the terms of the proposals from Oracle, Company X and a possible proposal from Company Y. [… Company Y also submitted a proposal …] Later that night, before open of market on March 1, 2007, the Company

[9] https://www.sec.gov/Archives/edgar/data/1111721/000095013707008629/n15490dmdefm14a.htm.

[10] The deal initiation premium is measured as the increase of the offer per share relative to target's stock price one trading day prior to (private) initiation of deal discussions between target and (the) potential bidder(s) (following Eaton et al. (2020)).

[Hyperion] and Oracle executed the Merger Agreement. […] A joint press release announcing the transaction was issued immediately after the signing of the Merger Agreement."

Here[11], the acquirer initiated the deal. The *Proposals-to-CA-Ratio* was 1.000 (= 3/3), the final one-month-premium was 25.39%, and the deal initiation premium was 36.02%.

(3) High Competition – Takeover of Bancorp Rhode Is., Inc. by Brookline Bancorp, Inc. in 2011

"On March 14, 2011, the strategic committee met to discuss the proposed targeted third-party solicitation process. At this meeting, the strategic committee authorized Jefferies, on behalf of BancorpRI [the target – Bancorp Rhode Island, Inc.], to contact the four potential acquirers to solicit initial indications of interest in a possible business combination. [… two firms signed non-disclosure agreements with BancorpRI …] In its initial indication of interest, Brookline [the acquirer – Brookline Bancorp, Inc. (NasdaqGS:BRKL)] proposed a purchase price range of $44–$48 per share. […] One of the other potential acquirers ("Company A") proposed […] $45 per share. […] The third potential acquirer ("Company B") proposed $40 per share. […] Brookline [then] had increased its proposed purchase price to $48.25 per share. […] Both Company A's and Brookline's draft merger agreements restricted BancorpRI from soliciting a competing proposal, subject to a "fiduciary out" for an unsolicited superior proposal as well as a [target] termination fee payable by BancorpRI equal to 3.8% (which BancorpRI had negotiated down from 4%) of the transaction value in the event BancorpRI terminated the merger agreement to pursue such a proposal. Both Company A and Brookline also agreed to a "walk away" provision [i.e., bidder termination fee] in the event of a material decline in their respective stock price (on an absolute basis and relative to a bank index) prior to closing. […] The BancorpRI board determined that the Brookline offer represented the superior proposal. […] Following the April 14, 2011 BancorpRI board meeting, BancorpRI and Brookline and their respective legal counsels continued to work to complete negotiations with respect to the definitive merger agreement and to prepare related disclosure schedules. […] The parties issued a joint press release publicly announcing the transaction on Wednesday, April 20, 2011, prior to the opening of the stock market."

[11] https://www.sec.gov/Archives/edgar/data/1001113/000089161807000145/f28093orsc14d9.htm.

In this third case[12], the target-initiated deal led to a series of bid revisions, and a *Proposals-to-CA-Ratio* of 1.500 (= 3/2), the final one-month-premium was 54.88%, and the deal initiation premium was 55.34%.

4.2.2 Stylized Facts of the Private Takeover Process

Even though these are just three cases, they represent some stylized facts of the private takeover process: first, there is substantial competition among potential acquirers behind the curtain. Most of this competition cannot be measured with standard, machine-readable datasets provided by commonly known vendors such as Standard & Poor's Capital IQ or Refinitiv's Securities Data Corporation (SDC) Platinum. These datasets only include publicly announced transactions with their associated characteristics, but no columns containing data about pre-announcement bidding, the number of prospective acquirers, the number of signed confidentialiy agreements, bid revisions, and so forth. Thus, researchers rely on carefully hand-collecting such information.

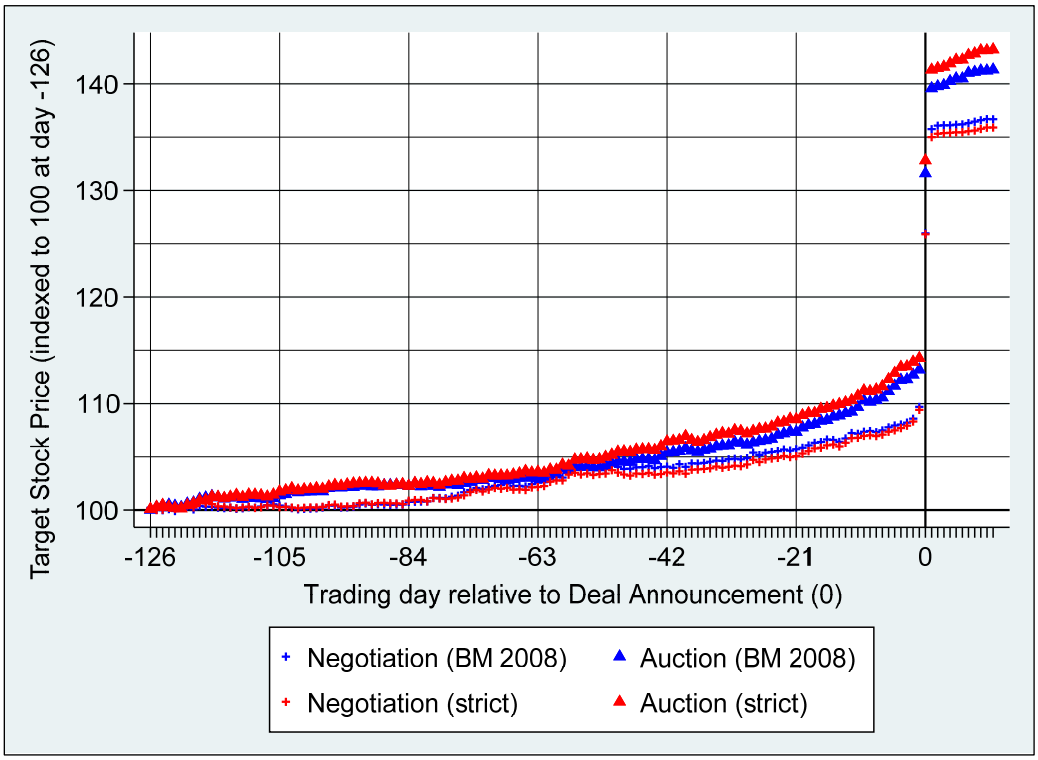
Second, there is a substantial target share price run-up, often starting months prior to deal announcement. In empirical M&A, researchers are often interested in the prices paid for targets, which includes the deal premium. The question then is to which reference value the final offer price per target share should be measured. Ideally, the reference share price perfectly reflects the target firm's stand-alone value, unaffected by any early M&A-related events, such as, e.g., rumors, news articles, media speculation, or 13D filings by a potential bidder. Premium measures commonly used in the literature are the one-week, one-, and two-month premium, with the latter motivated by Schwert (1996), who notes that target firms' stock prices "[…] start to rise around day −42 (about 2 months before the first bid announcement)." That literature is now a couple of decades old and analyses data from the 1970s, 1980s, and 1990s. Since then, the length of the pre-announcement merger negotiation period (i.e., the number of days between the date where the deal was initiated and the date of public deal announcement) has significantly increased, as Liu et al. (2018) show in their paper. If deal premiums are measured in the traditional way, their magnitude is likely underestimated. As mentioned in

[12] https://www.sec.gov/Archives/edgar/data/1049782/000104746911006583/a2204712zs-4a.htm.

the three example cases, the initial premium is substantially larger than the more conservatively calculated one-month premium[13]. The increased run-up period is observable for both one-to-one negotiations, i.e., where only one acquirer and the target exclusively negotiate with each other, as well as for auctions, i.e., bidder contests in which at least two prospective acquirers sign confidentiality (non-disclosure) agreements with the target[14], as Figure 1 shows.

Figure 1
Pre-Announcement Target Stock Price Run-up by Sales Procedure

Figure 1 shows the pre-announcement target stock price movement, based on last sale prices for every trading day, and indexed to 100 at trading day −126 (six calendar months) prior to public offer announcement. For every trading day, the last sale price on that day is divided by the last sale price on day −126 to enable comparisons with deal premiums (which are raw percentage markups rather than modeled abnormal returns). The returns for all observations (i.e., targets) are winsorized at the 1st and 99th percentile on each tranding day to minimize the influence of outliers. The observations are then grouped into negotiations and auctions (following the BM 2008 definition as well as my "strict" classification, i.e., target sales with at least two contacts, two signed confidentiality agreements, and two final proposals). Means are reported. Each column represents one calendar month (approx. 21 trading days).



[13] Summary statistics (unwinsorized) show that the initiation premium is on average 5.88% larger than the one-month premium.

[14] This definition was originally established in Boone and Mulherin (2007, 2008), in the following denoted as "BM 2008". I also suggest a more strict definition for auctions (denoted as "strict" in the rest of this chapter): to make sure that all involved parties know about the competitiveness of the sales process at any time during the private phase, I define a strict auction as a firm's sale where at least two potential bidders are contacted, at least two potential bidders sign confidentiality agreements, and at least two bidders submit an offer to the target.

Based on the findings in Liu et al. (2018), Liu and Officer (2020), and Eaton et al. (2020) about the length of the private takeover process, I start on trading day −126 (prior) to deal announcement as the reference to plot target firm's raw markups for each trading day until eleven days after announcement[15]. Together with the detailed information and descriptions in the 780 hand-collected "Background of the Merger/Tender Offer" sections of SEC filings, one can try to explain some stock price movements and developments in Figure 1:

(a) Both sales procedures exhibit a significant run-up, but the run-up in auctions seems to start earlier (approx. on day −105) than the run-up in one-to-one negotiations (approx. on day −84). This might be due to early M&A-related events that appear to occur more frequently in takeovers structured as auctions, such as, e.g., the announcement of the target to seek strategic alternatives/hiring of an investment bank, and 13D filings by a potential bidder[16]. Analyzing the deal process lengths in full detail[17], I find that the starting point for target's (internal) kick-off of the auction process is on average on day −104. Day −79 is the average starting point in negotiations to conduct the kick-off meeting. Contrary to auctions, this usually takes place between both parties.

(b) Around three calendar months prior to announcement, one can observe a kink in the markup plot for negotiations, and a steeper increase in the plot for auctions. The average point in time when the confidentiality agreement is signed with (the single) potential acquirer in negotiations is on day −64. Moreover, day −60 represents the average day on which the first indications of interest are submitted to the target. These findings – together with the observations in (a) – are consistent with information being leaked into the market, and upward price movements reflect the anticipation of a takeover.

[15] Eaton et al. (2020) find that the target price run-up begins to increase roughly around trading day −105 (five calendar months), on average. I add one more calendar month as an additional safety margin.
[16] The SEC dictates for 13D filings: "When a person or group of persons acquires beneficial ownership of more than 5% of a voting class of a company's equity securities registered under Section 12 of the Securities Exchange Act of 1934, they are required to file a Schedule 13D with the SEC. (Depending upon the facts and circumstances, the person or group of persons may be eligible to file the more abbreviated Schedule 13G in lieu of Schedule 13D.) Schedule 13D reports the acquisition and other information within ten days after the purchase." (see https://www.sec.gov/fast-answers/answersshed13htm.html)
[17] I have drafted a comprehensive overview of key milestones and detailed takeover process lengths in the Appendix of this chapter (Figure A5). In this overview chart, the time periods are denoted in calendar days.

(c) Comparing the average target stock price shortly after deal announcement (day 0) with the price on day −21, −42, and −63, respectively, one can directly read off the average one-, two-, and three-month premium[18]. Auctions seem to result in higher six-month premiums: the difference to negotiations is positive, but due to the large standard deviations in both sales procedure groups, not statistically significant. Premiums for the three-month window are also higher for auctions with the difference to negotiations not being statistically significant, consistent with the findings in Boone and Mulherin (2007). Given that auctions exhibit a steeper run-up, particularly shortly after the −63 day mark, resulting one- and two-month premium differences between the sales procedures cancel out, and might even be negative (for the one-month premium), yet are still not statistically significant[19].

Third, if deals are structured as auctions, they are often initiated by the target. In one-to-one negotiations, however, the deal is usually initiated by the acquirer (in approx. 80–95% of the cases, depending on the year). This suggests that targets are trying to stimulate competition and acquirers trying to suppress it. Figure 2 plots the relative share of selling procedure (deal type) and initiating party for the sample period from 2004–2017. There seems to be a slight upward trend of auctions as a share of all deals during the last two decades, although a sharp drop occurred in the aftermath of the Great Recession.

Fourth, as Liu and Officer (2020) report, bid revisions are very common in the pre-public phase of a deal, especially if there is significant competition among potential acquirers. The suggested *Proposals-to-CA-Ratio* thus tries to capture the degree of relative competition: As the above mentioned takeover cases have shown, all three targets received three proposals each, but the way how competition evolved was significantly different, with significantly different outcomes, i.e., offered share price premiums.

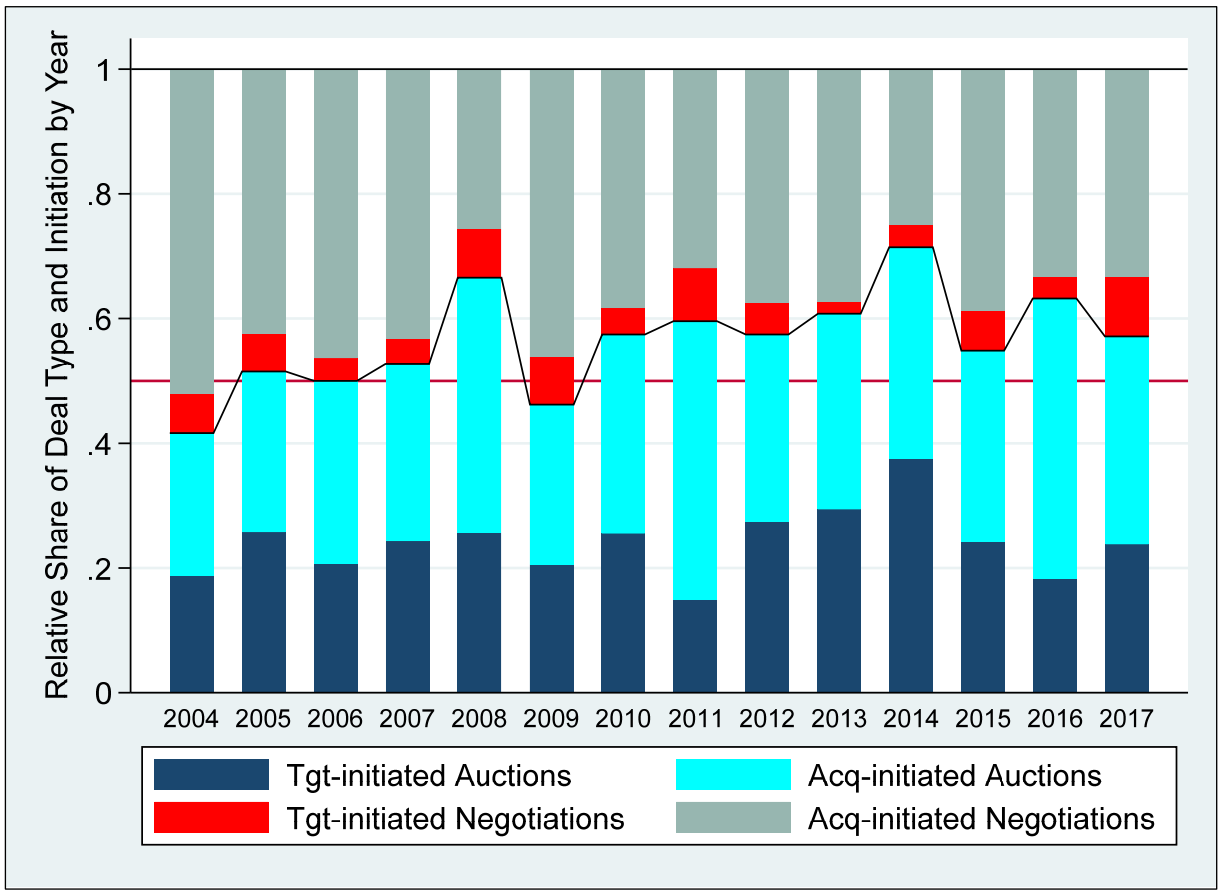
[18] This can be done easily since the figure plots last sale prices relative to the last sale price on day −126 and represents – like takeover premiums – raw returns.

[19] In Table A7 in the Appendix, I show that, after considering potential endogeneity by applying a propensity score matching procedure, premiums between auctions and negotiations are not statistically significantly different. These results hold for different definitions for auctions (classification of BM 2008 vs. "strict" auctions), for different premium measures (six-, three-, and one-month premium), and for different propensity score matching procedures (nearest two neighbor matching, caliper matching, and kernel matching (Epanechnikov)). A simple t-test (differences of sample means) delivers the same results.

Figure 2

Relative Share of Selling Procedure and Initiating Party by Announcement Year (2004–2017)

This figure depicts the relative share of selling procedure (deal type: auction vs. negotiation, based on the definition in BM 2008) and initiating party (acquirer vs. target) based on a sample of 780 public U.S. takeovers over the period from 2004–2017.



Fifth, as the difference-in-means tests in Table 1 suggest, acquirer-initiated auctions are significantly different from target-initiated auctions when focussing on competition measures. Acquirer-initiated auctions exhibit a smaller number of contacted bidders (10.546 vs. 19.891 for target-initiated auctions), fewer signed confidentiality agreements (5.149 vs. 9.864) and fewer submitted proposals (2.562 vs. 3.420). However, when looking at the conversion ratios, acquirer-initiated auctions represent a higher degree of relative competition: the *Proposals-to-CA-Ratio* is significantly higher, and even the one-month premium is approximately 6.5% higher than in target-initiated deals, although weaker statistically significant at the 10% level. This is consistent with the findings in Masulis and Simsir (2018), who note that target economic weakness, financial constraints, and negative economy-wide shocks are important motives for targets initiating the deal, a selection necessary to consider when analyzing deal premiums.

