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Liquidity and Information Asymmetry Considerations in Corporate Takeovers*

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Abstract

We examine how stock market liquidity and information asymmetry considerations influence the wealth effects of Mergers and Acquisitions (M&As). We present a simple model predicting that M&As of listed targets that have relatively illiquid stocks are profitable for acquirers due to (a) the weak bargaining power of the targets' shareholders, and (b) the limited information asymmetry concerns when evaluating takeover synergies. Our results show that cash-financed M&As of listed targets that have relatively illiquid stocks are associated with an increase in acquirer risk-adjusted returns. These gains are equivalent to those realized from comparable private target M&As. When engaging in stock-financed listed-target M&As, acquirers with liquid stocks enjoy significant gains when the targets have relatively illiquid stocks. This result holds especially when the deal is announced during periods of deterioration in the overall stock market liquidity. Lastly, we find that liquidity considerations affect the acquirer's choice of the target firm's listing status, as well as the M&A method of payment.

Keywords: Stock market liquidity; Listed targets; Private targets; Method of payment; Takeover premia; Risk-adjusted returns.

JEL classification: G12, G14, G30, G34.

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1. Introduction

A stylized fact in the Mergers and Acquisitions (M&As) literature is that listed target deals are generally value-destroying – or, at best, value-neutral – for the acquirer, while private target M&As are associated with significantly positive acquirer gains (Fuller, Netter, and Stegemoller 2002; Draper and Paudyal 2006; Chang 1998; Officer, Poulsen, and Stegemoller 2009). Ample and non-mutually-exclusive explanations have been offered in support of these findings (Ekkayokkaya, Holmes, and Paudyal 2009; Officer, Poulsen, and Stegemoller 2009; Chang 1998; Officer 2007). Most notably, Fuller et al. (2002) argue that the enhanced bargaining power of listed targets' shareholders, which is primarily due to their option to sell their shares in a liquid stock market, enables them to negotiate a relatively large share of the acquisition synergies by forcing acquirers to offer high takeover premia.

The foundations of this widely cited empirical fact can be found in the theoretical literature on bilateral bargaining (Osborne and Rubinstein 1990; Muthoo 1999). Put simply, holding the added value of an acquisition constant, the ownership of highly liquid publicly traded shares increases the value of the 'outside options' available to the listed target's shareholders. In addition to the ability to sell shares in the open market, these 'outside options' can also refer to the target shareholders' ability to tender their shares to other potential acquirers in the near future. This is due to the fact that publicly traded target firms are easily identified and evaluated by potential bidders (Ekkayokkaya, Holmes, and Paudyal 2009). The presence of these valuable options makes the target shareholders' threat to walk away from the deal highly credible. This credible threat, consequently, enhances the target shareholders' bargaining positions when they demand a larger fraction of the acquisition synergies.[1] This key characteristic of listed targets makes their

[1] As illustrated by Muthoo (1999), during the bargaining process, the share earned by each player in a subgame perfect Nash equilibrium can be exactly equal to the value of her outside options.

acquisitions costlier for acquirers to initiate and execute than private target M&As (Ekkayokkaya et al., 2009; Officer et al., 2009).

Despite the validity of this argument, there is no empirical evidence to date uncovering the extent to which the level of a listed target's stock market liquidity influences its shareholders' bargaining power and, consequently, the wealth effects of the deal. In this paper, we set out to emphasize the explanatory power of the argument around the (listed) target firm's bargaining power by examining the extent to which its stock market liquidity affects (a) the overall acquirer gains from listed target M&As, and (b) the difference in acquirer risk-adjusted returns between private and listed target M&As.

We first build a simple model emphasizing the interplay between information asymmetry and stock market liquidity in affecting the acquirer's risk-adjusted returns. The main prediction of the model is that a deterioration in the listed target's stock market liquidity erodes the value of the 'outside options' available to its shareholders and ultimately weakens their bargaining position. We predict that M&As of listed target firms that tend to have relatively illiquid shares include relatively low premia. Moreover, acquirers in such M&As do not face the valuation difficulties and information asymmetry challenges that arise in private target deals. As a result, acquirers in M&As of listed targets that have illiquid shares enjoy significant gains that are equal to, or greater than, the gains realized from comparable private target M&As. Our results are highly relevant for both academics and practitioners, as they highlight a type of listed target M&As that systemically enhance acquirer gains.

We execute our analysis on a comprehensive sample of U.S. domestic listed and private target M&As announced between 1990 and 2013 (inclusive). Using the listed merging firms' pre-acquisition turnover as a measure of their stock market liquidity, we offer various interesting

results that support our main predictions. We find that cash-financed M&As of listed targets that have relatively illiquid stocks yield significant acquirer Cumulative Abnormal Returns (CAR) that are in excess of 1%. In the multivariate context, such M&As (i.e. of listed targets with illiquid stocks) yield 2.6% higher acquirer CAR than M&As of listed targets that have relatively liquid stocks. We also show that the acquirer's gains in cash-financed deals in which the (listed) target has relatively illiquid stocks are equivalent to the acquirer's gains arising from private target M&As. We further find that, in stock-financed M&As, acquirers with relatively liquid stocks enjoy significant gains when their listed targets have relatively illiquid stocks. These gains are as high as the gains arising from stock-financed private target M&As, especially during periods of deterioration in the overall stock market liquidity as proxied by the index of Pastor and Stambaugh (2003). Collectively, our findings provide great support to the view that the liquidity position of the (listed) target firm is an important factor in determining acquirers' risk-adjusted returns.

Our analysis of the relation between the takeover premia and the acquirer CAR further elaborates on the role of stock market liquidity in influencing the bargaining positions of the merging firms. In cash-financed listed target M&As, the takeover premium has a significant negative effect on acquirer CAR when the target's stocks are relatively liquid. This result supports the overpayment hypothesis suggesting that listed targets with relatively liquid stocks manage to extract a significant fraction of the takeover synergies at the expense of their acquirers (Antoniou et al., 2008; Mueller and Sirower, 2003). This negative effect, however, vanishes in deals in which the target's shares are relatively illiquid. This suggests that equity investors have fewer concerns about overpayment to listed targets that have relatively illiquid stocks. Our analysis of stock-financed deals uncovers a similar conclusion: we find a negative premium-CAR relation in stock-financed deals in which the targets' stocks are more liquid than the acquirers' stocks. This

relationship is canceled out when the acquirers' stocks are more liquid than their targets'. Once again, these results suggest that targets with relatively illiquid stocks do not manage to extract significant gains at the expense of their acquirers.

To address potential concerns related to the endogenous choice of the target firm's listing status and deal's method of payment, we use the Propensity Score Matching (PSM) method. Our findings from the PSM analysis suggest that acquirers that avoid engaging in cash- and stock-financed listed target M&As with targets that have relatively strong liquidity positions earn 3.5% higher CAR than comparable M&As in which acquirers deviate from this rule. We recognize the possibility that missing covariates might alter our conclusions. Hence, we apply the Rosenbaum (2002) sensitivity analysis to our PSM results. Emphasizing the relative insensitivity of our conclusions to the impact of missing covariates, the Rosenbaum bounds (RB) analysis suggests that – for two matched deals – a missing covariate should increase the relative odds of treatment assignment by 65% to 75% for our conclusions to be altered.

Our findings contribute to various strands of the literature. First, we extend the literature on the effect of target firms' listing status on acquirer gains. By documenting how a deterioration in the listed target firm's stock liquidity makes listed target M&As profitable investment opportunities for the acquirer, we show that the widely held view that listed target deals destroy value or, at best, break even needs not be taken for granted. Recent work by Alexandridis et al. (2017) suggests that listed target acquisitions are associated with significant acquirer gains after 2009. The authors attribute their results to the improvement of corporate governance mechanisms in the aftermath of the 2008 financial crisis. Our findings suggest that the significant acquirer gains arising from M&As of listed target firms that have relatively illiquid stocks hold even before 2009. Accordingly, the role of stock market liquidity in influencing the gains from listed target M&As

is not fundamentally driven by the ramifications of the 2008 financial crisis but is rather persistent over the extended period covered in our analysis. The results also enhance our understanding of the impact of deal payment method on merging firms' returns (Adra and Barbopoulos 2018; Travlos 1987). Specifically, we provide evidence suggesting that both cash- and stock-financed acquisitions of listed target firms can be sources of significant gains for acquirers. Particularly, the effect of stock market liquidity in influencing the gains from listed target acquisitions is robust across the different payment methods used in the deals.

Second, the empirical evidence enhances our understanding of the determinants of the acquirer's choice of the target firm's listing status (Capron and Shen 2007) and payment method (Faccio and Masulis 2005; Adra and Barbopoulos 2018). More specifically, acquirers understand that a rise in the overall stock market liquidity enhances the 'outside options' of listed targets. Consequently, such acquirers become less likely to acquire highly liquid listed companies using cash. They also avoid engaging in stock-financed acquisitions of targets with more liquid shares than theirs. Lastly, acquirers understand that having more liquid stocks than their targets enhances their bargaining position in stock-financed deals. As a result, they respond to a rise in the liquidity of their stocks by becoming more likely to acquire targets with relatively weak liquidity positions.

Third, our results extend the literature on the implications of stock market liquidity on corporate decisions (Amihud and Mendelson, 1988; Becker-Blease and Paul, 2006; Boot and Thakor, 2008). Previous research suggests that stock market liquidity influences firms' investment opportunities (Becker-Blease and Paul 2006), managerial autonomy (Boot and Thakor 2008), market valuation (Amihud and Mendelson 1988), and monitoring incentives (Roosenboom, Schlingemann, and Vasconcelos 2014). We extend this literature by providing evidence suggesting that a deterioration in stock market liquidity, in addition to limiting a company's investment

opportunities and reducing its market value, motivates its shareholders to tender their stocks for cash-paying acquirers or stock-paying acquirers with more liquid stocks, without extracting significant economic rents.

