Do acquirers pay less for unlisted targets? Evidence from OTC markets*

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Abstract

It is widely known that bidder announcement returns are higher when targets are unlisted (i.e., not traded on a stock exchange) than listed. However, the source of these gains – either because acquirers pay less or because deal value creation is greater – remains elusive due to data limitations. I introduce a set of deals to the M&A literature with a novel unlisted target type: firms with equity traded over the counter (OTC). This sample allows me to directly measure offer premiums and synergies in unlisted target deals for the first time. I show that (1) contrary to the conventional wisdom, premiums are higher – not lower – for OTC targets, (2) these high premiums originate from shared synergy gains rather than bidder overpayment, (3) the synergy gains are consistent with improvements to OTC targets' access to capital, with a larger portion of synergies going to OTC target shareholders due to stronger bargaining, and (4) acquirer returns, synergies, *and* premiums are all higher for OTC targets that are closer to private firms (illiquid stock) than listed firms (liquid stock).

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1 Introduction

Mergers and acquisitions (M&A) of unlisted targets – firms not traded on a stock exchange – account for two-thirds of US takeovers and represent a total deal value of $3.5 trillion, 1980-2020. Despite their prevalence, relatively little is known about these deals due to limited data on unlisted targets themselves, which rarely file public disclosure or have observable stock prices. Instead, previous studies typically rely on information that can be inferred from the stock price of listed acquirers. Since at least Chang (1998), it is known that these acquirers experience higher cumulative abnormal returns (CAR) when announcing takeovers of unlisted targets than listed targets. However, it remains unclear whether this return differential is attributable to higher synergy gains or better deal terms for the bidder (i.e., paying less). Most recently, Jaffe, Jindra, Pedersen, and Voetmann (2015) test a battery of hypotheses but do not find strong support for either channel, concluding that the return differential remains an unsolved puzzle.

In this paper, I provide new evidence addressing this gap in the literature and an important question about the market for corporate control: Do acquirers pay less for unlisted targets than listed targets? To do so, I introduce a set of deals to the M&A literature with a novel unlisted target type: firms with equity traded over the counter (OTC). OTC targets present an ideal test case because they have observable stock prices while still diverging from listed targets in key dimensions distinguishing listed firms from unlisted firms, such as stock liquidity, information disclosure, and ownership concentration. Importantly, these characteristics also vary within the OTC target sample, allowing for empirical testing of potential economic channels related to offer premiums and synergies in a way that is difficult or impossible with private target deals.[1]

Two prior papers address the question of how much acquirers pay for unlisted versus listed targets. Officer (2007) compares deal valuation multiples for unlisted private and subsidiary targets with those of listed targets and estimates that unlisted targets sell at a 15-30% discount relative

[1]For example, practically all private targets have completely illiquid stock and do not file with the SEC, making it difficult to distinguish effects related to stock liquidity and disclosure from those of private status more broadly. In contrast, OTC target deals allow the econometrician to isolate the relationship between premium or synergy differentials and these distinct channels from listing status effects more broadly.

to listed targets. Jaffe, Jindra, Pedersen, and Voetmann (2019) also use multiples as in Officer (2007) but with an updated methodology that corrects for biases related to one-sided sample truncation and Jensen's inequality. Unlike Officer (2007), they do not find evidence of an unlisted target discount. By introducing OTC target deals, I am able to directly measure offer premiums via unlisted target stock prices for the first time in the literature. Doing so is preferable because stock prices incorporate all public information and investors' expectations about future cash flows when estimating the standalone value of the target firm. In contrast, multiples are limited to relatively simple metrics such as EBITDA, sales, or book value of equity, and require the implicit assumption that the target has the same future growth and discount rates as comparable firms. Perhaps even more importantly, stock prices represent the firm's *de facto* value to shareholders.[2]

I open by testing whether offer premiums are different for OTC targets and listed targets. I run cross-sectional regressions for a sample of 735 OTC and 7,923 listed target deals and control for deal, acquirer, and target characteristics. My results are surprising and contrary to expectations from the previous literature: I estimate that OTC target shareholders receive a statistically and economically significant 26 percentage point (pp) *higher* premium compared to listed target shareholders. The economic magnitude of this differential is large; For comparison purposes, the average listed target premium is 43%.

High OTC target premiums could either be motivated by greater value creation in OTC target deals or because bidders pay too much. In the case of the former, we expect acquirers to experience more positive CAR around deal announcements than in listed target deals. If buyers instead overpay for OTC targets, we expect the market to react more negatively. To investigate, I calculate acquirer announcement CAR for the subset of deals with listed bidders. I also estimate expected deal synergies directly by calculating the combined market-value-weighted acquirer and target CAR (as in Bradley, Desai, and Kim 1988 and Dessaint, Eckbo, and Golubov 2023). I find strong

[2]Estimating deal premiums using multiples also has other drawbacks. For one, positive and negative multiples are not comparable, which in practice mostly entails dropping the latter. This is particularly likely to result in missing values for the types of small, unprofitable firms that make up a significant fraction of unlisted targets. Even among listed firms, more than a quarter of firm-year observations in Compustat have negative EBITDA (1980-2020). Moreover, deal multiples can be highly sensitive to fluctuation (and potential measurement error) in the value of the underlying variables.

support for higher deal synergies behind OTC premiums: Bidders experience 1.1pp higher returns when announcing OTC target deals than listed target deals – despite paying higher premiums – and expected combined synergy gains are 1.5pp higher. This result is robust to controlling for both acquirer and target runup, indicating that the difference in expected gains is not driven by deal anticipation. I also find that a larger fraction of synergy gains (in dollar value) goes to OTC target shareholders than listed target shareholders by around one-fifth (21pp), consistent with stronger bargaining on behalf of OTC target owners.

Why is value creation greater in deals where targets trade over the counter instead of on a stock exchange? I evaluate three types of synergies related to distinct economic channels, with a particular emphasis on characteristics that distinguish listed from unlisted firms.[3] First, I test the role of financial synergies by investigating target stock liquidity. OTC firms with low stock liquidity are likely to face higher equity issuance costs and cost of capital, which may inhibit the financing of otherwise positive net present value (NPV) projects. Takeovers may alleviate such financial constraints faced by illiquid OTC targets.[4] Second, I test for OTC-specific operating synergies, which are captured by differences in public information disclosure. Specifically, I propose that OTC firms choosing not to file with the SEC (roughly half of OTC targets) may be trying to conceal innovative or strategic activity from competitors (Leuz and Wysocki, 2016) or poor performance from the public (Leuz, Triantis, and Wang, 2008). Both scenarios allow for synergy gains by bringing previously undisclosed innovations to market (Gao, Ritter, and Zhu, 2013) or professionalizing target operations. Third, I consider the role of governance synergies, in particular, whether listed acquirers benefit by integrating blockholders from closely held unlisted targets into

[3]In this paper, I consider "synergies" to be any source of value creation that results in a merged entity with a greater value than the sum of the individual firms.

[4]For stock liquidity and cost of equity issuance, see Amihud and Mendelson (1986); Butler, Grullon, and Weston (2005); Hanselaar, Stulz, and Van Dijk (2019). For stock liquidity and cost of capital, see Bolton and Von Thadden (1998); Eckbo and Norli (2005); Brav (2009); Amihud and Levi (2023). Relatedly, Almeida, Campello, and Hackbarth (2011) and Erel, Jang, and Weisbach (2015) show that takeovers can relieve financial frictions for cash-constrained targets. Boucly, Sraer, and Thesmar (2011) also find that leveraged buyout targets often issue additional debt to finance investments post-buyout, particularly when these targets are private. Finally, Massa and Xu (2013) show that acquirers with illiquid stock can benefit by buying a liquid listed target – a somewhat similar argument as presented here, but emphasizing how bidder shareholders can gain from liquid targets (by increasing the liquidity of their own shares), instead of how illiquid targets can benefit from bidders (by alleviating the firm's financing frictions).

their ownership structure (Chang, 1998).

My findings are consistent with financial synergy gains via the stock liquidity channel. Controlling for target liquidity is sufficient to explain all of the additional acquirer CAR and estimated synergies and most (but not all) of the additional premium in OTC target deals. Moreover, the relationship between OTC target liquidity and offer premium is negative and monotonic: Premiums are highest for the least liquid OTC targets and lowest for the most liquid. The results show that acquirer returns, synergies, *and* offer premiums are all higher for targets that are closer to private firms (illiquid stock) than listed firms (liquid stock).[5] On the other hand, I find support for neither disclosure-related operating synergies nor ownership-related governance synergies. For the former, I do not observe any relationship between the target's public information disclosure (proxied using 10-K filings) and acquirer returns, synergies, or premiums. Similarly, the latter does not reveal any connection between a listed acquirer's use of stock payment (a necessary condition for it to benefit from changes in ownership structure) and the same set of outcome variables.

Although the stock liquidity channel is able to explain the additional value creation in OTC target deals, as well as the abnormally high bidder announcement returns, it leaves roughly one-third of OTC-the specific premium unexplained. Notably, the fraction of synergies captured by target shareholders is unrelated to stock liquidity or information disclosure, meaning that OTC targets share a stronger negotiating position that is independent of trading and filing status. While concentrated ownership in OTC targets does not appear to be a source of synergy gains, I hypothesize that it could well explain this additional bargaining power demonstrated by OTC target shareholders.[6] However, directly testing this hypothesis is presently beyond the scope of this paper due to limited ownership data.

Finally, since OTC targets are new to the M&A literature, I round out the paper by considering whether my results could be biased by potential stock mispricing on OTC markets. Unlike stock

[5]In separate regressions including private target deals, I also show that acquirer CAR in deals involving the most illiquid OTC targets – which also receive the highest premiums – are not statistically different from the high acquirer CAR observed in private target deals.

[6]For related studies on ownership and bargaining power, see Ghosh and Ruland (1998); Stulz (1988); Amihud, Lev, and Travlos (1990); Ang and Kohers (2001).

exchanges, most trading of OTC equities is conducted by (potentially uninformed) retail investors (White, 2016). If OTC targets are undervalued when standalone value is estimated, offer premiums will appear larger than they are. I argue that, to the extent that there is any mispricing in my sample, it works *against* – not in favor of – my results. Due to brokerage restrictions, search costs, and limited supply, short selling of OTC equities is difficult, expensive, and rare (Ang, Shtauber, and Tetlock, 2013; Eraker and Ready, 2015). It is known since at least Miller (1977) that in scenarios where investors hold heterogeneous beliefs (as with OTC retail traders) and there are constraints to short-selling, prices will be inflated. Indeed, Ang, Shtauber, and Tetlock (2013) find that the OTC market return is negative (-0.8% per month), "implying widespread overpricing of OTC stocks" (p. 2987). As such, there is little to suggest that this paper's results are biased by mispricing.[7]

This paper contributes to several strands of literature. Foremost is the M&A literature, particularly studies on takeovers involving unlisted targets. The two papers closest to this one are Officer (2007) and Jaffe, Jindra, Pedersen, and Voetmann (2019), which estimate acquisition discounts for unlisted versus listed targets using deal valuation multiples and find significant unlisted target discounts and no significant discounts, respectively. Other studies examine the source of bidder gains in unlisted target deals, with varied results. Chang (1998) argues that acquirers benefit from improved governance when paying with stock by incorporating unlisted target blockholders. Fuller, Netter, and Stegemoller (2002) and Cooney, Moeller, and Stegemoller (2009) find evidence that the return differential is related to better deal terms for the buyer. Faccio, McConnell, and Stolin (2006) and Jaffe, Jindra, Pedersen, and Voetmann (2015) test a range of previous and new hypotheses but do not find support for any particular channel. In this paper, I show that for OTC deals, the return differential is consistent with synergy gains rather than the buyer paying less. Moreover, this relationship is stronger the closer the OTC target is to private status than listed

[7] A similar intuition holds for any sort of market price manipulation. Since short-selling is expensive, manipulators are only incentivized to inflate prices, such as in a "pump-and-dump" scheme. Moreover, since my sample consists of *bona fide* deals where the acquiring firm launches a takeover bid after accessing the target's data room, it is unlikely that they would be fooled by market manipulation schemes (or still be willing to extend an offer should they observe such a scheme).

status in terms of stock liquidity, with higher bidder CAR, financial synergies, and premiums for the former.[8]

Beyond the M&A literature, I also contribute to the body of papers on OTC-traded firms. Earlier papers on OTC equities generally focus on asset prices (Bushee and Leuz, 2005; Bollen and Christie, 2009; Ang, Shtauber, and Tetlock, 2013; Eraker and Ready, 2015). More recently, several papers look at OTC firms in the corporate finance context. Brüggemann, Kaul, Leuz, and Werner (2018) document institutional details of the OTC market and examine the trade-off between regulation and market quality (crash risk and liquidity). Cole, Floros, and Ivanov (2019) show that initial public offering (IPO) underpricing is lower for firms that trade OTC before listing on a stock exchange than firms that list directly from private ownership.[9] Cole, Liang, and Zhang (2020) use OTC firms to investigate the relationship between debt financing and the financial growth cycle proposed by Berger and Udell (1998). Most recently, Jiang, Wang, and Yang (2022) measure returns for firms that trade OTC or on stock exchanges after bankruptcy reorganization. I add to this growing field with the first evidence on takeovers involving OTC firms.