Table 1
Competition Measures and One-Month Target Share Price Premiums in Auctions

Table 1 presents different measures of private takeover competition in auctions, further split by the initiating party. The average one-month premium is also reported. Auctions are defined based on Boone and Mulherin (2008), i.e., deals where at least two prospective bidders sign confidentiality agreements with the target. Means are reported, median values are in angular parentheses (premium in %-points).

Mean [Median]	Obs.	# Contacts	# CAs	# Proposals	Proposals-to-CA-Ratio	Proposals-to-Contacts-Ratio	One-month Premium
All Auctions	411	14.459 [8]	7.168 [4]	2.929 [2]	0.588 [0.500]	0.411 [0.333]	37.379 [29.961]
Tgt-initiated Auctions	176	19.891 [13]	9.864 [7]	3.420 [3]	0.494 [0.444]	0.308 [0.214]	33.635 [24.556]
Acq-initiated Auctions	235	10.546 [5]	5.149 [3]	2.562 [2]	0.658 [0.667]	0.485 [0.400]	40.182 [32.839]
Difference-in-means {p-value}		9.345*** {0.000}	4.715*** {0.000}	0.859*** {0.000}	−0.164*** {0.000}	−0.178*** {0.000}	−6.547* {0.099}

4.3 Theoretical Foundations and Hypothesis Development

4.3.1 Pre-Announcement Competition and Target Share Price Premiums

A common perception in economics is that increased competition for scarce resources results in higher market prices for these resources. This general assumption can be transferred to the market for corporate takeovers as well: the higher competition among bidders for a given target – especially in auctions, the higher the offered bid premium, all else equal.

Theoretical work modeling bidding behavior in corporate takeovers is abundant. Fishman (1988, 1989) shows that a high initial bid premium signals a high bidder valuation and deters competing bids in an environment where bidding is costly (i.e., sunk costs such as information acquisition or entry fees for auctions). Discouraging other bidders through this preemptive bidding strategy is also predicted by the model in Bulow and Klemperer (2009). This work can explain why one-to-one negotiations are not rare and why they do not appear competitive to the outside world. Fishman's model is extended in Dimopoulos and Sacchetto (2014) by another source of high premiums: target resistance. Their model of takeover competition also considers costly sequential entry as established in French and McCormick (1984) and Fishman (1988). They find that even small entry costs are sufficient to rationalize high preemption rates,

but that takeover premiums are, to a large extent, determined by target resistance instead of preemptive bidding. Hansen (2001) highlights and theoretically analyzes stylized facts observed in auctions of companies. Sellers sometimes restrict the number of bidders and accept preemptive bids. He explains these phenomena with the assumption that some information about the target can, if released, reduce firm value. In equilibrium, however, when deciding on the sales process and number of potential bidders, targets outweigh the benefits of getting more bidders with the (indirect) costs of information revelation[20]. Hansen's (2001) work helps to explain why we not always observe auctions, especially in the public phase of the takeover.

The empirical findings of Liu and Officer (2020) build on this theoretical framework. The authors indicate, that the higher the competition, the higher the probability of upward price revisions – assuming no information detrimental to target firm's value is revealed – and the higher target's reservation price in each round of bidding. Exploiting a representative sample of public U.S. takeovers from 1994 to 2016, they find that target firms are able to improve the merger consideration by 8.5% on average through private negotiations. This considerable increase comes on top of an average 34.8% initial premium, resulting in a relative increase of 24.4%. Consistent with prior studies, they find that the price revision during the public phase of the deal, i.e., bid revisions observable by the market, is a mere 1.1%, and only 10% of announced deals receive a public price revision. They conclude that target managers' behavior appears congruent with shareholder wealth maximization, and inconsistent with systematic agency problems.

My central hypothesis is based on the notion that the existence of a competing bidder is a general indication of the desirability of the target. The degree of relative competition is higher, the more potential acquirers from the bidder pool, who already signed confidentiality agreements, also submit their ultimate proposal to buy target shares. Put simply, my hypothesis can be expressed as "premiums are higher, the higher the share of bidders who stay in the game". It assumes that bidding is costly and becomes even more expensive, the longer the potential acquirer remains in the negotiation process. This ex-ante known sunk cost character of bidding ensures that participation of the bidder is driven by its real demand for the target:

[20] I.e., targets trade off the upward potential for higher premiums with competitive information cost.

a positive selection. Hence, the higher premium is the result of higher demand for the target by bidders, reflecting high competition, because the gains from controlling it could be transferable to a larger pool of bidders. As standard theory predicts and as target board fiduciary duties dictate, the winning bidder is the bidder with the highest offer per share. The central testable hypothesis of this chapter thus is:

Hypothesis 1: *The higher the Proposals-to-CA-Ratio,*
the higher the offered target share price premium.

I make one important assumption, namely that participating bidders know of the existence of each other. If one supposes the signing of confidentiality agreements by bidders and the conduction of due diligences for the target as events for which their occurrence is known to respective counterparts, this assumption seems appropriate.

4.3.2 Pre-Announcement Competition and Acquirer Wealth Effects

Auction theory in corporate takeovers (e.g., Hansen (2001)) suggests that bidders only participate in auctions if their expected profit from the bid is positive. Bidders may opt out of the auction at any time, i.e., they self-select to quit, when they perceive the costs of participating as being greater than the benefits from bidding.

Yet some researchers have suggested that, if pressured by competition, managers of potential acquirers over-bid for a target (rational but entrenched CEOs, e.g., de Bodt et al. (2018)), and some even exhibit "hubris" (overconfidence) when competing to win (Roll (1986)). This overbidding phenomenon is generally known as the "winner's curse" (Giliberto and Varaiya (1989)) and has been widely studied in financial economics[21].

The winner's curse is applicable to common value, sealed bid, first price auctions. It states that the winning bidder – who bids the highest price – is "cursed" by paying too much. This suboptimal outcome may arise if this bidder does not properly adjust his bidding strategy for the degree of competition and the degree of uncertainty over the true value of the target

[21] Dasgupta and Hansen (2007) present a broader review of auctions in corporate finance, and also discuss the winner's curse in M&A.

firm. Following the review in Boone and Mulherin (2008), the incidence and magnitude of the winner's curse then is a direct function of the number of bidders and magnitude of uncertainty. Given that the sales procedure in M&A has multiple stages, i.e., from contacting via signing confidentiality agreements and indicating interest to submitting proposals, the total number of bids might only be a noisy measure of obvious competition, as the three exemplary cases in Section 4.2 indicate. Hence, I advocate using the *Proposals-to-CA-Ratio* to gauge the degree of competition, since it better accounts for the latter's evolution during the whole private phase of the deal.

Although the classical M&A selling procedure certainly does not reflect the idealized common value auction mentioned above[22], the current view in empirical research is that if competition is high, overbidding might likely occur (de Bodt et al. (2018), Eckbo and Thorburn (2009)). On average, acquirer shareholders should react negatively if their managers' overbid. Based on prior theoretical predictions and empirical findings, I propose that, if the *Proposals-to-CA-Ratio* measures competition, winning bidder's deal announcement returns should be inversely related to this ratio. This leads to the second hypothesis:

Hypothesis 2: *The higher the Proposals-to-CA-Ratio,*
the lower acquirer cumulative abnormal deal announcement returns.

4.3.3 Post-Bid Competition

Although empirical evidence indicates that the private sales process already seems to "set the stage" in a way that it filters out the highest-valuing bidder – at least in auctions, there is little reason to believe that announcing the bid itself (1) deters prior competitors (i.e., rivals of the announcing bidder during the private phase) from making a topping bid, and (2) deters rival bidders newly informed of target's selling intention in the first place. A competing bid should even be more likely, if the market learns from observing winning bidder's stock price

[22] Reasons are, e.g., its multistage character, private values of bidders that play a key role (e.g., Schwert (1996)), bidders likely observe each other's bids and can react accordingly (information leakage), and the existence of informed and uninformed bidders (bidders likely do not have symmetric information).

reaction on announcement, that the bid is probably value-creating for the acquirer. Consistently, hypothesis 3a predicts:

Hypothesis 3a: *The higher the Proposals-to-CA-Ratio,*
the more likely the emergence of a competing bid for the target,
if original bidder's announcement returns are positive.

Eckbo et al. (2019) note, that under U.S. law governing corporate control transactions, directors of the target board have a fiduciary duty to consider any rival bids that occur before the final (target) shareholder vote. In this way, competing bids might lead to a lower probability of closing the originally announced bid, not only because the competing bid offer per share usually exceeds the original offer price[23], but also because bid consideration and review by target's board significantly increases the time-to-completion. Thus, hypothesis 3b states:

Hypothesis 3b: *The higher the Proposals-to-CA-Ratio,*
the less likely the comsummation of the announced bid,
if original bidder's announcement returns are positive.

4.4 Sample Description, Empirical Design, and Key Variables

4.4.1 Sample Description

To construct the sample, I begin with all M&A deals in Standard & Poor's Capital IQ database announced between January 01, 2004, and December 31, 2017. In order to observe the final outcome, deals must have either been closed or withdrawn within this time period. I then impose the following sample filters, commonly used in empirical M&A literature (e.g., Liu and Officer (2020), Aktas et al. (2010), Offenberg and Pirinsky (2015)): first, both the acquirer and the target are publicly traded companies and are headquartered in the U.S.[24] Second, the

[23] In 76% of my observations the competing offer per share is higher than the offer per share of the original announced bid. Yet this has to be taken with caution since a direct comparison between these two values suffers because of information (positive or negative) that has become known in the meantime.
[24] I require the firms to be based in the U.S. to ensure that U.S. takeover law applies to the deal (one jurisdiction only).

acquirer aims for a change in control and seeks a majority stake in the target firm (i.e., the acquirer owns less than 50% of target's outstanding shares prior to deal announcement). Third, to focus on economically meaningful transactions, I set the minimum transaction value (item "Deal Value", excluding assumed liabilities) to USD 1 mm. These three filters result in a sample of 8,466 transactions. I then merge this dataset with stock price data from the Center of Research in Security Prices (CRSP) to calculate (abnormal) announcement returns for the firms. Finally, I require that merger documents are available on the Securities and Exchange Commission's EDGAR website. This is to make sure that I am able to hand-collect all relevant detailed information[25] on the private sales process related to pre-public deal competition (i.e., initiator of the deal, number of potential acquirers contacted by the target firm, number of potential acquirers signing non-disclosure agreements, number of binding, privately submitted bids to the target with a price to purchase target shares, size of the termination fees, and type of transaction (classical negotiated deals vs. tender offers)). After mapping this dataset with accounting and industry-level data from Compustat, 780 final transactions remain[26].

4.4.2 Empirical Design and Key Variables

The base specification to measure the effect of pre-public competition on target firm's announcement returns and stock price premiums is the following linear fixed effects regression model:

$$\begin{aligned} \textit{Tgt Premium}_{[-k;OPS]i,t} = {} & \alpha_{i,t} + \beta_1 \textit{ Proposals-to-CA-Ratio}_{i,t} + \beta_2 \textit{ Number Proposals}_{i,t} \\ & + \beta_3 \textit{ Tgt Initiation}_{i,t} + \beta_4 \textit{ Auction}_{i,t} + \beta_5 \textit{ Tgt Anti-takeover State}_{i,t} \\ & + \beta_6 \textit{ Acq Industry Count}_{i,t} + \beta_7 \textit{ Tgt Run-up CAR}_{[-m;-(k+1)]i,t} \\ & + \eta \textit{ Deal Characteristics}_{i,t} + \theta \textit{ Acq and Tgt Firm Characteristics}_{i,t} \\ & + \varphi \textit{ Tgt Industry} \times \textit{ Year FE}_{i,t} + \vartheta \textit{ Acq Industry FE}_{i,t} + \varepsilon_{i,t} \end{aligned}$$

[25] These filings are mainly of the following type: S-4 (business combination or exchange offers: deals in connection with the issuance of acquirer shares for the merger), 14D-9 (tender offer solicitation/recommendation statements), and DEFM14A (definitive proxy statement relating to a merger or an acquisition; issued by the target to invite its shareholders to vote on the merger agreement).

[26] Table A2 in the Appendix lists the detailed sample selection process with the number of remaining observations after applying respective filters.

Where i indexes the transaction (i.e., the unique acquirer-target-combination), t indexes the time (i.e., announcement date of the transaction), α is an intercept, and β_1 is the coefficient of primary interest – the estimate of the effect of pre-public takeover competition on target firm's share price premium and cumulative abnormal deal announcement returns. The dependent variable (*Tgt Premium*) is defined as the relative increase of the announced offer price per target share (OPS) to the target's last sale share price one month prior to offer announcement[27], and expressed in percentage points. As a robustness, I also regress target cumulative abnormal deal announcement returns (*Tgt CAR*) on my variable of interest and all other controls. CARs are calculated applying Carhart's (1997) four-factor model, including the momentum factor, to model normal returns, and the model parameters are estimated over the period −250 to −23 trading days (prior) to offer announcement. Choosing the premium over abnormal returns hast two key advantages (Eckbo (2009)): first, it is the direct outcome of the bidding behavior; second, bid premiums are less prone to be affected by rumors shortly before announcement[28]; third, it is not affected by the market's assessment of deal completion.

Proposals-to-CA-Ratio is the main variable of interest and is defined as the number of proposals (*Number Proposals*) for the target firm divided by the number of signed confidentiality agreements (*Number Signed Confidentiality Agreements*) with the target. *Number Proposals* is the number of potential acquirers that privately submitted written offers (bids) to the target firm, shortly before the deal is publicly announced, i.e., at the end of the private takeover process, with a price proposed to buy target shares. *Number Signed Confidentiality Agreements* is the number of potential acquirers that signed confidentiality (non-disclosure) agreements with the target firm after indicating their interest in buying the firm. These detailed data are hand-colletcted from the background section of official SEC merger filings issued by either the target, the acquirer, or both, on or shortly after publicly announcing the proposed takeover. To control for the level of proposals, every regression includes *Number Proposals* as

[27] Besides the one-day, three-day, one-week, one-month, and deal inititation premium (Eaton et al. (2020)), as depicted in the regression equation, I also regress the cumulative abnormal announcement returns (CARs) for the symmetric event windows [–5;+5], [–3;+3], and [–1;+1] around (public) deal announcement on the *Proposals-to-CA-Ratio* as well as all other controls. In untabulated specifications, I also regress the two-month-premium on the same set of variables, for which I find the results to remain unchanged.

[28] In every specification for premiums or abnormal returns I include a tailored run-up control (rumors).

its anchor value[29]. This is important since relative competition might be very different, even if the number of submitted proposals to the target is the same, as the examplary cases in Section 4.2 with three proposals each represent.

I further include *Tgt Initiation*, a dummy variable that equals 1 if the target initiated the deal, 0 otherwise, to control for this likely endogenous decision. Masulis and Simsir (2018) report that targets initiate deals in response to exploring strategic alternatives and find that they often show signs of financial and economic distress and binding financial constraints prior to their initiation. They state consistency with the hypotheses that (1) financially distressed targets seek to avoid expected bankruptcy costs through their sale, and (2) financially constrained targets seek to merge with cash-rich or financially strong partners. Since this very likely changes the bargaining power and associated expected premiums considerably, I include *Tgt Initiation* in every regression throughout this chapter.

Auction is a dummy variable representing the sales procedure. I follow the literature consensus, established in the work of Boone and Mulherin (2007, 2008, 2009), and code *Auction* with a value of 1, if at least two potential acquirers sign a confidentiality (non-disclosure) agreement with the target[30]. *Auction* is included in the baseline regressions, given that this selling method is significantly different from a one-to-one negotiation (Gentry and Stroup (2019)).

Tgt Anti-takeover State is a dummy variable set to 1, if the target firm is headquartered in a state with strong anti-takeover laws, and 0 otherwise. Comment and Schwert (1995) find that the more strict a state's anti-takeover law, the greater the bargaining power of the target. Following Bebchuk and Ferrell (2002), and applied in Boone and Mulherin (2008), states with strong anti-takeover laws are Idaho (ID), Indiana (IN), Maryland (MD), Nevada (NV), Ohio (OH), Pennsylvania (PA), South Dakota (SD), Tennessee (TN), and Wisconsin (WI). A greater

[29] I receive qualitatively and quantitatively similar results if I include *Number Signed Confidentiality Agreements* as the anchor variable instead. Figures A3 and A4 in the Appendix provide strong graphical evidence highlighting different premium levels for various values for the number of proposals.

[30] In M&A, not every selling procedure defined as *Auction* is in similar vein of a classical, open, first price (sealed) bid auction. Therefore, I introduce and include (in untabulated regressions) a dummy variable *Auction (strict)* that equals 1 if there exist at least two interested potential bidders on every stage of the private takeover process (i.e., at least two contacts, two signed confidentiality agreements, and two privately submitted proposals). This does not change the overall results.

bargaining power might lessen the likelihood that the target sells itself via an auction and enables the target to negotiate higher premiums, all else equal. I thus expect the coefficient on *Tgt Anti-takeover State* to be positively related to target announcement returns and premiums.

Since my goal is to distill the effect of *real*, *observable* competition during the pre-public phase of the deal, I include a variable proxying for the degree of *latent* competition. Aktas et al. (2010) find that latent competition increases the bid premium. This potential correlation with both my variable of interest and the outcome variable itself renders *Acq Industry Count* as an important control variable. It is defined as the number of firms in the same SIC4 industry as the acquirer with a market capitalization larger than the acquirer[31], and proxies for unobserved, potential purchasing power of likely acquirers. This variable gauges the potential depth of the demand side of the takeover market to a certain extent. Following this argumentation, I expect the relation between *Acq Industry Count* and target premiums to be positive.