The remainder of this paper is organized as follows. Section 2 provides a brief overview of the literature. Section 3 develops a simple model and sets out our empirical predictions. Section 4 discusses our dataset. Section 5 offers a discussion of our main findings. Section 6 concludes.

2. An Overview of the Literature

2.1. M&A payment method and target firm's listing status

The prevailing consensus in the M&A literature suggests that stock-financed M&As of listed targets are associated with significant acquirer losses relative to cash-financed counterparts (Travlos, 1987). The signaling-based explanation of this result is that the use of stocks in the deal's financing process is a signal of the acquiring firm's overvaluation. Shleifer and Vishny (2003) further propose that acquirers tend to use their overvalued stocks as the payment method during periods characterized by overall stock market mispricing. Put simply, the less overvalued target firms' shareholders/managers accept the acquirer's stocks, aiming to cash in quickly after the deal's completion. Along these lines, overvalued acquirers subject to limited investor attention can capitalize on the limited scrutiny that their stocks are subject to, and hence use their stocks as the payment method in the deal without experiencing immediate announcement period corrections (Adra and Barbopoulos 2018). Yet, the magnitude of these overvaluations becomes evident in the long run. Alexandridis et al. (2017) document a significant improvement in the gains of listed target acquirers in the post-2009 period. The authors find that stock-for-stock listed target M&As are no longer a source of value destruction for the acquiring firm.

Along similar lines, the use of stock rather than cash financing in private target M&As appears to be an important contributor to the widely documented evidence of significant acquirer gains (Draper and Paudyal, 2006; Fuller et al., 2002; Kohers and Ang, 2001). Kohers (2004) shows that the acquirer gains from stock-financed, rather than cash-financed, private target M&As increase with the target's relative size. Chang (1998) relates such gains to the formation of effective blockholding groups by private targets' owners during the post-acquisition period. More specifically, the ownership of private companies tends to be concentrated within a small group of individuals who become active shareholders (i.e. blockholders) and contribute through their effective engagement to the facilitation of post-merger integration.

2.2. Stock liquidity

Access to an open and liquid stock market is a key determinant of the bargaining advantage of listed companies, as discussed by Koeplin et al. (2000) and Officer (2007). These contributions document a significant reduction in the premia offered to private target firms' shareholders compared to those offered to the shareholders of listed target firms. Massa and Xu (2013), in turn, show that (high) target pre-acquisition stock liquidity is a positive contributor to acquirer post-acquisition liquidity. Accordingly, the shareholders of highly liquid listed (target) companies capitalize on this aspect to negotiate high takeover premia.

Roosenboom et al. (2013) find that low stock market liquidity tends to positively affect acquirer gains, especially in acquisitions of large unlisted targets. This result is attributed to the perception that, due to the trade-off between liquidity and institutional monitoring, companies with low stock market liquidity make better takeover decisions.

3. Empirical Predictions

3.1. Basic model and initial predictions

Upon designing their acquisition plans, acquirers do not usually decide in advance whether to approach and eventually acquire a private or a listed company. They often discuss the anticipated outcomes of their business plans, such as the acquisition of specific assets, skills, products, or know-how, with their financial advisors. Given that financial advisors simultaneously examine various potential targets (Boone and Mulherin 2007), the difference between the bargaining power of listed and private target companies may determine the choice of the takeover target. Let S be the total value that an acquirer realizes by purchasing the assets of a target firm. We factor in our model the net gains from acquiring listed and private target firms, respectively, as follows:

$$Net\ Gains_{Listed} = S - \alpha_{Listed} - \beta_{Listed}\, Stock\ Liquidity_{Listed} \quad (1)$$

$$Net\ Gains_{Private} = S - \alpha_{Private} \quad (2)$$

We model the acquirers' net gains from engaging in M&As with listed and private target acquisitions as functions of fixed factors ($\alpha_{Listed} > 0$ and $\alpha_{Private} > 0$) representing the losses emerging due to information asymmetry. We impose the condition $\alpha_{Private} > \alpha_{Listed}$. That is, the potential losses arising due to information asymmetry are larger in the case of private target M&As than in the case of listed target M&As. The relatively weak reporting standards for privately owned companies may create substantial difficulties for the acquiring firm in valuing the target's assets and in setting performance objectives during the integration period, as well as in accurately estimating the acquisition premia (Datar et al., 2001). By contrast, the more transparent accounting environment of listed companies allows the acquirer to reach more accurate estimations about the anticipated synergies than in the case of private target M&As. As a result, such a transparent accounting environment gives acquirers the ability to set realistic expectations while monitoring

the performance of the target firm during the post-acquisition or integration period (Draper and Paudyal 2006; Kohers 2004; Fuller, Netter, and Stegemoller 2002).

For listed targets, we present in our model the acquirer gains as a function of the target firm's stock market liquidity ($Stock\ Liquidity_{Listed}$). As discussed earlier in the paper within the 'outside options' context, accessing a liquid stock market presents a key determinant of the bargaining position of listed companies (Koeplin, Sarin, and Shapiro 2000; Officer 2007; Officer, Poulsen, and Stegemoller 2009; Massa and Xu 2013). However, the sensitivity of the listed firm's investment and financing to stock market liquidity can be a blessing in disguise. A reduction in stock market liquidity decreases the value of the listed firm, especially as the cost of capital used to discount future dividends increases (Amihud and Mendelson 1988) and the financing of future investments with equity becomes costlier (Becker-Blease and Paul 2006). Such considerations make the holding of the company's stock by short- and medium-term-oriented equity investors for an extended period less desirable. As a result, such investors become more likely to tender their shares in a takeover bid, even on relatively unfavorable terms. By eroding the value of the outside option of liquidity-constrained shareholders, the decrease in stock market liquidity reduces the additional bargaining power of listed target shareholders.

Private companies, in contrast, adopt a business model that is – to a large extent – independent of the temporary (liquidity) swings in the equity market. Private target owners tend to be small groups of individuals, often with common long-term objectives and implicit agreements to not sell their stakes at the earliest sign of decline in liquidity. In the game theoretic context outlined earlier in the paper, our proposition is that the 'outside option' of listed and private targets has an asymmetric dependence on share liquidity. Other things held constant, a significant

decline in stock market liquidity significantly reduces the value of the 'outside option' – and hence the bargaining power – of listed target owners relative to the owners of private ones.

As a result, our model predicts that acquirers of listed targets enjoy additional economic rents due to the reduced bargaining power of the target's shareholders, whose shares are relatively illiquid. This, in turn, predicts higher acquirer gains that arise when:

$$Stock\ Liquidity_{Listed} \leq \frac{\alpha_{Private} - \alpha_{Listed}}{\beta_{Listed}} \quad (3)$$

Under this condition, M&As of listed targets that have relatively illiquid stocks are at least as profitable for acquirers as private target deals. This is because the acquirers end up paying relatively low premia, without necessarily facing the information asymmetry challenges they would face in the event of a private target M&A. The conclusion reached out from this argument has direct implications on the gains realized by acquirers aiming to settle their deals in cash. In such cases, acquirers may exploit the target firm's limited bargaining power to enjoy significant gains (Draper and Paudyal, 2006).

Empirical Prediction 1: In cash-financed M&As of listed targets with relatively illiquid shares, acquirers are expected to enjoy risk-adjusted returns that are as high as the risk-adjusted returns realized from cash-financed private target M&As.

3.2. Acquirers' gains from stock-financed deals

Our initial model can also accommodate the effect of stock-financed M&As. Put forward, in the Shleifer and Vishny (2003) model, the managers of target firms tend to accept the acquiring firm's stock as the medium of exchange in the deal, with the expectation of cashing out quickly (before the full extent of the acquirer overvaluation is revealed in the market). In the context of our model,

$Stock\ Liquidity_{Listed}$ can represent the target's stock liquidity position relative to the acquirer's. Accordingly, acquirers with highly liquid shares can capitalize on their stock liquidity to acquire listed companies that have relatively less liquid shares. Rather than being value-destroying, as portrayed in previous studies (Travlos 1987; Adra and Barbopoulos 2018), stock-financed listed target M&As may still allow acquirers to enjoy significant gains that can be as high as those arising from stock-financed M&As of private target companies. This leads to our next empirical prediction:

Empirical Prediction 2: In stock-financed M&As, acquirers with more liquid shares than their listed targets enjoy risk-adjusted returns that are as high as the risk-adjusted returns realized by private target acquirers.

3.3. The premium-CAR relationship

To further test the causal effect of the target's relative bargaining power on the acquirer risk-adjusted returns, we adopt the approach used in Antoniou et al. (2008) and Díaz et al. (2009). A straightforward way to examine the balance of the bargaining powers of the merging firms is to examine the premium-CAR relationship. A negative relation between the takeover premium and the acquirer CAR is a reflection of overpayment, which is partly driven by the target's ability to exploit factors such as the acquirer managers' hubris (Roll 1986) to extract high premia. However, a neutral or positive relation between the takeover premium and the acquirer CAR reflects the acquirer's ability to avoid overpaying the target (Mueller and Siroiwer 2003; Antoniou, Arbour, and Zhao 2008; Alexandridis et al. 2013). Consequently, we predict that a listed target firm's strong bargaining position, due to its highly liquid shares, is reflected in the negative relationship

between the premium paid and the acquirer CAR. The opposite prediction should hold in the presence of a deterioration in the target's bargaining position due to its illiquid shares. This weak bargaining position should be reflected in a neutral or even positive relationship between the premium paid to the target and the acquirer CAR. As a result, our next and final empirical prediction is as follows:

Empirical Prediction 3: The negative premium-CAR relationship becomes positive (or neutral) in M&As where the listed target is in a relatively weak liquidity position.

