The liquidity and trading activity effects of acquisition payment methods: Evidence from the announcements of private firms' acquisitions

The liquidity and trading activity effects of acquisition payment method: evidence from announcements of the acquisition of private firms

Abstract
We investigate how the liquidity and trading activity effects of the announcement of the acquisition of private targets vary by payment method. We find significant increases in trading activity around acquisition announcement dates irrespective of the payment method used; however, fluctuations are lower for acquisitions financed by earnouts and cash. Similarly, the stocks of acquirers using cash and earnouts are also less affected by a general loss of liquidity that accompanies announcements. We show that these effects are explained by the interpretation of cash acquisition by the market as an option used when acquirers perceive no risk of being adversely selected, and the potential of earnout as an adverse selection risk reduction tool.

Keywords: Earnout financing, Information asymmetry, Acquisition announcements, Liquidity, Payment methods.

JEL: G34, G12, G14

1. Introduction

The question of whether mergers and acquisitions (M&A) create or destroy value for both or either of the acquiring or acquired firms is a long-running one, and has led to the emergence of a large body of literature over the past few decades. The fundamental challenge of acquiring a new firm is the information asymmetry arising from the informational advantages that target firms typically hold over their acquirers. Adverse selection costs, which is the main constituent of the spread between an acquirer's bid price and the target firms ask price, reflects this superior level of managerial knowledge about a target firm's finances and future prospect. These challenges posed by information asymmetry in M&As has formed the basis of several seminal studies (see as examples, Brealey, et al., 1977; Downes and Heinkel, 1982; Jensen and Meckling, 1976; Verrecchia, 1983). Other studies also highlight the implications of the choice of payment methods in mergers and acquisitions both in terms of corporate control (see Faccio and Masulis, 2005), bidders and target firms' value gains (Myers and Majluf, 1984; Travlos, 1987), and trading activity and market liquidity (Draper and Paudyal, 1999).

Increasingly, attention is also being paid to whether and how the various methods of payment for acquisitions, such as cash, stock and mixed payments, impact returns and trading costs of both the acquiring and target firms around M&A announcements (see as examples, Amihud, et al., 1990; Barbopoulos and Sudarsanam, 2012; Barbopoulos, et al., 2017; Brown and Ryngaert, 1991; Draper and Paudyal, 1999; Liuqing, 2012; Loughran and Vijh, 1997; Travlos, 1987; Wansley, et al., 1987). Draper and Paudyal (1999) specifically argue that the method of payment can 'inform' the market regarding the acquiring managers' viewpoint of the value of the target firm. They highlight the influence of cash, stock and mixed payments on price return, trading activity, and liquidity around acquisitions made by acquirers and targets when both the target and acquiring firms are listed. However, and perhaps critically, in an age where most of the acquisitions undertaken by acquiring firms are for private or unlisted subsidiary firms, the role or liquidity effects of the various methods of payment in a scenario where the target firm is not listed remains largely unexplored. Firms such as Google/Alphabet, Facebook, and Apple rarely acquire publicly listed targets and yet are the most active acquirers in the world, having engaged in a buying spree of start-ups over the past decade as a growth strategy. Although giant tech firms acquiring start-ups are more likely to pay cash than use other payment methods, firms in other sectors are more cautious in their approach, thus indicating the existence of uncertainty in their targets' future prospects. Therefore, given that information asymmetry will, on average, be higher when the target firm in an acquisition deal is not publicly listed versus when they are, the impact of payment methods on the value of the acquiring firm deserves attention. Among the important outstanding questions on the effects of earnout as a form of payment

in M&As include its impact on acquirer's stock's trading activity and market liquidity around acquisition announcements, especially where the target firm is private.

Based on the foregoing, in this paper, we contribute to the wider M&A literature stream by taking a market microstructure view in investigating whether employing a non-cash or stock payment option ameliorates the liquidity fluctuations around the acquisition announcements. Specifically, we extend the literature on the liquidity effects of the modes of payment on the stock prices of firms acquiring *private* targets, by conducting a comparative analysis of the liquidity effects of earnout as a payment option versus cash, stock and a mixture of cash and stock payment options. Earnout involves the acquirer providing an initial payment to the target shareholders at the time of the acquisition and a second payment based on future performance of the target firm. Thus, earnouts are devised with a view to reducing the key challenge in M&As, i.e. information asymmetry between bidders and targets (Kohers and Ang, 2000). To our knowledge, this current study is the first to conduct a comparative analysis of the stock liquidity and adverse election costs effects of listed acquirer firms when their targets are unlisted. While existing studies have either examined broader and longer-term economic questions regarding earnout as a payment option and the liquidity (see as examples, Datar et al., 2001; Kohers and Ang, 2000) and trading effects of acquiring firms when their targets are publicly-listed (see as examples, Draper and Paudyal, 1999; Kryzanowski and Lazrak, 2007), this current study is the first to focus on the liquidity effects of earnout as a payment option in comparison to other commonly deployed payment options. The contemporaneous relevance of our contribution is underscored by the year-on-year significant increases in the value of private firms acquired by public firms, a trend that has recently been further driven by the growth in Special Purpose Acquisition Companies (SPACs).