Other variables consist of controls for deal and firm characteristics. Tender offers are usually quicker than negotiations, sometimes circumvent target's management board, and have been found to pay, on average, higher premiums (Offenberg and Pirinsky (2015)). This is explained by a raise in target's reservation price through the acquirer signalling his higher demand for target shares. Horizontal deals have found to be value-creating, which makes it an important control when analyzing bidder returns. Pre-announcement cumulative abnormal returns control for information leakage and are thus expected to be significantly negatively related to announcement returns[32]. Target announcement returns have been found to be higher in cash deals (Eckbo (2009))[33]. I also include *Acq Toehold*, the percentage of target's total common shares outstanding owned by the acquirer. Betton and Eckbo (2000) and Betton, Eckbo, and Thorburn (2008) find that it leads to lower premiums for the winning bidder

[31] One caveat of this literature definition is that it only accounts for firms assigned to the same SIC4 industry, i.e., it does not capture potential purchasing power arising from other industries. I remedy this concern by testing with broader measures (on SIC3, SIC2, and SIC1 level) as well (untabulated).

[32] The more information is leaked into the market prior to announcement, the less the surprise effect on announcement, all else equal.

[33] Explanations range from the tax hypothesis (implied immediate capital gains tax penalty for target shareholders forces acquirers to pay higher premiums as a refund for paid taxes) and corporate control concerns (cash is selected by the acquirer to avoid diluting their private benefits of control in the merged firm) to behavioral motives, market timing, and asymmetric information (adverse selection: bidder uses overpriced stock as the method of payment to lock in this financial advantage).

through its effect as an entry deterrence for rivals. Offenberg and Pirinsky (2015) also find that acquirers are more likely to choose a tender offer when they have made some prior relationship-specific investment in the target. A relative size control is included to address potential effects of unequal bargaining power, and termination fee measures are also added to control for anticipated value effects if deals are abandoned after announcement. All remaining covariates (market capitalization of the acquirer, market-to-book ratios, stock return volatility, and institutional ownership) are included to partial out their effect on deal announcement returns. Especially target undervaluation could also lead to higher competition.

All regressions include industry-year fixed effects (Gormley and Matsa (2014)) based on the first SIC digit and announcement year to control for unobserved heterogeneity that could affect my variable of interest, the dependent variable, and all other controls (e.g., Betton et al. (2008)). This reduces endogeneity concerns in the form of omitted variable bias in that it removes the influence of unobserved covariates that are constant across industry-years and potentially correlated with all variables. This could take the form of, e.g., certain shocks to competition, deal premiums, and other controls in different industries and over time: economic recessions, e.g., are known to tighten financing conditions (Harford (2005)). This could reduce the number of potential bidders and decrease overall competition. All variables are defined in detail in Table A1 in the Appendix, which also includes the respective source of the data.

4.5 Empirical Results

4.5.1 Summary Statistics

Table 2 presents summary statistics of the sample consisting of 780 public-public U.S. transactions over the time period from January 01, 2004 to December 31, 2017. The average one-month premium is 37.18%, with a somewhat smaller median value (30.83%). This positively skewed distribution is typical for all measures of M&A premiums (e.g., Betton et al. (2008), Liu and Officer (2020)). The average initiation premium (Eaton et al. (2020)) is larger than the average one-month premium, consistent with stock price run-ups starting already at early stages of deal negotiations. Target cumulative abnormal deal announcement returns

amount to 25% on average, similar to other studies, such as, e.g., Boone and Mulherin (2007). Acquirer returns mimic a stylized fact of shareholder wealth changes through M&A: they are negative yet small for public deals (Eckbo (2009)). 95% of deals are completed and 3% receive competing bids from a different bidder during the public phase of the (pending) takeover. Similar to Table 1 in Section 4.2, the number of participating bidders decreases from stage to stage. The average number of contacted bidders is 8.7, 4.5 sign confidentiality agreements, and 2.1 bidders submit proposals to the target, on average. It is important to mention that these values are higher in auctions compared to one-to-one negotiations, since one-to-one negotiations receive by definition only one confidentiality agreement and one offer. The main variable of interest, the *Proposals-to-CA-Ratio*, has a mean of 0.768, suggesting that approximately three out of four potential acquirers who sign confidentiality agreements also submit bids. The alternative measure, the *Proposals-to-Contacts-Ratio*, is smaller, consistent with the notion that some contacted bidders drop out of the negotiation process.

Table 2
Summary Statistics

Table 2 reports summary statistics of the sample consisting of 780 public-public U.S. transactions announced and either closed or withdrawn between January 01, 2004 and December 31, 2017. Number indices display the point in time (i.e., trading day) relative to the offer announcement (OA) date when the variable was measured. Letter indices refer to the variable the non-indexed variable is scaled with, i.e., $BTF\ Size_{\ Deal\ Value}$ is the USD amount of the bidder termination fee scaled (divided) by the USD amount of *Deal Value*. Cumulative abnormal returns (*CAR*) are measured in symmetric event windows around deal announcement, applying a Carhart (1997) four-factor-model to model normal returns. The model parameters are estimated over the period −250 to −23 trading days (prior) to offer announcement. All deal competition measures are obtained by parsing the background section of the merger agreements (S-4, 14D-9 and/or DEFM14A SEC filings). All CARs, Premiums, Market-to-Book ratios, and $Relative\ Size\ Market\ Cap_{\ [OA-22]}$ are winsorized at the 1st and 99th percentile. All variables are defined in detail in Table A1 in the Appendix.

	Summary Statistics					
Variables	Obs.	Mean	Median	Std. Dev.	Min.	Max.
Panel A: Cumulative Abnormal Announcement Returns, Target Share Price Premiums, and Deal Competition Measures						
Tgt CAR $_{[-1;+1]}$	780	24.942	20.640	22.778	−19.906	124.937
Tgt CAR $_{[-3;+3]}$	780	25.418	21.935	23.275	−23.914	129.171
Tgt CAR $_{[-5;+5]}$	780	26.194	22.511	24.002	−26.272	132.542
Premium $_{1\ Day}$	780	30.795	25.668	27.781	−25.507	238.866
Premium $_{3\ Day}$	780	32.034	27.359	28.621	−25.507	260.825
Premium $_{1\ Week}$	780	32.638	27.989	29.492	−29.996	255.073
Premium $_{1\ Month}$	780	37.180	30.826	35.282	−59.253	378.516
Premium $_{Initiation}$	406	38.281	34.060	34.306	−64.126	165.748

Acq CAR [−1;+1]	677	−1.265	−0.843	6.108	−20.719	23.916
Acq CAR [−3;+3]	677	−1.403	−1.173	6.980	−26.889	27.097
Acq CAR [−5;+5]	675	−1.549	−1.096	7.902	−29.097	31.458
Deal Completion	780	0.954	1	0.210	0	1
Competing Bid	780	0.028	0	0.166	0	1
Number Contacts	763	8.692	2	17.006	1	180
Number Signed Confidentiality Agreements	732	4.463	2	7.370	1	77
Number Proposals	780	2.144	1	1.821	1	15
Proposals-to-CA-Ratio	732	0.768	1	0.307	0.026	1.500
Proposals-to-Contacts-Ratio	763	0.663	1	0.373	0.009	1.000

Panel B: Deal Characteristics and Cumulative Abnormal Run-up Returns

Tgt Initiation	780	0.297	0	0.457	0	1
Auction	780	0.588	1	0.492	0	1
Tgt Anti-takeover State	780	0.182	0	0.386	0	1
Acq Industry Count	780	40.844	8	68.268	0	487
Tgt Industry Count	764	74.610	23	111.930	0	566
Deal Value	780	2.786	0.519	6.987	0.010	79.406
Friendly	780	0.996	1	0.062	0	1
Cash Only	780	0.408	0	0.492	0	1
Tender Offer	780	0.159	0	0.366	0	1
Horizontal Takeover	780	0.485	0	0.500	0	1
Relative Size Market Cap [OA–22]	780	46.580	6.624	167.217	0.333	1,792.928
Relative Size Market Cap [OA–126]	777	39.099	6.336	114.727	0.569	935.260
Acq Toehold [OA–1]	780	0.320	0.000	3.460	0.000	45.386
Acq Toehold [OA–126]	780	0.026	0.000	0.243	0.000	4.214
BTF Size Deal Value	780	1.226	0.000	2.454	0.000	30.214
TTF Size Deal Value	780	3.327	3.347	1.478	0.000	30.171
Tgt Run-up CAR [−42;−2]	780	4.888	3.377	17.585	−56.075	89.633
Tgt Run-up CAR [−42;−4]	780	4.414	3.407	17.045	−56.558	86.435
Tgt Run-up CAR [−42;−6]	780	3.694	2.345	16.242	−57.144	81.719
Tgt Run-up CAR [−252;−23]	752	−3.070	−2.157	53.476	−215.808	206.447
Acq Run-up CAR [−42;−2]	675	0.227	0.102	10.454	−33.601	45.635
Acq Run-up CAR [−42;−4]	675	0.298	0.325	10.010	−37.145	43.978
Acq Run-up CAR [−42;−6]	675	0.290	−0.053	9.833	−35.638	44.146

Panel C: Acquiring Firm Characteristics

Acq Market Cap [OA–22]	780	22.073	3.091	50.803	0.014	534.879
Acq Market Cap [OA–126]	780	21.208	2.880	49.220	0.021	441.492
Acq Market-to-Book [OA–22]	780	3.519	2.221	5.691	0.429	76.642
Acq 1YR Stock Return Volatility [OA–1]	780	29.673	26.034	15.024	4.322	122.573
ln Acq 1YR Stock Return Volatility [OA–1]	780	3.289	3.259	0.437	1.464	4.809
Acq Institutional Own Sum [OA–1]	780	49.088	49.093	19.007	0.481	95.761

Panel D: Target Firm Characteristics

Tgt Market-to-Book [OA–22]	780	2.967	1.886	4.083	0.197	35.653
Tgt Market-to-Book [OA–126]	777	2.719	1.867	2.831	0.401	19.362
Tgt 1YR Stock Return Volatility [OA–1]	780	40.597	34.951	25.007	8.231	229.343
ln Tgt 1YR Stock Return Volatility [OA–1]	780	3.561	3.554	0.519	2.108	5.435
Tgt Institutional Own Sum [OA–1]	780	56.641	59.062	26.077	0.355	99.729
Tgt Institutional Own Sum [OA–126]	771	52.115	54.271	26.782	0.000	99.994

Tgt Institutional Own Herf [OA–1]	780	0.033	0.024	0.049	0.000	0.710
Tgt Institutional Own Herf [OA–126]	771	0.031	0.023	0.048	0.000	0.681
Tgt Return on Assets [OA–126]	780	−0.009	0.011	0.136	−0.750	0.219
Tgt Sales Growth	716	12.735	6.544	46.853	−99.327	882.622
Tgt R&D Intensity [OA–126]	780	0.110	0.000	0.604	0.000	10.709
Tgt Sales Herfindahl	762	0.171	0.131	0.156	0.010	1.000

(Table 2 continued)

In about 30% of the cases the target initiates the deal. This rate is significantly higher in auctions compared to one-to-one negotiations, and similar to the initiation rate obtained in Masulis and Simsir (2018) and Heitzman (2011). The share of auctions in the sample is 58.8%, consistent with Schlingemann and Wu (2015), and slightly larger than the corresponding share in Boone and Mulherin (2008). About 18% of targets are headquartered in anti-takeover states as defined in Bebchuk and Ferrell (2002). The average deal size is USD 2.8 bn, a value typical for public-public transactions (e.g., Dimopoulos and Sacchetto (2014) and de Bodt et al. (2018)). All other deal characteristics, in particular *Friendly*, *Cash Only*, *Tender Offer*, *Horizontal Takeover*, *Relative Size Market Cap* *[OA–22]*, and termination fees are consistent with empirical M&A literature. Target run-up returns are significantly positive over the two months preceding deal announcement, but are negative if measured from one year prior to one month before announcement (*Tgt Run-up CAR* *[–252;–23]*). This is congruent with the literature indicating that targets are often firms that underperformed before being taken over.

4.5.2 Private Takeover Competition, Deal Premiums, and Target Announcement Returns

Hypothesis 1 predicts a positive relation between pre-announcement competition and takeover premiums. This relation is based on the notion that bidding is costly, resulting in only credible bids made for the target (positive selection). If the *Proposals-to-CA-Ratio* is high, the stronger the obvious demand for the target, because all else equal, the gains from controlling the target then seem to be transferable to a larger pool of bidders. The more bidder stay in the negotiation process, the more likely are bid revisions, and the higher is the expected offer per share (i.e., premium).

Table 3 presents the baseline results of linear fixed effects regressions of various measures of target share price premiums on the *Proposals-to-CA-Ratio*. Controlling for a large vector of covariates, the coefficient on the variable of interest is positive and statistically highly

significant at the 1% level. The results hold for cumulative abnormal deal announcement returns as well, except for the initiation premium, for which the coefficient is significant at the 5% level[34]. Multiplying the marginal effect with the standard-deviation of the ratio underlines its economical significance: a one-standard deviation increase of this ratio corresponds to a 9.29% increase of the one-month premium and a 5.99% increase of the deal initiation premium. Consistent with theoretical predictions in Section 4.3, the coefficients for both *Tgt Anti-takeover State* and *Acq Industry Count* are positive and significant. Targets from anti-takeover states receive, on average, 7.6% higher one-month premiums, and each additional firm in acquirer's SIC4 industry larger than the acquirer corresponds to an one-month premium increase of 6.8 basis points, all else equal. This suggests that increased bargaining power of the target and latent competition among potential acquirers seem to have a positive effect on deal premiums, which is in line with the results obtained in Aktas et al. (2010). As expected, the run-up returns are highly significantly negatively related to announcement returns and premiums. This is what one would expect, since if information about a likely takeover is already leaked (i.e., priced) into the market, the surprise effect on announcement should be comparatively smaller.

Another stylized fact of announcement returns is that reactions are more positive if the deal currency consists entirely of cash (e.g., Betton et al. (2008), Boone and Mulherin (2007, 2008, 2011)). Accordingly, paying purely with cash increases the seven-day symmetric abnormal announcement returns for target's stock by approximately 7.7% on average, compared to deals including at least a portion paid with stock. Another reason for these significantly positive returns could be explained by taking on a price risk perspective: paying with acquirer's stock makes target shareholders' expected value from the deal dependent on acquirer's stock price reactions during the pricing period. This risk is completely avoided when receiving cash only. Offenberg and Pirinsky (2015) show that tender offers are often structured as cash offers. Their model predicts faster completion times for tender offers compared to non-tender offers, and they show that premiums are higher because tendering signals acquirer's higher demand for target shares. This is consistent with my findings of a positive and statistically significant

[34] Not every filing contains the exact deal initiation date, the reason why the number of observations drops, which might explain weaker significance. Following the suggestions in Eaton et al. (2020), I receive highly statistically significant results when using the six-month premium as default (i.e., when there is no initiation date mentioned in the respective filing).

Table 3

Private Takeover Competition, Target Announcement Returns, and Takeover Premiums

Table 3 presents the results of linear fixed effects regressions of *Target Cumulative Abnormal Returns* (regressions (1)–(3)) and *Target Share Price Premium* (regressions (4)–(8)) on the variable of interest, the *Proposals-to-CA-Ratio*, which is defined as the ratio between the number of privately submitted proposals to the target firm at the end of the private takeover process divided by the number of signed confidentiality (non-disclosure) agreements. I further include control variables as defined in Section 4.4. All regressions include *Target Industry* × *Year Fixed Effects*, *Acquirer Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Cumulative Abnormal Returns			Target Share Price Premium				
Event Window	[–1;+1]	[–3;+3]	[–5;+5]	1 Day	3 Day	1 Week	1 Month	Initiation
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Deal Characteristics								
Proposals-to-CA-Ratio	11.890***	11.447***	12.059***	18.331***	19.258***	20.979***	30.238***	19.507**
	(3.979)	(4.268)	(4.315)	(3.943)	(4.386)	(4.464)	(5.233)	(9.745)
Number Proposals	−0.754	−0.794	−0.922*	−0.621	−0.848	−0.660	−1.029	−1.476
	(0.493)	(0.522)	(0.518)	(0.543)	(0.550)	(0.585)	(0.801)	(1.708)
Tgt Initiation	0.784	−0.026	−0.783	1.202	0.568	−0.132	2.336	−2.133
	(1.792)	(1.827)	(1.908)	(1.993)	(2.029)	(2.134)	(2.734)	(4.232)
Auction	2.828	3.158	4.150	4.122	5.457	5.815*	9.055**	7.247
	(2.921)	(3.004)	(3.134)	(3.065)	(3.426)	(3.493)	(4.445)	(6.879)
Tgt Anti-takeover State	5.257***	5.227***	5.360***	5.007**	5.770**	6.063***	7.620***	5.352
	(1.661)	(1.666)	(1.626)	(2.046)	(2.269)	(2.249)	(2.680)	(4.081)
Acq Industry Count	0.015	0.009	0.006	0.048***	0.042***	0.046***	0.068***	0.030*
	(0.015)	(0.015)	(0.017)	(0.014)	(0.012)	(0.015)	(0.017)	(0.017)
Tgt Run-up CAR $_{[-42;-2]}$	−0.209***			−0.297***				
	(0.055)			(0.074)				
Tgt Run-up CAR $_{[-42;-4]}$		−0.220***			−0.303***			
		(0.069)			(0.073)			
Tgt Run-up CAR $_{[-42;-6]}$			−0.222***			−0.356***		
			(0.065)			(0.078)		
Tgt Run-up CAR $_{[-252;-23]}$							−0.060	
							(0.037)	