4. Data and Sample Statistics

Our sample includes U.S. domestic M&As of publicly (listed) and privately held target firms that are announced by publicly held companies and recorded in the Securities Data Corporation's (SDC) Thomson One Database. The sample covers deals between January 1, 1990, and December 31, 2013, that meet the following sample selection criteria: (a) the deal has a disclosed value that is in excess of $1m; (b) no takeovers by the same acquirer are announced within five trading days of each other (i.e. the event window analyzed), to ensure that the acquirer risk-adjusted returns of different deals are not conflated; (c) the acquirer pre-acquisition market-to-book value is covered in Compustat and the target firm's book value of assets is covered in SDC; and (d) the acquirer aims to control 100% of the target shares by the time of the deal's completion. The latter restriction is imposed to ensure that the acquirers in the sample share the same objective of full target ownership. Moreover, as our primary empirical investigations are related to cash- and stock-financed M&As, we limit our analysis to these two groups of deals. To determine whether a deal is cash- or stock-financed, we adopt a procedure similar to Netter et al. (2011). A deal is classified

as cash-financed if more than 70% of the consideration is settled in cash. In turn, a deal is classified as stock-financed if 70% of the deal is settled in stock.[2] After imposing these restrictions, 4,192 M&As remain in the sample, including 413 withdrawn deals (9.85%).

Table 1 presents the annual distribution of the sample according to the target's listing status, M&A payment method, and the industrial sector of the target firm. In the sample, 702 M&As involve listed target firms (17% of the sample) and 3,490 (83% of the sample) involve private target firms. The yearly M&A volumes follow a pro-cyclical pattern, with a peak during the dotcom bubble (413 deals in the year 2000) and significant declines in the aftermath of the 2008 financial crisis. Moreover, 2,161 deals (52% of the sample) are cash financed, while 2,030 (48% of the sample) are stock financed. At the target sector level, the largest fraction of deals in the sample is in the high technology sector (37% of all deals). In turn, the lowest fraction of M&As in the sample is in the real estate sector (0.7% of all deals).

(Insert Table 1 about here)

Table 2 presents the descriptive statistics of the firm- and deal-specific factors that are covered in the analysis. The acquirer risk-adjusted returns are estimated as in Fuller et al. (2002), where the acquirer announcement period 5-day Cumulative Abnormal Returns (CAR) are measured as the sum of the daily differences between the acquirer actual returns and the returns of an overall market index (NYSE firms) over the 5-day window $(t-2, t+2)$ around the M&A announcement day (i.e. day $t = 0$). Evidence reported in Table 2 shows that M&As, on average, add about 1% to the acquiring firm's value (CAR). However, the significant variation in acquirer CAR (11% standard deviation) raises the need for further examination in a cross-sectional framework.

[2] Nevertheless, our results are not altered if full cash and stock payments are used, or if the 50% threshold is used.

(Insert Table 2 about here)

We follow previous research (Becker-Blease and Paul 2006; Adra and Barbopoulos 2018) by using the acquirer and the listed target firm's share turnover as a proxy for the level of the firm's stock market liquidity. Particularly, for the window covering $t-250$ to $t-43$ days before the M&A announcement, where $t=0$ is the deal's announcement day, we estimate the acquirer and listed target firm's liquidity as the daily average of the firm's ratio of traded shares to its listed shares. In the analysis of cash-financed acquisitions, we consider the target firm to have highly liquid shares when its level of pre-acquisition turnover exceeds the 80th percentile in the group of listed targets. Otherwise, the company is considered to have relatively less liquid shares. It is also important to note that our main empirical conclusions in this paper remain unchanged if the 70th and the 90th percentiles are used as alternative cut-off points.[3] Among the cash-financed acquisitions, 72 are classified as having targets with highly liquid shares, while 236 are classified as having targets with relatively illiquid shares. In the analysis of stock-financed acquisitions, the acquirer shares are more liquid than the target shares when the difference between their turnover level exceeds one percent. Otherwise, the acquirer shares are considered equally or less liquid than their target shares. Overall, 146 deals include acquirers with highly liquid shares relative to their targets.

We control for the acquirer's size using its equity market value on the 20th day preceding the M&A. Acquirer growth opportunities are represented by the book-to-market value during the same period. In addition to covering a wide range of target characteristics, we control for the number of competing bids as a proxy for the degree of competition. We control for the acquirer's age as well as acquirer's market experience, measured as the number of days between its listing in Datastream

[3] These results are available from the authors upon request.

and the M&A announcement. We also include the level of the acquirer's pre-acquisition toehold to highlight the impact of the acquirer's knowledge of the target's business activities(as in Betton, Eckbo, and Thorburn (2009)). Moreover, to control for the degree of the acquirer's leverage, we include in our analysis the acquirer's debt level as a fraction of common equity in the most recent balance sheet filing before the M&A announcement. As a proxy for the level of overall stock market liquidity, we employ the liquidity index developed by Pastor and Stambaugh (2003). A detailed description of this index's construction is presented in Appendix 2. The underlying assumption behind this index's construction is that the larger the liquidity constraints, the larger the liquidity-induced returns, and consequently the larger the reversals on the following trading day. Given that this index quantifies the effect of liquidity-induced returns on the following day's returns, a negative value of this index – by construction – reflects the presence of liquidity constraints in the stock market. Accordingly, we consider months for which this index has negative (positive) values as periods of deteriorating (improving) stock market liquidity.

When we impose the restriction that acquisition multiples are covered in the analysis, the sample is reduced significantly, mainly due to the limited coverage of the takeover premia for private target deals in SDC. We operate within this constraint. The acquisition multiple that has the highest coverage in our sample is the deal-value-to-sales, which has been used as a measure of acquisition premium in previous studies, such as Koeplin et al. (2000) and Officer et al. (2009). This variable is covered for 1,687 deals in our study (692 listed target deals and 995 private target deals).

5. Results and Discussion

5.1. Differential wealth effects in cash-financed acquisitions

We begin by describing the model used to test our first our second empirical predictions. In particular, we estimate the following specification on the sample of cash-financed acquisitions and report the outcome in Model (1) in Table 3:

$$Acquirer\ CAR_i = \alpha_1 + \alpha_2 Listed\ Target_i + \alpha_3 Listed\ Target_i \times Relatively\ Low\ Liquidity\ Listed\ Target_i + \sum_{j=1}^{k} \beta_j X_{ij} + \varepsilon_i \quad (4)$$

We classify listed targets with relatively liquid or illiquid shares based on their pre-acquisition share turnover. Targets are considered to have highly liquid shares if their pre-acquisition turnover exceeds the 80th percentile in the group of listed targets. Otherwise, targets are considered to have relatively illiquid shares. The dummy variable $Relatively\ Low\ Liquidity\ Listed\ Target_i$ is assigned the value of one if the target's pre-acquisition turnover is below the 80th percentile in the group of listed target M&As, and zero otherwise. $Listed\ Target_i$ is assigned the value of one if the target is a listed firm, and zero otherwise. In Equation (4), α_2 is the difference in the acquirer CAR between listed target deals involving targets with highly liquid shares and private target M&As. $\alpha_2 + \alpha_3$ represents this differenial effect when the listed targets have relatively illiquid shares. If Empirical Prediction 1 holds, then we expect α_3 to represent a positive effect offsetting the negative effect in α_2.

Model (1) (Table 3) supports our first empirical prediction. As evidenced by the coefficient of the interaction variable ($Listed\ Target_i \times Relatively\ Low\ Liquidity\ Listed\ Target_i$), the acquisitions of listed targets with relatively illiquid shares yield more than 2.6% higher average CAR than the acquisitions of listed targets with relatively liquid shares. Moreover, acquisitions of listed targets with liquid shares yield 2.5% lower acquirer CAR than acquisitions of private target firms. This negative wealth differential is vanishes when the listed targets have illiquid shares. Specifically, the hypothesis that the coefficient of ($Listed\ Target_i$) and the coefficient of (

$Listed\ Target_i \times\ Relatively\ Low\ Liquidity\ Listed\ Target_i$) have opposite signs and the same absolute value is not rejected based on the Wald test.[4] Put together, these results suggest that the cash-financed acquisitions of listed targets that have relatively illiquid shares yield acquirer CAR that are as high as the CAR arising from private target acquisitions.[5] Untabulated univariate results (available from the authors upon request) show that cash-financed M&As of listed targets with relatively liquid shares tend to be value-neutral (-0.75% insignificant CAR). Interestingly, cash-financed M&As of listed target firms with relatively illiquid stocks tend to create significant acquirer CAR (1.3% increase in the acquirer's CAR), which are statistically equivalent to the gains arising from private target deals.[6]

Evidence from both the univariate and multivariate approaches clearly adds a new dimension in exploring the acquirer gains from listed target M&As. More specifically, the widely cited evidence that listed target M&As are value-destroying for acquirers – and poorly performing relative to private target M&As – is clearly driven from acquisitions of listed target firms with highly liquid shares. In such deals, the relatively strong bargaining position of listed targets, due to their highly liquid shares, allows them to extract a higher fraction of the takeover synergies and leave the acquirers with relatively lower gains. On the contrary, and in line with our empirical predictions, M&As of listed companies with relatively illiquid shares offer profitable opportunities to acquirers. Such opportunities are on average equivalent to those arising from private target M&As.[7]

[4] The *p*-value in the Wald test is 0.32.

[5] In alternative estimations, we exclude all the listed target M&As in which the target's pre-acquisition turnover is between the 10th and 90th percentiles to exclusively focus on the wealth differentials between listed target deals with highly liquid and highly illiquid shares, in addition to private target M&As. Our main economic conclusions are not altered when we conduct our estimations on this sample.

[6] These results are available from the authors upon request.

[7] In a recent paper, Alexandridis et al. (2017) argue that, due to the ramifications of the recent financial crisis on corporate governance, listed target M&As no longer represent sources of value destruction. Our results – emphasizing the gains from M&As of listed targets with relatively less liquid stocks – hold after excluding the post-2009 period from our analysis. Accordingly, these gains cannot be attributed to the improvement in the corporate governance structure in response to the recent financial crisis.