Our analysis of the liquidity effects of earnout payment options in the context of private firm acquisitions is also relevant because, according to Datar et al. (2001), earnouts are more likely to be used in the case of the acquisition of private and small firms. This is because private firms are more frequently characterized by the actions of managers than public firms, and due to their being more susceptible to informational asymmetry than publicly listed firms. The preference for earnouts in M&As involving private firms also infers critical differences in the rigour of accounting requirements that public and private firms are subjected to. From this perspective, if the acquirer's confidence in the level of information available to them is considered too low to properly assess the target firm's value, it would be advisable to avoid both cash and stock payments; it might even be reasonable to abandon the entire acquisition in the absence of reliable information. This is where the earnout option

becomes very useful. Specifically, the earnout serves a strategic informational role in converging the interests of both the target and acquirer by reducing the adverse selection risk faced by the acquirer. Consistent with Datar et al. (2001), this implies that the earnout option, while not completely eliminating information asymmetry in acquisitions, should reduce adverse selection risk/costs, and thereby reduce or eliminate adverse liquidity effects that may characterize acquisitions announcements in the presence of high levels of information asymmetry. At a minimum, we would expect that the liquidity effects of the announcement of M&A deals where earnout is a payment option will be lower than those of other payment options, such as cash and stock. Our findings support this argument. Specifically, our results show that bidders' stock prices liquidity effects around private and subsidiary firms'[1] acquisitions financed with earnouts are lower in economic terms than the stock liquidity effects of bidders paying for similar-sized acquisitions with non-earnout payment options. Our results suggest that the use of earnouts mitigates acquirers' acquisition valuation risk, leading to higher stock liquidity for the acquirer in the post-event period when compared with the other payment methods. Consistent with the literature, the magnitude of the liquidity and trading activity effects observed are explained by the evolution of adverse selection cost around the date of deals announcements. The results as obtained are robust to various measures of liquidity and trading activity, as well as alternative specifications.

Our study broadly extends three streams of the literature, i.e. the stream of the implications of payment options on corporate acquisition (see as an example, Barbopolous and Danbolt, 2021), the stream on earnout agreements in M&A (see as examples, Cain et al., 2011; Barbopoulos and Sudarsanam, 2012; Barbopoulos et al., 2017; Barbopoulos et al., 2018; Bates et al., 2018; Cadman, 2014; Datar et al., 2001; Elnhas et al., 2017; Erel, 2018; Kohers and Ang, 2000; Lukas and Heimann, 2014; Viarengo et al., 2018) and the broader literature on the liquidity effects of corporate announcements (see as an example, Hegde and McDermott, 2003). Particularly, this paper underscores the findings of Barbopoulos and Danbolt (2021), who find that acquirers of unlisted targets using earnout gain more than those making full up-front payment in cash. Other related studies include those showing that bidders offering an earnout payment alternative to cash and stock payments obtain significantly higher announcement and post-acquisition value gains than bidders offering non-earnout payment options, and that acquirers gain the most from earnout deals when both

[1] In line with ThomsonONE, we define a subsidiary as an entity that is not publicly traded and has a parent firm, which is not a government entity, owning 50% or more of its assets. A private firm is defined as a firm that is private, i.e. its shares are not publicly traded, and is owned by an individual(s) or family or has a parent, which is not a government entity, owning less than 50% of its assets.

the initial and deferred payments are in stocks (see as examples, Barbopoulos and Sudarsanam, 2012; Barbopoulos et al., 2016, Barbopoulos et al., 2017).