Deal Value	−0.303***	−0.262**	−0.244**	−0.126	−0.120	−0.134	−0.319	0.349
	(0.110)	(0.114)	(0.107)	(0.160)	(0.148)	(0.146)	(0.208)	(0.252)
Friendly	−6.757	−7.094	−4.313	−23.392	−24.433	−22.456	9.670	17.077*
	(16.113)	(17.773)	(15.881)	(29.771)	(30.558)	(30.518)	(9.946)	(9.926)
Cash Only	8.018***	7.702***	6.840***	6.017**	4.746*	6.129**	3.551	−4.428
	(2.264)	(2.363)	(2.425)	(2.742)	(2.651)	(2.606)	(2.983)	(16.331)
Tender Offer	6.174**	6.218**	6.930**	8.514**	9.018**	7.832**	12.141**	6.423
	(2.520)	(2.668)	(2.751)	(3.358)	(3.629)	(3.948)	(5.638)	(10.771)
Horizontal Takeover	2.892*	3.229*	3.088*	1.075	0.852	0.361	−2.600	−0.395
	(1.576)	(1.677)	(1.762)	(2.184)	(2.299)	(2.439)	(2.556)	(4.428)
Relative Size Market Cap [OA–22]	0.018**	0.018**	0.019**	0.025***	0.023**	0.023***	0.022**	0.068***
	(0.008)	(0.009)	(0.009)	(0.010)	(0.009)	(0.008)	(0.009)	(0.015)
Acq Toehold [OA–1]	−0.640***	−0.607**	−0.603**	−0.656***	−0.674***	−0.622***	−0.398	−1.554***
	(0.223)	(0.237)	(0.241)	(0.191)	(0.197)	(0.198)	(0.242)	(0.391)
BTF Size Deal Value	−1.183***	−1.183***	−1.271***	−1.162**	−1.206**	−1.158**	−1.164*	−2.893***
	(0.402)	(0.397)	(0.416)	(0.512)	(0.520)	(0.517)	(0.659)	(1.086)
TTF Size Deal Value	0.536	0.307	0.409	0.000	0.238	0.880	0.774	0.756
	(0.756)	(0.775)	(0.834)	(0.802)	(0.891)	(0.937)	(1.210)	(1.807)
Acquiring Firm Characteristics								
Acq Market Cap [OA–22]	0.003	0.003	0.003	−0.018	−0.004	−0.021	0.039	−0.104
	(0.026)	(0.027)	(0.027)	(0.036)	(0.037)	(0.036)	(0.046)	(0.075)
Acq Market-to-Book [OA–22]	0.031	0.020	0.080	0.070	0.034	0.029	0.195	0.648*
	(0.086)	(0.081)	(0.092)	(0.182)	(0.175)	(0.165)	(0.176)	(0.354)
ln Acq 1YR Stock Return Volatility [OA–1]	−5.918**	−6.162***	−6.025**	−4.706	−4.812	−5.406**	−8.735**	1.988
	(2.389)	(2.285)	(2.326)	(2.993)	(2.929)	(2.713)	(3.896)	(6.480)
Target Firm Characteristics								
Tgt Market-to-Book [OA–22]	−0.447*	−0.568**	−0.644**	−1.004***	−1.054***	−1.037***	−0.937***	−1.387*
	(0.236)	(0.261)	(0.264)	(0.329)	(0.337)	(0.336)	(0.356)	(0.783)
ln Tgt 1YR Stock Return Volatility [OA–1]	9.867***	10.309***	10.914***	16.534***	15.178***	14.738***	20.445***	16.120***
	(2.718)	(2.731)	(2.740)	(3.852)	(3.593)	(3.842)	(5.520)	(5.469)
Tgt Institutional Own Sum [OA–1]	−0.111**	−0.115***	−0.114**	−0.118**	−0.120***	−0.138***	−0.128*	−0.222*
	(0.043)	(0.042)	(0.044)	(0.046)	(0.046)	(0.047)	(0.066)	(0.116)
Tgt Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	732	732	732	732	732	732	704	406
Adjusted R^2	0.208	0.195	0.193	0.206	0.193	0.199	0.187	0.215

(Table 3 continued)

coefficient on *Tender Offer*. However, given their different course of the selling procedure, I additionally test hypothesis 1 for the subsample of auctions excluding tender offers. The results are deferred to the Appendix (Table A5). The coefficient on *Horizontal Takeover* is positive but only weakly significant at the 10% level. Explaining positive target returns with higher premiums paid because of a higher synergy potential has thus to be taken with caution. In line with the literature (e.g., Boone and Mulherin (2007)), the coefficient on relative size is also positive and significant in every specification. This suggests that merging with a relatively large acquirer is good news for the target. Reflecting the result in Betton and Eckbo (2000), having a toehold in the target firm results in lower premiums paid for the target, and subsequently lower announcement returns. Toehold's entry deterrence effect might lead to less aggressive, less preemptive bidding behavior. In addition, all variance inflation factors (vifs) are below 2.5, suggesting that multicollinearity[35] is very likely not at play. By successively adding control variables to the univariate regression depicted in Table A3 in the Appendix (modular regression setup), I show that the relation between competition and target premiums holds independently of the inclusion of certain controls. This is to mitigate concerns that the effect is the simple byproduct of a specifically fitted regression model.

Taken together, controlling for factors explaining announcement effects, deal premiums and latent competition, I find strong empirical support for hypothesis 1.

4.5.3 Private Takeover Competition and Acquirer Announcement Returns

Strong competition among bidders is generally linked to a more negative outcome for the winning acquirer due to overbidding (Roll (1986), de Bodt et al. (2018)). I argue that the richness of the typical M&A selling procedure is not captured by pure auction models which assume that acquirers should expect a positive value from the bid. The assumptions of the winner's curse do not perfectly hold in reality, but empirical literature also cannot reject the

[35] It is important no note that even if multicollinearity would exist, coefficients will still be unbiased. The sample distribution of the coefficients will still be centered on the true values. The only thing that changes is the chance of a Type II error (i.e., failure to reject a false null hypothesis of no effect of the explanator due to inflated standard errors), which generally increases if multicollinearity is at play.

existence of overbidding. Hypothesis 2 thus predicts that the *Proposals-to-CA-Ratio* is inversely related to acquirer deal announcement returns.

Table 4
Private Takeover Competition and Acquirer Announcement Returns

The following table depicts the results of linear fixed effects regressions of *Acquirer Cumulative Abnormal Returns* on the variable of interest, the *Proposals-to-CA-Ratio*, which is defined as the ratio between the number of privately submitted proposals to the target firm at the end of the private takeover process divided by the number of signed confidentiality (non-disclosure) agreements. Specifications (5) and (6) show the results for diversifying and horizontal takeovers, respectively. A deal is classified as horizontal if the acquirer and the target share the same SIC4 industry, and classified as diversifying if not. I further include control variables as defined in Section 4.4. All regressions include *Acquirer Industry* × *Year Fixed Effects*, *Target Industry Fixed Effects* (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Acquirer Cumulative Abnormal Returns					
Sample	Full Sample			Auctions Only		
Event Window	[–1;+1]	[–3;+3]	[–5;+5]	[–3;+3]		
Subsample					Diversify.	Horizont.
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Deal Characteristics						
Proposals-to-CA-Ratio	−2.303**	−3.220**	−2.424*	−2.839**	−4.393***	0.161
	(1.005)	(1.229)	(1.443)	(1.359)	(1.513)	(2.187)
Number Proposals	0.056	0.003	−0.069	0.082	0.546	−0.553*
	(0.183)	(0.194)	(0.238)	(0.225)	(0.392)	(0.281)
Tgt Initiation	−0.298	−1.057	−1.003	−0.320	−1.752	0.819
	(0.588)	(0.659)	(0.764)	(0.997)	(1.259)	(1.690)
Auction	−1.633**	−2.003**	−1.556			
	(0.704)	(0.821)	(0.939)			
Tgt Anti-takeover State	−0.435	−0.892	−1.189	−0.443	0.255	−0.568
	(0.576)	(0.659)	(0.769)	(0.786)	(1.139)	(1.327)
Acq Industry Count	0.004	0.005	0.006	0.008	0.008	0.006
	(0.004)	(0.005)	(0.006)	(0.007)	(0.009)	(0.013)
Acq Run-up CAR $_{[-42;-2]}$	−0.034					
	(0.025)					
Acq Run-up CAR $_{[-42;-4]}$		−0.022		0.057	0.113**	0.112
		(0.032)		(0.049)	(0.046)	(0.075)
Acq Run-up CAR $_{[-42;-6]}$			−0.027			
			(0.035)			
Deal Value	−0.070**	−0.081**	−0.095**	−0.065	−0.051	0.002
	(0.031)	(0.037)	(0.042)	(0.067)	(0.129)	(0.081)
Friendly	3.733**	2.181	1.700	3.663		
	(1.700)	(2.050)	(2.262)	(2.413)		
Cash Only	2.705***	2.210**	2.131*	2.447**	3.395**	2.642
	(0.705)	(0.892)	(1.082)	(1.216)	(1.516)	(2.125)
TTF Size $_{\text{Deal Value}}$	0.226**	0.209**	0.105	0.061	0.092	−1.363*
	(0.104)	(0.082)	(0.110)	(0.091)	(0.064)	(0.712)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	No
Observations	732	732	732	421	217	204
Adjusted R^2	0.087	0.085	0.069	0.090	0.149	0.040

(Table 4 continued)

Table 4 shows the results of the analysis of acquirer announcement returns. The coefficient on the *Proposals-to-CA-Ratio* is negative and statistically significant at the 5% level for the [–1;+1] and [–3;+3] window, and somewhat weaker significant for the [–5;+5] window. All specifications are adjusted to control for acquirer-related covariates. The results hold for the full sample controlling for one-to-one negotiations, as well as for the subsample of auctions, where the relation should exist by definition. *Deal Value* is negatively related to acquirer announcement returns, consistent with Liu and Officer (2020). Paying purely with cash is positively and significantly correlated with returns, following theoretical predictions of adverse selection (overvaluation). Specifications (5) and (6) split the subsample of auctions in diversifying and horizontal takeovers. Interestingly, the inverse relation of competition and acquirer announcement returns seems to be mainly driven by competition in diversifying deals[36]. Untabulated regressions and literature consensus highlight that horizontal deals are generally considered as value-creating transactions, where higher synergy potentials between the merging parties rationalize higher premiums. Conversely, if synergy potential is on average lower in diversifying deals, high competition among bidders might explain this result – if overbidding is at work – and lowers the winning bidder's share of remaining synergy gains. The higher likelihood of overbidding in diversifying deals could be the result of acquirers being less skilled in evaluating the target's business and industry, resulting in less precise valuations for the target (i.e., acquirers' valuations for the target have a higher standard deviation in diversifying transactions). Thus, the empirical evidence in Table 4 supports the prediction of hypothesis 2.

4.5.4 Post-Announcement Competition and Takeover Outcomes

Making a public bid for the target likely does not decrease competition. Hypothesis 3a states that high pre-announcement competition should be correlated with post-announcement

[36] In untabulated regressions, I also include an interaction term (Diversifying × Proposals-to-CA-Ratio), which delivers similar results.

competition, and that this effect should be more pronounced, if the market learns from observing positive bidder returns that the deal is likely value-creating. This stock price reaction could lure rival bidders after public announcement: a competing bid made either by a bidder who slightly lost during the private phase or by a bidder newly informed that the target is on sale. In most of the cases, a rival bid is made if there exists a bidder who has an even higher reservation value for the target. Table 5 presents the results of fixed effects logit regressions of *Competing Bid*, a dummy variable that equals 1 if a public bid is made by a bidder different to the original announcing bidder[37] during the public phase of the pending deal, and 0 otherwise. The coefficient on the *Proposals-to-CA-Ratio* is positive, but only weakly statistically significant (regression (1)). This changes if I interact the ratio with *Pos. Acq OA Reaction*, a dummy variable equal to 1 if acquirer's [–5;+5] abnormal announcement returns are positive, and 0 otherwise. The coefficient becomes statistically more significant (regression (2)). The results hold if I split the sample by the median value of acquirer announcement reactions as a robustness test. Specification (3) shows the results for the subsample of values above the sample median. Consistent with hypothesis 3a, the positive relation between pre-public competition and the probability of receiving a competing bid is particularly strong. To the contrary, specification (4) yields an insignificant, even negative correlation, also supporting hypothesis 3a.

If competing bids are made, the probability of completing the originally announced bid generally decreases. Since target boards, following their Revlon duties[38], have to consider any bid made prior to successful shareholder approval, competing bids usually result in a longer public phase of the pending takeover. Hypothesis 3b predicts that deal completion should be less likely, if competition is high and rival bidders are lured through observing positive acquirer announcement returns. Specifications (5) and (6) show the results for the total sample, i.e., including negotiations. The coefficient on the *Proposals-to-CA-Ratio* is negative and statistically significant. The marginal effect increases if I focus on the subsample of auctions. As predicted by hypothesis 3b, the inverse relation between pre-public competition and deal completion seems to be more pronounced, if acquirer returns are positive (regression model (7)).

[37] This is to make sure that my algorithm does not include public bid revisions by the original acquirer.
[38] Revlon, Inc. v. MacAndrews & Forbes Holdings, Inc., 506 A.2d 173 (Del. 1986), available online: https://law.justia.com/cases/delaware/supreme-court/1986/506-a-2d-173-1.html (permanent link).

Table 5
Private Takeover Competition, Post-Bid Competition, and Takeover Outcomes

Table 5 shows the results of fixed effects logit regressions of *Competing Bid*, a dummy variable that equals 1 if the announced deal receives at least one another bid from a bidder different to the original acquirer before the original announced deal is either closed or withdrawn, 0 otherwise, on the variable of interest, the *Proposals-to-CA-Ratio*, which is defined as the ratio between the number of privately submitted proposals to the target firm at the end of the private takeover process divided by the number of signed confidentiality (non-disclosure) agreements (regressions (1)–(4)). I further include control variables as outlined in Section 4.4. In the last six columns (regressions (5)–(10)), I regress *Deal Completion*, a dummy variable that equals 1 if the announced transaction was closed successfully within the sample period, and 0 otherwise, on the same set of variables. Specifications (2) and (7) include an interaction term of the Proposals-to-CA-Ratio and *Pos. Acq OA Reaction*, which is a dummy variable set to 1 if cumulative abnormal deal announcement returns of the acquiring firm ($Acq\ CAR_{[-5;+5]}$) are strictly positive, and 0 otherwise. Regressions (3) and (9) restrict the sample to observations in which the cumulative abnormal deal announcement returns of the acquiring firm ($Acq\ CAR_{[-5;+5]}$) are above the sample median (*Above Med. Acq OA Reaction*), whereas in regressions (4) and (10) the sample is restricted to the observations below the sample median (*Below Med. Acq OA Reaction*), respectively. All regressions include *Acquirer Industry* × *Resolution Year Fixed Effects*, *Target Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Competing Bid				Deal Completion					
Sample	Full Sample		Above Med. Acq OA Reaction	Below Med. Acq OA Reaction	Full Sample			Auctions Only	Above Med. Acq OA Reaction	Below Med. Acq OA Reaction
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Deal Characteristics										
Proposals-to-CA-Ratio	1.627*	−0.637	5.885**	−0.636	−2.167**	−2.336***	−1.042	−3.726**	−5.469*	−1.556
	(0.891)	(1.460)	(2.824)	(3.157)	(1.049)	(0.906)	(1.160)	(1.580)	(2.949)	(1.167)
	[3.836]		[359.553]	[0.529]	[0.119]	[0.091]		[0.021]	[0.004]	[0.223]
Proposals-to-CA-Ratio × Pos. Acq OA Reaction		6.315**					−4.674***			
		(2.563)					(1.711)			
Pos. Acq OA Reaction		−5.283**					3.882**			
		(2.273)					(1.545)			

Number Proposals	−0.164 (0.205) [0.758]	0.036 (0.220)	−0.956 (0.622) [0.384]	0.038 (0.268) [1.038]	−0.305*** (0.079) [0.757]	−0.282*** (0.079) [0.719]	−0.369*** (0.100)	−0.459*** (0.129) [0.643]	−0.851*** (0.302) [0.427]	−0.275** (0.121) [0.758]
Tgt Initiation	−0.228 (0.705) [0.981]	−0.196 (0.715)	0.804 (1.744) [2.235]	−0.144 (1.270) [0.866]	0.192 (0.517) [1.088]	0.203 (0.504) [1.294]	−0.183 (0.621)	0.370 (0.553) [1.791]	−0.778 (1.526) [0.459]	0.533 (0.694) [1.659]
Auction	1.167* (0.598) [3.865]	1.046 (0.724)	4.233*** (1.573) [68.943]	1.196 (3.441) [3.307]	0.258 (0.539) [1.148]		0.468 (0.583)		3.719*** (1.128) [41.230]	−0.506 (0.540) [0.626]
Tgt Anti-takeover State	−0.704 (0.808) [0.525]	−0.568 (0.857)	−1.492 (1.253) [0.225]	−0.833 (1.220) [0.435]	−0.149 (0.512) [0.778]	−0.146 (0.508) [0.689]	−0.172 (0.519)	−0.658 (0.816) [0.425]	−0.813 (0.944) [0.443]	−0.296 (0.748) [0.718]
Acq Industry Count	−0.001 (0.007) [0.997]	−0.006 (0.008)	−0.009 (0.018) [0.991]	0.002 (0.011) [1.002]	0.001 (0.005) [1.001]	0.001 (0.005) [1.001]	0.017** (0.008)	−0.004 (0.011) [0.994]	0.012 (0.009) [1.012]	0.026** (0.013) [1.027]
Deal Value	−0.004 (0.031) [0.963]	0.003 (0.034)	0.022 (0.063) [1.023]	0.030 (0.054) [1.031]	−0.065** (0.027) [0.941]	−0.064** (0.026) [0.918]	−0.050* (0.029)	−0.157*** (0.043) [0.816]	−0.135*** (0.041) [0.874]	−0.062** (0.030) [0.940]
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry × Resolution Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	780	690	304	304	780	780	690	359	327	327
Pseudo R^2	0.358	0.429	0.558	0.538	0.320	0.315	0.344	0.709	0.509	0.251

(Table 5 continued)

In the logit model without interaction terms, I include x-standardized odds ratios [in angular parentheses] that relate to the change in the probability of the dependent variable taking on the value of one for a one-standard deviation increase in the independent variable. I do this to show the relative importance of covariates: a one-standard deviation increase of the *Proposals-to-CA-Ratio* hence corresponds to a statistically and economically significant 130% increased probability of receiving a rival bid prior to closing, and a 44.5% increased probability of cancelling the originally announced deal (measured relative to the unconditional probability). Due to their nature as being non-linear models, the coefficients and their economic magnitudes are hard to interpret in logit (and probit) models[39]. The coefficients in Table 5 are average effects, but it depends on the x-axis value how strong the effect on the dependent variable is. I.e., the rate of change in the predicted probability of receiving a competing bid or successfully closing the deal is not constant over the full range of the *Proposals-to-CA-Ratio*. To make this non-linear relation between pre-public competition and post-bid dynamics more tangible, I plot the graphs of predicted probabilities for *Competing Bid* and *Deal Completion* in Figure A1 in the Appendix. Figure A2 likewise depicts the relation for the subsamples sorted by acquirer announcement reactions.