The remainder of this paper proceeds as follows. Section 2 describes data and summary statistics. Section 3 presents the main results, while Section 4 examines the potential economic channels behind my findings. Sections 5 and 6 expand the analysis by introducing private target deals and addressing potential concerns regarding mispricing, respectively. Section 7 concludes.

[8]More broadly, my findings also add to the extensive literature on M&A deal offer premiums. Previous studies examine the relationship between premiums and deal initiation (Masulis and Simsir, 2018), managerial hubris (Roll, 1986; Aktas, De Bodt, Bollaert, and Roll, 2016), rival bidders (Aktas, De Bodt, and Roll, 2010), size (Moeller, Schlingemann, and Stulz, 2004; Alexandridis, Fuller, Terhaar, and Travlos, 2013), target stock price runup (Schwert, 1996; Betton, Eckbo, Thompson, and Thorburn, 2014; Eaton, Liu, and Officer, 2021), termination fees (Officer, 2003), toeholds (Betton, Eckbo, and Thorburn, 2009), as well as many others. I contribute by showing that premiums are also related to target listing status: OTC target shareholders receive higher premiums than owners of listed firms, consistent with both greater value creation and stronger bargaining.

[9]See also Eckbo and Lithell (2023), who document that uplists from OTC markets account for as much as 28% of all new US stock exchange listings during 1980-2020.

2 Data and empirical methods

2.1 Sample Construction

OTC target deals. I construct my main sample of M&A OTC target deals from Refinitiv SDC Platinum and the FactSet Mergerstat/BVR Control Premium Study (Mergerstat henceforth). I identify all deals announced between 1985-2020 where the target firm exchange is OTC or Pink Sheets. I keep control bids, defined as when the buyer holds less than 50% of target shares before the deal is announced and seeks to own at least 50%. The deal form must be either "merger" ("M") or "acquisition of majority interest" ("AM"). Deal value must be known and at least $1 million. I exclude deals in which the target is a utilities firm (SIC 49) or a REIT, trust, or investment unit (SIC 6722, 6726, 6798, or 6799).[10] I limit the sample to initial bids, in which target has not been the target in any other deal in the last 18 months. After applying these filters, I have a sample 2,966 deals, of which 544 are recorded in both SDC and Mergerstat, 516 are found in Mergerstat only, and 1,906 are in SDC only.

Next, I filter out any deals where the target firm was listed at any point in the 12 months prior to the deal announcement. I do so by linking targets to CRSP after keeping CRSP observations with US-domiciled common stock (share code 10 and 11) on NYSE, Amex, or NASDAQ (exchange code 1-3 or 31-33) that have an active trading status, non-missing price, and positive trading volume. I set a 12-month minimum to ensure that the target firm is not listed at any point during the estimation window, which covers 12 to 2 months before the deal announcement date and is further discussed in Section 2.2. Doing so eliminates 1,131 deals. This suggests that a sizeable fraction of the deals labelled as OTC target deals by SDC and MS are actually listed and incorrectly

[10]Many M&A studies also exclude deals in which the target is a financial industry firm. In this paper, I opt to keep these deals for two reasons. First, a large fraction (51%) of the OTC targets in my final sample are financial industry firms, mostly banks. Retaining these in the sample is important to avoid losing too much statistical power. Second, it is not clear that deal offer premiums or synergies should materially differ for financial industry targets than targets from other industries. Moreover, I control for target industry fixed effects throughout the analysis. While not tabulated here, my findings also hold when run exclusively on the subsample of non-financial industry target firms.

categorized.

I locate stock price data for unlisted OTC target firms from three sources: WRDS OTC Markets, Compustat Daily, and Refinitiv Eikon. WRDS OTC Markets records end-of-day pricing data directly from OTC Markets Group (formerly Pink Sheets). While it is the most detailed and comprehensive of these three data sources, the data only start in September 2011. For deals that are announced in November 2012 or later, I prioritize data from WRDS OTC Markets to allow for a full estimation window. For deals announced before November 2012, I prioritize data from Compustat Daily, then Eikon. Where indicators are available, I require observations to be from when a firm has an "active" status designation and where the security is common stock or ordinary shares (there are basically no prices recorded for preferred shares). Following Schwert (1996), I measure acquirer and target standalone value at the start of the runup period 42 trading days (2 months) before the deal announcement. I require non-missing stock prices (either fresh prices or bid-ask midpoints) to be observed 42 trading days (2 months) before the deal announcement and at least one day with trading activity in the event window (-2, +2). With these criteria, I find stock price information for 908 of the remaining 1,835 deals.

Finally, I set a minimum offer price to avoid measurement error in case stock prices are rounded (Ince & Porter 2006). First, I keep deals where the deal offer price per share is known, to allow for estimation of the deal premium, resulting in 830 remaining deals. Next, I require the minimum offer price to be at least \$0.10, after which 801 observations remain. I maintain a low minimum price to maximize the number of OTC target deals in my sample. Additionally, many firms trade OTC precisely because they are so-called "penny stocks" (with a share price of less than \$5) and are ineligible for listing, making these firms interesting objects of study. For robustness, I rerun my analysis using higher minimum prices (\$1, \$5, \$10, and even \$50) in untabulated results and find that my main results hold.[11] My final sample of OTC takeovers consists of 735 deals.

Listed and private target deals. I assemble a sample of listed target deals by selecting all control bids from SDC with the same initial filters as OTC firms except for keeping only targets

[11] Ang, Shtauber, and Tetlock (2013) also find that setting a minimum stock price of \$0.10 gives them similar results as using \$1 when estimating OTC return premiums.

that trade on NYSE, Amex, and NASDAQ. This gives me a starting sample of 9,553 listed target deals. Next, I link targets to CRSP using the same filters as above. After linking and requiring observations on event day -42 and (-2, +2), I am left with 8,344 deals. Finally, I require deal offer price to be known and at least $0.10 for a final sample of 7,925 listed target deals.

I also select private target deals from SDC and using the same initial filters as above for a starting sample of 13,252. As with OTC targets, I filter out any targets that were listed within 1 year prior to deal announcement by linking to CRSP (reducing the sample to 13,191). Since it is not possible to calculate premiums for private targets, I do not filter on deal offer price (which is anyway rarely recorded in SDC for these deals).

Other data sources and cleaning. I download additional firm accounting data from Compustat Annual Fundamentals, using observations from the year before the merger announcement. For information on 10-K and 10-Q filings I use the Loughran-McDonald SEC/EDGAR 10-X Summaries File (Loughran & McDonald 2016), which I link to target firms via CIK and company name. This file contains summary data gathered via textual analysis for all 10-K and 10-Q forms filed with the SEC from 1993-2021, although the number of filings on record prior to 1996 is relatively small since companies were not required to file via electronically EDGAR until that year.

I winsorize all continuous variables at the 5% tails by target type (listed, OTC, or private). I winsorize by type since the sample mean and standard deviation vary significantly by type (as illustrated in Section 2.3), which can result in large one-sided winsorization if done on the deal sample as a whole. To filter out any potentially misrecorded returns from the estimation window, I replace one-day returns below -62.3% or above 149.6% with missing values; These thresholds respectively correspond to the 0.001st and 99.999th percentiles of listed target estimation window returns, which applies to 0.1% of the estimation period OTC return observations. The results in this paper are not sensitive to the level of winsorization or to filtering out extreme returns.

2.2 Constructing key variables

In this section, I describe how I construct my four outcome variables, as well as eight different control variables to proxy for deal anticipation, target stock liquidity, and target information disclosure.

Dependent variables. I measure deal offer premiums as in Betton, Eckbo, Thompson, and Thorburn (2014), who compare the offer price to the target's standalone value at the start of the runup period 42 trading days (approximately two months) before the deal is announced.

To I calculate acquirer announcement CAR, I use a Carhart four-factor model (Carhart, 1997) and estimate factor loadings using the estimation window (-252, -42), corresponding to the 10 months before the start of the runup period. I cumulate abnormal returns over a five-day window around the announcement date, corresponding to event trading days (-2, +2).

Following Bradley, Desai, and Kim (1988) and Dessaint, Eckbo, and Golubov (2023), I estimate expected deal synergy gains by calculating the estimated dollar value of synergies (combined market-value-weighted acquirer-target CAR) and dividing this by the sum of the acquirer and target's standalone values. This measure can be interpreted as the percent increase in value that the merging firms can achieve together by merging instead of remaining separate.

Finally, I estimate which fraction of dollar synergy gains is allocated to target shareholders. This measure proxies for target management bargaining: The higher the fraction of synergy gains that are captured by target shareholders, the stronger their negotiation outcome. The fraction of synergy gains is also calculated following Bradley, Desai, and Kim (1988).

Independent variables. I construct eight additional explanatory variables for use in my analysis. The first two are acquirer and target runup, which serve as proxies for deal anticipation. In deals with more market anticipation and higher expected value, target runups are expected to be larger (Betton, Eckbo, Thompson, and Thorburn, 2014). The relationship between acquirer runup and expectations is less clear, and more sensitive to the deal terms negotiated by the acquirer. To calculate target and acquirer runup, I calculate factor loadings in the same manner as for

announcement CAR above and cumulate abnormal returns through event trading days (-42, -3).

I also construct three proxies for target liquidity, which are measured during the ten-month estimation window defined above to avoid any bias related to deal anticipation. The first is the fraction of trading days with trading activity (positive trade volume), similar to the primary OTC illiquidity measure used by Ang, Shtauber, and Tetlock (2013). As shown next in Section 2.3, the number of days with trading varies considerably among OTC targets; Half trade every other day or less frequently.

The second is an Amihud liquidity measure based on Amihud (2002). This measure captures how sensitive a stock's price is to trading – the price of an illiquid stock will move more in response to small amounts of trading than a liquid stock. I construct my Amihud liquidity measure for each target firm in four steps: (1) per day, divide the absolute value of the return by the dollar trading volume, (2) take the daily average across the estimation period and rescale by 10^6 as in Amihud (2002) to get the Amihud illiquidity measure, (3) add 1 and take the natural logarithm to reduce skewness, and (4) multiply by -1 to convert this illiquidity measure into a liquidity measure to align it with the other liquidity indicators used here.