2. Hypotheses Development

2.1.Trading activity and method of payment

It is now a commonly held view that, in addition to the announcement of a bid amount, the method of payment for an M&A deal in itself is an incredible information source to the market. Methods of payment provide investors/the market with an indication of the managers' view of the target firm's value (Chang and Suk, 1998; Draper and Paudyal, 1999). Thus, when Facebook chooses to pay guaranteed $19B worth of cash and stocks for WhatsApp,[2] it sends a message to the market that Facebook has complete confidence in the future of the then privately held messaging service. The form of payment, as well as the unexpected $19B price tag, larger than Iceland's GDP, both serve as information sources to the market, especially because WhatsApp had largely ignored venture capital funding. This implies even less was known publicly about WhatsApp's finances and operations than is normally known for most tech start-ups, which typically heavily rely on venture capital funding. Mixed payments such as this, along with cash and shares, are the three most common forms of M&A payments that have been extensively examined in the literature. Most of the evidence shows that the methods of payment affect both the bidding and target firms' price returns. For example, Loughran and Vijh (1997) show positive excess returns when the acquisitions involve a cash payment. However, some studies have shown quite different results. As an example, Draper and Paudyal (1999) demonstrate that irrespective of whether bidding firms offer cash payments to the target firm's shareholders or not, the shares of bidding companies do not generate any significant excess returns or increased transactions on the announcement day.

With regards to earnouts, Kohers and Ang (2000) and recently Barbopoulos and Sudarsanam (2012) have shown that bidders that offer an earnout payment (as alternative to cash and stock offers) obtain positive and higher announcement and post-acquisition value gains than bidders using non-earnout payment methods. However, few studies examine the comparative effects of payment methods on trading activity and market liquidity, and none have done so in relation to non-listed target firms. Hence, there is still a general lack of evidence on market reaction when an M&A deal includes an earnout clause. However, the expectation is for new information events such as M&A

[2] See https://www.forbes.com/sites/parmyolson/2014/10/06/facebook–closes–19–billion–whatsapp–deal/#46f1cb45c66c

announcements to spur new trading activity, and what is clear from empirical evidence is that an acquisition announcement results in a significant increase in the trading activity of the shares of both companies (target and acquirer), as it represents the market's response to the implementation of a major corporate change. Indeed, changes in average trading volume are typically viewed as being the result of new information from a market microstructure perspective. For example, Easley and O'Hara (1992) show that volume changes indicate the arrival of new information into the market, while others such as Harris and Raviv (1993) report that volume changes are a signal of a negative market reaction to an event. Verrecchia (1981) suggests that the degree of volume reaction on the arrival of new information should not be judged either positively or negatively, as it is not possible to evaluate how it is interpreted by market makers. The key, of course, to determining whether significant trading activity changes induce either a positive or negative reaction in stock returns is dependent on the type of information. If the market perceives the terms (e.g. price and method of payment) of an announced M&A as being positive, i.e. has a potential to create value for the acquirer, there should be a surge in the buy volume for the acquirer's stock, leading to a short to medium term intraday (or inter-day) order imbalance and price appreciation. If the market sentiment is justified we should see the acquirer's price attain a new equilibrium, and if not, a correction should be induced subsequently through the activities of arbitrageurs responding to the order imbalance in the stock (Chordia, et al., 2008).

Trading activity in the pre-acquisition announcement stage has been interpreted in several ways, among which is the hypothesis that such trading is due to the presence of informed traders (Easley and O'Hara, 1992). Daley, et al. (1995) also suggest that corporate events such as M&As can stimulate a pre-announcement drive for private information, leading to increased trading. In order to identify the presence of informed investors, Easley and O'Hara (1987) suggest examining the order size of trades, since informed traders are more likely to want to exploit their information quickly before the rest of the market becomes wiser, and are thus likely to exploit such information using block trades (Karpoff, 1987). However, Kyle (1985), Holden and Subrahmanyam (1992), Foster and Viswanathan (1994) and Hong and Stein (1999), argue that informed traders could also employ their private information gradually rather than quickly. Thus, if pre-announcement private information regarding an M&A event is acquired, it is possible for savvy investors to exploit it in a gradual manner, such that no significant change in trading activity occurs at the M&A's announcement.

According to Chang *et al.* (1998) and Draper and Paudyal (1999), the method of payment in an acquisition can provide investors with relevant information on the value of an acquisition when there