Taken together, the logit regressions in Table 5 suggest that competitive private negotiations stay competitive after public deal announcement, and that rival bidders seem to be lured by noticing value-creating transactions and compete more likely with a bid for the target.

4.6 Robustness Tests: Endogeneity and Alternative Competition Measure

4.6.1 Endogeneity between Deal Initiation, Deal Premiums, and Selling Procedure

Selling a firm is very likely not a random corporate event: initiating a deal and the structure of the subsequent selling procedure (i.e., auctioning among multiple bidders vs. negotiating exclusively with only one prospective acquirer) are usually well-conceived, deliberate decisions by target firm's management. Aktas et al. (2010) argue that the target, if initiating the deal, clearly signals its willingsness to sell and thereby lowers its bargaining power during

[39] Yet sign and statistical significance are.

the following negotiations. Masulis and Simsir (2018) determine that average takeover premiums, target announcement returns, and valuation multiples are significantly lower in target-initiated deals. In addition, firms might set up a (structured) auction led by an investment bank, because they expect higher revenues from increased competition (Bulow and Klemperer (1996)). If so, the subsets of target-initiated deals and auctions do not represent a random sample drawn out of the takeover population, and results obtained via OLS might be biased.

To remedy potential endogeneity concerns between deal initiation, the sales method, and takeover premiums, I first apply an instrumental variables approach to estimate instrumented regressors for initiation and selling procedure. Since I am interested in the effect of relative competition on takeover premiums in this chapter, I then concentrate on a subset of takeovers where the competition measure, the *Proposals-to-CA-Ratio*, exhibits substantial variation across observations, namely pure auctions[40]. I therefore estimate various specifications of Heckman (1979) selection models to account for the likely self-selection[41] of target firms to sell themselves via auctions.

Determinants of Deal Initiation and Selling Procedure

After taking the different characteristics of deals initiated by targets and the subsequent selling procedure into consideration (Section 4.2), I instrument, in the first step, the two dummy variables *Tgt Initiation* and *Auction* for the whole sample. I do this to exploit exogenous variation stemming from firm characteristics that are already fixed ex-ante, and might, based on economic theory, affect the decision to initiate and to auction, respectively. The instrumented variables *Tgt Initiation** and *Auction** correspond to the predicted values obtained from probit regressions of the realized values.

[40] The *Proposals-to-CA-Ratio* in negotiations defined following Boone and Mulherin (2007, 2008) mechanically results in a value of one. This is not a concern in the regressions in Section 4.5 since I additionally control for the selling procedure (with a dummy variable for auctions).

[41] This is the case if unobserved private information by target managers is an important determinant of choosing to auction (Li and Prabhala (2007)). Then, the motivation to self-select most likely is the expectation of a "more positive outcome" for the firm, i.e., better fulfilling fiduciary duties through higher expected revenues (premiums) made possible by increased competition (Bulow and Klemperer (1996, 2009)). Since I include estimated regressors in the second stage, standard errors are adjusted.

Following Aktas et al. (2010), I select the sum and the concentration of target's institutional ownership, its market-to-book ratio, return on assets, and sales growth, all obtained six months prior to deal announcement, as explanatory variables for target initiation. Targets with high growth opportunities or under tighter control by institutional investors might less likely inititate deals. The same could apply for targets experiencing strong growth in sales and firms with profitable, revenue generating assets. Column (1) in Table 6 presents the results of the probit regression including year fixed effects to control for aggregate shocks.

Table 6
Determinants of Target Deal Initiation and Selling Procedure

Table 6 presents the results of fixed effects probit regressions of *Tgt Initiation* (column (1)) and *Auction* (column (2)) on determinants of deal initiation and the selling procedure, respectively. All variables are measured six months, i.e., on day −126, prior to offer announcement. *Tgt Sales Growth* is the change in sales relative to the second last fiscal year prior to announcement. *Tgt Industry Count* is the number of firms in the same SIC4 industry as the target with a market capitalization larger than the target itself. *Tgt Sales Herfindahl* reflects the market concentration in target's SIC4 industry, measured as the Herfindahl-Hirschman index of sales (sum of squares of each firm's market share in a given industry-year). *Acq Toehold* is the percentage of target's total common shares outstanding that are owned by the acquirer. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Instrumented:	Tgt Initiation	Instrumented:	Auction
Independent Variables	(1)	Independent Variables	(2)
Tgt Institutional Own Sum	−0.008***	Tgt Institutional Own Sum	0.006***
	(0.002)		(0.002)
Tgt Institutional Own Herf	2.217*	Tgt R&D Intensity	0.273*
	(1.157)		(0.150)
Tgt Market-to-Book	−0.087***	Tgt Initiation	1.179***
	(0.025)		(0.118)
Tgt Return on Assets	−0.173	Tgt Industry Count	0.000
	(0.338)		(0.000)
Tgt Sales Growth	−0.000	Tgt Sales Herfindahl	−0.173
	(0.001)		(0.321)
		Relative Size Market Cap	0.001
			(0.000)
		Acq Toehold	0.333***
			(0.123)
		Acq Market Cap	−0.001
			(0.000)
Year FE	Yes		Yes
Tgt Industry FE	No		Yes
Observations	656		656
Pseudo R^2	0.048		0.141
Model p-value	0.000		0.000
Percentage of correct predictions	71.38%		69.56%

As predicted, the coefficients on both institutional ownership and market-to-book are negative and highly statistically significant. The coefficients on return on assets and sales growth are also negative but not significant. Taken together, the results suggest that targets with strong growth opportunities and monitoring by institutional investors are less prone to start the selling procedure.

As outlined above, auctioning is also likely an endogenous choice. Besides target characteristics, I include industry and acquirer controls in the probit model estimating *Auction*, because the selling procedure could be affected by the relative bargaining power of the participating firms as well as industry dynamics and supply and demand effects for M&A. The model consists of target institutional ownership, target R&D intensity, a dummy for target initiation, target's industry count, target industry sales concentration, relative size of bidder and target, acquirer's holdings in the target firm, and acquirer size. As Figure 2 in Section 4.2 shows, auctions are, compared to negotiations, disproportionately more often initiated by targets. Firms operating in a concentrated industry might engage in exclusive negotiations rather than auctions, and acquirers could increase their expected value from the bid by purchasing target stocks prior to materialized run-ups, i.e., through toehold acquisitions. The toehold interestingly generates a positive payoff for the acquirer, especially when he loses to a rival (winning) bidder who purchases "his" toehold. This is rational from the acquirer's perspective if he expects increased competition in gaining control over the target.

Column (2) in Table 6 depicts the results of a probit regression of *Auction* on these variables. As in column (1), I measure all variables – except *Tgt Initiation*, which might be somewhat sooner or later – six months prior to offer announcement to preserve their exogenous characteristics. I include time and target industry fixed effects to control for associated unobserved heterogeneity, i.e., shocks affecting all observations in a given year or industry in the same way. Following the theoretical argumentation, the coefficients on *Tgt Initiation* and *Acq Toehold* are both positive and highly statistically significant at the 1% level. Interestingly, the coefficient on institutional ownership is also positive and significant. This suggests that, if targets decide to sell themselves, the selling procedure is more likely structured as an auction, maybe because of increased monitoring motivated by the expectation of higher revenues in this

case. The percentage of correct predictions[42] is roughly 70% in both cases, suggesting that theoretically reasoned covariates accurately predict the initiation decision and the decision of the selling procedure.

Heckman Selection Models

As already argued, auctions do not represent a random subsample of all takeovers. Although my multivariate analyses in Section 4.5 control for the selling procedure and initiating party, I want to rule out sample selection issues when analyzing the effect of relative competition on premiums in auctions, where I find competition to be obvious and more tangible[43]. Hence, I adopt the classical Heckman (1979) two-stage procedure with and without the instrumented regressor for target initiation (estimated in column (1) of Table 6).

In the first step – the selection equation, I estimate the probability of structuring the deal as an auction instead of a one-to-one negotiation as a probit model with control vector $\boldsymbol{Z}$ from column (2) in Table 6, i.e., using all observations in the sample:

Selection equation[44]*:* $\text{Prob}(\text{Auction} = 1 \mid \boldsymbol{Z}) = \Phi(\boldsymbol{Z}\gamma)$

This allows me to compute the inverse Mills ratio (IMR, also called "Heckman's lambda" or "non-selection hazard") for each individual observation, i.e., the probability to be included in the sample of auctions, in the following way to enable controlling for the selection bias:

$$\text{IMR}\ (\hat{\lambda}) = \frac{\phi(\boldsymbol{Z}\hat{\gamma})}{\Phi(\boldsymbol{Z}\hat{\gamma})}$$

where ϕ and Φ denote the Gaussian probability density function (PDF) and the Gaussian cumulative density function (CDF), with mean zero and unit variance, respectively.

[42] I include this to the table as a (control) measure of model fit: for each observation, if $\widehat{\Pr}(Y_i = 1 \mid \boldsymbol{X}_i) > 0.5$, then $\widehat{Y_i} = 1$. The percent correctly predicted is the percentage for which $\widehat{Y_i}$ matches Y_i.

[43] In pure one-to-one negotiations there most likely exists also a certain degree of competitive pressure that increases the bid premium, but by definition taking on the form of latent competition, as proxied by *Acq Industry Count* (i.e., the commonly known "negotiation under the threat of an auction", as the eponymous paper by Aktas et al. (2010)). Additionally, see the subsample of auctions only (Table A4).

[44] With γ = vector of parameters and Φ = cumulative distribution function (CDF) of the standard normal distribution.

In the second step – the structural equation, I regress the one-month premium on the *Proposals-to-CA-Ratio* and all other controls $\boldsymbol{X}$ from the baseline specification[45] for the sub-sample of auctions using OLS, but additionally controlling for each individual observation's probability to be included in the selected sample, its estimated inverse Mills ratio (IMR):

Structural equation: $$\text{Premium}_{1\text{ Month}} = \varpi\,\text{Proposals-to-CA-Ratio} + \boldsymbol{\beta X} + \delta\,\hat{\lambda}$$

Because both the *IMR* and *Tgt Initiation** are by themselves generated regressors, the standard errors in the 2nd stage must be adjusted accordingly. I estimate the Heckman selection models with fixed effects and two-step efficient estimates of the parameters, standard errors, and covariance matrices. Standard errors are computed applying a bootstrap procedure: from the whole sample, I draw, with replacements, one thousand bootstrap samples with the same number of observations as in the original sample[46]. For each bootstrap sample, I estimate the Heckman (1979) regression coefficients. This procedure thus generates an empirical sample distribution consisting of one thousand estimates for the coefficients and provides the correct (bootstrapped) standard errors and t-statistics shown in Table 7.

Heckman (1979) shows that sample selection bias is a specification error, namely in form of an omitted variable bias (the *IMR*) representing – in my application – the probability to be included in the sample of auctions, and correction for this selection results in both unbiased and consistent estimates of the coefficient on the *Proposals-to-CA-Ratio*.

The first column of Table 7 estimates the baseline regression for all observations with instrumented regressors (predicted values) *Tgt Initiation** and *Auction** obtained through probit regressions (1) and (2) in Table 6. Both coefficients are not statistically significant, but indicate the correct sign as predicted by theory. The marginal effect of both instruments is larger than the marginal effect of the dummy variables in the baseline regressions, suggesting that if endogeneity is controlled for, the impact on premiums might be larger. Inferences about all other coefficients, especially for the coefficient for the *Proposals-to-CA-Ratio*, remain unchanged, which suggests that endogeneity problems seem to be less severe in this case.

[45] Except the dummy variable *Auction*.

[46] The number of observations drops from 704 to 656 due to the availability of controls for the estimation of instrumented regressors in Table 6.

Table 7
Instrumented Variables Regression and Heckman Selection Models

The following table depicts the results of linear fixed effects regressions (column (1)) of *Premium* $_{1\ Month}$ on the variable of interest, the *Proposals-to-CA-Ratio*, the predicted regressors (instruments) *Tgt Initiation** and *Auction**, and control variables as defined in Section 4.4. Specifications (2)–(5) show the 2nd stage results of Heckman (1979) selection models for the subsample of auctions, with the one-month premium and acquirer cumulative abnormal deal announcement returns as the dependent variable, respectively. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. All standard errors (in parentheses) are bootstrapped following the procedure as outlined above. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Premium $_{1\ Month}$			Acq CAR $_{[-3;+3]}$	
	Instr. Var.	Heckman Selection Model (with Instrumented Variables)			
Sample	Full Sample	Auctions Only			
Independent Variables	(1)	(2)	(3)	(4)	(5)
Proposals-to-CA-Ratio	23.501***	27.451***	27.439***	−3.869***	−3.624***
	(4.729)	(6.590)	(7.120)	(1.305)	(1.315)
Number Proposals	0.578	0.164	0.103	0.183	0.152
	(0.733)	(0.803)	(0.898)	(0.214)	(0.203)
Tgt Initiation		−11.582		−1.060	
		(11.848)		(2.667)	
Estimated Instrumented Regressors					
Tgt Initiation*	−8.319		−11.479		4.963
	(30.803)		(87.010)		(8.846)
Auction*	7.480				
	(6.305)				
Controls					
Tgt Anti-takeover State	5.343*	6.743	6.682	−0.417	−0.401
	(2.884)	(4.335)	(4.206)	(0.988)	(0.885)
Acq Industry Count	0.057***	0.070*	0.071*	0.002	−0.000
	(0.020)	(0.039)	(0.038)	(0.007)	(0.008)
Inverse Mills Ratio λ		−12.969	3.162	0.142	1.403
		(17.639)	(6.040)	(3.589)	(1.229)
Premium $_{1\ Month}$				0.001	−0.000
				(0.013)	(0.013)
Other Controls	Yes	Yes	Yes	Yes	Yes
Tgt Industry × Year FE & Acq Industry FE	Yes				
Tgt Industry FE		Yes	Yes	Yes	Yes
Acq Industry FE		Yes	Yes	Yes	Yes
Year FE		Yes	Yes	Yes	Yes
Observations (selected; non-selected)	656	656 (366; 290)		619 (329; 290)	
Model p-value	0.000	0.000	0.000	0.000	0.000
Adjusted R^2	0.311				

The second and third column present the results of the 2nd stages of the Heckman model, without (specification (2)) and with (specification (3)) the instrumented regressor for target

initiation. In both cases, the coefficient is negative but not significant, consistent with my prior findings. The estimate on the *Proposals-to-CA-Ratio* remains positive and highly statistically significant at the 1% level. Inferences for the heckman models of acquirer announcement returns are practically unchanged. The coefficient on the ratio is negative and significant at the 1% level.

The estimated *Inverse Mills Ratio* ($\hat{\lambda}$) multiplied with its coefficient is supposed to pick up the expected value of the error in the structural equation, conditional on auctioning. The coefficient on the *IMR* (−12.969 and 3.162 in specification (2) and (3), respectively) represents the covariance between the errors in the structural and the selection equation under the model assumptions. In all cases in Table 7, it never is statistically significant and the bootstrapped t-statistics for the *IMR* are small (and the p-values are large), which means that I cannot reject the null hypothesis that the error terms are uncorrelated. This means that the data are consistent with no selection[47].

4.6.2 Measuring Pre-Announcement Competition with the Proposals-to-Contacts-Ratio

To show that my measure of relative competition does not depend on one narrow, single definition, I repeat the main regression for target cumulative abnormal announcement returns and bid premiums with a modified variable, the *Proposals-to-Contacts-Ratio*. This ratio relates the number of privately submitted proposals to the number of contacted potential bidders at the beginning of the private takeover process. Here, I also control for the level, i.e., number, of proposals. As already argued in the introduction, I assume that there is more leeway in reporting the number of contacts in SEC merger filings, since the target often does not name all contacted bidders with their respective firm names. This is particularly true if there exists a large number of contacted parties. Reporting no names makes the target firm less vulnerable, but the data might also become less reliable. An additional argument in favor of the *Proposals-to-CA-Ratio* as the main competition measure is that, after screening the filings, I find that in some cases the number of contacts refers to the number of firms contacted by the target's

[47] Given that my sample size (656 observations) is sufficiently large and exclusion restrictions are not weak.