The third liquidity proxy I use is the average daily dollar trading volume, expressed as a natural logarithm to reduce skewness. OTC stocks often have low free float and little trading activity. As such, the overall dollar amount of trading is a useful tool for gauging how much stock it is possible for investors to transact.[12]

Next, I construct three proxies for how much information the target discloses to the public, based on information from the 10-X Summaries File (Loughran and McDonald, 2016) and measured in the two-year period before the announcement date. The measures are (1) a dummy equal to one if the target filed a 10-K, (2) the log of the total number of filings (10-Ks and 10-Qs), and

[12]Two other well-known liquidity measures are bid-ask spreads and turnover. I am unable to produce the former due to data limitations. However, Lesmond (2005) shows that the Amihud measure is closely correlated to bid-ask spreads, making it unnecessary to include both in this analysis. I exclude turnover, defined as the number of shares traded divided by shares outstanding, because it has come to be regarded as a poor liquidity measure; Turnover can simultaneously proxy for liquidity and differences in investor opinion and is thus considered less accurate (Lesmond, 2005). Goyenko, Holden, and Trzcinka (2009), who run horseraces between two-dozen different liquidity measures, even ignore turnover entirely.

(3) the log of the total word count in all filings. Since EDGAR's coverage is incomplete prior to 1996, I measure disclosure only for deals announced in 1998 and onward to allow for two full years of data. The disclosure measures are assigned a missing value if the deal is announced prior to 1998.

2.3 Descriptive statistics

This section summarizes the variables used in this analysis. Table 1 summarizes continuous variables for listed and OTC targets. Private target deals are also included for comparison in Panel A, but not in Panel B, which contains variables that are either unobservable or not relevant for private target deals. Table 2, which is discussed further below, describes categorical (dummy) variables. Finally, for illustrative purposes, Appendix Table 1 also presents the ten largest OTC target deals alongside additional hand-collected information.

Starting with Table 1, Panel A summarizes deal value, relative deal size, target leverage, and acquirer CAR for listed, OTC, and private target deals. It is noteworthy how closely OTC target deals resemble private target deals in the cross-section, in particular when compared to listed targets. Opening with deal value, both OTC and private target deals are close in size with mean (median) values of \$78m (\$35m) and \$88m (\$29m) respectively.[13] Listed target deals tend to be considerably larger, averaging \$1.35 billion and with a median of \$349 million. The ratio of deal value over acquirer market cap (limited to the subsample of deals with listed US acquirers), is similar for OTC firms (mean/median 0.21/0.12) and private firms (mean/median 0.20/0.08). Listed targets are generally closer in size to their respective buyers (mean/median 0.41/0.22).

Both OTC and private targets tend to have higher leverage than listed targets. I collect target debt ratio (total liabilities over total assets, or book leverage) from SDC and bound it to be between 0 and 1 if nonmissing. The mean (median) debt ratio is 0.72 (0.9) for OTC targets and 0.73 (0.8) for private targets. In comparison, listed targets only have a mean (median) debt ratio

[13] OTC target deal value is slightly larger than the mean (median) market cap for the OTC population at \$64m (\$21m), as calculated for 2001-2010 by Brüggemann, Kaul, Leuz, and Werner (2018) (and converted to 2020 USD here).

of 0.56 (0.6). This differential is consistent with higher equity issuance costs for unlisted firms, and also suggests that it may be difficult for these firms to issue additional debt prior to being acquired because of their high leverage.

Next, I summarize the four key dependent variables used in this analysis. The first is acquirer deal announcement CAR, which is recorded for the subsample of deals with US listed acquirers. Consistent with the prior literature following Chang (1998), investors react more favorably to deals with private targets than listed targets, with respective CAR of 1.6% (0.5%) versus -1.6% (-1.2%) on average (median). OTC target deals appear to fall in the middle, with mean (median) acquirer CAR of 0.0% (-0.1%).

Panel B of Table 2 further summarizes continuous variables for listed and OTC targets but leaves out private targets, for which these variables are either unmeasurable or irrelevant. I start by showing deal offer premiums, which are the main focus of my analysis. Consistent with the prior literature (see e.g., Eckbo, Malenko, and Thorburn 2020), listed target shareholders receive an average unconditional premium of 43% and a median premium of 37%. In comparison, OTC target shareholders receive even higher unconditional premiums: 63% on average and 46% at the median.

Combined bidder-target announcement CAR, the third key outcome variable presented here, proxies for expected synergy gains. OTC target deals yield larger unconditional synergies at 2.7% (2.2%) versus 1.9% (1.2%) for listed target deals on average (median). The fourth key outcome variable documents what fraction of these synergy gains go to target shareholders. In OTC target takeovers, target shareholders are able to negotiate for a larger fraction of the value created in the deal, with a mean (median) share of 55% (41%) versus only 36% (27%) for listed target shareholders.

Sections 3 and 4 are dedicated to examining these four key outcome variables in detail. In particular, I check to see if the unconditional differences observed here still hold after controlling for salient factors such as size and payment type. I also test several economic channels that may account for these differences.

Table 2 Panel B continues with three measures of stock liquidity. All measures indicate that OTC targets generally have much lower stock liquidity than listed targets. Listed targets generally trade every day (mean/median 96/100%), while OTC targets tend to only have trading activity every other day (mean/median 52/46% of trading days). Amihud liquidity indicates that OTC target share prices are more sensitive to trading; More negative values correspond to lower liquidity, while values closer to zero indicate higher liquidity. On average (median), a listed target has $7,283,000 ($941,000) in daily trading while an OTC target only has $34,000 ($8,000). Across these three liquidity measures, the least liquid listed target has higher liquidity than roughly two-thirds of the OTC target sample.

To round out Table 1, I show that roughly one-third of the OTC deals feature a target that was at some point listed (237 of 735 deals). Among those that previously traded on a stock exchange, the mean (median) number of years between the target's delisting date and the takeover announcement date is 5.6 (4.2) years. While not shown here, CRSP delisting codes indicate that 85% of these delistings are due to cause and 15% voluntary. In other words, most OTC target firms that were previously listed were taken off the exchange for failing to uphold listing requirements (e.g., the stock price became too low, target did not file timely reports with the SEC, or firm failed to uphold governance standards or financial performance).

I also present unadjusted stock returns, expressed in monthly terms, for listed and OTC targets during the estimation period. Listed targets experience 1.2.% (1.2%) monthly returns on mean (median) in the 10 months prior to the runup period. Comparatively, OTC targets experience higher returns, with a mean (median) monthly return of 4.7% (2.3%). This suggests that OTC targets generally tend to be performing well prior to acquisition, which is noteworthy since OTC stocks have been shown to provide negative returns to investors on average at -0.04% per month (Ang, Shtauber, and Tetlock, 2013).

Table 2 proceeds by summarizing categorical (dummy) variables. Panel A tabulates deal characteristics. Compared to listed target deals, OTC/private target deals, respectively, are more likely to be completed (88/88% vs 79%) but less likely to be hostile (0.4/0.2% vs 5%), be tender

offers (5/0.4% vs 22%), or feature lockup provisions (2/1% vs 11%). These results are consistent with unlisted firms having lower free float and more concentrated ownership; Hostile and tender bids are difficult or even impossible to execute if too few shares are floated for the bidder to acquire a controlling position, and announced deals are more likely to have received approval from target owners and management prior to the deal being made public.

OTC target deals are somewhat more likely to be horizontal mergers than other deals (61% vs 53/54% for listed/private targets). The distribution of payment type (all cash, mixed, or all stock) is roughly similar between OTC and listed target deals. Private deals are more likely to feature a mix of stock and cash or some other type of payment, although this could potentially be due to less precise payment method data.

Panel B of Table 2 shows acquirer characteristics. Acquirers of OTC firms are slightly more likely to be strategic buyers (88%) than in listed target deals (83%) and slightly less than in private target deals (93%). OTC target deals feature a larger fraction of deals with buyers that are financial firms (62%) versus listed/private target deals (40/28%). In terms of buyer public status (listed, OTC, private, subsidiary, or other) and nation (US or foreign), the distribution varies but is overall fairly similar across target types.

Table 2 Panel C summarizes target characteristics. Interestingly, I observe that in 53% (375 of 735) of the OTC target deals, the target files at least one 10-K filing in the two years preceding the deal announcement. In comparison, 96% of listed targets file, while only 5% of private targets do. While not tabulated, the correlation between previous listing status and 10-K filing among OTC target deals is fairly weak – only around 25%. In other words, roughly half OTC targets do not file any 10-K filings before they are acquired, and this decision appears mostly unrelated to prior listing status. I also show that a larger proportion of OTC deals feature targets that are financial firms (51%) than in deals with other target types, at 21% for both listed and private targets (see also Footnote 4).

Finally, for illustrative purposes, Appendix Table 1 presents detailed information on the ten largest OTC target deals in my sample. All ten deals have transaction values above $1 billion

and are spread across several industries and years, with the earliest deal in 1992 and most recent in 2018. Half of the targets were previously listed while the other half had never traded on a stock exchange. I manually identify the largest target owners from web searches and newspaper clippings where possible. For deals where I can identify the largest owners, I observe that they tend to own a large fraction of the target shares prior to the acquisition; For example, in the largest deal (Belk Inc at $2.9 billion), 70% of the shares were family-owned before the sale, while five other deals had private equity, hedge fund, and former senior lender ownership ranging from 40% to 90% of shares.

2.4 Empirical methodology

In the remainder of the paper, I use multivariate regression analysis to investigate the relationship between target listing status and four different dependent variables: offer premium, acquirer CAR, deal synergies, and division of synergies. I run a set of cross-sectional deal-level regressions for listed and OTC targets using the following base specification:

$$Y_d = \alpha + \beta_1 OTC_d + \lambda X_{i,t} + \theta Z_d + \mu_t + \nu_j + \epsilon_{d,t} \tag{1}$$

where Y_d is one of the four dependent variables listed above. OTC_d is a dummy taking a value of one if the deal target trades OTC and zero otherwise. The following four terms are vectors: $X_{i,t}$ for acquirer characteristics, Z_d for deal characteristics, μ_t for year fixed effects (FE), and ν_j for industry FE. $\epsilon_{d,t}$ is the error term. Standard errors are clustered by industry, which is measured at the target SIC-2 level.

The acquirer characteristics include a listed acquirer dummy, OTC acquirer dummy, and strategic bidder dummy. For regressions in which the outcome variables is related to acquirer CAR or synergies, the listed and OTC dummies are automatically dropped since the sample is limited to deals with listed acquirers.

Deal characteristics consist of dummies for deal completion, all-stock payment, hybrid stock-

cash payment, hostility, tender offer, and lockup provisions. I also include a size control that corresponds to the outcome variable: For offer premiums, I use log deal value, while for other outcome variables I use the ratio of deal size over acquirer standalone value (market capitalization at the start of the runup period) to capture relative deal size alongside dummy if the deal value is above median. Since relative deal size is a ratio with deal value in the numerator, I am unable to use it alongside the deal value control at the same time. Relative deal size is widely recognized as being important for acquirer CARs, since deals involving smaller targets will have a lesser impact on acquirer stock price *ceteris paribus*. As CAR and synergy regressions only involve listed-acquirer deals, I can consistently measure relative deal size using acquirer market capitalization. However, for offer premium regressions, I include all acquirer types, which necessitates the use of a size control variable that can be consistently recorded regardless of acquirer type. Additionally, the relationship between offer premiums and relative size is ex-ante more ambiguous than for acquirer CAR. For this reason, I control for deal size instead of relative deal size when the dependent variable is offer premium.[14]

3 Main results

3.1 Estimating OTC target premiums

Do buyers pay less when buying OTC targets than listed targets? In Table 3, I run a set of cross-sectional regressions based on the model specified in Equation 1. The primary independent variable of interest is a dummy indicating that the target is an unlisted OTC firm. I vary the fixed effects by column to check whether the OTC-target coefficient estimate is sensitive to unobserved time-, industry-, and even acquirer-invariant characteristics. Column (1) excludes FE, while the remaining columns include (2) year FE, (3) year and industry FE, (4) year-times-industry FE, (5)

[14]To validate this decision, in Table 4, I show that replacing deal size with relative deal size (scaled by acquirer market value) has a negligible impact on the other coefficient estimates. While not tabulated, doing the same using a relative size measure scaled by total assets (which is available for a small subset of the unlisted acquirers as well as listed acquirers) yields the same result.

year, industry, and acquirer FE, and (6) year-times-industry and acquirer FE.