is a high level of information asymmetry. Draper and Paudyal (1999) further demonstrate the influence of three methods of payment (cash, stock and mixed) on the bidders' stock trading activity around acquisition announcements. The use of cash payment suggests to the bidders' investors that the acquirer is concluding a low risk transaction, therefore a cash offer may indicate that the target firm's managers have no superior information regarding the value of their firm and that, from the acquirer's perspective, the acquisition creates valuable synergies for the acquirer. Thus, in the use of cash, we may see an increase in buy orders relative to sell orders around the announcement date, leading to an appreciation in the bidder's stock price. On the flipside, using a stock payment option is likely to have a negative impact on the bidder's stock price, because it could suggest that the bidding company believes that its own shares are overvalued or that the synergies with the target is uncertain (see Draper *et al.*, 1999; Myers and Majluf, 1984). Again, we would expect a rise in trading activity; however, we would expect a negative order imbalance resulting from a surge in the volume of sell orders relative to buy orders around the announcement date. While the expectations for using up--front cash and stocks are quite settled with regards to trading activity, earnouts present a different challenge, since the full bill of an earnout deal to the bidder will not be fully known until the final payment is made. In the literature, trading activity effects generated by the disclosure of earnout payment acquisitions have not been explored, although according to recent studies (Kohers et. al., 2000; Barbopoulos and Sudarsanam, 2012), the use of earnout allows for a mitigation of adverse selection risk associated with acquiring a firm and has a positive influence on shareholders' wealth. In essence, the bidder's shareholder's shares achieve higher returns when an M&A deal involves an earnout than when the deal is settled by cash or stock payments. Moreover, it has been recently demonstrated that the acquirers gain the most from earnout deals when both initial and deferred payments are in stocks (Barbopoulos, et al., 2017).

Hence, based on the evidence that earnouts contribute to the mitigation of adverse selection risks faced by bidders in an M&A deal, we expect investors to take a risk-neutral view of the deal. This implies that investors are unlikely to alter their view of the value of the firm beyond the additional value offered by acquiring the target firm. In such a scenario, the additional value created by the acquisition will be the main driver of the stock price, and since this will only become clear when the full costs of the bid are known in the future, we expect to see lower trading activity effects for earnouts than for other payment methods, such as cash, stock, or mixed. Based on the foregoing, we hypothesise that:

H1: *The trading activity effects in bidders' stocks around announcements dates is lower/less pronounced when earnouts are used as a mode of payment than when cash, stock, or mixed modes of*

payment are used.

The evidence of the impact of corporate announcements, such as earnings and M&As announcements, has been extensively studied. Lee et al. (1993) show that both volume and spreads increase around earnings announcements and that the latter remains wider than the pre-event period for up to one day. One of the main causes of this phenomena has been identified as an increase in the adverse selection component of the spread because of the superior ability of informed traders to acquire and assess firms' information ahead of most of the market. Krinsky et al. (1996) find that the adverse selection cost rises significantly during the period surrounding earnings releases, supporting the view that earnings releases increase information asymmetry among market participants, leading to widening spreads and fall in market depth (Kim and Verrecchia, 1997; Lee, et al., 1993). Draper and Paudyal (1999) show a gradual decrease in bidders' stock bid-ask spread prior to M&A announcements, as well as significant changes on the day of the announcement. The authors argue that the decline in spread is due to increased trading activity that causes reductions in adverse selection costs and inventory holding costs. Lipson and Mortal (2007) examine the evolution of liquidity of acquiring firms in the post-event window (from 20 days to 80 days after the announcement), and they also find that liquidity improves in the post event period in line with increases in volume.

Liquidity effects around the announcement of M&As is expected given increased order imbalance around such announcements. Thus, an increase in the bid-ask spread demonstrates a higher than average relative rise in either the volume of buyers or sellers in the market for the stocks involved in the M&A. In the case of cash payment we would expect a positive investor sentiment leading to larger than average buys, and in the case of stock payments, larger than average sells, since stock payment indicates that the acquiring firm may view its stock as over-priced. However, in the case of earnouts, as argued above, we expect a lower level of trading activity changes; hence order imbalance, if it rises at all, should still be low enough to retain a higher level of bidder's stock liquidity than it would have been in the case of cash, stock, or mixed payment methods. This is consistent with Kohers and Ang (2000), who argue that using an earnout may serve as a risk-reducing mechanism for bidders by reducing the risk of target misevaluation when there is a high information asymmetry. Datar *et al.* (2001) suggest that the earnout is particularly helpful to alleviate private high information asymmetry in acquisition of private and subsidiary companies, diversifying and cross-border, which are more likely to incorporate adverse selection costs. The general uncertainty that characterises M&A deals implies that (market maker) spreads generally widen to incorporate the trading noise they generate; nevertheless, this should be less pronounced for earnout deals in comparison to e.g., a stock purchase

since the risk associated with such deals are ameliorated by a significant part of the payment being linked to future performance of the target. Thus, bidders have a lower risk of being adversely selected. Specifically, the protection against information asymmetry that earnout deals afford (see Datar et al., 2001) implies that trading activity (and order imbalance) around the announcement of the deals will also be lower in comparison to the announcement of deals financed by other forms of payment (see also Kohers and Ang, 2000). The information asymmetry is encapsulated by the range of interpretations market participants glean from payment options decisions, and this is more relevant around the announcement days for non-earnout deals than for earnout deals, where a significant proportion of the payment for target firms are future-dated. For example, according to Draper and Paudyal (1999), an offer to exchange shares should indicate that the acquirers' stocks are overvalued or the synergies to arise from the acquisition are 'uncertain'. Therefore, that the informational channel driving the variation in trading activity and liquidity effects across various payment options is the fluctuation in the adverse selection cost, the main component of the bid-ask spread (see Glosten and Milgrom, 1985; Kyle, 1985; Huang and Stoll, 1997), faced by market participants trading acquirers' stocks. Based on the foregoing, we hypothesize that:

H2: *Bidders' spreads widen at the event and decrease post- the acquisition announcements for all groups of payment (cash, stock, mixed, and earnout).*

H3*: Spreads are narrower around the acquisition announcements when the method of payment is earnout than for other non-earnout payments*

3. Data and methodology

This section describes our data, defines the variables employed, and lays out the econometric approach we employ to test our research hypotheses.

3.1.Data

The sample consists of takeover bids of privately held/unlisted or subsidiary firms by United States-domiciled firms listed on NYSE or NASDAQ between 01/01/1986 and 15/07/2014, as recorded on the *Reuters ThomsonONE* database. To ensure that all acquirers in our final sample aim for full control of their targets, only acquisitions involving at least 50% of the target equity are included in the sample. Specifically, for a bid to remain in the sample, it must meet the following

criteria:

1) The acquirer is a US company listed on the NYSE and NASDAQ and has a market value of at least 1 million dollars, measured four weeks prior to the announcement.
2) Both the acquirer and target companies are not linked to financial services, utility (i.e. energy and power) and real estate sectors; the excluded sectors are heavily regulated, and thus we impose these criteria to avoid confounding effects due to regulatory effects.
3) Bid target is not a publicly listed firm but could be classed as only a private or unlisted subsidiary firm. This filter allows us to focus only on the acquisitions where the information problem is more severe for the acquirers, and to better evaluate the contribution provided by earnouts to the mitigation of such information asymmetry.
4) Deal involves cash (CASH), stock (STOCK ONLY), a mixture of cash and stocks (MIXED PYMT), or earnout (EARNOUT) payments.
5) Consistent with Lipson and Mortal (2007), the ratio of the deal value to the bidder's market value of equity (relative deal value) is not less than 10%.
6) Each firm has historical data available on Thomson Reuters Tick History (TRTH) database for a period commencing 250 days before and 10 trading days after the acquisition announcement date. Given that TRTH provides historical market data going back to January 1996, all acquisition announcements before 03/06/1996 have been excluded.

Once all the above criteria have been satisfied, 3,486 completed deals' announcements remain in the sample[3].

As indicated in (6) above, for each acquisition announcement, we also collect the intraday trade and quote data from the TRTH database, managed and distributed by SIRCA. The data obtained includes time, transaction price, transacted volume, bid quotes with quantities, ask quotes with quantities, and quote qualifiers. We apply a series of standard filters (Chordia, et al., 2001) to the trades and quotes data in order to avoid inexplicable data entries. As suggested by Lee *et al.* (2013), in order to minimize data errors, we omit quotes with the ask or bid price less than or equal to zero, and trades with price or volume less than or equal to zero.

[3] The same bidding firms appear more than once in the sample. Data trading activity and spreads were available for 2,410 bidding firms.

3.2.Descriptive statistics

We classify the acquisition deals as announced in our sample in the following four groups, with each corresponding to a payment method: 1) cash deals, when the payment is 100% cash; 2) stock deals, when settlement is made with 100% exchange of the acquirer's stock; 3) mixed, when payment is a mixture of cash and exchange of acquirer's stock (excluding earnout); and 4) earnout, when payment includes earnout options in addition to cash, stock or mixed payment. The percentages of cash, earnout, stock, mixed deals (all successfully completed) are 52.44%, 16.32%, 11.47% and 19.76%, respectively. Table 1 reports descriptive statistics for the deals' values (in $ millions), the market capitalization of acquirers four weeks prior to the announcements, the acquirers' market-to-book value, also four weeks prior to deals' announcements, and acquirers' relative sizes, calculated as the ratios of deals' values to the market equity values in the pre-event period, Kaplan-Zingales Index (Kaplan and Zingales, 1997) and time to completion of the deal.