Table 8

Robustness Test — Measuring Private Takeover Competition with Proposals-to-Contacts-Ratio

This table depicts the results of linear fixed effects regressions of *Target Cumulative Abnormal Returns* (regressions (1)–(3)) and *Target Share Price Premium* (regressions (4)–(8)) on the modified variable of interest, the *Proposals-to-Contacts-Ratio*, which is defined as the ratio between the number of privately submitted proposals to the target firm at the end of the private takeover process divided by the number of contacted potential acquirers at the beginning of the private takeover process. I further include control variables as defined in Section 4.4. All regressions include *Target Industry* × *Year Fixed Effects*, *Acquirer Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Cumulative Abnormal Returns			Target Share Price Premium				
Event Window	[–1;+1]	[–3;+3]	[–5;+5]	1 Day	3 Day	1 Week	1 Month	Initiation
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Deal Characteristics								
Proposals-to-Contacts-Ratio	11.041***	10.659***	11.163***	17.843***	18.198***	18.379***	26.799***	20.984**
	(3.292)	(3.502)	(3.571)	(3.671)	(3.841)	(4.032)	(6.095)	(10.117)
Number Proposals	−0.520	−0.569	−0.679	−0.248	−0.425	−0.268	−0.322	−1.420
	(0.465)	(0.495)	(0.489)	(0.540)	(0.534)	(0.554)	(0.651)	(1.826)
Tgt Initiation	−0.424	−1.065	−1.514	−0.302	−0.781	−1.740	−0.439	−1.483
	(1.820)	(1.825)	(1.913)	(1.979)	(2.031)	(2.099)	(2.421)	(4.416)
Auction	4.381	4.545	5.586*	6.370**	7.324**	7.087**	11.121**	10.360
	(2.763)	(2.846)	(2.988)	(2.931)	(3.112)	(3.287)	(4.591)	(7.794)
Tgt Anti-takeover State	4.365**	4.293**	4.388**	3.980**	4.036*	4.491**	4.971**	4.196
	(1.759)	(1.796)	(1.796)	(2.005)	(2.059)	(2.064)	(2.412)	(4.106)
Acq Industry Count	0.017	0.011	0.008	0.049***	0.044***	0.046***	0.065***	0.032*
	(0.015)	(0.015)	(0.016)	(0.013)	(0.012)	(0.014)	(0.016)	(0.017)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	763	763	763	763	763	763	735	397
Adjusted R^2	0.195	0.178	0.179	0.202	0.190	0.195	0.179	0.221

financial advisor, i.e., investment bank, which also containes firms that are not interested in buying the target[48]. This would mechanically lead to an underestimation of the *Proposals-to-Contacts-Ratio*, as it would then not accurately capture real demand by potential bidders.

Nontheless, Table 8 shows the regression results with this alternative competition measure instead of the *Proposals-to-Contacts-Ratio*. In all but one specifications, the coefficient is positive and statistically highly significant at the 1% level, supporting the notion that higher relative pre-announcement competition results in higher returns and premiums for target shareholders. All other coefficients do not change considerably compared to the estimates obtained in Table 3, which underpins that both ratios measure something similar, namely perceivable competition[49].

4.7 Conclusion

This chapter sheds light on the private takeover process and its competition dynamics. By extending a representative M&A sample with hand-collected data from credible SEC filings, I find that pre-public takeover negotiations can be highly competitive, and that higher competition among bidders leads to higher takeover premiums. Dynamic negotiations and associated bid revisions, fueled by competition, might explain why we commonly observe large deal premiums, despite lower perceived public competition since the late 1980s.

Notwithstanding its relevance, there is surprisingly litte empirical work focussing on pre-public competition and its wealth effects for participating firms, partially also because the competitiveness during this private process remained difficult to study due to data availability. Commonly used databases only include public bids made for the target. My findings contribute to this growing body of research that focuses on this active process shielded from public scrutiny. I find that competitive private negotiations stay competitve during the public phase, and that rival bids are more likely if announcement returns of the original acquirer are positive. Observing this might lure rival bidders. Especially the share price run-up of target firms seems

[48] I.e., involves "cheap talk" contacts or sham bids (Boone and Mulherin (2011)). Similarly, some firms did not even respond to the deal advisor's effort to get in touch.

[49] To rule out non-linear effects, I also split the *Proposals-to-CA-Ratio* into main quantiles (Table A6).

to be different for auctions compared to one-to-one negotiations. A higher number of involved parties could increase the likelihood of leaking information to the market, well ahead of official bid announcement. In light of this as well as increased negotiation period lengths, I advise researchers to utilize the initiation premium when assessing target wealth effects, as put forward by Eaton et al. (2020).

My findings further suggest that winning bidders incur more negative announcement returns if competition for the target is ex-ante high. Given the richness of the private sales process and its likely private value component for strategic bidders, I do not claim that this reflects a winner's curse in corporate transactions. The best setting to analyze the existence of a winner's curse would be a pure common value auction, e.g., through studying financial bidder auctions. Here, synergies between the merging parties are usually non-existent because of the missing operating fit, and post-acquisition value-creating strategies for targets include more aggressive use of leverage and higher-powered managerial compensation. Because these strategies are relatively similar across private equity bidders, they are likely to have high common components of target valuations (Gorbenko and Malenko (2014, 2019)). I leave this for future research.

My inferences drawn in this chapter are robust to endogeneity between deal initiation, the selling procedure, and bid premiums. This is important because takeover auctions, in which my suggested competition measure, the *Proposals-to-CA-Ratio*, exhibits strong variation, are not a random subsample of all M&A deals. Applying a Heckman (1979) two-stage selection model with instrumented regressors rules out these concerns. After utilizing a propensity score matched sample procedure (deferred to the Appendix), I further do not detect a systematical difference in premiums paid in auctions versus premiums paid in one-to-one negotiations. Different results obtained by researchers might depend on the definition of what counts as an auction.

Although empirical evidence on the "one best way to sell a company" (Boone and Mulherin (2009)) is mixed, the results strongly suggest that high competition among bidders raises the publicly announced offer per target share. My results indicate that target boards fulfill their fiduciary duties by selecting the highest-bidding acquirer. This is consistent with

the findings in Liu and Officer (2020), who show that the behavior of target managers appears congruent with shareholder wealth maximization rather than systematic agency problems.

Research interest in the details of the private phase of merger negotiations has strongly increased over the last years. It helps to explain strategic interactions and the decisions of participating firms as well as deal outcomes. Analyzing the private takeover process is a fruitful avenue for future research. It might be interesting to determine the exact channels of my identified relation. Bao and Edmans (2011) and Golubov, Petmezas and Travlos (2012) find that investment banks may posses a heterogeneous set of skills in advising M&A deals. E.g., deal advisor fixed effects could explain competitive bidding, through efficiently structuring and soliciting (high) bids for the target.

4.8 References

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4.9 Appendix

Appendix – Table A1
Variable Definitions

Table A1 presents the definitions of all variables used throughout this chapter, including the source.

Variable	Definition
Panel A: Cumulative Abnormal Announcement Returns, Target Share Price Premiums, and Deal Competition Measures	
Tgt CAR $_{[-1;+1]}$	Three-trading-day cumulative abnormal announcement return (in percentage points) of target firm's stock calculated using the Carhart (1997) model to model normal returns. The model parameters are estimated over the period −250 to −23 trading days (prior) to offer announcement. Security prices are dividend adjusted day close prices, further adjusted for stock splits, cash dividends, rights offerings, and spin-offs (*Source: CRSP*).
Tgt CAR $_{[-3;+3]}$	Defined as *Tgt CAR* $_{[-1;+1]}$, but instead measured for the seven-trading-day window around offer announcement.
Tgt CAR $_{[-5;+5]}$	Defined as *Tgt CAR* $_{[-1;+1]}$, but instead measured for the eleven-trading-day window around offer announcement.
Premium $_{1\ Day}$	Difference of the announced offer price per share and target's last sale share price one trading day prior to offer announcement, divided by target's last sale share price one trading day prior to offer announcement, and expressed in percentage points (*Source: S&P Capital IQ*).
Premium $_{3\ Day}$	Defined as *Premium* $_{1\ Day}$, but instead measured with target's last sale share price three trading days prior to offer announcement as the premium's reference.
Premium $_{1\ Week}$	Defined as *Premium* $_{1\ Day}$, but instead measured with target's last sale share price five trading days prior to offer announcement as the premium's reference.
Premium $_{1\ Month}$	Defined as *Premium* $_{1\ Day}$, but instead measured with target's last sale share price 22 trading days prior to offer announcement as the premium's reference.
Premium $_{Initiation}$	Defined as *Premium* $_{1\ Day}$, but instead measured with target's last sale share price at the deal initiation date as the premium's reference, following Eaton et al. (2020).
Acq CAR $_{[-1;+1]}$	Defined as *Tgt CAR* $_{[-1;+1]}$, but instead measured for the three-trading-day window around offer announcement and for acquiring firm's stock.
Acq CAR $_{[-3;+3]}$	Defined as *Tgt CAR* $_{[-1;+1]}$, but instead measured for the seven-trading-day window around offer announcement and for acquiring firm's stock.
Acq CAR $_{[-5;+5]}$	Defined as *Tgt CAR* $_{[-1;+1]}$, but instead measured for the eleven-trading-day window around offer announcement and for acquiring firm's stock.
Deal Completion	Dummy variable that equals 1 if the announced deal was closed successfully within the sample period (January 01, 2004 – December 31, 2017), and 0 if cancelled (*Source: S&P Capital IQ*).
Competing Bid	Dummy variable that equals 1 if the announced deal receives at least one another bid from an acquirer different to the original acquirer before the original announced deal is either closed or withdrawn, and 0 otherwise (*Source: S&P Capital IQ*).
Number Contacts	Number of contacted potential acquirers at the beginning of the private takeover process (*Source: SEC Merger Filings*).
Number Signed Confidentiality Agreements	Number of potential acquirers that signed confidentiality (non-disclosure) agreements with the target firm (*Source: SEC Merger Filings*).
Number Proposals	Number of potential acquirers that privately submitted binding written offers (bids) to the target firm shortly before the deal is publicly announced, i.e., at the end of the private takeover process, with a price proposed to buy target shares (*Source: SEC Merger Filings*).
Proposals-to-CA-Ratio	*Number Proposals* divided by *Number Signed Confidentiality Agreements*.
Proposals-to-Contacts-Ratio	*Number Proposals* divided by *Number Contacts*.

Panel B: Deal Characteristics and Cumulative Abnormal Run-up Returns

Tgt Initiation	Dummy variable that equals 1 if the target initiated the deal, and 0 otherwise (*Source: SEC Merger Filings*).
Auction	Dummy variable that equals 1 if the private sales process is characterized as an auction, and 0 otherwise. As in Boone and Mulherin (2008), I classify the private sales process as an auction, if the target signs confidentiality agreements with more than one prospective acquirer. To the contrary, I classify the sales process as a (1:1) negotiation, if the target firm focuses on a single acquirer throughout the whole private takeover phase, i.e., negotiations are deals with one formal contact, one signed confidentiality agreement, and one private (and later public) bid for the target by the original acquirer (*Source: SEC Merger Filings*).
Tgt Anti-takeover State	Dummy variable that equals 1 if the target is located in a state with strong anti-takeover regulations, and 0 otherwise. I follow the classification in Bebchuk and Ferrell (2002) and code the following states as strong anti-takeover states: Idaho (ID), Indiana (IN), Maryland (MD), Nevada (NV), Ohio (OH), Pennsylvania (PA), South Dakota (SD), Tennessee (TN), and Wisconsin (WI) (*Source: Compustat*).
Acq Industry Count	Number of firms in the same SIC4 industry as the acquiring firm with a value (i.e., market capitalization) greater than the acquiring firm, obtained on the last fiscal year end date (of the acquiring firm) prior to offer announcement (*Source: Compustat*).
Tgt Industry Count	Defined as *Acq Industry Count*, but instead measured for target firm's industry.
Deal Value	USD (bn) value of the transaction, i.e., total transaction value excluding assumed liabilities (*Source: Thomson Reuters SDC Platinum*).
Friendly	Dummy variable that equals 1 if the deal attitude is friendly on the announcement day of the deal, and 0 otherwise (*Source: S&P Capital IQ*).
Cash Only	Dummy variable that equals 1 if the payment by the acquirer is made entirely in cash, and 0 otherwise (*Source: Thomson Reuters SDC Platinum*).
Tender Offer	Dummy variable that equals 1 if the deal is classified as a tender offer, and 0 otherwise (*Source: SEC Merger Filings*).
Horizontal Takeover	Dummy variable that equals 1 if both the acquiring and the target firm are primarily assigned to the same industry as defined by all four SIC digits, and 0 otherwise (*Source: S&P Capital IQ*).
Relative Size Market Cap $_{[OA-22]}$	*Acq Market Cap* $_{[OA-22]}$ divided by *Tgt Market Cap* $_{[OA-22]}$.
Acq Toehold $_{[OA-1]}$	Acquiring firm's holdings in target firm's stock one trading day prior to offer announcement, measured as a share of total shares outstanding and expressed in percentage points (*Source: S&P Capital IQ*).
BTF Size $_{Deal\ Value}$	USD (mm) amount of the bidder termination fee divided by *Deal Value* (also in USD mm) and expressed in percentage points (*Source: SEC Merger Filings*).
TTF Size $_{Deal\ Value}$	USD (mm) amount of the target termination fee divided by *Deal Value* (also in USD mm) and expressed in percentage points (*Source: SEC Merger Filings*).
Tgt Run-up CAR $_{[-42;-2]}$	Defined as *Tgt CAR* (Panel A), but instead measured for the 40 trading day window $(-42;-2)$ prior to offer announcement.
Tgt Run-up CAR $_{[-42;-4]}$	Defined as *Tgt CAR* (Panel A), but instead measured for the 38 trading day window $(-42;-4)$ prior to offer announcement.
Tgt Run-up CAR $_{[-42;-6]}$	Defined as *Tgt CAR* (Panel A), but instead measured for the 36 trading day window $(-42;-6)$ prior to offer announcement.
Tgt Run-up CAR $_{[-252;-23]}$	Defined as *Tgt CAR* (Panel A), but instead measured for the 229 trading day window $(-252;-23)$ prior to offer announcement.
Acq Run-up CAR $_{[-42;-2]}$	Defined as *Tgt Run-up CAR* $_{[-42;-2]}$, but instead measured for acquiring firm's stock.
Acq Run-up CAR $_{[-42;-4]}$	Defined as *Tgt Run-up CAR* $_{[-42;-4]}$, but instead measured for acquiring firm's stock.
Acq Run-up CAR $_{[-42;-6]}$	Defined as *Tgt Run-up CAR* $_{[-42;-6]}$, but instead measured for acquiring firm's stock.

	Panel C: Acquiring Firm Characteristics
Acq Market Cap [OA–22]	Last sale price of acquiring firm's stock (adjusted for stock splits) multiplied with the latest number of shares outstanding, measured 22 trading days prior to offer announcement and expressed in billions of USD (*Source: S&P Capital IQ*).
Acq Market-to-Book [OA–22]	Market-to-book ratio of acquirer's stock, calculated as *Acq Market Cap* [OA–22] divided by the latest available value of total common equity (= common stock & additional paid in capital + retained earnings + treasury stock & other; all measured in USD billions) 22 trading days prior to offer announcement (*Source: S&P Capital IQ*).
ln Acq 1YR Stock Return Volatility [OA–1]	Natural logarithm of 1 plus the standard deviation of weekly log-normal price returns of acquiring firm's stock over the year preceding the offer announcement, annualized with a factor of 52 for the 52 trading weeks in a year and measured one trading day prior to offer announcement (*Source: S&P Capital IQ*).
Acq Institutional Own Sum [OA–1]	Sum of institutional holdings in acquiring firm's stock, measured one trading day prior to offer announcement and expressed in percentage points (*Source: S&P Capital IQ*).
	Panel D: Target Firm Characteristics
Tgt Market-to-Book [OA–22]	Defined as *Acq Market-to-Book* [OA–22], but instead measured for target firm's stock.
ln Tgt 1YR Stock Return Volatility [OA–1]	Defined as *ln Acq 1YR Stock Return Volatility* [OA–1], but instead measured for target firm's stock.
Tgt Institutional Own Sum [OA–1]	Defined as *Acq Institutional Own Sum* [OA–1], but instead measured for target firm's stock.
Tgt Institutional Own Herf [OA–1]	Concentration of institutional ownership in target 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 target firms' stock (*Source: S&P Capital IQ*).
Tgt Return on Assets	Target's operating income before depreciation divided by total assets, measured at the last fiscal year end date prior to offer announcement (*Source: S&P Capital IQ*).
Tgt Sales Growth	Target firm's sales at the last fiscal year end date prior to offer announcement divided by sales second last fiscal year end date prior to offer announcement, minus 1 and expressed in percentage points (*Source: Compustat*).
Tgt R&D Intensity [OA–22]	Target's Research and Development (R&D) expenses scaled by sales, measured at last fiscal year end date prior to offer announcement (*Source: S&P Capital IQ*).
Tgt Sales Herfindahl	Herfindahl-Hirschman concentration index of all firms in target's SIC4 industry. Calculated as the sum of the squares of each firm's market share at the last fiscal year end prior to offer announcement (*Source: Compustat*).

(Table A1 continued)

Appendix – Table A2
Sample Selection

This table summarizes the selection criteria of the M&A sample with the respective remaining number of observations. After applying filters 1–6, 8,466 observations remain. The availability of SEC filings, control variables, stock ownership data as well as valid detailed data of the private takeover process in the background section of the SEC filings (S-4, 14D-9, and DEFM14A) further restricts the sample to the final 780 observations.