In all six specifications, the coefficient estimate for the OTC target dummy is highly statistically significant at the 1% level as well as economically significant, with estimated OTC premiums ranging between 20pp and 29pp. Results for my main specification, which uses year and industry FE as in Equation 1, are shown in Column (3). This model estimates that OTC target shareholders receive 26.1pp higher offer premiums than listed target shareholders. For comparison purposes, listed target shareholders receive an unconditional 43% premium on average. As discussed in the introduction, this result is both novel and surprising since it contradicts expectations set by the prior literature, which predicts that buyers pay less (Officer, 2007) or the same (Jaffe, Jindra, Pedersen, and Voetmann, 2019) when buying unlisted targets as listed ones.

In Column (4), I replace year and industry FE with a year-times-industry FE, which captures the relationship between offer premiums and industry-specific merger waves (Mitchell & Mulherin 1996; Harford 2005). The OTC target deal coefficient remains unchanged at 25.9pp, suggesting that the OTC-specific premium is unrelated to merger wave activity. In Columns (4)-(6), the number of sampled OTC target deals shrinks due to more granular fixed effects, down to only 271 OTC target deals in Column (6) from the starting sample of 735 as in Column (3) (and reducing the overall deal count from 8,658 to 4,429). Despite the loss in sample size and more stringent controls, the coefficient of interest remains remarkably stable with an estimated value of 25.8pp in Column (6). In other words, even after accounting for acquirer fixed effects and unobserved year-industry characteristics, the OTC-specific offer premium remains large and significant.

Among the other control variables in my regressions, I estimate that premiums are higher when the acquirer is a strategic buyer and when the bidder is more aggressive (the deal is hostile or a tender offer). Deal completion is also positively related to offer premiums, which can intuitively be explained since target shareholders are more likely to accept a bid with more generous terms. Stock payment is associated with lower premiums, particularly for all-stock bids. In Columns (5)-(6), many of these coefficient estimates become insignificant since they may be consistent over time for many acquirers or due to model overspecification. Interestingly, the premium does not

appear related to the acquirer's listing status (whether listed or OTC versus the base case of a private bidder).

Next, I consider whether my main results are significantly impacted by omitted variable bias. The challenge with unlisted target deals, including OTC deals, is that data on firm characteristics are missing or unobservable for many targets (e.g., those without 10-K filings). Additionally, half of OTC target deals involve bidders that are not US listed. To isolate the potential impact of excluded variables from changes in sample size, I run regressions in pairs where the variable I evaluate is non-missing in both, but only included in the second specification. I evaluate four control variables that are not included in my main specification and pay particular attention to whether the OTC target coefficient changes when the control variable is included.

Table 4 presents my findings. In Columns (1)-(2), I test for a deal termination agreement dummy (Officer, 2003); in (3)-(4), a deal relative size variable scaled by acquirer market value; in (5)-(6), the target debt ratio; and in (7)-(8), the target sales growth in the five years prior to the announcement. In each case, the OTC target coefficient estimate in even-numbered columns including the control variable is largely unchanged from the odd-numbered columns without it. This holds even when the added control variable is significant as in Columns (2), (4), and (6). Thus, it appears unlikely that the relationship between target OTC status and high premiums is significantly biased because of some correlation between OTC target deals and unobserved acquirer, deal, or target characteristics. Moreover, it is worth noting again that despite the large variation in the sample size between specifications – from a maximum of 573 OTC target deals (8,491 deals in total) in Columns (1)-(2) to a minimum of only 164 deals (4,936 deals total) in Columns (7)-(8), or only a fifth of the original sample of OTC 735 deals, the OTC target dummy remains consistently significant at the 1% level and relatively stable, ranging from 18.1pp to 23.9pp.

3.2 Are high OTC premiums due to synergies or bidder overpayment?

The surprising result that OTC target shareholders receive higher premiums than listed target shareholder begs the question: Are premiums higher because synergy gains are larger or because the buyer overpays? To test, I use acquirer announcement CAR and expected combined synergies. If high OTC premiums are due to bidder overpayment, we expect acquirer CAR to be lower for OTC target deals than listed target deals. If, on the other hand, the high offer premiums are due to unlisted-target-specific synergies, we expect to see one of two outcomes: Either (1) synergies are higher but acquirers have similar CAR when acquiring OTC targets as when acquiring listed targets or (2) synergies are higher and acquirers simultaneously see more positive CAR. In the former, there are additional synergy gains but target shareholders capture their entire value when negotiating deal terms. In the latter, these synergy gains are instead shared – a "win-win" scenario for both the bidder and target.

In Table 5, I put these hypotheses to the test using the regression model specified in Equation 1 with three different outcome variables: acquirer announcement CAR in Columns (1)-(2), expected synergies in Columns (3)-(4), and the fraction of synergy gains allocated to target shareholders in Columns (5)-(6). The results are inconsistent with bidder overpayment and instead indicate that OTC offer premiums are higher due to OTC-specific synergy gains that are shared by the buyer and target. First, Column (1) shows that acquirer CAR is higher when the deal involves an OTC target instead of a listed target, with the differential estimated to be 1.1pp and statistically significant at the 1% level. Moreover, Column (3) also shows that combined synergies are higher by 1.5pp (also significant at the 1% level). Finally, Column (5) estimates that OTC target shareholders capture around one-fifth more of synergy gains than listed target shareholders (21pp). In other words, Table 5 shows that both acquirers and targets are better off in OTC target deals, despite the buyer paying higher premiums and target shareholders successfully bargaining for a larger fraction of the synergy gains.

In the even-numbered Columns (2), (4), and (6) of Table 5, I add a pair of additional control

variables to the model: acquirer runup and target runup. Since announcement CAR is measured using the five-day event window (-2, +2), it is possible that my results could be influenced by differences in deal anticipation between OTC and listed target deals. If the market is better at predicting listed target deals than OTC target deals (for example, due to more public information, analyst attention, or rumors and leaks), a larger fraction of the expected synergy gains may already be factored into the acquirer and target stock price by the time the deal is announced. If the differences between OTC and target deals above are due to differences in deal anticipation, we expect that controlling for runups should have a significant impact on the coefficient estimate of the OTC target deal dummy.

My results indicate that concerns about deal anticipation and measurement error are unfounded. For all three dependent variables, the OTC target coefficient remains identical (acquirer CAR and combined synergies) or barely changes (target fraction of synergies). This holds even when the runup variable itself is significant; Higher target runup is associated with lower measured synergies and a lower fraction of the synergies going to the target – which is consistent with more of the target's gains being anticipated by the market and thus not measured within the (-2, +2) window. Overall, Table 5 shows that despite paying higher offer premiums in OTC target deals, bidders do not overpay but instead pay more because of higher expected synergy gains. In Section 4, I proceed by investigating several economic channels that could be the source of these synergies.

4 Evaluating economic channels

In this section, I consider four channels that could plausibly explain the differences shown above between OTC and listed target deals in terms of offer premiums, acquirer CAR, combined synergy gains, and division of synergies. I start with three channels for each of the main characteristics distinguishing listed from unlisted firms: stock liquidity, public information disclosure, and ownership concentration. The fourth channel I consider is target underperformance.

4.1 Stock liquidity

A key difference between listed and unlisted firms is stock liquidity. While listed firms tend to have a large fraction of their shares freely floated on highly liquid stock exchanges, unlisted firms may have a relatively small fraction of shares floated on less liquid marketplaces (OTC firms) or essentially be completely illiquid (private firms). Stock illiquidity has been shown to increase equity issuance costs (Amihud and Mendelson, 1986; Butler, Grullon, and Weston, 2005; Hanselaar, Stulz, and Van Dijk, 2019) and cost of capital (Bolton and Von Thadden, 1998; Eckbo and Norli, 2005; Brav, 2009; Amihud and Levi, 2023), both of which can inhibit firms from making value-increasing investments. Thus, one explanation for why synergy gains are higher in OTC target deals than listed target deals could be that the former allows the target to take on profitable projects that would otherwise be restricted by financing constraints. Indeed, prior research has also shown that mergers can ease financial frictions for target firms with low cash reserves (Almeida, Campello, and Hackbarth, 2011; Erel, Jang, and Weisbach, 2015), although to the best of my knowledge a similar effect has not yet been documented for targets with low stock liquidity.

If synergy gains and correspondingly, higher offer premiums, are related to stock liquidity, we should expect to see larger synergy gains and premiums for less liquid OTC targets. One advantage of my setting is the considerable variation among OTC targets in stock liquidity prior to being acquired. For example, on average, the bottom quartile of OTC targets in terms of stock liquidity has trading activity on 16% of days and daily trading volume of $1,200, while the top quartile trades 93% of days with $115,100 in daily trading. Two-thirds of the OTC targets are less liquid than the least liquid listed target. As such, OTC targets present an ideal test case to isolate variation in stock liquidity and link this to deal outcomes.

I first examine the relationship between offer premiums and stock liquidity, starting with within-OTC variation in liquidity. In Table 6 Columns (1)-(3), I run the offer premium regression defined in Equation 1 but split the OTC target dummy into four separate dummies corresponding to OTC stock liquidity quartiles. In Column (1), the liquidity measure used is the fraction of days

with trading, while (2) and (3) use Amihud liquidity and dollar volume respectively. Regardless of which liquidity measure is used, the results show a monotonic and negative relationship between OTC target liquidity and premiums. The first-quartile OTC target deals with the lowest liquidity have the highest premiums – between 41.7pp and 55.6pp more relative listed target deals for the first quartile, depending on the liquidity measure. In contrast, the fourth-quartile highest-liquidity OTC target deals have premiums that are closer to listed target premiums (Column 1 estimates 15.5pp larger premiums) or even statistically indifferent from them (as in Columns 2-3). For all three liquidity measures, Wald tests confirm that the coefficient estimates for first and fourth quartile OTC target deals are statistically different from each other.

In Table 6 Columns (4)-(6), I consider the relationship between offer premiums and liquidity more broadly using the same three liquidity proxies as in (1)-(3). Do the high OTC-specific premiums observed in Tables 3 and 4 persist after controlling for variation in liquidity between and within OTC and listed target deals? I run cross-sectional offer premium regressions as per Equation 1 and add an additional control variable for target liquidity in all deals (OTC and listed). The results show that liquidity is negatively associated with offer premiums at the 1% significance level. Moreover, accounting for liquidity reduces the magnitude of the OTC target dummy coefficient from 26.1pp to between 6.6pp and 12.7pp, or a reduction of around 50-75%. This suggests that some – but not all – of the high OTC premiums may be related to differences in liquidity between OTC and listed targets, which we saw was the case within OTC target deals in Columns (1)-(3).

Next, Table 7 considers the relationship between target stock liquidity and acquirer CAR in Columns (1)-(3), expected synergy gains in Columns (4)-(6), and the division of synergies in Columns (7)-(9). The liquidity measures are the same as in Table 6. Since acquirer CAR is required to be known, the sample is limited to the subset of deals with listed US acquirers.