The average deal value is lowest for when the payment method used is an earnout (Bates, et al., 2018); the mean (median) value is $153.83M ($42.30M) for deals settled with earnouts. This suggests that deals involving the use of earnouts are typically smaller. The mean (median) relative size value is also lowest for firms using the earnout option for purchases at 0.23 (0.24); implying that smaller firms are those who often deploy earnouts. This is consistent with the view that larger firms are likely to cope better with valuation risks and therefore are less likely to employ earnout options (Barbopoulos and Sudarsanam, 2012). This view is underscored by the mean (median) market value computed for acquirers using the earnout payment option at $676.65M ($175.90M). Kaplan-Zingales Index is highest for the earnout and mixed groups with the mean values equal to 2.32 and 2, respectively. Moreover, the KZ index for firms financing acquisitions with earnouts are typically higher than for firms financing acquisitions with the other forms of payment considered, and the differences in each case are statistically significant at the 1% level (Panel C of Table 1).

This is in line with the prior studies that suggests that acquirers that are financially constrained are more likely to use earnout (Bates et al., 2018). It can also be observed that deals financed by earnouts typically take longer than those financed by cash, stock, or mixed payment options. On average, based on our sample, earnout deals have a completion time of at least 96 days, while others have much lower mean times to completion ranging from 40.9 for mixed to 64.17 for stock-financed deals. The difference is even more stark when median estimates are considered. While the median estimate for earnout time to completion is 77 days, median times to completion for mixed, cash and stock are 18, 35.50 and 40 respectively. This variation is also broadly consistent with our expectations based on the existing literature; for example, Vishny and Sheifer (2003) argue that acquirers offer cash payment in scenarios where corporate control is threatened and speed of deal completion is

therefore of prime importance.

Table 1. Descriptive statistics for acquisition announcements value and acquirers' stocks

Deal and firm characteristics'								
	Cash		**Earnout**		**Stock**		**Mixed**	
Panel A	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Deal value	317.69	93.00	153.83	42.30	293.72	64.28	469.64	66.58
Relative size	0.25	0.25	0.32	0.28	0.53	0.24	0.23	0.24
Mtbv	532.35	47.87	107.20	35.22	506.04	65.84	143.79	52.76
Acquirer Mv	1291.62	381.69	676.65	175.90	913.29	228.40	879.80	276.13
KZ Index	0.66	0.90	2.32	1.30	1.53	0.94	2.00	0.69
Time to completion	55.00	35.50	96.15	77.00	64.17	40.00	40.49	18.00

	Focused		**Diversifying**		**Domestic**		**Foreign**	
Panel B	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Deal value	350.40	80.00	231.24	60.00	292.80	73.70	449.03	79.83
Relative size	10.25	0.22	0.40	0.21	8.87	0.22	1.00	0.22
Mtbv	460.14	51.85	181.18	42.66	258.33	47.45	1031.06	53.18
Acquirer Mv	1122.76	325.24	916.56	255.97	978.99	295.59	1520.21	335.86
KZ Index	0.96	0.93	1.95	0.87	1.16	0.94	1.57	0.73
Time to completion	61.69	38.00	52.37	32.00	59.73	36.00	56.27	35.00

	KZ Index		
Panel C	**Earnout vs Cash**	**Earnout vs Stock**	**Earnout vs Mixed**
Mean (diff.)	1.34	-0.31	0.47
Median (diff.)	0.4^{+++}	0.36^{+++}	0.61^{+++}

Note: The table presents mean and median values of variables related to announced acquisitions of privately held and unlisted subsidiary firms by United States-domiciled firms listed on NYSE or NASDAQ between 03/06/1996 and 03/07/2014.The statistics are cross-sectional averages and median values for a sample distinguished by payment methods and deal characteristics (focused, diversifying, domestic, and foreign). Cash payment deals are when the payment for acquisition is paid in cash, stock payment involves paying for acquisitions by exchanging stocks of the acquirer, mixed payment involves the use of both cash and acquirer's stock (excluding earnout), and earnout is when payment includes payments guaranteed only by future performance. Focused deals are deals involving acquisitions of firms within the same industry, diversifying involves acquiring firms from industries with different 2-digit SIC codes, while domestic and foreign are deals involving the acquisition of US-based and non-US-based firms respectively. Deal value, in millions of US$, corresponds to the value of the announced acquisition, Relative size is computed as the ratio of deal value to the acquirer's market equity value four weeks prior to an acquisition announcement, Mtbv is the market-to-book value of the acquirer four weeks prior to an acquisition announcement. Acquirer market value of equity, in millions of US$, is the market capitalization of an acquirer four weeks before an acquisition announcement. Relative size is the relative size of each deal.