The results reported in Models (2) and (3) (Table 3) provide strong support to our Empirical Prediction 3. Specifically, the results highlight the premium-CAR relationship in the acquisitions of private targets and listed targets with liquid vs. illiquid shares. Both models have the following specification:

$$Acquirer\ CAR_i = \alpha_1 + \alpha_2 Deal\ Value\ to\ Sales_i + \alpha_3 Deal\ Value\ to\ Sales_i \times Listed\ Target_i + \alpha_4 Deal\ Value\ to\ Sales_i \times Listed\ Target_i \times Relatively\ Low\ Liquidity\ Listed\ Target_i + \sum_{j=1}^{k} \beta_j X_{ij} + \varepsilon_i \quad (5)$$

whereby α_2 represents the acquirer CAR response to a one unit increase in the ratio of 'deal value to sales' in private target M&As. α_3 is the differential wealth effect arising from the effect of the M&A premium on the acquirer CAR from M&As of listed targets with highly liquid shares. $\alpha_2 + \alpha_3 + \alpha_4$, in turn, is the effect of the acquisition premium on the acquirer CAR in M&As of listed targets with relatively less liquid shares. $\alpha_2 + \alpha_3$ should reflect a negative effect of the acquisition multiple on the acquirer CAR. If Empirical Prediction 3 holds in the context of cash-financed M&As, then α_4 should reflect a positive effect that, at least, offsets the negative effect presented by $\alpha_2 + \alpha_3$. Evidence from Models (2) and (3) suggests that, other things held constant, a one unit increase in the acquisition multiple when the target has liquid shares is associated with a 0.12% to 0.16% decrease in the acquirer CAR. As predicted, this negative association is offset in M&As involving listed targets with relatively illiquid shares.

These results offer an interesting perspective on the role of the listed target's stock liquidity in influencing the premium-CAR relationship (Antoniou, Arbour, and Zhao 2008; Mueller and Sirower 2003). The rise in the acquisition multiple when the listed target has highly liquid shares is negatively perceived by equity investors. These investors attribute the high acquisition multiple to the target's strong ability to extract significant parts of the synergies at the expense of the acquirer. However, when the target has relatively illiquid shares and limited outside options, the

rise in acquisition multiples has a neutral effect on the acquirer CAR, suggesting a limited bargaining position of the target firm's shareholders.

(Insert Table 3 about here)

5.2. Differential wealth effects in stock-financed acquisitions

We begin this section by outlining the models that we use to test Empirical Prediction 2 on the sample of stock-financed M&As. The main difference between Equation (6) and Equation (4) is the inclusion of the dummy variable $(Acquirer\ Liquidity > Target\ Liquidity)_i$, which is assigned a value of one if the acquirer's shares turnover exceeds the target's stock turnover by more than one percent, and zero otherwise.[8] Accordingly, we test the following specification:

$$Acquirer\ CAR_i = \alpha_1 + \alpha_2 Listed\ Target_i + \alpha_3 Listed\ Target_i \times (\text{Acquirer Liquidity} > \text{Target Liquidity})_i + \sum_{j=1}^{k} \beta_j X_{ij} + \varepsilon_i \quad (6)$$

Model (1) (Table 4) reveals that acquirers in stock-financed acquisitions involving listed targets with relatively liquid stocks experience significant losses (8% relative reduction in CAR). Only 2.9% of these losses are offset in stock-financed deals in which the acquirer's shares are significantly more liquid than their target's shares. However, evidence from Models (2) and (3) shows that these losses are fully offset during periods of deterioration in the overall stock market liquidity.[9] These results refine the previous literature's findings on stock-financed M&As. In particular, acquirers can still enjoy significant gains from stock-financed M&As involving listed targets with relatively illiquid shares. Put simply, during periods of deteriorating liquidity for the overall stock market, acquirers with relatively liquid stocks seem to gain significant bargaining

[8] Among stock-financed acquisitions, 146 deals include acquirers with share turnover exceeding their target's turnover by more than one percent, and 251 deals include share turnover liquidity differences below one percent.

[9] The univariate analysis of stock-financed deals, to some extent, supports our empirical predictions. Stock-financed deals in which the acquirer has more liquid shares than the target tend to be value-destroying. However, the economic and statistical significance of these losses are relatively limited (1.6% weakly significant decline in the acquirer's CAR) compared to stock-financed deals in which the target's shares are more liquid than the acquirer's (4.48% significant decline in the acquirer's CAR).

advantage when acquiring targets with illiquid shares, as the deteriorating liquidity of the overall stock market limits the outside options of listed targets.

We expand the multivariate analysis on the sample covering periods of deteriorating overall stock market liquidity and test Empirical Prediction 3 with the specification:

$$Acquirer\ CAR_i = \alpha_1 + \alpha_2 Deal\ Value\ to\ Sales_i + \alpha_3 Deal\ Value\ to\ Sales_i \times Listed\ Target_i + \alpha_4 Deal\ Value\ to\ Sales_i \times Listed\ Target_i \times (\text{Acquirer Liquidity} > \text{Target Liquidity})_i + \sum_{j=1}^{k} \beta_j X_{ij} + \varepsilon_i \quad (7)$$

The evidence from Model (4), in line with Empirical Prediction 3 in the context of stock-financed M&As, shows that the negative premium-CAR relationship when acquiring targets with relatively liquid shares flips sign in stock-financed deals in which acquirers have more liquid shares than their targets. Specifically, in listed target M&As in which the target has highly liquid shares relative to the acquirer, a one-point increase in the deal value-to-sales ratio is associated with a 0.09% (0.09%-0.18%) decline in the acquirer CAR. In stock-financed deals in which the acquirer's shares are more liquid than their target's shares, however, a one-point increase in the acquisition multiple is associated with a one percent increase in the acquirer's gains during periods of deteriorating stock market liquidity. Consequently, equity investors treat the increase in the premium as an indicator of additional synergies realized by the acquirer. These results add a new perspective to the relevant literature by showing that stock-financed M&As of listed companies, which are treated in the literature as a source of value reduction for the acquirer, can be a source of significant gains for acquirers who exploit their stock's liquidity in acquiring less liquid targets.[10]

(Insert Table 4 about here)

[10] An anonymous reviewer suggested the use of alternative measures of takeover premium, such as the deal-value-to-total-assets or the deal-value-to-market-value-of-equity. We apply this analysis exclusively on the sample of listed target M&As for which these variables are more frequently available. The resulting conclusions support the prediction that the negative premium-CAR relationship is neutralized in deals in which the listed target is in a relatively weak liquidity position. These results are available from the authors upon request.

5.3. Target liquidity considerations

The conclusion that emerges from our empirical analysis is that listed targets' stock liquidity is an important predictor of the overall gains from listed target deals on the one hand, and the difference in acquirer gains between listed and private target M&As on the other hand. The direct recommendation from this analysis is that (a) cash-paying acquirers should avoid approaching listed targets with high stock liquidity, and (b) stock-paying acquirers should avoid approaching listed targets with more liquid shares. This is because, in both of these cases, the target shareholders capitalize on the relative liquidity of their shares to enhance their bargaining position at the expense of the acquirer.

In Table 5, we present two logit models predicting, based on the acquirer- and market-related variables, the extent to which acquirers avoid engaging in unfavorable M&As in which the target has a relatively strong liquidity position. The dependent variable is $Unfavorable\ Deal\ Avoidance_i$, which is assigned the value of one if the acquirer avoids announcing (a) cash-financed acquisitions of high liquidity targets, or (b) stock-financed acquisitions of targets with a higher level of stock market liquidity. Otherwise, the variable is assigned the value of zero.[11]

We predict that a rise in overall stock market liquidity increases the value of the 'outside option' available to listed target shareholders and consequently enhances their bargaining power. Accordingly, cautious acquirers should become hesitant to engage in M&As involving targets with enhanced liquidity positions. Evidence from Models (1) and (2) in Table 5 supports this empirical prediction. In particular, a rise in the overall stock market liquidity in the twelve months preceding

[11] We include the variable referring to the relative size of the deal as a proxy for the resources that the acquirer aims to spend on the takeover.

the acquisition announcement increases the likelihood that the announced deal does not involve a target with a relatively strong stock liquidity position. These models also suggest that acquirers understand the importance of the bargaining advantage arising from having highly liquid shares. That is, acquirers respond to a rise in the liquidity of their shares by becoming more likely to avoid M&A involving targets with relatively liquid shares. Hence, both firm-specific and market-wide stock market liquidity considerations seem to play a significant role in influencing the acquirer's choice of the target's listing status and the deal's payment method.

(Insert Table 5 about here)

5.4. Addressing selection bias: Propensity Score Matching and Rosenbaum-bounds methods

To further assess the robustness of our conclusions we apply the Propensity Score Matching (PSM) method (Smith and Todd 2005). We follow Heckman and Robb (1985) to estimate the Average Treatment Effect on the Treated (ATT) on groups of comparable deals. We follow a two-step approach. First, we estimate the propensity score from Logit Model (1) in Table 5. Second, we match the treated deals, in which the acquirer avoids engaging in M&As with targets in a relatively strong liquidity position, with non-treated deals that have close propensity scores, i.e. within a small caliper of 0.001. ATT is estimated on the matched sample with Equation (8):

$$ATT = \frac{\sum_{i:Listed\ Target\ =\ 1}\{Acquirer\ CAR_i(Unfavorable\ Deal\ Avoidance_i) - Acquirer\ CAR_i(Other_i)\}}{N} \quad (8)$$

In Equation (8) the ATT is estimated as the mean difference between the acquirer's CAR in listed target M&As in which the acquirer avoids engaging with a target in a relatively strong stock liquidity position ($Acquirer\ CAR_i(Unfavorable\ Deal\ Avoidance_i)$) and the mean acquirer CAR of the matched deal in which the acquirer violates this rule $Acquirer\ CAR_i(Other_i)$. N is the number of matched pairs.