Table 7 shows that acquirer CAR and synergies are strongly associated with target stock liquidity. In fact, controlling for liquidity causes the OTC target dummy coefficient to become insignificant in all specifications, Columns (1)-(6). In other words, the results show that the OTC-

specific synergy gains – including those captured by the acquirer – are related to target stock illiquidity. These findings are consistent with the hypothesis that M&A activity can increase the value of an unlisted target by lowering its barriers to issuing equity as well as its hurdle rate for new projects.

While not tabulated here, additional evidence supports this conjecture. OTC targets tend to have higher leverage than listed targets, and this relationship is correlated with stock liquidity. Specifically, the bottom quartile of OTC targets by liquidity has an average debt ratio of 0.76, while the top quartile (most liquid) OTC targets have a mean of 0.68. By comparison, the bottom liquidity quartile of listed targets has a mean debt ratio of 0.62, while the top quartile measures 0.53. In other words, illiquid targets appear to be more reliant on debt financing than liquid targets, which is consistent with equity issuance costs as well as limits to taking on more debt. This appears to be most pronounced for OTC targets.

Interestingly, Columns (7)-(9) of Table 7 shows that target stock liquidity is unrelated to the division of synergy gains, with the OTC target dummy coefficient remaining large and statistically significant. While the high acquirer CAR and synergy gains in OTC target deals appear consistent with reductions in financial frictions due to stock illiquidity, some other explanation is needed for why target management is able to secure a larger fraction of synergies for shareholders in OTC target deal negotiations than listed target deals. This result is also consistent with the findings from Table 6 Columns (4)-(6), which showed that variation in stock liquidity was unable to account for all of the high OTC target premiums, leaving some 25-50% of the high OTC premiums unexplained. In Section 4.3, I argue that the division of synergies and the unexplained premium component could be consistent with concentrated ownership.

4.2 Information disclosure

Another important difference between listed and unlisted firms is how much information they disclose to the public. Listed firms are required by the SEC to regularly disclose information including financial statements in 10-K and 10-Q filings. In contrast, very few unlisted firms are

required to do so. Indeed, as shown in Section 2.3, the target files a 10-K filing in the two years prior to the takeover announcement in 96% of listed target deals, while the same applies to only 5% of private target deals. OTC target deals fall somewhere in the middle, with 53% of targets filing a 10-K form prior to being acquired.[15]

As with target stock liquidity, there is reason to believe that low disclosure may be a source of high OTC-specific offer premiums and synergy gains. Disclosure has been shown to improve cost of capital (Leuz and Verrecchia, 2000; Easley and O'Hara, 2004; Bailey, Karolyi, and Salva, 2006), so takeovers may create value by reducing financial frictions faced by non-disclosing OTC targets (much as in the case of stock illiquidity). Moreover, disclosure may signal potential sources of synergy gains even if disclosure-related cost of capital is not itself a value creation channel. Specifically, non-disclosure may contain information about the target's characteristics. For example, managers could be trying to conceal innovation or strategic activity from competitors (Leuz and Wysocki, 2016) or hide poor performance from the public (Leuz, Triantis, and Wang, 2008). In the former, firms may be particularly concerned about their limited ability to enforce patent protection due to high legal costs. Either case allows for synergy gains by bringing previously undisclosed innovations to market (Gao, Ritter, and Zhu, 2013) or professionalizing target management.

In Table 8, I replicate the regressions from Table 6 Columns (4)-(6) and Table 7, but control for target disclosure instead of stock liquidity. I use three different disclosure proxies measured in the two years prior to the takeover announcement: a dummy if the target files a 10-K, the log total number of filings (10-K and 10-Q), and the log total word count in those filings. Regardless of which dependent variable or disclosure proxy is used, the coefficient estimate for the disclosure variable remains insignificant and the OTC target dummy coefficient remains significant. In other words, I find no evidence that the OTC-specific premiums or synergy gains are related to differences

[15]While not shown here, I also consider analyst coverage as an alternative proxy for information disclosure. However, I do not find it to be a useful metric for isolating the effect of disclosure for two reasons. First, using data from Refinitiv's I/B/E/S dataset, I find that only 8% of OTC targets (61 deals) have any analyst coverage in the two years prior to the deal announcement, while fully 83% of listed targets are covered. Since so few OTC targets are covered, it is econometrically difficult to separate effects related to analyst coverage from those related to OTC status more broadly. Second, the amount of analyst coverage is closely correlated with liquidity, since analysts are not incentivized to cover illiquid stocks and since coverage may itself also increase liquidity.

in disclosure.

4.3 Concentrated ownership

The evidence from Sections 4.1 and 4.2 is consistent with OTC-target deal value creation related to stock illiquidity rather than information non-disclosure. While the former seems to account for all of the high acquirer CAR and synergy gains in OTC target deals, it does not account for 25-50% of the OTC target premiums or any of the division of synergy gains during the negotiation process. What explains the remaining OTC-specific premiums?

To address this question, I turn to the third major characteristic separating listed from unlisted firms: concentrated ownership. Prior literature and anecdotal evidence indicate that OTC stocks are more closely held than listed firms (Marosi and Massoud, 2007) and have little institutional ownership (Ang, Shtauber, and Tetlock, 2013). Although it is challenging to test the implications of ownership directly due to data limitations, prior theory and empirical evidence provide clear guidance about what to expect. One can reasonably assume that closely-held target firms will be better-run than firms with dispersed ownership owing to more management monitoring, long-run growth orientation, and risk-taking (Edmans, 2009; Aghion, Van Reenen, and Zingales, 2013). Thus, there are unlikely to be OTC-specific synergy gains from ownership-related underperformance.

Chang (1998) suggests an alternative source of value creation in unlisted-target deals. He hypothesizes that listed acquirers may benefit from improved governance by integrating a private target blockholder into their ownership structure. This only applies when the method of payment is stock. In Table 9, I put this hypothesis to the test by adding an interaction variable for OTC target times all stock payment to the regression specification in Equation 1. I find that the added interaction variable yields insignificant coefficient estimates in all Columns (1)-(4), corresponding to the four different outcome variables used above. Overall, there is no indication that there are OTC-specific synergies due to blockholder governance benefits for listed acquirers.

While concentrated ownership of OTC targets is thus unlikely to yield higher synergies, it

is expected to give targets more bargaining power when dividing up synergy gains (Ghosh and Ruland, 1998; Ang and Kohers, 2001). Concentrated owners are less willing to give up control (Stulz, 1988; Amihud, Lev, and Travlos, 1990), may be more bullish about the firm's future prospects, and may receive private benefits from ownership in the form of sentimental value for a founder or family. My evidence is consistent with the interpretation that concentrated ownership strengthens OTC target bargaining but is not a source of synergy gains. As documented in Sections 4.1 and 4.2, I find that accounting for stock liquidity is sufficient to explain all of the OTC-specific acquirer gains and synergies, part of the target offer premiums, and none of the distribution of synergies. In other words, while synergies are associated with stock illiquidity, how those synergies are shared between the acquirer and target is not – in line with expectations about concentrated ownership based on prior theory and empirical evidence.

4.4 Poor performance

Finally, I consider whether underperformance could be a source of OTC-specific synergy gains. If OTC targets are poorly run compared to listed targets prior to the acquisition, there may be synergy gains by professionalizing target management. However, I find this interpretation unlikely. For one, the evidence presented thus far is inconsistent with subpar management for OTC targets. In Section 4.2, no relationship is observed between non-disclosure (potentially to conceal poor performance) and premiums or synergies. Section 4.3 also does not provide any reason to expect that concentrated ownership is likely to be correlated with poorer management.

Moreover, additional empirical evidence contradicts the interpretation that OTC targets are mismanaged. First, I observe that OTC targets have higher average (median) monthly returns in the ten months prior to measuring standalone value (i.e., the start of the runup period) than listed targets: 4.7% (2.3%) versus 1.2% (1.1%). Second, OTC targets that were previously listed (so-called "fallen angels"), which account for one-third of my sample and were in almost all cases involuntarily delisted due to poor performance – and could thus be expected to be worse-run than targets that were never listed – have lower average (median) synergies than never-listed targets

at 1.7% (0.1%) versus 3.1% (2.7%), respectively. While not tested directly here, I do not find it likely that OTC-specific premiums and synergies are related to poor target performance.

5 Comparing OTC and private target deals

Thus far, this paper tests differences between listed and unlisted target deals using a sample of listed and OTC target deals. While OTC markets provide a useful setting for testing differences between listed and unlisted target deals, private target deals still make up a majority of unlisted target deals. In this section, I add private target deals to the analysis and consider whether the available evidence suggests that this paper's findings may also be applicable in private target deals. It is not possible to observe offer premiums or expected synergies and their allocation to acquirer versus target shareholders in private target deals. However, it still possible to look at bidder CAR and valuation multiples. I proceed below to investigate these in sections 5.1 and 5.2, respectively.

5.1 Acquirer CAR

This paper opened with the observation that since Chang (1998), it is widely recorded in the M&A literature that bidders experience CAR when announcing acquisitions of unlisted targets than listed targets, but that it remains unclear whether this differential is the result of greater synergy gains or bidders paying less. Using OTC target deals, I show the former to be the case. Moreover, I find that both premiums and acquirer CAR are highest in low-liquidity OTC target deals, in which the target most resembles private firms. While premiums are unobservable in private target deals, acquirer CAR are not.

Table 10 shows the results.

5.2 Valuation multiples

6 Potential concerns

6.1 Mispricing

Since OTC equities are new to the M&A literature, it is important to consider if there are any data issues that could bias my results. In particular, I consider whether my results could be driven by OTC target mispricing. Unlike listed markets, most trading of OTC equities is conducted by (potentially uninformed) retail investors (White 2016). If OTC targets are undervalued when standalone value is estimated, offer premiums will appear larger than they should.

I argue that, to the extent that there is any mispricing in my sample, it works *against* – not in favor of – my results. Due to brokerage restrictions, search costs, and limited supply, short-selling of OTC equities is difficult, expensive, and rare (Ang, Shtauber, and Tetlock, 2013; Eraker and Ready, 2015). It is known since at least Miller (1977) that in scenarios where investors hold heterogeneous beliefs (as with OTC retail traders) and there are constraints to short selling, prices will be inflated. Indeed, Ang, Shtauber, and Tetlock (2013) find that the OTC market return is negative (-0.8% per month), "implying widespread overpricing of OTC stocks" (p. 2987). Moreover, as noted above in Section 4.3, OTC targets have relatively high monthly pre-runup returns, making it unlikely that they would be underpriced at the time that their standalone value is measured.

Similarly, it is worth considering whether low information disclosure could bias prices downward and thus inflate offer premiums. In particular, one might be concerned that investors would be more cautious when investing in firms with limited available information, resulting in prices that are too low. Again, I find it unlikely that this would be the case. First, we know from Section 4.2 that there is no discernable relationship between disclosure and offer premiums. Second, because less information exacerbates investor disagreement, we expect to see similar upward price pressure due to market restrictions on short selling restrictions as in Miller (1977) or Jarrow (1980). Ang,

Shtauber, and Tetlock (2013) find theoretical and empirical support that this is the case in OTC markets when information is disclosed.

Finally, a similar intuition holds for any sort of market price manipulation. Since short selling is expensive, manipulators are only incentivized to inflate prices, such as in "pump-and-dump" schemes. Moreover, since my sample consists of *bona fide* merger deals with (friendly) acquirers launching takeover bids only after accessing the target's data room, it is unlikely that they would be biased by market manipulation schemes (or still be willing to extend an offer should they observe such a scheme). All in all, there is little to suggest that this paper's results are biased by mispricing.