The statistical significance of difference in KZ Index mean and median between the earnout group each of the other method of payment (cash, stock and mixed groups) are tested using the *t*-test (means) and the Wilcoxon Two-Sample Test (medians).

$*^{(+)}$, $**^{(++)}$, $***^{(+++)}$ denote significance at the 10%, 5% and 1% levels of statistical significance for means and medians, respectively.

4. Trading activity and liquidity effects around bid announcements

4.1.Key variables

We commence our analysis by first examining the changes in both trading activity and market liquidity pre- and post- the acquisition events; hence, we calculate the following trading activity and market liquidity proxies for each stock-day:

- Volume: the total stock volume traded on day *t*;
- Trades: the total number of transactions during day *t*;
- Volatility: the daily standard deviation of 1-minute transaction price return on day *t*;[4]
- For each minute, *t*, quoted spread, relative spread, effective spread is computed as follows:

$$Quoted\ Spread_{it}=Ask_{it}-Bid_{it} \tag{1}$$

$$Relative\ Spread_{it}=(Ask_{it}-Bid_{it})/M_{it} \tag{2}$$

$$Effective\ Spread_{it}=2\left|(Price_{it}-M_{it})\right| \tag{3}$$

where Ask_{it} is the best ask price for stock *i* at time *t*, Bid_{it} is the best bid price for stock *i* at time *t*, M_{it} is the quote midpoint, computed as $(Ask_{it}+Bid_{it})/2$ at time *t*, and $Price_{it}$ is the transaction price at time *t*. The per-minute variables are then aggregated across the day to obtain daily proxies of liquidity. Bid-ask spreads-based proxies are adequate measures of event impacts on the liquidity of financial instruments. Dennis and Strickland (2003), Pham, et al. (2003), Cao, et al. (2004), Schrand and Verrecchia (2005), and Lesmond, et al. (2008), all employ similar approaches. Goyenko *et al.* (2009) also examine the most commonly used measures of liquidity in the finance literature, and find that when considered on a range of benchmarks, bid-ask spread-based liquidity proxies usually outperform other proxies. Although both the quoted spread and the relative spread are commonly used proxies, Lee and Ready (1991) indicate that the relative spread may be an inaccurate measure of liquidity if many trades occur with the bid and ask prices. Hence, for robustness, the effective bid-ask spread measure is also implemented.

[4] We also proxy volatility using mid–quote price returns, the estimates obtained are qualitatively similar to the ones reported.

4.2.Preliminary analysis

We next employ event study methodology to investigate trading activity and liquidity effects around the announcement of acquisition deals involving the acquisition of unlisted/private targets. First, we focus on trading activity. A set of statistical analyses is executed to evaluate the evolution of trading activity and market liquidity around the acquisition announcements of each cash, stock, mixed and earnout groups of acquisitions. Specifically, we examine average daily differences in trading activity measures (Volume and Trades) and liquidity proxies (Quoted Spread, Relative Spread, and Effective Spread) in the pre-announcement period (-10, -1) and post-announcement period (+1, +10) for each payment group (cash, stock mixed and earnout). We calculate the pre-announcement period mean values of the variables using data from day -10 to day -1 before the announcement and their post-announcement period mean values using data from day +1 to day +10 after the announcement. We then construct a standard t-test testing the null that the differences between the two periods equals zero. Consistent with Lee et al. (2013), in order to exclude any uncertain effects on short term shifts in liquidity, we investigate short-time periods that are not too far from the announcement, and excludes the announcement day itself.

Table 2 shows the daily mean of volume, trades, spreads and volatility between post-announcement (+1, +10) and pre-announcement periods (-10, -1) for an average stock of bidders in our sample. Panels A, B, C and D present results for Cash, Earnout, Stock and Mixed payment options respectively. There are several interesting findings here. Average stock price changes in all payment options are positive and statistically significant, except in the case of the stock payment option. The results suggest that a significant and positive change in trading activity measures (volume and number of transactions/trades) between the pre- and post-announcement dates typically occur irrespective of the payment option used in acquisitions. However, although average nominal changes in volume and trades are the lowest for earnouts, these values are larger on a percentage basis for earnouts than for other payment options. The average percentage changes in volume and trades for earnouts are 19.29% and 19.24% respectively. These are marginally larger values for the next comparable payment option (stock), at 17.74% and 19.30% for volume and trades respectively. This is inconsistent with our expectation that changes in trading activity around the announcement dates for earnouts will be lower than for other payment options, given an expected lower of adverse selection risk. However, in these results, it appears that lower adverse selection risk is not a dissuading factor for investors. Thus, given that they hold a positive view of the use of earnout in an acquisition bid, investors are likely to increase their holdings in the bidding firm's stock, leading to the average price appreciation of 3.83% shown in Panel B. The arrival of new information into the market induces increased trading activity (see

Barclay and Hendershott, 2003), therefore disclosures of bids and the various methods of payment generate additional trading activity in each acquisition group (cash, earnout, stock and mixed). The price changes induced in each group imply either buyer-initiated or seller-initiated pressures.