Selection criteria		Number of observations
1.	All M&A deals announced between 01/01/2004 and 12/31/2017	475,458
2.	Deal status either "closed" or "withdrawn"	460,243
3.	Acquirer and Target headquartered in the U.S.	98,647
4.	Acquirer and Target publicly listed firms	9,980
5.	Acquirer seeks majority stake and change of control in the Target	8,884
6.	Deal value exceeds USD 1 mm	8,466
7.	Availability of SEC filings, control variables, and ownership data	1,139
8.	Valid detailed data of the private takeover process in the background section of the SEC EDGAR filings (https://www.sec.gov/edgar/searchedgar/companysearch.html), denoted as "background of the merger/offer" (S-4, 14D-9, and DEFM14A)	780

Appendix – Table A3
Modular Regression Setup

Table A3 presents the results of a modular regression setup of linear fixed effects regressions of target firm's share price premium, *Premium* $_{1\ Month}$, on the variable of interest, the *Proposals-to-CA-Ratio*, which is defined as the ratio between the number of privately submitted proposals to the target firm at the end of the private takeover process divided by the number of signed confidentiality (non-disclosure) agreements. On a step-by-step basis, I include control variable sets defined in Section 4.4. *Number Signed CAs* is the number of signed confidentiality agreements. All regressions include *Target Industry* × *Year Fixed Effects* as well as an intercept but are unreported. Regressions (8)–(12) include *Acquirer Industry Fixed Effects*. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Premium $_{1\ Month}$											
Sample	Full Sample										Auctions Only	
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Deal Characteristics												
Proposals-to-CA-Ratio	16.458***	17.693***	28.016***	27.763***	32.357***	31.992***	30.973***	30.238***		25.562***		22.472***
	(3.519)	(3.824)	(5.220)	(5.160)	(4.867)	(4.753)	(5.202)	(5.233)		(5.050)		(5.611)
Number Proposals		0.615	−0.513	−0.759	−0.992	−0.951	−1.090	−1.029	2.023**		1.843*	
		(0.693)	(0.795)	(0.845)	(0.834)	(0.830)	(0.784)	(0.801)	(0.998)		(1.040)	
Number Signed CAs									−0.360	0.261	−0.715	−0.126
									(0.535)	(0.484)	(0.601)	(0.508)
Number Contacts									−0.278	−0.245	−0.146	−0.141
									(0.238)	(0.222)	(0.261)	(0.241)
Tgt Initiation			0.669	1.161	2.435	2.428	2.261	2.336	−2.245	0.362	−4.264	−1.040
			(2.823)	(3.110)	(2.833)	(2.806)	(2.774)	(2.734)	(2.619)	(2.576)	(4.541)	(4.424)
Auction			11.658**	12.101***	10.818**	10.622**	9.355**	9.055**	−2.818	6.238*		
			(4.452)	(4.568)	(4.358)	(4.386)	(4.351)	(4.445)	(3.004)	(3.474)		
Anti-takeover, Ind. C., Run-up	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other Deal Characteristics	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acquiring Firm Characteristics	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Firm Characteristics	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry FE	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Observations	732	732	732	704	704	704	704	704	687	687	379	379
Adjusted R^2	0.021	0.021	0.032	0.048	0.129	0.128	0.185	0.187	0.165	0.187	0.142	0.165

Appendix — Table A4

Auction Subsample — Private Takeover Competition, Target Announcement Returns, and Takeover Premiums

The following table presents the results of linear fixed effects regressions of *Target Cumulative Abnormal Returns* (regressions (1)–(3)) and *Target Share Price Premium* (regressions (4)–(8)) on the variable of interest, the *Proposals-to-CA-Ratio*, which is defined as the ratio between the number of privately submitted proposals to the target firm at the end of the private takeover process divided by the number of signed confidentiality (non-disclosure) agreements. The models are exactly the same as in Table 3, except that the sample in this table is restricted to *Auctions* only, which is a dummy variable that equals 1 if the private sales process is characterized as an auction, and 0 otherwise (following the definition in Boone and Mulherin (2008)). I further include control variables as defined in Section 4.4. All regressions include *Target Industry × Year Fixed Effects*, *Acquirer Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Target Cumulative Abnormal Returns			Target Share Price Premium				
Event Window	[–1;+1]	[–3;+3]	[–5;+5]	1 Day	3 Day	1 Week	1 Month	Initiation
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Deal Characteristics								
Proposals-to-CA-Ratio	11.218**	10.296**	10.302**	16.568***	17.840***	19.436***	28.149***	17.451*
	(4.421)	(4.651)	(4.742)	(4.632)	(5.075)	(5.087)	(6.227)	(10.171)
Number Proposals	−0.985*	−0.995*	−1.161**	−1.014*	−1.129**	−0.842	−1.378	0.507
	(0.539)	(0.555)	(0.550)	(0.589)	(0.556)	(0.597)	(0.844)	(1.401)
Tgt Initiation	1.903	1.363	0.616	1.843	0.954	0.758	2.436	−4.010
	(2.339)	(2.372)	(2.523)	(2.995)	(2.916)	(2.849)	(4.035)	(5.637)
Tgt Anti-takeover State	7.330***	7.517***	7.444***	7.658**	10.241***	10.436***	15.398***	5.002
	(2.623)	(2.679)	(2.708)	(3.020)	(3.338)	(3.360)	(4.354)	(5.165)
Acq Industry Count	0.049**	0.042*	0.044*	0.077**	0.054**	0.064**	0.081**	0.030
	(0.024)	(0.023)	(0.023)	(0.031)	(0.024)	(0.027)	(0.040)	(0.029)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Acq Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	411	411	411	411	411	411	396	184
Adjusted R^2	0.201	0.202	0.195	0.209	0.211	0.227	0.178	0.272

Appendix – Table A5

Auction Subsample w/o Tender Offers – Private Takeover Competition, Announcement Returns, Takeover Premiums, and Takeover Outcomes

The following table presents the results for the subset of auctions excluding tender offers. The regression models are exactly the same as in Table 3, except that the sample in this table is restricted to non-tender offer auctions only (and include the one-month premium in specifications (7)–(10)). I further include control variables as defined in Section 4.4. All regressions include fixed effects (as denoted) as well as an intercept but are unreported. In columns (9) and (10), the year of deal resolution is taken into account for the fixed effects. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Tgt CAR [−3;+3]		Premium 1 Week		Premium 1 Month		Acq CAR [−3;+3]		Deal Completion	
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Proposals-to-CA-Ratio	11.463**	9.175*	20.085***	18.414***	28.184***	27.904***	−3.012**	−3.105**	−3.491**	−5.648***
	(5.442)	(5.152)	(6.139)	(6.229)	(6.726)	(6.639)	(1.326)	(1.562)	(1.597)	(1.613)
Number Proposals	−0.046		−0.129		0.458		−0.035		−0.493***	
	(0.668)		(0.592)		(0.945)		(0.314)		(0.128)	
Number Signed CAs		−0.223		−0.153		−0.084		−0.006		−0.157***
		(0.158)		(0.136)		(0.179)		(0.107)		(0.038)
Tgt Anti-takeover State	7.422***	7.287***	11.279***	11.140***	13.994***	14.175***	0.199	0.180	−0.825	−1.322
	(2.644)	(2.605)	(3.300)	(3.346)	(4.172)	(4.205)	(0.885)	(0.905)	(0.796)	(0.903)
Acq Industry Count	0.030	0.033	0.044*	0.046*	0.070*	0.073**	0.007	0.007	−0.004	−0.005
	(0.021)	(0.020)	(0.024)	(0.024)	(0.036)	(0.036)	(0.007)	(0.007)	(0.012)	(0.013)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry × Year FE & Acq Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Acq Industry × Year FE & Tgt Industry FE	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Observations	335	335	335	335	324	324	346	346	310	310
Adjusted R^2	0.270	0.276	0.272	0.274	0.197	0.197	0.123	0.123		
Pseudo R^2									0.663	0.584

Appendix – Table A6
Separating the Proposals-to-CA-Ratio in multiple Quantiles – Takeover Auctions

This table shows regression results for different quantiles of the *Proposals-to-CA-Ratio* (*PpCA*) for the subsample of takeover auctions. Quantiles are listed in ascending order. The benchmark case is the respective lowest quantile. I further include control variables as defined in Section 4.4. All regressions include *Target Industry × Year Fixed Effects*, *Acquirer Industry Fixed Effects* as well as an intercept but are unreported. All standard errors (in parentheses) are adjusted for heteroskedasticity (White (1980)) and within-cluster correlation. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Dependent Variable	Tgt CAR [−3;+3]			Premium 1 Month		
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)
Above Median PpCA	5.431**			16.202***		
	(2.524)			(4.382)		
Top Tercile PpCA		9.200***			25.175***	
		(3.380)			(5.348)	
Medium Tercile PpCA		5.849***			15.032***	
		(2.192)			(4.532)	
Quart4 PpCA			7.682**			22.525***
			(3.861)			(5.317)
Quart3 PpCA			7.549**			17.228***
			(3.227)			(5.797)
Quart2 PpCA			3.721			6.067
			(2.836)			(4.328)
Number Proposals	−1.048*	−1.096**	−1.029*	−1.601*	−1.732**	−1.467*
	(0.562)	(0.545)	(0.581)	(0.871)	(0.842)	(0.877)
Tgt Initiation	0.692	2.137	1.315	1.328	4.621	2.849
	(2.328)	(2.450)	(2.351)	(3.877)	(4.093)	(3.875)
Tgt Anti-takeover State	7.289***	7.151***	7.197***	15.107***	14.554***	15.119***
	(2.605)	(2.631)	(2.636)	(4.465)	(4.101)	(4.454)
Acq Industry Count	0.044*	0.042*	0.043*	0.090**	0.083**	0.085**
	(0.023)	(0.022)	(0.023)	(0.041)	(0.039)	(0.041)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Tgt Industry × Year FE & Acq Ind. FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	411	411	411	396	396	396
Adjusted R^2	0.199	0.207	0.198	0.175	0.191	0.175

Appendix – Table A7

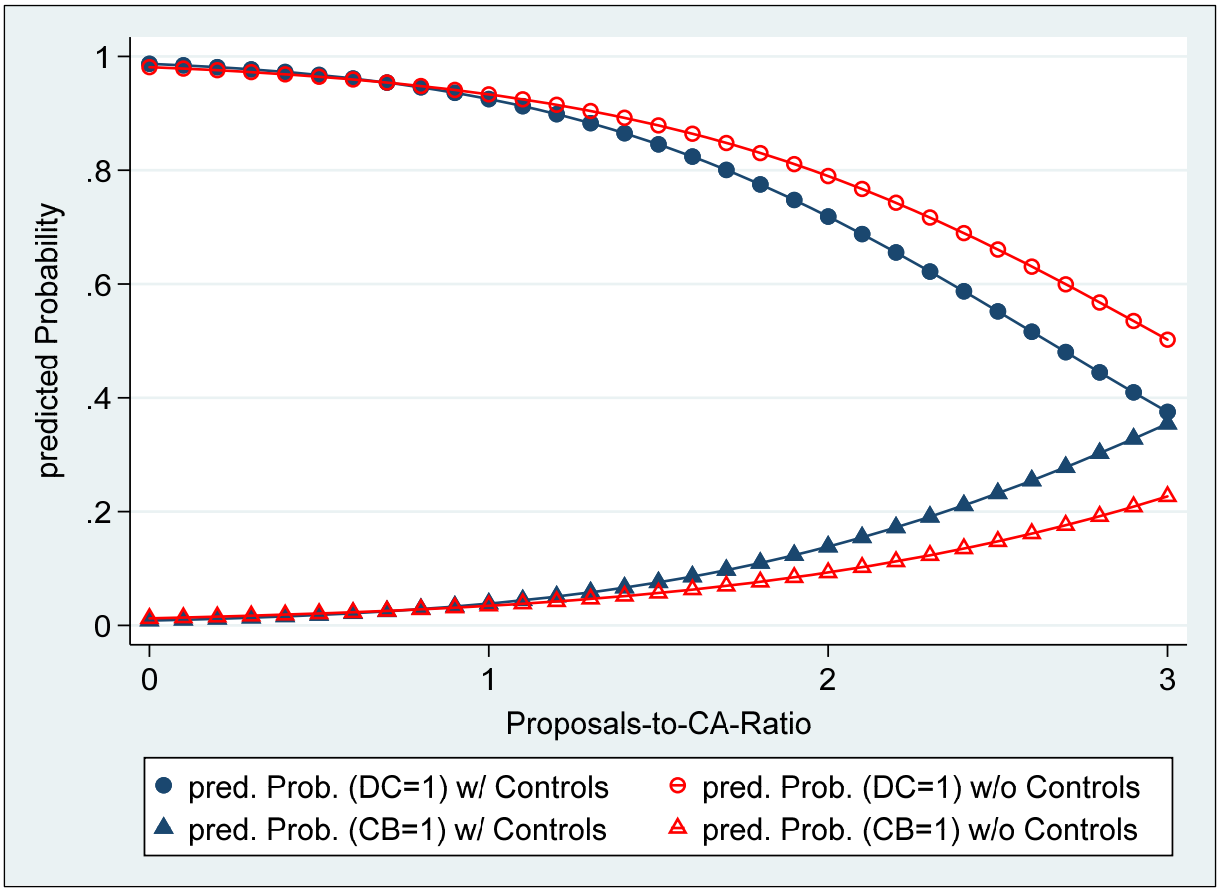
Sales Procedure: Difference of Premiums – Propensity Score matched Sample

Transactions structured as auctions and transactions structured as one-to-one negotiations might differ along some other dimensions correlated with deal premiums. Despite the selling procedure being not my main variable of interest, differences, if existent, might explain the self-selection described in Section 4.6. To detect if premiums are different for these two sales procedures, I employ a propensity score matched sample. For all observations, I define a treatment and control group that are similar along the characteristics of being structured as an auction. The matching attempts to randomize treatment (i.e., auctioning) across the full sample of transactions by ensuring that the two groups are comparable on observable covariates that might explain deal premiums. In the first stage, I compute the propensity score using the probit regression predicting *Auction* with controls from the baseline regression. In the second stage, I match treatment and control group based on different matching algorithms (nearest two neighbors, caliper matching (0.01 radius), and kernel matching), and estimate the average treatment effect (ATE = $E((\mu_{\text{Premium}} \mid \boldsymbol{X}, \text{Auction} = 1) - (\mu_{\text{Premium}} \mid \boldsymbol{X}, \text{Auction} = 0))$ as reported (Coeff.). Due to matching with common support (balanced, with replacement), the number of observations is reduced to 694. The results suggest that auction premiums are slightly higher in most cases, yet the difference is statistically insignificant.

			6-month Premium			3-month Premium			1-month Premium		
	Matching Procedure		Coeff. (SE)	*[t-statistic]* [z-statistic]	{p-value}	Coeff. (SE)	*[t-statistic]* [z-statistic]	{p-value}	Coeff. (SE)	*[t-statistic]* [z-statistic]	{p-value}
Strict Auction *(316 Auc. 378 Neg.)*	t-test of means		3.567 (3.112)	*[1.146]*	{0.252}	1.442 (2.529)	*[0.570]*	{0.569}	0.562 (2.525)	*[0.223]*	{0.824}
	Propensity Score Matching	Nearest (2) Neighbor	2.668 (4.586)	[0.582]	{0.561}	3.902 (3.420)	[1.141]	{0.254}	1.522 (3.220)	[0.473]	{0.636}
		Caliper (r ≤ 0.01)	4.176 (4.233)	[0.987]	{0.324}	2.905 (2.852)	[1.019]	{0.308}	0.709 (3.141)	[0.226]	{0.821}
		Kernel (Epanec.)	4.428 (3.506)	[1.263]	{0.207}	3.054 (2.837)	[1.077]	{0.282}	1.423 (2.694)	[0.528]	{0.597}
Auction (BM 2008) *(385 Auc. 309 Neg.)*	t-test of means		0.645 (3.116)	*[0.207]*	{0.836}	0.518 (2.531)	*[0.205]*	{0.838}	−0.727 (2.526)	*[−0.288]*	{0.773}
	Propensity Score Matching	Nearest (2) Neighbor	0.867 (3.865)	[0.224]	{0.823}	0.495 (3.278)	[0.151]	{0.880}	−1.905 (3.390)	[−0.562]	{0.574}
		Caliper (r ≤ 0.01)	1.590 (3.861)	[0.412]	{0.681}	2.547 (2.838)	[0.897]	{0.370}	0.204 (2.976)	[0.069]	{0.945}
		Kernel (Epanec.)	1.549 (3.558)	[0.435]	{0.663}	2.002 (2.599)	[0.770]	{0.441}	−0.295 (2.478)	[−0.119]	{0.905}