Evidence from Table 6 (Panel A) supports the view that acquirers are better off when they avoid engaging in M&As with targets that have highly liquid shares. In the matched sample including 774 treated and 774 untreated (control) observations, the acquirers that do not engage in (a) cash-financed M&As with targets having highly liquid shares, or (b) stock-financed M&As with targets having more liquid shares than theirs, realize 3.5% higher CAR relative to acquirers that violate this rule.[12] Following previous empirical work (Hujer, Caliendo, and Thomsen 2004; Sianesi 2004), we assess the effectiveness of the PSM by calculating the Absolute Standardized Mean Difference (ASMD) for the propensity scores before and after the matching. This variable measures the absolute difference between the means of the estimated propensity scores in the treated and untreated groups divided by the square root of the average of the propensity scores' variances in both groups. The reduction in this measure from a factor of 47 to a factor of 9, combined with the statistically insignificant difference between the propensity scores, is an additional indicator of the success of our matching in balancing the propensity scores, and consequently reducing the bias in estimating the *ATT*.

We recognize the relevance of assessing the sensitivity of our conclusions to the effects of missing covariates. The Rosenbaum (2002) sensitivity analysis addresses this issue. The underlying assumption of this approach is that researchers do not have to necessarily identify each potential missing factor in their analysis. Instead, researchers should focus on quantifying the effects of missing factors – without explicitly identifying these factors – on the empirical conclusions. Matching-based conclusions are considered relatively insensitive to the effects of a missing covariate if these hypothetical effects on the estimation of propensity scores need to be considerably large. In the context of the Rosenbaum (2002) sensitivity analysis, the estimated Γ

[12] Panel B highlights the balancing of the propensity scores between treated and untreated observations on the matched sample.

quantifies the effect of the missing covariate on the relative odds of treatment assignment. Accordingly, conclusions that are invalidated only in the presence of a relatively large Γ are considered to be generally insensitive to the effect of missing covariates.

Barbopoulos and Adra (2016) and Peel and Makepeace (2012) consider Γ levels between 1.5 and 2 as evidence of relatively insensitive PSM conclusions in the deal structuring in M&As and the choice of fees paid to accounting auditors, respectively. Our Rosenbaum-based evidence from Table 6 yields equally robust conclusions. More specifically, a missing covariate should increase the relative odds of avoiding unfavorable deals by 65% to 75% to render our treatment effect insignificant at the 5% and 10% levels respectively. Taken together, these results suggest that our findings are to a large extent insensitive to the effect of missing covariates, especially when assessed relative to previous studies in the field of corporate finance.

(Insert Table 6 about here)

6. Conclusions

We provide robust evidence suggesting that merging firms' liquidity positions are important factors in determining (a) the acquirer gains from listed target acquisitions, and (b) the differential wealth effects between listed and private target acquisitions. We present a simple model highlighting the trade-off between liquidity and information asymmetry concerns. A direct implication of our model is that a deterioration in the listed target firm's stock market liquidity significantly reduces its bargaining power, and consequently makes it a relatively inexpensive investment opportunity. Conversely, a rise in a listed target's stock liquidity significantly enhances its shareholders' bargaining power. This ultimately results in acquirers being forced to offer higher premia that lead them to experience significant losses from the deal.

Our results suggest that cash-financed acquisitions of target firms that have relatively illiquid shares yield significant acquirer risk-adjusted returns. Such returns are equivalent to those earned from private target acquisitions. However, cash-financed acquisitions of listed targets that have highly liquid shares lead to significant acquirer losses. In stock-financed M&As, we report evidence suggesting that acquirers with relatively liquid shares capitalize on this feature and acquire listed targets that have less liquid shares. During periods of overall deterioration in stock market liquidity, such acquirers realize announcement period gains that are equivalent to those realized from stock-financed private target acquisitions. Nevertheless, acquirers who end up using their shares to acquire listed targets with relatively more liquid shares than theirs experience significant losses that are mainly driven by the high premia paid to their targets' shareholders.

Our robust findings also suggest that acquirers understand these wealth effects, and consequently respond to rising stock liquidity by limiting their engagement in cash-financed acquisitions of highly liquid listed target firms or stock-financed acquisitions of companies with more liquid stocks than theirs. The findings enhance our understanding of the role of stock liquidity in explaining the wealth effects of M&As in addition to the choice of the target's listing status and payment method.

References

Abadie, Alberto, and Guido W. Imbens. 2006. "Large Sample Properties of Matching Estimators for Average Treatment Effects." *Econometrica* 74 (1): 235–67. doi:10.1111/j.1468-0262.2006.00655.x.

Adra, Samer, and Leonidas G. Barbopoulos. 2018. "The Valuation Effects of Investor Attention in Stock-Financed Acquisitions." *Journal of Empirical Finance* 45: 108–25.

Alexandridis, George, Nikolaos Antypas, and Nickolaos Travlos. 2017. "Value Creation from M&As: New Evidence." *Journal of Corporate Finance* 45: 632–650.

Alexandridis, George, Kathleen P. Fuller, Lars Terhaar, and Nickolaos G. Travlos. 2013. "Deal Size, Acquisition Premia and Shareholder Gains." *Journal of Corporate Finance* 20 (April): 1–13. doi:10.1016/j.jcorpfin.2012.10.006.

Amihud, Yakov, and Haim Mendelson. 1988. "Liquidity and Asset Prices: Financial Management Implications." *Financial Management* 17 (1): 5–15.

Antoniou, Antonios, Philippe Arbour, and Huainan Zhao. 2008. "How Much Is Too Much: Are Merger Premiums Too High?" *European Financial Management* 14 (2): 268–87. doi:10.1111/j.1468-036X.2007.00404.x.

Avramov, Doron, and Tarun Chordia. 2006. "Asset Pricing Models and Financial Market Anomalies." *Review of Financial Studies* 19 (3): 1001–40.

Barbopoulos, L., and S. Adra. 2016. "The Earnout Structure Matters: Takeover Premia and Acquirer Gains in Earnout Financed M&As." *International Review of Financial Analysis* 45: 283–94. doi:10.1016/j.irfa.2016.04.007.

Barbopoulos, Leonidas, and Sudi Sudarsanam. 2012. "Determinants of Earnout as Acquisition Payment Currency and Bidder's Value Gains." *Journal of Banking & Finance* 36 (3): 678–94. doi:10.1016/j.jbankfin.2011.10.007.

Becker-Blease, John R., and Donna L. Paul. 2006. "Stock Liquidity and Investment Opportunities: Evidence from Index Additions." *Financial Management* 35 (3): 35–51.

Betton, Sandra, B. Espen Eckbo, and Karin S. Thorburn. 2009. "Merger Negotiations and the Toehold Puzzle." *Journal of Financial Economics* 91 (2): 158–78.

Boone, Audra L, and J. Harold Mulherin. 2007. "How Are Firms Sold?" *Journal of Finance* 62 (2): 847–75.

Boot, Arnoud WA Radhakrishnan Gopalan, and Anjan V. Thakor. 2008. "Market Liquidity, Investor Participation, and Managerial Autonomy: Why Do Firms Go Private?" *Journal of Finance* 63 (4): 2013–59.

Capron, Laurence, and Jung-Chin Shen. 2007. "Acquisitions of Private vs. Public Firms: Private Information, Target Selection, and Acquirer Returns." *Strategic Management Journal* 28 (9): 891–

911. doi:10.1002/smj.612.

Chang, Saeyoung. 1998. "Takeovers of Privately Held Targets, Methods of Payment, and Bidder Returns." *The Journal of Finance* 53 (2): 773–84. doi:10.1111/0022-1082.315138.

Chordia, Tarun, Avanidhar Subrahmanyam, and Qing Tong. 2014. "Have Capital Market Anomalies Attenuated in the Recent Era of High Liquidity and Trading Activity?" *Journal of Accounting and Economics* 58: 41–58.

Díaz, Kaon Belén Díaz, Sergio Sanfilippo Azofra, and Carlos López Gutiérrez. 2009. "Are M&A Premiums Too High? Analysis of a Quadratic Relationship between Premiums and Returns." *Quarterly Journal of Finance and Accounting* 48 (3): 5–21.

Draper, Paul, and Krishna Paudyal. 2006. "Acquisitions: Private versus Public." *European Financial Management* 12 (1): 57–80. doi:10.1111/j.1354-7798.2006.00310.x.

Ekkayokkaya, Manapol, Phil Holmes, and Krishna Paudyal. 2009. "Limited Information and the Sustainability of Unlisted-Target Acquirers' Returns." *Journal of Business Finance & Accounting* 36 (9–10). Wiley Blackwell: 1201–27. http://ideas.repec.org/a/bla/jbfnac/v36y2009-11i9-10p1201-1227.html.

Faccio, Mara, and R.W Masulis. 2005. "The Choice of Payment Method in European Mergers and Acquisitions." *The Journal of Finance* 60 (3): 1345–88. doi:10.1111/j.1540-6261.2005.00764.x.

Fuller, Kathleen, Jeffry Netter, and Mike Stegemoller. 2002. "What Do Returns to Acquiring Firms Tell Us? Evidence from Firms That Make Many Acquisitions." *The Journal of Finance* 57 (4): 1763–93. doi:10.1111/1540-6261.00477.

Hujer, Reinhard, Marco Caliendo, and Stephan L. Thomsen. 2004. "New Evidence on the Effects of Job Creation Schemes in Germany—A Matching Approach with Threefold Heterogeneity." *Research in Economics* 58 (4): 257–302. doi:10.1016/j.rie.2004.07.001.

Koeplin, John, Atulya Sarin, and Alan C. Shapiro. 2000. "The Private Company Discount." *Journal of Applied Corporate Finance* 12 (4): 94–101. doi:10.1111/j.1745-6622.2000.tb00022.x.