7 Conclusion

In this paper, I introduce a new type of target firm to the M&A literature: unlisted over-the-counter (OTC) firms. Bringing in this new target type allows me to provide the first direct evidence on how much bidders pay when acquiring unlisted targets versus listed targets. Moreover, it allows me to provide new evidence on a twenty-five year old puzzle, first introduced by Chang (1998): Why are acquirer announcement cumulative abnormal returns (CAR) higher in deals with unlisted targets than listed targets?

I find that deal offer premiums are significantly higher for OTC target shareholders than listed target shareholders. This finding is surprising because it contradicts the expectations set by prior papers (Officer, 2007; Jaffe, Jindra, Pedersen, and Voetmann, 2019), which indirectly estimate whether buyers pay less for unlisted targets using deal valuation multiples. I also provide clear evidence showing that the high OTC target premiums are motivated by higher deal synergies rather than overpaying: Acquirer CAR are higher when announcing OTC target deals than listed target deals, despite paying more in the former than the latter. This is also consistent with the prior evidence documenting higher acquirer CAR in unlisted target (specifically, private and subsidiary) deals (Chang 1998; many others). Moreover, combined expected synergy gains are

also larger in OTC target deals and OTC target shareholders capture a larger fraction of the value from these synergies during deal negotiations.

Finally, I evaluate several potential economic channels that could explain high OTC target premiums and synergies. My evidence suggests that OTC-specific target synergies are strongly related to differences in stock liquidity, with less liquid targets benefiting more from the market for corporate control than more liquid targets. This is also reflected in higher offer premiums for OTC targets that are closer to private firms (low stock liquidity) than listed firms (high stock liquidity). While stock liquidity can explain most of the high OTC premium, it cannot explain all of it. I propose that the remainder of the premium is consistent with stronger target bargaining due to more concentrated ownership. In contrast, I do not find any evidence that target information disclosure or mismanagement are related to premiums or synergies.

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Table 1: **Summary statistics for continuous variables**

This table present summary statistics for the continuous variables used in this paper. In Panel A, variables are presented for listed, OTC, and private target deals. Panel B omits private targets since it contains variables that cannot be calculated for, or are not relevant to, private targets. Variables are winsorized at the 5% tails by target type (OTC, listed, or private). Observations are at the deal level.

Variable	Target	N	Mean	Median	Std dev	Min	Max
Panel A: Listed, OTC, and private target deals							
Deal value (2020 USDm)	Listed	7,925	1,349	349	2,278	24	8,848
	OTC	735	78	35	110	4	447
	Private	13,191	88	29	137	2	528
Deal relative size (over acq market cap)	Listed	4,344	0.41	0.22	0.46	0.01	1.65
	OTC	345	0.21	0.12	0.25	0.00	0.93
	Private	7,006	0.20	0.08	0.31	0.01	1.21
Target debt ratio (debt/assets)	Listed	7,683	0.56	0.60	0.26	0.1	0.9
	OTC	387	0.72	0.90	0.27	0.2	1
	Private	2,189	0.73	0.80	0.27	0.2	1
Acquirer announcement CAR (-2, +2)	Listed	4,374	-1.6%	-1.2%	6.7%	-15.9%	11.5%
	OTC	345	0.0%	-0.1%	5.4%	-10.7%	13.2%
	Private	7,116	1.6%	0.5%	7.8%	-12.6%	20.3%
Panel B: Listed and OTC target deals							
Deal offer premiums	Listed	7,925	43%	37%	34%	-11%	124%
	OTC	735	63%	46%	69%	-33%	261%
Combined announcement CAR (-2, +2)	Listed	4,215	1.9%	1.2%	6.6%	-10.7%	16.3%
	OTC	329	2.7%	2.2%	5.8%	-7.9%	16.5%
Target fraction of synergies	Listed	4,215	36%	27%	125%	-251%	339%
	OTC	329	55%	41%	121%	-163%	391%
Target liq: Fraction of days w/ trading	Listed	7,925	96%	100%	8%	70%	100%
	OTC	735	52%	46%	30%	8%	100%
Target liq: (-)log Amihud illiquidity	Listed	7,925	-0.49	-0.08	0.76	-2.60	0.00
	OTC	732	-3.01	-2.77	1.80	-6.82	-0.41
Target liq: Daily trade volume (2020 USDk)	Listed	7,925	7,283	941	14,021	24	54,032
	OTC	735	34	8	64	0.4	262
Target years bef deal ann since last listed	Listed	7,925	0	0	0	0	0
	OTC	237	5.6	4.2	4.1	0.9	14.4
Target est window (t-252, t-43) monthly ret	Listed	7,847	1.2%	1.2%	3.5%	-6.0%	8.2%
	OTC	726	4.7%	2.3%	7.6%	-5.0%	25.9%

Table 2: Summary statistics for categorical variables

This table summarizes dummy variables used in this paper. Each cell shows what fraction of deals meet that column's condition, i.e., have a value of one. Panels A, B, and C present deal, acquirer and target characteristics respectively. Observations are at the deal level.

Panel A: Deal characteristics

						Payment type		
Target type	Complete	Hostile	Tender	Lockup	Horizontal	All cash	Mixed pay	All stock
Listed	79%	5%	22%	11%	53%	41%	28%	31%
OTC	88%	0.4%	5%	2%	61%	48%	28%	24%
Private	88%	0.2%	0.4%	1%	54%	18%	51%	31%

Panel B: Acquirer characteristics

		Industry				Public status					
Target type	Strategic	Finance	High tech	Non-HT	Utilities	US listed	US OTC	US priv	US subs	US misc	Foreign
Listed	83%	40%	35%	25%	0.4%	57%	1%	17%	11%	1%	13%
OTC	88%	62%	21%	17%	0.0%	49%	8%	16%	11%	10%	6%
Private	93%	28%	41%	30%	0.8%	58%	12%	6%	8%	2%	16%

Panel C: Target characteristics

		Industry			
Target type	10-K filing	Finance	High tech	Non-HT	Utilities
Listed	96%	21%	43%	36%	0.0%
OTC	53%	51%	26%	23%	0.0%
Private	5%	21%	43%	36%	0.0%

Table 3: Deal offer premiums by target listing status

This table presents cross-sectional regression results using the specification outlined in Equation 1, with variation in the choice of fixed effects as indicated at the bottom of the table. The dependent variable is deal offer premium and the sample consists of OTC and listed target M&A deals, 1985-2020. The sample size shrinks with later columns as more granular fixed effects force singletons to drop out of the regression. A constant is included but not displayed. All continuous variables are winsorized at the 5% tails by target type (OTC or listed). T-statistics are in parentheses and standard errors are clustered at the industry level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Dependent variable:	Premium					
	(1)	(2)	(3)	(4)	(5)	(6)
OTC target	0.200***	0.245***	0.261***	0.259***	0.286***	0.258***
	(5.15)	(7.11)	(7.45)	(6.88)	(3.86)	(4.20)
Acquirer listed	0.009	0.020	0.015	0.016	0.050	0.101*
	(0.73)	(1.42)	(1.05)	(1.05)	(0.86)	(1.72)
Acquirer OTC	-0.013	0.006	0.008	-0.029	0.001	-0.011
	(0.23)	(0.11)	(0.14)	(0.60)	(0.03)	(0.18)
Acquirer strategic	0.058***	0.043***	0.048***	0.050***	0.016	0.019
	(4.48)	(3.17)	(3.66)	(4.03)	(0.47)	(0.53)
Deal complete	0.021	0.034**	0.038**	0.039**	0.046	0.042
	(1.25)	(2.21)	(2.54)	(2.42)	(1.60)	(1.13)
Deal payment all-stock	-0.032**	-0.064***	-0.058***	-0.050***	-0.044***	-0.023
	(2.36)	(5.98)	(5.40)	(3.92)	(2.75)	(1.02)
Deal payment mixed	-0.016	-0.038***	-0.028**	-0.025	-0.024	-0.004
	(1.51)	(2.92)	(2.24)	(1.63)	(1.17)	(0.15)
Deal hostile	0.093***	0.083***	0.090***	0.080***	0.087**	0.061
	(4.38)	(3.95)	(4.24)	(3.88)	(2.37)	(1.16)
Deal horizontal	0.003	0.010	0.019*	0.019	0.029	0.049***
	(0.18)	(0.72)	(1.68)	(1.47)	(1.58)	(3.17)
Deal tender offer	0.101***	0.076***	0.059***	0.068***	0.037*	0.028
	(5.03)	(3.53)	(3.09)	(3.12)	(1.97)	(1.20)
Deal lockup agreement	0.041***	0.011	0.020	0.008	0.023	0.022
	(3.22)	(0.78)	(1.39)	(0.46)	(1.02)	(0.80)
Deal log-value	-0.008*	0.001	-0.000	0.001	-0.009	-0.011
	(1.93)	(0.17)	(0.03)	(0.18)	(0.99)	(0.95)
Observations	8,658	8,658	8,655	8,174	4,429	3,767
...of which OTC target deals	735	735	735	688	297	271
Adjusted R-squared	0.040	0.076	0.085	0.104	0.171	0.190
Year FE		Y	Y		Y	
Industry FE			Y		Y	
Year-industry FE				Y		Y
Acquirer FE					Y	Y

Table 4: Deal offer premiums by target listing status, alternative controls

This table presents cross-sectional regression results using the specification in Equation 1. The dependent variable is deal offer premium and the sample consists of OTC and listed target M&A deals, 1985-2020. To isolate the potential impact of excluded variables from Column (3) of Table 3, I run regressions in pairs where the variable I am evaluating is nonmissing in both, but only included in alternating specifications (odd-numbered columns). Acquirer and deal controls which are included but not shown are the same as in Table 3. The sample size varies depending on which control variable is being evaluated, since these variables are missing for many deals. A constant is included but not displayed. All continuous variables are winsorized at the 5% tails by target type (OTC or listed). T-statistics are in parentheses and standard errors are clustered at the industry level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Dependent variable:	Premium							
Nonmissing control variable:	Termination agreement		Relative size (market cap)		Target debt ratio		Target sales growth	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OTC target	0.237***	0.239***	0.219***	0.226***	0.236***	0.227***	0.182***	0.181***
	(7.98)	(7.99)	(5.54)	(5.64)	(7.44)	(7.55)	(3.75)	(3.74)
Deal termination agreement		0.026***						
		(2.66)						
Deal relative size (market cap)				-0.041**				
				(2.52)				
Target debt ratio						0.079**		
						(2.31)		
Target 5-year sales growth								0.006
								(1.27)
Deal log-value	-0.001	-0.002	-0.006		-0.002	-0.002	-0.005	-0.005
	(0.20)	(0.42)	(0.88)		(0.41)	(0.54)	(1.27)	(1.30)
Observations	8,491	8,491	4,684	4,684	8,067	8,067	4,936	4,936
... of which OTC target deals	573	573	345	345	387	387	164	164
Adjusted R-squared	0.079	0.080	0.082	0.084	0.079	0.081	0.089	0.090
Acquirer and deal controls	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y

Table 5: Acquirer CAR, synergy gains, and division of synergies by target listing status