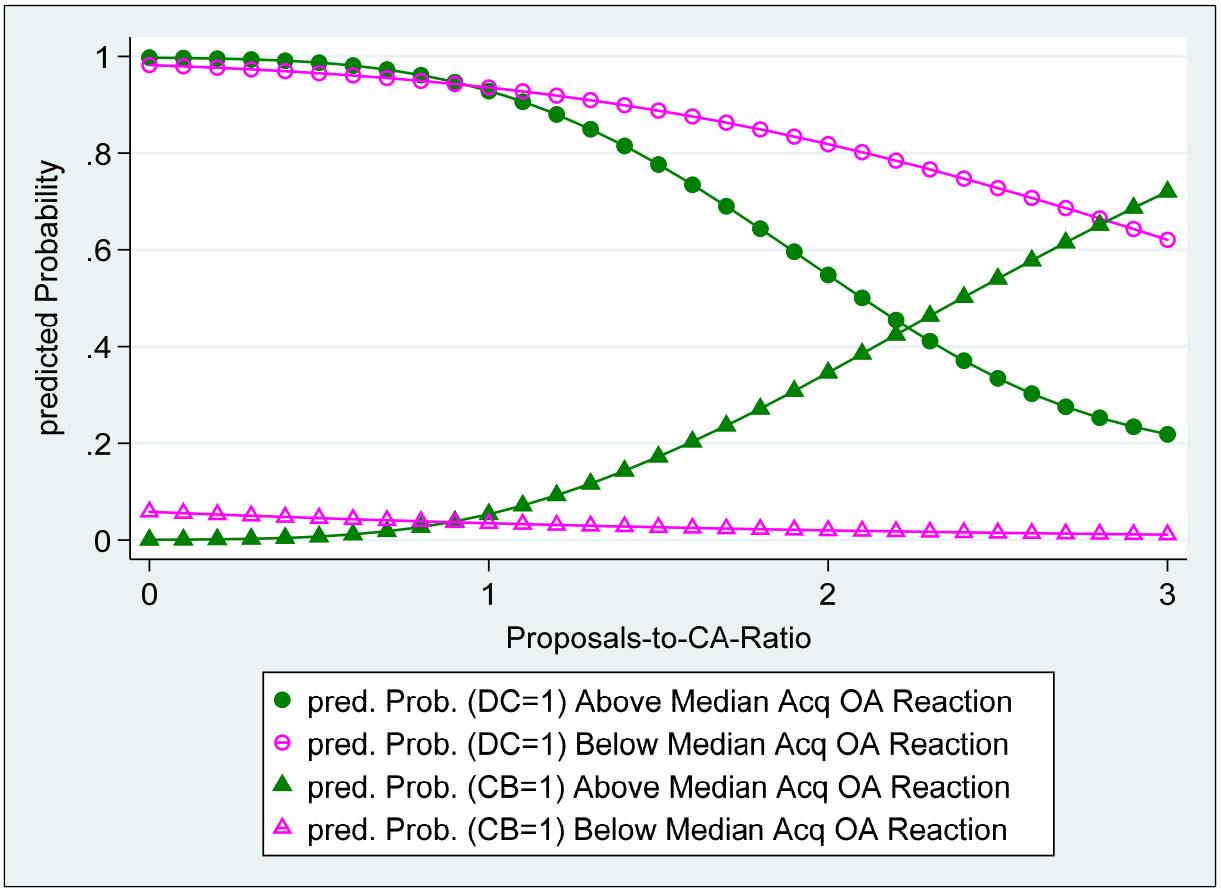
Appendix – Figure A1
Plot of Predicted Probabilities – Competing Bid and Deal Completion

Figure A1 plots the predicted probabilities of both *Competing Bid* and *Deal Completion* against the *Proposals-to-CA-Ratio*. The solid blue triangles represent the predicted probability of receiving a competing bid from a different bidder prior to resolution of the original announced bid (CB=1), depending on the value of the *Proposals-to-CA-Ratio*, thus visualizing the regression results obtained in Table 5, column (1) (i.e., controlling for all other independent variables with their values held at their sample mean). The hollow red triangles depict associated probabilities for the simple logit model with *Proposals-to-CA-Ratio* as the only regressor, i.e., without additional controls. The solid blue and hollow red circles represent, respectively, the predicted probabilities of successfully closing the announced deal (DC=1) (also with (solid blue circles, representing specification (5) in Table 5) and without (hollow red circles) controls).



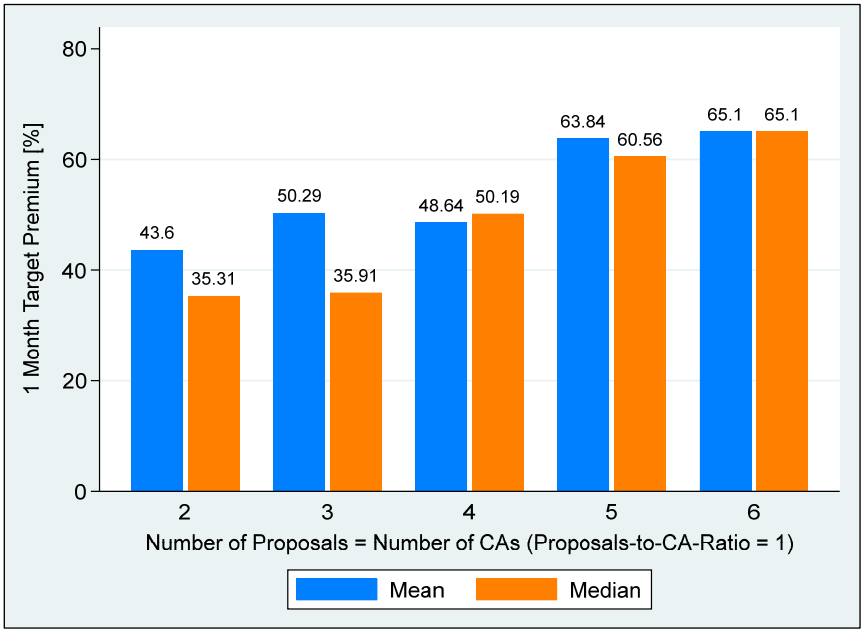
Appendix – Figure A2
Plot of Predicted Probabilities – Competing Bid and Deal Completion by Acq OA Reaction

This figure plots the predicted probabilities of both *Competing Bid* and *Deal Completion* against the *Proposals-to-CA-Ratio* as shown in Figure A1, but sorted by subsamples (*Above* vs. *Below Median Acq OA Reaction*). All four plots show the results including controls, i.e., all other independent variables are held at their respective sample mean. The solid green (*Above Median Acq OA Reaction*) and hollow magenta (*Below Median Acq OA Reaction*) triangles, depict the predicted probabilities of receiving a competing bid from a different bidder prior to resolution of the original announced bid (CB=1), depending on the values of the *Proposals-to-CA-Ratio* (visualizing the regression results obtained in Table 5, columns (3) and (4)). The solid green and hollow magenta circles, respectively, represent the predicted probabilities of successfully closing the announced deal (DC=1), depending on the values of the *Proposals-to-CA-Ratio* (visualizing the regression results obtained in Table 5, columns (9) and (10)).



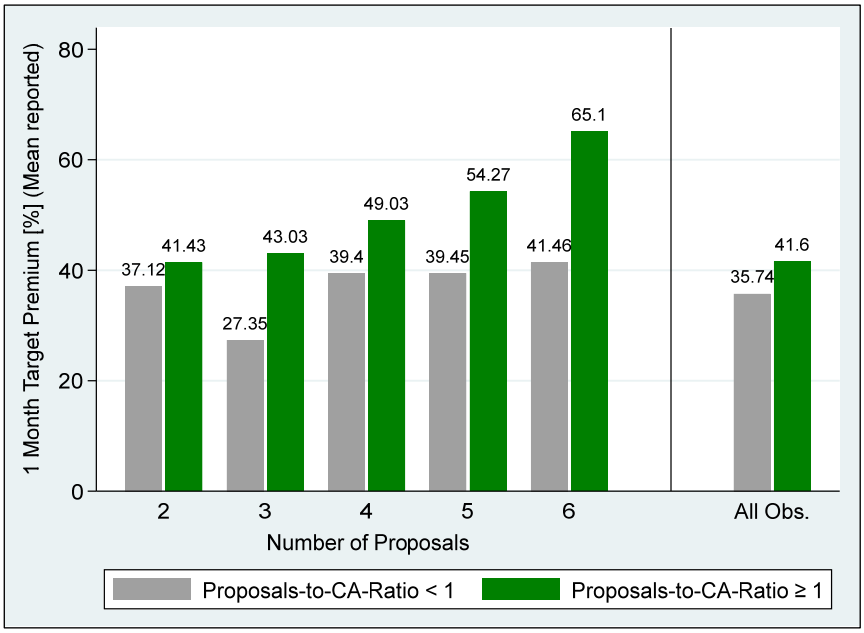
Appendix – Figure A3
Mean and Median One-Month Target Premiums – Competitive Auctions

This figure plots the mean and median value of the one-month target premium for all auctions, in which all bidders who signed confidentiality agreements also submitted bids for the target, sorted by the total number of bids (for which the *Proposals-to-CA-Ratio* equals 1). The average across all columns exceeds 53%, underlining the significant competitive effect (the one-month premium sample average is 37.18%).



Appendix – Figure A4
Mean One-Month Target Premiums sorted by Low vs. High Competition

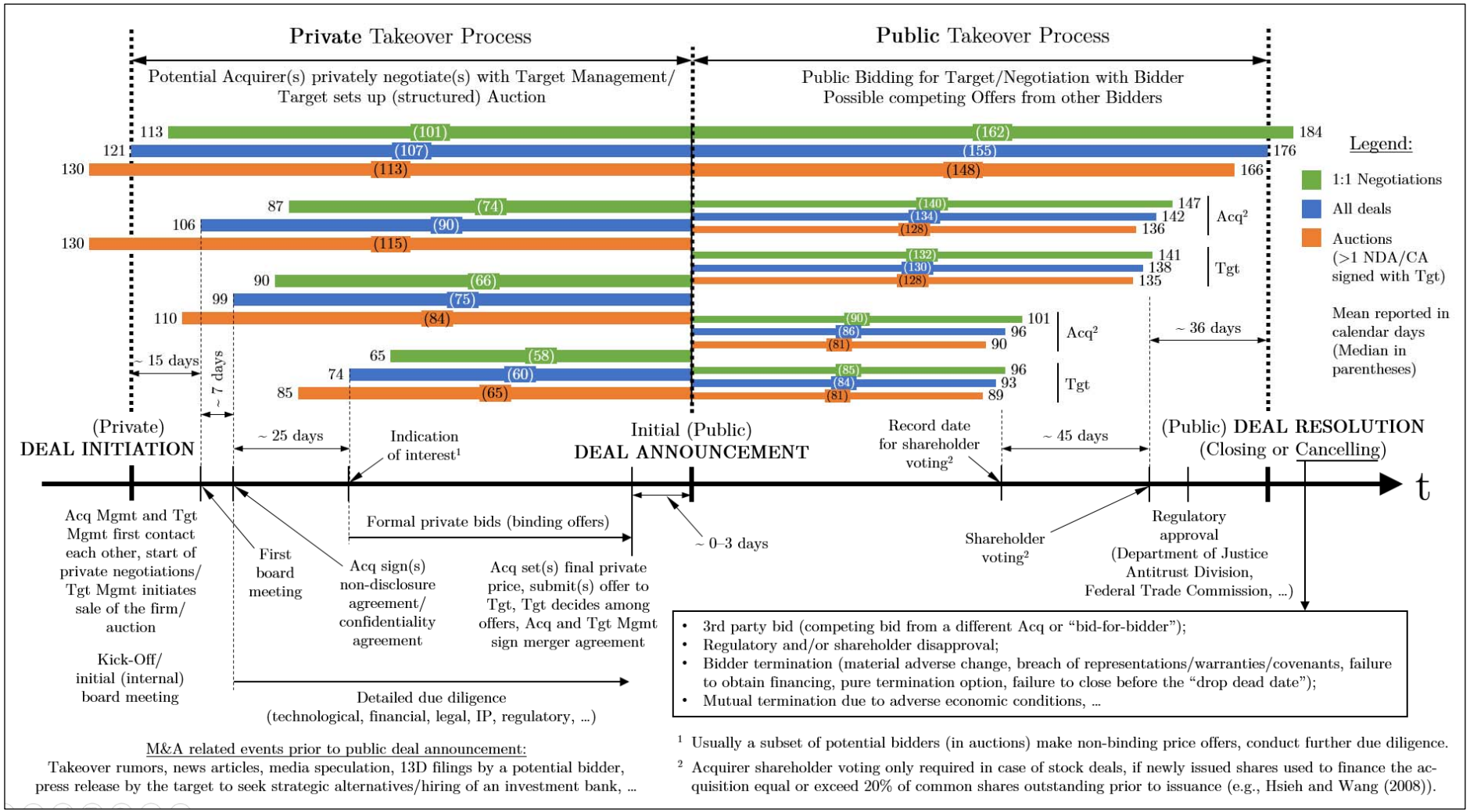
Figure A4 plots the mean one-month target premium for low (*Proposals-to-CA-Ratio* < 1) vs. high (*Proposals-to-CA-Ratio* ≥ 1) competition. At all levels (2, 3, 4, 5, and 6 received bids, respectively), highly competitive auctions are associated with significantly higher bid premiums.



Appendix – Figure A5

Key Milestones and Takeover Process Lengths in M&A

This figure illustrates key milestones during the private and public phase of M&A negotiations. Data are based on a sample of 377 public U.S. deals (2004–2017).



Concluding Remarks

This thesis addresses strategic interactions between acquiring firms, target firms, and market participants during M&A negotiations. I conclude by summarizing the central findings of each chapter, assessing limitations of the studies, and suggesting avenues for future research.

Chapter 1 highlights the role of short sellers and their informational advantage in pending transactions: they obtain a valuable trading option in M&A deals through their private observation of possible stock recalls from beneficial owners, and are thus hypothesized to accept lower deal premiums. The main finding is that offered premiums are lower, the higher the magnitude of positioned merger arbitrageurs and the more likely a stock recall is. The relation is more pronounced, if targets exhibit low insider ownership (i.e., if target stocks are more liquid after announcement), if acquirers have high active institutional ownership (i.e., if the possible stock recall signal is highly valuable), and if acquirers' deal advisors' have high equity capital market expertise. Chapter 1 hence extends the literature by adding a "bright side"-motive to short acquirer stocks besides the commonly known hedging of the long position in target stocks. The study further contributes to the general question in the finance literature about real effects of financial markets on real investments, as short sellers' impact on takeover prices reflect such a real effect. Since merger arbitrageurs' short selling of acquirer stocks is part of their trading strategy and thus unrelated to information about the fundamental value of the acquirer, future studies should consider their magnitude when assessing bidder gains on M&A announcements. A limitation of this study is the estimation of the precise value of this trading option. Future research could remedy this by using data of daily short sales and more detailed ownership.

Chapter 2 applies the idea of Shleifer and Vishny's (1989) entrenchment strategy through manager-specific investments by misusing a merger contract clause thought to compensate the target if the acquirer terminates the deal due to reasons under his sphere of control. If a CEO is under high turnover pressure and announces a transaction with an excessively high, irreversible bidder termination fee, acquiring firm's shareholders react significantly negative on announcement. The CEO thereby entrenches herself through the deal by making it costly for shareholders to replace her. This effect is stronger, if the CEO and subordinated

managers are less aligned with shareholders' interests, if the board of directors is busy, and if the deal is characterized as a diversifying takeover (i.e., more likely of empire-building nature). The study shows that in these cases the level of entrenchment, as measured by the E-Index developed in Bebchuk, Cohen, and Ferrell (2009), increases stronger in the years following the deal compared to otherwise similar deals. Chapter 2 thus motivates members of the board of directors to take a close look when negotiating termination fee clauses in M&A contracts. A limitation of this study is that it does not take CEO's talents and experience into account, as the theoretical paper by Shleifer and Vishny (1989) suggests. Future research could address this, especially for the identified diversifying deals. Another fruitful avenue could be the analysis of post-announcement forced CEO turnover probability to verify if the strategy of the CEO to counter the disciplinary forces of the market for corporate control really did materialize.

Chapter 3 emphasizes the protection of intellectual property during M&A negotiations. The relevance of intangible capital has significantly increased over the last decades and explains why average market-to-book ratios seem to inflate. Recent research highlights the role of R&D in M&A, and finds that the prospects of being acquired by a larger firm increases the incentives for smaller firms to innovate (Phillips and Zhdanov (2013)). I contribute to this literature by showing that target managers can utilize their bargaining power to negotiate bidder termination fees, which are paid by the acquirer if he later terminates the deal due to reasons under his sphere of control. These fees incentivize the target to reveal private information to the acquirer: I find that the relation between my proxy for target's relative intellectual property value and the size of the negotiated bidder termination fee is positive and statistically highly significant. Further analyses indicate that the positive relation increases in the degree of technological proximity and product market rivalry between acquirer and target. The association is more pronounced, if the target is a pioneer in its technology sector, operates in the hightech or healthcare industry, and mentions trade secrets in its 10-K report prior to announcement. This suggests that new innovation, generated through R&D, can be most valuable for firms with a similar technology base and firms that are direct product market competitors. Future research could relate my proxy for target's intellectual property value to the selling procedure in M&A negotiations: following Hansen (2001), targets trade off the upward potential for higher premiums with competitive information cost when deciding on the selling mechanism. I hence

expect a positive relation of this proxy with the probability to exclusively negotiate, i.e., one-to-one with only one prospective acquirer.

Chapter 4 sheds light on competition among bidders during private merger negotiations and its effect on announcement returns of involved firms. This pre-public phase received heightened attention by researchers over the past two years. Data of the private sales process have to be parsed from the background section of official merger/tender offer documents provided by the Securities and Exchange Commission (SEC). Since textual analysis and machine learning techniques have only recently been introduced to finance research, this might have contributed why the research gap of the analysis of private merger negotiations took some time to be fully identified. I develop a ratio to measure the degree of competition during private negotiations, and find that this ratio is significantly positively related to target premiums and significantly negatively related to announcement returns of the winning bidder. Chapter 4 provides additional details of the private takeover process: I find that targets' stock price run-ups in anticipation of the takeover seem to increase earlier if the selling procedure is structured as an auction rather than an exclusive one-to-one negotiation. This indicates that a higher number of involved parties, as is the case in auctions, could increase the likelihood of leaking information to the market, well ahead of official bid announcement. By applying a propensity score matched sample approach, I do not detect a systematic difference between premiums paid in auctions versus premiums paid in one-to-one negotiations. This finding contributes to Boone and Mulherin (2008, 2009) that empirical evidence on the "one best way to sell a company" is mixed. Future studies could identify how competition is enabled: research shows that investment banks may posses a heterogeneous set of skills in advising M&A clients (e.g., Bao and Edmans (2011) and Golubov, Petmezas and Travlos (2012)). Different deal advisors could be specialists for different selling procedures. Analyzing the private takeover process in full detail is highly relevant to better understand strategic behavior of firms in M&A.

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