Kohers, Ninon. 2004. "Acquisitions of Private Targets: The Unique Shareholder Wealth Implications." *Applied Financial Economics* 14 (16). Routledge: 1151–65. doi:10.1080/09603100412331297676.

Lin, Hai, Junbo Wang, and Chunchi Wu. 2011. "Liquidity Risk and Expected Corporate Bond Returns." *Journal of Financial Economics* 99: 628–650.

Massa, Massimo, and Moqi Xu. 2013. "The Value of (Stock) Liquidity in the M&A Market." *Journal of Financial and Quantitative Analysis* 48 (5): 1463–97.

Mueller, Dennis C., and Mark L. Sirower. 2003. "The Causes of Mergers: Tests Based on the Gains to Acquiring Firms' Shareholders and the Size of Premia." *Managerial and Decision Economics* 24 (5): 373–91. doi:10.1002/mde.1103.

Muthoo, Abhinay. 1999. *Bargaining Theory with Applications*. Cambridge University Press.

Officer, Micah S. 2007. "The Price of Corporate Liquidity: Acquisition Discounts for Unlisted Targets." *Journal of Financial Economics* 83 (3): 571–98. doi:10.1016/j.jfineco.2006.01.004.

Officer, Micah S., Annette B. Poulsen, and Mike Stegemoller. 2009. "Target-Firm Information Asymmetry and Acquirer Returns." *Review of Finance* 13 (3): 467–93. doi:10.1093/rof/rfn017.

Osborne, Martin J., and Ariel Rubinstein. 1990. *Bargaining and Markets*. Academic Press.

Pastor, Lubos, and Robert F. Stambaugh. 2003. "Liquidity Risk and Expected Stock Returns." *Journal of Political Economy* 111 (3): 642–85.

Peel, Michael J., and Gerald H. Makepeace. 2012. "Differential Audit Quality, Propensity Score Matching and Rosenbaum Bounds for Confounding Variables." *Journal of Business Finance & Accounting* 39 (February): 606–48. doi:10.1111/j.1468-5957.2012.02287.x.

Roll, Richard. 1986. "The Hubris Hypothesis of Corporate Takeovers." *The Journal of Business* 59: 197–216.

Roosenboom, Peter, Frederik P. Schlingemann, and Manuel Vasconcelos. 2013. "Does Stock Liquidity Affect Incentives to Monitor? Evidence from Corporate Takeovers." *Review of Financial Studies* hht076.

———. 2014. "Does Stock Liquidity Affect Incentives to Monitor? Evidence from Corporate Takeovers." *The Review of Financial Studies* 27 (8): 2392–2433.

Rosenbaum, Paul. 2002. *Observational Studies*. Springer Series in Statistics. New York, NY: Springer New York. doi:10.1007/978-1-4757-3692-2.

Rosenbaum, Paul, and David Rubin. 1983. "The Central Role of the Propensity Score in Observational Studies for Causal Effects." *Biometrika* 70 (1): 41–55. http://biomet.oxfordjournals.org/content/70/1/41.short.

Rosenbaum, PR, and DB Rubin. 1985. "Constructing a Control Group Using Multivariate Matched Sampling Methods That Incorporate the Propensity Score." *The American Statistician* 39 (1): 33–38. http://amstat.tandfonline.com/doi/abs/10.1080/00031305.1985.10479383.

Shleifer, Andrei, and Robert W. Vishny. 2003. "Stock Market Driven Acquisitions." *Journal of Financial Economics* 70: 295–311.

Sianesi, Barbara. 2004. "An Evaluation of the Swedish System of Active Labor Market Programs in the 1990s." *Review of Economics and Statistics* 86 (1): 133–55.

Smith, Jeffrey, and Petra Todd. 2005. "Does Matching Overcome LaLonde's Critique of Nonexperimental Estimators?" *Journal of Econometrics* 125 (1–2): 305–53. doi:10.1016/j.jeconom.2004.04.011.

Travlos, Nickolaos G. 1987. "Corporate Takeover Bids, Methods of Payment, and Bidding Firms' Stock

Returns." *The Journal of Finance* 42 (4): 943–63. doi:10.1111/j.1540-6261.1987.tb03921.x.

Appendix 1 Variables definitions

Variable	Description	Source
Acquirer Market Value	Acquirer's market value of equity 20 days prior to bid announcement, in millions of dollars.	Compustat
Acquirer Book-to-Market Value	The book value of the acquirer from the most recent accounting statement prior to the bid announcement, divided by its market value of equity 20 days before the acquisition.	Compustat
Acquirer Age	Number of days between the acquirer's listing in Datastream and the acquisition announcement.	Datastream
Acquirer CAR	The acquirer's 5-day (-2, 2) announcement period cumulative abnormal returns. The abnormal (i.e. risk-adjusted) return in each day is the difference between the firm's returns and the value-weighted returns of NYSE firms.	Compustat
Deal Value	The value of the payment made to the target firm by the acquirer, in millions of dollars.	SDC
Deal Value to Sales	The ratio of the deal value to the target firm's yearly sales, as recorded in the last financial statement before the acquisition announcement.	SDC
Stock Market Liquidity	The average level of liquidity innovations estimated by Pastor and Stambaugh (2003) as discussed in Appendix 2 for the 12 months that precede the acquisition announcement.	Lubos Pastor's Webpage
Low Stock Market Liquidity	Dummy = 1 if Stock Market Liquidity <0, and 0 otherwise [High].	Lubos Pastor's Webpage
Private Target	Dummy = 1 if the target is a private firm, and 0 otherwise (Listed Target).	SDC
Listed Target	Dummy = 1 if the target is a listed firm, and 0 otherwise (Private Target).	SDC
Diversifying Deal	Dummy = 1 if the acquirer and the target have different two-digit SIC codes, and 0 otherwise.	SDC
Relatively Low Liquidity Listed Target	Dummy = 1 if the listed target's stock liquidity is lower than the 80th percentile, and 0 otherwise.	SDC + Compustat
Acquirer Liquidity	The average value of the acquirer's daily ratio of actively traded shares to listed ones over the window covering 240 to 43 days before the acquisition announcement.	Compustat
Target Liquidity	The average value of the listed target's daily ratio of actively traded shares to listed ones over the window covering 240 to 43 days before the acquisition announcement.	Compustat
Acquirer Liquidity > Target Liquidity	Dummy = 1 if the level of the acquirer's stock liquidity exceeds that of the target by more than one percent, and 0 otherwise.	Compustat
Acquirer Liquidity < Target Liquidity	Dummy = 1 if the level of the acquirer's stock liquidity does not exceed that of the target by more than one percent, and 0 otherwise.	Compustat
Cash	Dummy = 1 if more than 70% of the deal payment is settled in cash, and 0 otherwise.	SDC
Propensity Score	The propensity scores estimated from the logit model in Table 6.	Authors' Estimations
Stock	Dummy = 1 if more than 70% of the deal payment is settled in stock, and 0 otherwise.	SDC
Acquirer Debt Equity	The acquirer's level of debt as a percentage of equity market valuation.	SDC
Number of Bidders	The number of bidders (including the acquirer) expressing interest in the target.	SDC
Acquirer Toehold	Percentage of the target's listed shares held by the acquirer before the deal announcement.	SDC
High Relative Size	Dummy = 1 if the deal value relative to the acquirer's market value exceeds 25%, and 0 otherwise.	SDC
Friday	Dummy = 1 if the deal is announced on a Friday, and 0 otherwise.	SDC
Unfavorable Deal Avoidance	Dummy = 1 if the acquirer avoids announcing cash-financed acquisitions of high liquidity targets or stock-financed acquisitions of targets with a higher level of stock market liquidity, and 0 otherwise.	SDC + Compustat

Appendix 2 Stock market liquidity

This appendix presents a detailed description of the stock liquidity proxy that we use in our analysis. Pastor and Stambaugh (2003) start with the premise that investors accommodating the order flows from liquidity-constrained market participants require high returns to commit funds to investments. More specifically, the greater the order flows, the larger the compensation required for providing the much-needed liquidity, and consequently the larger the reversal in stock returns on the following day. Hence, the following regression is estimated:

$$r^{e}_{i,d+1,t} = \theta_{i,t} + \emptyset_{i,t} r_{i,d,t} + \gamma_{i,t} sign\left(r^{e}_{i,d,t}\right).v_{i,d,t} + \epsilon_{i,d+1,t} \qquad d = 1,\ldots,D \qquad \text{(A2.1)}$$

$r_{i,d,t}$ is the return on stock i on day d in month t. $r^{e}_{i,d+1,t}$ is the excess return of stock i over the CRSP value-weighted market return on day d in month t. $v_{i,d,t}$ is the dollar volume for stock i on day d in month t. The larger the liquidity constraints, the larger the liquidity-induced returns, and the larger the reversals on the following trading day. In the presence of significant liquidity constraints, $\gamma_{i,t}$ is expected to be negative and large in magnitude. Accordingly, the average monthly level of the estimated liquidity measure is:

$$\hat{\gamma}_t = \left(\frac{1}{N}\right)\sum_{i=1}^{N}\hat{\gamma}_{i,t} \qquad \text{(A.2.2)}$$

where N is the number of firms in NYSE and AMEX. Then, a dynamic measure of this index is estimated as:

$$\Delta\hat{\gamma}_t = \left(\frac{m_t}{m_1}\right)\frac{\sum_{i=1}^{N}(\hat{\gamma}_{i,t} - \hat{\gamma}_{i,t-1})}{N_t} \qquad \text{(A.2.3)}$$

where $\left(\frac{m_t}{m_1}\right)$ is a scaling factor where m_t is the value of the stock market at the beginning of month t and m_1 is the value of the stock market in August 1962, the first month in the authors' sample.