This table presents cross-sectional regression results using the specification in Equation 1. The dependent variable varies by column: acquirer CAR in (1)-(2), combined CAR indicating expected synergy gains in (3)-(4), and the fraction of the combined CAR going to target shareholders. The sample consists of OTC and listed target M&A deals, 1985-2020. To measure acquirer CAR, bidders are restricted to US listed firms. Both the bidder and target must have at least 40 return observations during the estimation window. A constant is included but not displayed. All continuous variables are winsorized at the 5% tails by target type (OTC or listed). T-statistics are in parentheses and standard errors are clustered at the industry level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Dependent variable:	Acquirer CAR		Combined CAR		Target % of synergies	
	(1)	(2)	(3)	(4)	(5)	(6)
OTC target	0.011***	0.011***	0.015***	0.015***	0.210***	0.203***
	(3.24)	(3.29)	(4.31)	(4.06)	(5.09)	(5.17)
Target runup		0.008*		-0.021***		-0.264***
		(1.70)		(5.13)		(3.40)
Acquirer runup		-0.007		-0.003		-0.056
		(0.88)		(0.35)		(0.73)
Acquirer strategic	-0.003	-0.002	-0.001	-0.001	0.006	0.001
	(0.57)	(0.54)	(0.19)	(0.30)	(0.07)	(0.01)
Deal complete	0.002	0.002	0.006*	0.006**	0.062	0.065
	(0.58)	(0.56)	(1.95)	(2.05)	(1.25)	(1.32)
Deal payment all-stock	-0.019***	-0.019***	-0.017***	-0.017***	-0.142***	-0.143***
	(5.02)	(5.05)	(8.43)	(8.24)	(2.94)	(2.93)
Deal payment mixed	-0.013***	-0.014***	-0.010***	-0.009***	0.028	0.029
	(4.38)	(4.34)	(3.39)	(3.43)	(0.53)	(0.56)
Deal hostile	0.002	0.002	0.026***	0.026***	0.131	0.123
	(0.35)	(0.35)	(4.09)	(4.09)	(1.11)	(1.04)
Deal horizontal	0.002	0.002	0.006***	0.006***	0.051	0.052
	(0.55)	(0.55)	(2.71)	(2.73)	(1.40)	(1.41)
Deal tender offer	0.013***	0.012***	0.019***	0.019***	0.106**	0.112**
	(4.97)	(4.89)	(8.40)	(8.37)	(2.00)	(2.05)
Deal lockup agreement	-0.010***	-0.010***	-0.007**	-0.007**	0.013	0.008
	(3.50)	(3.46)	(2.53)	(2.65)	(0.20)	(0.12)
Deal relative size	-0.007**	-0.007**	0.039***	0.039***	0.495***	0.496***
	(2.45)	(2.28)	(13.65)	(12.83)	(12.68)	(12.86)
Observations	4,538	4,538	4,538	4,538	4,538	4,538
...of which OTC target deals	328	328	328	328	328	328
Adjusted R-squared	0.056	0.056	0.123	0.127	0.048	0.050
Year FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y

Table 6: Deal offer premiums by target stock liquidity

This table presents cross-sectional regression results based on specification in Equation 1. The dependent variable is deal offer premium. In Columns (1)-(3), the OTC target dummy is split into four parts, each corresponding to an OTC target stock liquidity quartile. In Columns (4)-(6), the OTC target dummy is kept as is but a continuous stock liquidity control variable is added instead for all deals. Liquidity is measured in ten months before start of the runup period. Liquidity proxy varies by column, as indicated in the second row. Sample of OTC and listed target deals. Last row shows p-values from Wald tests. Constant included but not shown. Continuous variables winsorized at 5% tails by target type. T-stats in parentheses, standard errors clustered at industry level. *, **, and *** for 10%, 5%, and 1% significance.

Dependent variable:	Premium					
Liquidity measure:	% days trade	(-)Amihud	$ volume	% days trade	(-)Amihud	$ volume
	(1)	(2)	(3)	(4)	(5)	(6)
OTC target liq Q1 (lowest)	0.417***	0.510***	0.556***			
	(3.37)	(7.75)	(4.97)			
OTC target liq Q2	0.307***	0.331***	0.303***			
	(3.46)	(8.51)	(6.27)			
OTC target liq Q3	0.210***	0.209***	0.212***			
	(5.21)	(5.12)	(4.49)			
OTC target liq Q4 (highest)	0.155***	0.029	0.053			
	(3.36)	(0.63)	(0.96)			
OTC target				0.127***	0.067**	0.066**
				(3.49)	(2.41)	(2.34)
Target liquidity				-0.373***	-0.107***	-0.089***
				(3.64)	(11.30)	(21.74)
Acquirer listed	0.016	0.017	0.017	0.018	0.022*	0.028**
	(1.07)	(1.15)	(1.20)	(1.34)	(1.83)	(2.33)
Acquirer OTC	-0.007	-0.005	-0.019	-0.011	-0.001	0.019
	(0.13)	(0.09)	(0.30)	(0.18)	(0.02)	(0.32)
Acquirer strategic	0.047***	0.045***	0.044***	0.046***	0.038***	0.049***
	(3.59)	(3.60)	(3.47)	(3.72)	(3.34)	(4.37)
Deal complete	0.038**	0.039**	0.038**	0.036**	0.035**	0.018
	(2.54)	(2.64)	(2.51)	(2.45)	(2.57)	(1.26)
Deal payment all-stock	-0.058***	-0.058***	-0.058***	-0.054***	-0.057***	-0.045***
	(5.47)	(5.31)	(5.54)	(5.15)	(5.37)	(3.17)
Deal payment mixed	-0.029**	-0.028**	-0.028**	-0.029**	-0.034***	-0.040***
	(2.35)	(2.27)	(2.42)	(2.36)	(2.83)	(3.62)
Deal hostile	0.088***	0.086***	0.085***	0.088***	0.087***	0.092***
	(4.09)	(4.14)	(3.98)	(4.05)	(4.14)	(4.25)
Deal horizontal	0.019*	0.018	0.019*	0.019*	0.021*	0.017
	(1.69)	(1.66)	(1.69)	(1.73)	(1.99)	(1.66)
Deal tender offer	0.058***	0.062***	0.059***	0.060***	0.067***	0.055***
	(3.02)	(3.22)	(3.12)	(3.19)	(3.56)	(2.83)
Deal lockup agreement	0.023	0.013	0.020	0.026*	0.018	0.026*
	(1.64)	(0.92)	(1.37)	(1.92)	(1.31)	(1.73)
Deal log-value	0.001	0.004	0.003	0.008	0.033***	0.092***
	(0.14)	(0.88)	(0.77)	(1.64)	(6.82)	(14.11)
Observations	8,652	8,652	8,652	8,652	8,652	8,652
...of which OTC target deals	732	732	732	732	732	732
Adjusted R-squared	0.090	0.101	0.102	0.094	0.122	0.141
Year FE	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y
Wald test OTC liq Q1=Q4	0.054*	0.000***	0.000***			

Table 7: Acquirer CAR and synergies by target stock liquidity

This table presents cross-sectional regression results based on the specification in Equation 1, but with the addition of a target stock liquidity variable as in Table 6 Columns (4)-(6). The dependent variable varies by column as indicated in the first row. The sample consists of OTC and listed target M&A deals, 1985-2020. To measure acquirer CAR, bidders are restricted to US listed firms. Both the bidder and target must have at least 40 return observations during the estimation window. A constant is included but not displayed. All continuous variables are winsorized at the 5% tails by target type (OTC or listed). T-statistics are in parentheses and standard errors are clustered at the industry level. *, **, and *** indicate statistical significance at 10%, 5%, and 1%, respectively.

Dependent variable:	Acquirer CAR			Combined CAR			Target % of synergies		
Liquidity measure:	% days trade	(-)Amihud	$ volume	% days trade	(-)Amihud	$ volume	% days trade	(-)Amihud	$ volume
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
OTC target	0.001	0.000	-0.002	0.003	0.006	0.002	0.285***	0.266***	0.165***
	(0.32)	(0.08)	(0.45)	(0.67)	(1.02)	(0.51)	(5.08)	(4.65)	(3.14)
Target liquidity	-0.022***	-0.005***	-0.003***	-0.031***	-0.004***	-0.003***	0.184	0.025*	-0.010
	(3.20)	(3.10)	(3.89)	(5.33)	(3.06)	(4.92)	(1.64)	(1.72)	(1.23)
Acquirer strategic	-0.002	-0.002	-0.002	-0.001	-0.000	-0.000	0.005	0.004	0.008
	(0.53)	(0.47)	(0.46)	(0.13)	(0.10)	(0.08)	(0.06)	(0.05)	(0.09)
Deal complete	0.002	0.002	0.002	0.006**	0.006**	0.007**	0.061	0.059	0.063
	(0.62)	(0.75)	(0.74)	(2.03)	(2.16)	(2.13)	(1.23)	(1.20)	(1.28)
Deal payment all-stock	-0.018***	-0.018***	-0.018***	-0.016***	-0.016***	-0.016***	-0.144***	-0.143***	-0.139***
	(4.83)	(4.98)	(4.99)	(8.06)	(8.36)	(8.14)	(3.04)	(2.94)	(2.85)
Deal payment mixed	-0.013***	-0.013***	-0.013***	-0.009***	-0.009***	-0.009***	0.026	0.026	0.029
	(4.38)	(4.36)	(4.20)	(3.41)	(3.35)	(3.21)	(0.52)	(0.50)	(0.57)
Deal hostile	0.003	0.003	0.005	0.027***	0.027***	0.029***	0.128	0.125	0.139
	(0.40)	(0.50)	(0.75)	(4.12)	(4.28)	(4.70)	(1.08)	(1.07)	(1.22)
Deal horizontal	0.001	0.002	0.001	0.006***	0.006***	0.006**	0.052	0.051	0.051
	(0.53)	(0.56)	(0.48)	(2.66)	(2.71)	(2.56)	(1.40)	(1.36)	(1.39)
Deal tender offer	0.013***	0.013***	0.013***	0.019***	0.019***	0.019***	0.105**	0.103*	0.107**
	(4.98)	(5.22)	(5.02)	(8.45)	(8.79)	(8.67)	(2.00)	(1.94)	(2.03)
Deal lockup agreement	-0.009***	-0.009***	-0.007**	-0.006**	-0.006**	-0.004	0.008	0.007	0.023
	(3.32)	(3.06)	(2.37)	(2.25)	(2.11)	(1.47)	(0.11)	(0.10)	(0.35)
Deal relative size	-0.007**	-0.006*	-0.005	0.039***	0.040***	0.041***	0.491***	0.488***	0.504***
	(2.25)	(1.96)	(1.41)	(13.33)	(14.06)	(13.74)	(13.08)	(12.47)	(11.50)
Observations	4,537	4,537	4,537	4,537	4,537	4,537	4,537	4,537	4,537
...of which OTC target deals	327	327	327	327	327	327	327	327	327
Adjusted R-squared	0.057	0.059	0.062	0.126	0.126	0.130	0.048	0.048	0.048
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table 8: Premiums, acquirer CAR, and synergies by target information disclosure

This table presents cross-sectional regression results based on the specification in Equation 1, with an added target information disclosure variable. Dependent variable varies by column as indicated in first row. Sample consists of OTC and listed target M&A deals, 1998-2020, since SEC EDGAR filing coverage is incomplete prior to 1996. In Columns (4)-(12), bidders are restricted to US listed firms to allow for measurement of acquirer CAR and both bidder and target must have at least 40 return observations during estimation window. Similarly restricting the sample in Columns (1)-(3) yields similar results to those shown. Disclosure is measured in two years before the deal announcement date. Disclosure proxy varies by column, as indicated in second row: a dummy if the target filed any 10-K, target's total 10-Q/10-K filing count, or total word count in filings. Acquirer controls as in Table 3 and a constant term are included but not shown. Continuous variables winsorized at 5% tails by target type. T-stats in parentheses, standard errors clustered at industry level. *, **, and *** indicate 10%, 5%, and 1% significance.

Dependent variable:	Premium			Acquirer CAR			Combined CAR			Target % of synergies		
Disclosure measure:	10-K	Filings	Words	10-K	Filings	Words	10-K	Filings	Words	10-K	Filings	Words
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
OTC target	0.269***	0.269***	0.267***	0.009*	0.008*	0.008*	0.015***	0.014***	0.013***	0.162**	0.192***	0.177***
	(8.36)	(8.02)	(7.99)	(1.94)	(1.89)	(1.71)	(3.35)	(3.13)	(2.97)	(2.64)	(3.20)	(2.75)
Target disclosure	0.034	0.016	0.002	-0.001	-0.001	-0.000	0.002	-0.000	-0.000	-0.010	0.028	0.002
	(1.25)	(1.35)	(1.20)	(0.34)	(0.80)	(1.41)	(0.42)	(0.14)	(0.42)	(0.13)	(0.88)	(0.30)
Deal complete	0.046**	0.045**	0.046**	0.003	0.003	0.003	0.007	0.007	0.007	0.011	0.010	0.011
	(2.17)	(2.17)	(2.17)	(0.80)	(0.81)	(0.82)	(1.62)	(1.63)	(1.64)	(0.19)	(0.17)	(0.18)
Deal pay all-stock	-0.092***	-0.093***	-0.093***	-0.028***	-0.028***	-0.028***	-0.028***	-0.028***	-0.028***	-0.179***	-0.178***	-0.179***
	(6.83)	(6.83)	(6.82)	(6.62)	(6.57)	(6.56)	(10.19)	(10.19)	(10.19)	(3.43)	(3.41)	(3.41)
Deal pay mixed	-0.027**	-0.027**	-0.027**	-0.022***	-0.022***	-0.022***	-0.016***	-0.016***	-0.016***	0.025	0.026	0.025
	(2.25)	(2.25)	(2.24)	(5.66)	(5.67)	(5.67)	(4.49)	(4.50)	(4.51)	(0.48)	(0.50)	(0.48)
Deal hostile	0.060*	0.060*	0.060*	-0.029**	-0.029**	-0.029**	0.007	0.006	0.006	0.135	0.140	0.137
	(1.86)	(1.86)	(1.85)	(2.50)	(2.50)	(2.49)	(0.50)	(0.48)	(0.47)	(0.73)	(0.76)	(0.75)
Deal horizontal	0.025*	0.025*	0.025*	0.004	0.004	0.004	0.006**	0.006**	0.006**	0.046	0.047	0.047
	(1.80)	(1.81)	(1.79)	(1.10)	(1.09)	(1.09)	(2.61)	(2.58)	(2.57)	(1.09)	(1.12)	(1.10)
Deal tender offer	0.051*	0.051*	0.051*	0.007*	0.007*	0.007*	0.009***	0.009***	0.009***	0.052	0.053	0.052
	(1.79)	(1.79)	(1.79)	(1.96)	(1.95)	(1.95)	(3.03)	(3.02)	(3.01)	(0.78)	(0.78)	(0.77)
Deal lockup	0.054**	0.053**	0.054**	-0.005	-0.005	-0.005	-0.001	-0.001	-0.001	-0.005	-0.008	-0.007
	(2.12)	(2.14)	(2.14)	(0.65)	(0.64)	(0.63)	(0.14)	(0.13)	(0.12)	(0.05)	(0.07)	(0.06)
Deal log-value	-0.006	-0.005	-0.006									
	(1.10)	(1.08)	(1.14)									
Deal relative size				-0.009**	-0.009**	-0.009**	0.039***	0.039***	0.039***	0.450***	0.450***	0.450***
				(2.25)	(2.24)	(2.23)	(11.77)	(11.66)	(11.56)	(11.10)	(11.17)	(11.09)
Observations	5,855	5,855	5,855	2,976	2,976	2,976	2,976	2,976	2,976	2,976	2,976	2,976
...of which OTC	711	711	711	318	318	318	318	318	318	318	318	318
Adj R-squared	0.099	0.099	0.099	0.072	0.072	0.072	0.105	0.105	0.105	0.043	0.043	0.043
Acquirer controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table 9: Do listed acquirers benefit by integrating OTC target blockholders?

This table presents cross-sectional regression results based on the specification in Equation 1, with an added interaction term between the OTC target and all-stock payment dummy variables. Dependent variable varies by column as indicated in first row. Sample consists of OTC and listed target M&A deals, 1985-2020. Bidders are restricted to US listed firms since these are the acquirers that are expected to experience governance benefits by acquiring an unlisted target with concentrated ownership, as hypothesized by Chang (1998). Both bidder and target must have at least 40 return observations during estimation window. Constant included but not shown. Continuous variables winsorized at 5% tails by target type. T-stats in parentheses, standard errors clustered at industry level. *, **, and *** indicate 10%, 5%, and 1% significance.

Dependent variable:	Premium	Acquirer CAR	Combo CAR	Tar % synergies
	(1)	(2)	(3)	(4)
OTC target	0.247***	0.013***	0.016***	0.219***
	(5.02)	(3.54)	(3.70)	(3.99)
OTC target X Deal payment all-stock	-0.086	-0.006	-0.001	-0.026
	(1.62)	(1.32)	(0.21)	(0.33)
Acquirer strategic	-0.017	-0.003	-0.001	0.006
	(0.52)	(0.57)	(0.19)	(0.07)
Deal complete	0.037*	0.002	0.006*	0.061
	(1.88)	(0.57)	(1.94)	(1.23)
Deal payment all-stock	-0.055***	-0.018***	-0.017***	-0.140***
	(3.94)	(4.56)	(8.63)	(2.72)
Deal payment mixed	-0.031*	-0.013***	-0.010***	0.028
	(1.91)	(4.38)	(3.39)	(0.53)
Deal hostile	0.092***	0.002	0.026***	0.130
	(2.76)	(0.34)	(4.07)	(1.10)
Deal horizontal	0.015	0.002	0.006***	0.051
	(1.29)	(0.55)	(2.72)	(1.39)
Deal tender offer	0.077***	0.013***	0.019***	0.106*
	(3.87)	(5.02)	(8.40)	(1.98)
Deal lockup agreement	0.006	-0.010***	-0.007**	0.013
	(0.38)	(3.50)	(2.55)	(0.19)
Deal log-value	-0.006			
	(1.03)			
Deal relative size		-0.007**	0.039***	0.495***
		(2.42)	(13.66)	(12.62)
Constant	0.453***	-0.001	0.001	0.093
	(8.05)	(0.22)	(0.26)	(0.85)
Observations	4,538	4,538	4,538	4,538
...of which OTC target deals	328	328	328	328
Adjusted R-squared	0.085	0.056	0.123	0.048
Year FE	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y

Table 10: Acquirer CAR in listed, OTC, and private target deals

This table presents cross-sectional regression results based on the specification in Equation 1 with the addition of a private target dummy. The dependent variable is acquirer CAR and the sample consists of listed, OTC, and private target deals (unlike previous tables, which excluded private targets). In Columns (3)-(8), the OTC target dummy is split into four parts, each corresponding to an OTC target stock liquidity quartile. Liquidity is measured in the ten months before the start of the runup period. The liquidity proxy varies by column, as indicated in the second row. To measure acquirer CAR, bidders are restricted to US listed firms with at least 40 return observations during the estimation window. Acquirer and deal controls as in Tables 5, 7, or 9 and constant included but not shown. Continuous variables winsorized at 5% tails by target type. The last three rows display p-values from Wald tests. T-stats in parentheses, standard errors clustered at industry level. *, **, and *** indicate 10%, 5%, and 1% significance.

Dependent variable:	Acquirer CAR							
OTC liquidity variable:			% days trade		(-)Amihud		$ volume	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Private target	0.037***	0.037***	0.037***	0.037***	0.037***	0.037***	0.037***	0.037***
	(7.31)	(7.32)	(7.31)	(7.33)	(7.33)	(7.35)	(7.32)	(7.34)
OTC target	0.022***	0.021***						
	(5.64)	(5.71)						
OTC target liq Q1 (lowest)			0.030***	0.030***	0.031***	0.031***	0.033***	0.033***
			(3.66)	(3.68)	(3.17)	(3.20)	(4.93)	(4.98)
OTC target liq Q2			0.023***	0.022***	0.015***	0.015***	0.014***	0.014***
			(3.72)	(3.72)	(3.55)	(3.52)	(2.84)	(2.83)
OTC target liq Q3			0.017***	0.017***	0.024***	0.024***	0.024***	0.024***
			(4.07)	(4.10)	(5.56)	(5.54)	(3.87)	(3.92)
OTC target liq Q4 (highest)			0.017***	0.017***	0.019**	0.019**	0.017***	0.017**
			(3.01)	(2.97)	(2.34)	(2.35)	(2.68)	(2.65)
Acquirer runup		0.005		0.005		0.004		0.004
		(1.02)		(1.02)		(1.01)		(1.01)
Observations	11,327	11,327	11,327	11,327	11,327	11,327	11,327	11,327
... of which OTC target deals	342	342	342	342	342	342	342	342
... of which private target deals	6,720	6,720	6,720	6,720	6,720	6,720	6,720	6,720
Adjusted R-squared	0.065	0.065	0.065	0.065	0.065	0.065	0.065	0.065
Acquirer and deal controls	Y	Y	Y	Y	Y	Y	Y	Y
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Industry FE	Y	Y	Y	Y	Y	Y	Y	Y
Wald test OTC=Private	0.000***	0.000***						
Wald test OTC liq Q1=Private			0.102	0.097*	0.495	0.458	0.281	0.264
Wald test OTC liq Q4=Private			0.001***	0.001***	0.000***	0.000***	0.004***	0.004***

A Appendix

Appendix A: Additional descriptive statistics

In Appendix Table 1, I describe the ten largest OTC M&A deals in my sample, all of which have a deal value of over $1 billion (2020 USD). The targets operate in a variety of industries and the deals are announced in various years between 1992 and 2018. Half of the targets were previously listed. I identify the largest target owner and their fraction of shares outstanding prior to the takeover via manual web searches of press releases and news articles. I am unable to identify the largest owner in three of the ten deals. For six of the remaining deals, the largest owners hold between 40% and 90% of target shares. Many of these are a mix of private equity funds, hedge funds, former senior lenders (for firms target that went into bankruptcy, with their original shareholders getting wiped out), and company insiders.

Table 1: Top 10 largest OTC target M&A deals (2020 USD billion), 1985-2020

This table provides descriptive information on the ten largest OTC target deals in my sample. The sample consists of US target control bids, 1985-2020.

Rank (1)	Deal value (2)	Target (3)	Acquirer (4)	Industry (5)	Ann year (6)	Prev listed (7)	Largest owner(s) (8)
1	$2.9	Belk Inc	Sycamore Partners LLC	Department stores	2015		70% family
2	$2.5	Citadel Broadcasting Corp	Cumulus Media Inc	Radio broadcasting	2010	Y	90% PE & senior lenders
3	$2.4	MNC Financial Inc	NationsBank Corp	Banking	1992	Y	10% former chairman
4	$1.6	MPM Holding Inc	MOM Holding Co	Silicones and advanced materials	2018		40% PE
5	$1.4	Mariner Health Care Inc	National Senior Care Inc	Nursing homes	2004		
6	$1.4	Samsonite Corp	CVC Capital Partners Ltd	Luggage	2007	Y	85% PE
7	$1.3	Alliance Imaging Inc	Kohlberg Kravis Roberts & Co (KKR)	MRI systems and services	1999	Y	83% PE
8	$1.2	Seventy Seven Energy Inc	Patterson-UTI Energy Inc	Onshore oil/gas drilling	2016		50% PE
9	$1.1	Trans Financial Inc	Star Banc Corp	Banking	1998	Y	
10	$1.1	National Community Banks Inc	Bank of New York Co Inc	Banking	1993		