The innovations are estimated as the error term in the following equation, in which $\Delta\hat{\gamma}_t$ is regressed on its lag as well as the lagged value of the scaled level series:

$$\Delta\hat{\gamma}_t = a + b\Delta\hat{\gamma}_{t-1} + c\left(\frac{m_{t-1}}{m_1}\right)\hat{\gamma}_{t-1} + u_t \quad \text{(A.2.4)}$$

The liquidity innovation is estimated as:

$$\mathcal{L} = \frac{u_t}{100} \quad \text{(A.2.5)}$$

A firm's decision to engage in an acquisition and the subsequent negotiations and due diligence are likely to be spread over a considerable period. To address these concerns, a smoothed version of the liquidity shocks over the year preceding the acquisition announcement is used as a proxy for the level of stock market liquidity during the period of deal structuring and due diligence.

Figure 1 presents the time variation of the 12-month average liquidity shocks estimated by Pastor and Stambaugh (2003) for the period ranging from January 1968 – the first month covered in Professor Pastor's website – until December 2013. The time variation in this index supports the anecdotal evidence that periods of stock market crashes and economic downturns tend to be associated with negative liquidity shocks. More specifically, the largest liquidity shocks are reported during the economic downturn of the 1970s, the 1987 stock market crash, the bursting of the dotcom bubble in the early 2000s, and the stock market crash of 2008.

(Insert Figure 1 about here)

Emphasizing the explanatory power of their liquidity index, Pastor and Stambaugh (2003) report that their liquidity index is a state variable explaining cross-sectional variation in stock returns. Avramov and Chordia (2006) augment the Fama and French three-factor model by using this liquidity factor. Lin, Wang, and Wu (2011) follow the same methodology used in constructing this index to create a liquidity index that explains the variation in corporate bonds returns.

Recently, Chordia et al. (2014) use the same index to examine whether market anomalies have persisted during recent periods of high liquidity and trading activity.

Table 1 Annual distribution of the sample

	Panel A					Panel B										
Year	All	List. Target	Priv. Target	Cash	Stock	Industrials	Healthcare	Consumer Staples	Materials	Media	Retail	Consumer Products	High Technology	Energy and Power	Telecom.	Real Estate
1990	35	11	24	15	20	4	3	1	2	2	2	4	8	7	1	1
1991	44	9	35	15	29	6	9	5	2	0	1	6	8	5	2	0
1992	88	7	81	20	68	11	18	3	3	1	8	7	24	5	8	1
1993	94	8	86	31	63	10	11	4	9	5	6	13	23	7	5	1
1994	121	23	98	51	70	16	19	7	5	9	10	13	30	3	6	3
1995	218	37	181	66	152	29	37	3	6	3	15	24	70	18	12	1
1996	310	35	275	88	222	45	42	13	13	14	20	36	98	12	15	2
1997	386	63	323	114	272	31	44	7	18	17	34	58	116	28	31	2
1998	412	100	312	163	249	36	43	7	21	21	21	58	159	19	24	3
1999	375	73	302	127	248	35	32	4	14	19	25	41	165	15	22	2
2000	413	65	348	105	308	31	33	7	7	18	20	35	216	12	32	2
2001	187	48	139	80	107	15	18	4	8	6	6	18	93	5	12	2
2002	163	33	130	105	58	15	30	4	4	8	7	13	68	5	8	1
2003	156	29	127	114	42	9	28	3	5	1	8	23	57	5	14	3
2004	199	24	175	164	35	20	24	6	4	11	5	16	102	4	6	1
2005	185	26	159	163	22	20	20	3	7	5	9	20	84	8	8	1
2006	177	30	147	160	17	20	24	8	2	10	3	13	76	11	8	0
2007	146	16	130	137	9	18	21	6	7	6	4	18	54	5	6	1
2008	125	18	107	113	12	16	18	2	5	3	3	18	45	10	5	0
2009	57	9	48	51	6	5	8	3	0	2	2	6	27	0	4	0
2010	85	12	73	79	6	11	14	5	2	2	0	6	34	8	2	1
2011	88	13	75	81	7	10	22	4	7	2	0	4	26	6	6	1
2012	74	7	67	72	2	12	7	3	4	3	5	7	21	9	3	0
2013	54	6	48	48	6	7	13	3	1	1	5	7	15	2	0	0
N	4,192	702	3,490	2,162	2,030	432	538	115	156	169	219	464	1,619	209	240	29
%	100.0	16.7	83.3	51.6	48.4	10.3	12.8	2.7	3.7	4.0	5.2	11.1	38.6	5.0	5.7	0.7

Panel A represents the annual distribution of domestic cash-financed acquisitions announced by U.S. public acquirers between January 1, 1990, and December 31, 2013. The distribution of the sample is presented according to the sum of the deal numbers, the target's listing status (Listed vs. Private), and the deal's payment method (Cash vs. Stock). Panel B represents the yearly distribution of the M&A bids with respect to the target's sector. The sectors, as reported by SDC, are: Industrials, Healthcare, Consumer Staples, Materials, Media and Entertainment, Retail, Consumer Products, High Technology, Energy and Power, Telecommunications, and Real Estate. *N* is the number of deals in each category and (%) is the percentage of deals in this category relative to the total number of deals.

Table 2 Descriptive statistics

Variable\Statistic	*N*	Mean	Median	Max	Min	SD
Acquirer CAR	4,192	1.06	0.70	159.30	-122.10	11.60
Deal Value to Sales	1,687	5.89	1.50	70.00	0.50	14.03
Acquirer Market Value	4,192	8648.80	674.28	575329.80	1.52	34575.06
Deal Value	4,192	311.84	32.95	62,592.00	1.00	2,138.38
Acquirer Liquidity	4,192	0.04	0.02	4.33894	0.00	0.09
Listed Target Liquidity	4,192	0.07	0.02	4.61	0.00	0.22
Acquirer Debt Equity	4,192	44.34	43.87	333.20	0.61	23.39
Market Liquidity	4,192	0.001	0.006	0.03	-0.06	0.02
Acquirer Book-to-Market Value	4,192	0.45	0.40	23.01	-3.50	0.51
Number of Bidders	4,192	1.03	1.00	6.00	1.00	0.21
Acquirer Age	4,192	4,822.00	3,046.00	3,1755.00	13.00	5216.26
Acquirer Toehold	4,192	0.27	0.00	49.98	0.00	2.80

The table presents the descriptive statistics of the variables used in this study. For each variable, we report the mean, median, maximum, minimum, and standard deviation values. All variables are winsorized at the 99th percentile. Please refer to Appendix 1 for a detailed description of each variable.

Table 3 Multivariate analysis of the acquirers' CAR for cash-financed acquisitions

Dependent Variable	Acquirer CAR	Acquirer CAR	Acquirer CAR
Payment Method	Cash	Cash	Cash
Explanatory Variable\Model (.)	(1)	(2)	(3)
Intercept	6.683***	3.816	3.802
	(1.763)	(2.44)	(2.513)
Listed Target	-2.446**		-1.312
	(0.962)		(1.188)
Listed Target × Relatively Low Liquidity Listed Target	2.592**		1.986
	(1.096)		(1.319)
Deal Value to Sales		-0.005	-0.003
		(0.021)	(0.022)
Deal Value to Sales × Listed Target		-0.163***	-0.121**
		(0.055)	(0.054)
Deal Value to Sales × Public Target × Relatively Low Liquidity Listed Target		0.185***	0.124**
		(0.064)	(0.062)
Acquirer Liquidity	1.980	2.598	2.488
	(1.260)	(1.675)	(1.624)
Acquirer Debt-Equity	0.023***	0.038**	0.038**
	(0.009)	(0.015)	(0.015)
Diversifying Deal	0.461	0.083	0.035
	(0.372)	(0.542)	(0.542)
ln (Acquirer Market Value)	-0.369***	-0.378*	-0.370
	(0.118)	(0.223)	(0.225)
ln (Acquirer Age)	-0.178	0.043	0.075
	(0.195)	(0.249)	(0.251)
Acquirer Book-to-Market	-1.187***	-0.031	0.010
	(0.286)	(1.422)	(1.431)
Number of Bidders	-2.127***	-2.566***	-2.591***
	(0.531)	(0.613)	(0.622)
ln (Deal Value)	-0.021	-0.078	-0.177
	(0.144)	(0.222)	(0.247)
Acquirer Toehold	0.062	0.134	0.130
	(0.110)	(0.144)	(0.143)
High Relative Size	2.701***	2.948***	2.909***
	(0.763)	(1.036)	(1.027)
Market Liquidity	-15.463	-9.344	-10.651
	(10.755)	(16.660)	(16.703)
Friday	-0.877**	-0.171	-0.132
	(0.401)	(0.628)	(0.626)
Industry Effects	YES	YES	YES
N	2,162	824	824
Adjusted R-Squared	0.040	0.052	0.052

The table reports three multivariate regressions explaining the variation in the acquirer's CAR in cash-financed acquisitions. Model (1) examines the role of the listed target's relatively low stock liquidity in explaining the acquirer's gains in listed target deals and the difference between the wealth effects of listed and private target acquisitions. Models (2) and (3) expand this analysis by examining the impacts of the acquisition multiple (Deal Value to Sales) paid to the target on the acquirer's gains while emphasizing the wealth effects arising from the interaction of this multiple with the listed target's stock market liquidity. *N* indicates the number of observations. ***, **, and * represent significance at the 1%, 5%, and 10% levels respectively. Please refer to Appendix 1 for an accurate description of the variables.

Table 4 Multivariate analysis of the acquirers' CAR for stock-financed acquisitions

Dependent Variable	Acquirer CAR	Acquirer CAR	Acquirer CAR	Acquirer CAR	Acquirer CAR
Payment Method	Stock	Stock	Stock	Stock	Stock
Stock Market Liquidity	-	High	Low	Low	Low
Explanatory Variable\Model (.)	(1)	(2)	(3)	(4)	(5)
Intercept	10.173***	10.464***	9.685	12.529	8.095
	(3.432)	(2.965)	(6.930)	(9.858)	(0.926)
Listed Target	-8.183***	-7.240***	-10.337***		-10.697***
	(1.026)	(1.201)	(1.952)		(-3.268)
Listed Target × (Acquirer Liquidity > Target Liquidity)	2.907**	0.413	8.391***		3.252
	(1.407)	(1.389)	(2.934)		(0.683)
Deal Value to Sales				0.091**	0.010
				(0.046)	(0.205)
Deal Value to Sales × Listed Target				-0.185**	0.047
				(0.088)	(0.558)
Deal Value to Sales × Listed Target × (Acquirer Liquidity > Target Liquidity)				1.036**	0.781
				(0.441)	(1.233)
Acquirer Liquidity	7.631	4.996	11.704	52.237	47.458
	(7.553)	(7.266)	(21.349)	(36.399)	(1.274)
Acquirer Debt-Equity	-0.026**	-0.001	-0.065**	-0.008	0.005
	(0.013)	(0.016)	(0.025)	(0.025)	(0.234)
Diversifying Deal	0.401	-0.328	1.647	0.599	0.634
	(0.694)	(0.694)	(1.602)	(2.397)	(0.266)
ln (Acquirer Market Value)	-1.477***	-0.931***	-2.437***	-1.163	-1.692
	(0.354)	(0.245)	(0.921)	(1.440)	(-1.134)
ln (Acquirer Age)	0.506*	0.256	1.146	-0.525	0.351
	(0.298)	(0.319)	(0.704)	(0.877)	(0.406)
Acquirer Book-to-Market	-5.85***	-6.254***	-6.194***	-6.718**	-6.779**
	(1.536)	(2.117)	(2.310)	(3.320)	(-2.119)
Number of Bidders	-0.796	-3.544***	3.614	2.398	3.721
	(2.264)	(1.309)	(4.270)	(4.693)	(0.788)
ln (Deal Value)	0.608*	0.543*	0.589	0.164	1.112
	(0.353)	(0.312)	(0.845)	(1.378)	(0.701)
Acquirer Toehold	-0.059	0.160	-0.194**	-0.320***	-0.404***
	(0.089)	(0.162)	(0.093)	(0.066)	(-2.973)
High Relative Size	2.796**	2.433*	4.293	-2.620	-2.027
	(1.258)	(1.409)	(2.745)	(3.380)	(-0.633)
Market Liquidity	-58.384***	-14.305	-27.325	69.157	45.433
	(22.124)	(53.171)	(47.430)	(58.909)	(0.816)
Friday	-0.239	0.067	-1.032	-2.257	-0.980
	(0.726)	(0.758)	(1.728)	(2.400)	(-0.403)
Industry Effects	YES	YES	YES	YES	YES
N	2,030	1,459	571	246	246
Adjusted R-Squared	0.084	0.071	0.119	0.053	0.111

The table reports three multivariate regressions explaining the variation in the acquirer's CAR in stock-financed acquisitions. Model (1) examines the role of the difference between the acquirer's and target's stock liquidity in explaining the acquirer's gains in listed target deals and the difference between the wealth effects of listed and private target acquisitions. Models (2) and (3) re-estimate the same specifications during periods of low and high stock market liquidity. Stock market liquidity is considered to be high if the Market Liquidity variable is positive, and low otherwise. Models (4) and (5) expand this analysis during periods of low stock market liquidity by examining the impacts of the acquisition multiple (Deal Value to Sales) paid to the target on the acquirer's gains while emphasizing the wealth effects arising from the interaction of this multiple with the listed target's stock market liquidity. *N* indicates the number of observations. ***, **, and * represent significance at the 1%, 5%, and 10% levels respectively. Please refer to Appendix 1 for an accurate description of the variables.

Table 5 Predicting the target status/payment method combination

Dependent Variable	Unfavorable Deal Avoidance = 1 Otherwise = 0	Unfavorable Deal Avoidance = 1 Otherwise = 0
Explanatory Variable\Model (.)	(1)	(2)
Intercept	3.693***	4.794***
	(0.441)	(1.148)
Acquirer Liquidity	10.216***	10.142***
	(2.467)	(2.472)
Market Liquidity	14.676***	14.671***
	(3.279)	(3.307)
Acquirer Debt-Equity	-0.0003	-0.001
	(0.002)	(0.003)
ln (Acquirer Market Value)	-0.046	-0.034
	(0.035)	(0.035)
ln (Acquirer Age)	-0.101*	-0.112*
	(0.056)	(0.058)
Diversifying Deal	0.183	0.105
	(0.130)	(0.133)
Acquirer Book-to-Market	0.265	0.215
	(0.177)	(0.182)
High Relative Size	-1.764***	-1.746***
	(0.142)	(0.143)
Industry Effects	NO	YES
N	4,192	4,192
Pseudo R-Squared	0.094	0.101

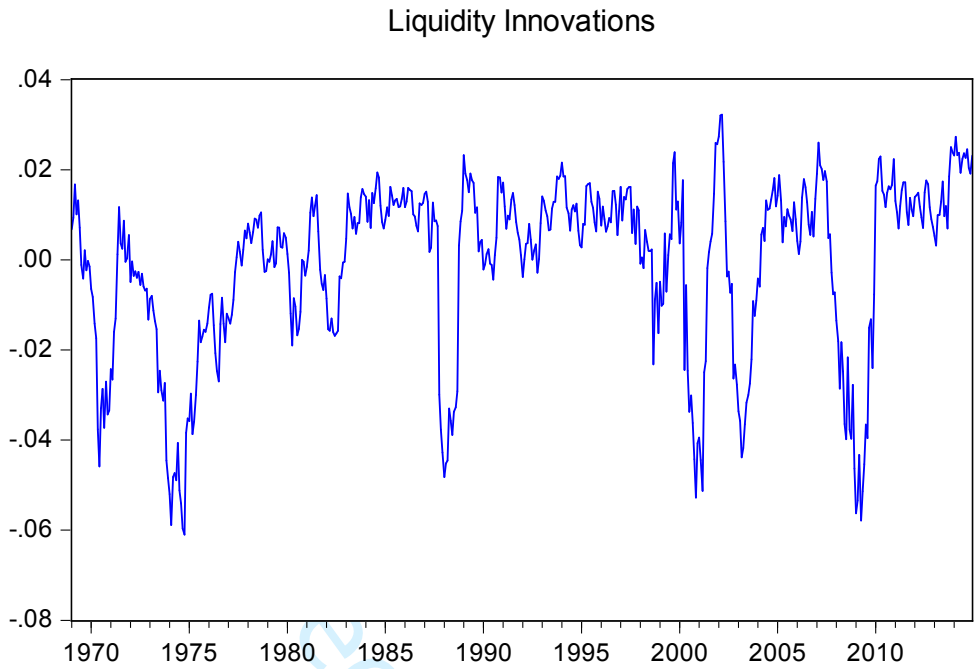
The table reports two models examining whether acquirers avoid making value-destroying deals. The dependent variable in these models (Unfavorable Deal Avoidance) is assigned the value of one if the acquirer avoids announcing cash-financed acquisitions of high liquidity targets or stock-financed acquisitions of targets with a higher level of stock market liquidity, and zero otherwise. Model (1) does not control for industry effects, while Model (2) controls for these factors. *N* indicates the number of observations. ***, **, and * represent significance at the 1%, 5%, and 10% levels respectively. Please refer to Appendix 1 for an accurate description of the variables.

Table 6 PSM results

Panel A: Matching outcome								
Matching Algorithm	Caliper Matching							
Caliper	0.001							
Matched Observations per Treated Deal	1:1							
Number of Treated Observations	774							
Number of Control Observations	774							
ATT (%) (Abadie and Imbens (2006)	3.52***							
Standard Errors)	(0.20)							
Cut-off Γ value (p≈0.05)	1.65							
Cut-off Γ value (p≈0.10)	1.75							
Panel B: Propensity Score Balancing								
	Before Matching				After Matching			
	Treatment Group	Control Group	*p*-value	ASMD	Treatment Group	Control Group	*p*-value	ASMD
Propensity Score	0.93	0.86	0.00	46.98	0.94	0.94	0.15	9.13

The table reports the outcome of the Propensity Score Matching analysis that estimates the wealth effect of listed target acquisitions under unfavorable liquidity conditions. The treatment variable is the Unfavorable Deal Avoidance discussed in Appendix 1. The outcome variable is the acquirer's announcement period CAR. The propensity scores are estimated via the Logit Model (1) in Table 5. Variables are included in this Logit model provided that such an inclusion improves the balance of the key covariates in the matched sample. Panel A presents the caliper used in the matching, the number of treated and control observations in the matched sample, and the *ATT* with the Abadie and Imbens (2006) standard errors and the cut-off Γ value at the 5% and 10% levels of significance. These outcomes are reported for the Caliper Matching algorithm with a caliper of 0.001 with replacement. The matching exercise's effect on balancing the propensity scores is presented in Panel B. The mean value of the estimated propensity scores in the treated group and the control group and the bootstrapped *p*-value from the *t*-test of the null hypothesis that the difference is statistically equal to zero are reported before and after the matching. To further assess the effect of the matching on bias adjustment, Panel B also reports Absolute Standardized Mean Difference (ASMD), defined as the absolute difference between the means of each covariate in the two groups divided by the square root of the mean of this covariate's variances in both groups. ***, **, and * represent significance at the 1%, 5%, and 10% levels respectively. Please refer to Appendix 1 for an accurate description of the variables.

Figure 1 12-month rolling averages of monthly liquidity innovations



The figure visualizes the monthly level of the one-year rolling averages of liquidity innovation shocks estimated by Pastor and Stambaugh (2003) and reported on Louis Pastor's website from August 1968 until December 2013.