The estimates obtained for the various payment options could have also been susceptible to information leakage, given the narrowness of the period covered for the pre-announcement period (+10). Thus, in subsequent analyses, we control for a larger pre-announcement period of up to 250 trading days. In order to build a picture of a normal level of trading activity prior to the acquisition announcements in the sample, we consider an estimation period of 250 trading days up to 11 days prior each announcement and, consistent with Bugeja et al. (2015) we consider 10 days prior to and 10 days post each acquisition announcement as the event period. In Figure 1, we plot the demeaned estimates of the daily average excess volume and trades estimates from -10 to +10 days around the acquisition announcements. In demeaning each daily average value from -10 to +10, we use the mean estimates for -250 to -11 days before each acquisition announcement. Panels A and C plot the demeaned daily average excess volume and trades estimates per acquirer stock for all acquisition deals respectively, irrespective of payment method, while Panels B and D disentangle the demeaned values for each payment method. Panels B and D show the plots for volume and trades respectively. The first observations are that all the panels show that abnormal trading activities are recorded for all payment types around the announcement days, and that these activities are more significant on the announcement date itself. However, Panels B and D also show that the trading activity effects are least pronounced on the announcement days when earnouts are used in acquisition deals. Mixed and stock payment options generate the most impact, followed by cash and earnout. Trading activity around announcements involving earnouts are also likely to be lower than the previous 240–day long–term period employed as a measure of the level of the pre-event trading activity. This is consistent with our first hypothesis, suggesting that due to reduced adverse selection risk when earnouts are used in acquisitions, trading activity effects are likely to be lower in comparison to other payment methods around announcement days. Other observations include that trading activity effects around bid announcement settled with cash tend to peter out faster than for other payment methods. Overall, making trading activity proxies around announcement days functions of long-term trading activity levels offers a more rigorous/balanced view of the evolution of trading activity around announcement dates. Thus, the insights gained from these estimates are more consistent with our foregoing hypothesis.

Table 2. Changes in trading activity and liquidity by method of payment

Panel A - Cash	*N of deals*	*Volume*	*%*	*Trades*	*%*	*QSpread*	*%*	*RSpread*	*%*	*Espread*	*%*	*Volatility*	*%*	*Price*	*%*
pre-Announcement	1,828	226,611		542.17		0.1915		0.0174		0.1206		0.0140		22.95	
post-Announcement	1,828	267,526		610.09		0.1886		0.0165		0.1211		0.0142		23.68	
Difference		40,915 ***	18.06	67.93 ***	12.53	-0.003	-1.53	-0.0009 ***	-5.26	0.0004	0.36	0.0002	1.58	0.72 ***	3.14
t-stat.		3.48		4.19		-1.03		-2.74		0.20		0.79		3.64	

Panel B - Earnout	*N of deals*	*Volume*	*%*	*Trades*	*%*	*QSpread*	*%*	*RSpread*	*%*	*Espread*	*%*	*Volatility*	*%*	*Price*	*%*
pre-Announcement	569	143,068		433.00		0.2058		0.0307		0.1227		0.1038		15.35	
post-Announcement	569	170,672		516.30		0.1967		0.0288		0.1195		0.0188		15.94	
Difference		27,604 ***	19.29	83.30 ***	19.24	-0.0091 *	-4.42	-0.0019 **	-6.19	0-0.0032	-2.61	-0.085	-81.89	0.59 **	3.83
t-stat.		3.56		4.05		-1.92		-2.05		-1.07		-1.41		2.01	

Panel C - Stock	*N of deals*	*Volume*	*%*	*Trades*	*%*	*QSpread*	*%*	*RSpread*	*%*	*Espread*	*%*	*Volatility*	*%*	*Price*	*%*
pre-Announcement	400	507,795		774.10		0.2534		0.0301		0.2004		0.0277		23.73	
post-Announcement	400	597,861		923.50		0.2538		0.0282		0.204		0.0276		24.72	
Difference		90,066 **	17.74	149.40 ***	19.30	0.0004	0.16	-0.0019	-6.31	0.0036	1.80	-0.00010	-0.36	0.99	3.99
t-stat.		2.35		2.65		0.06		-1.6		0.57		-0.05		1.28	

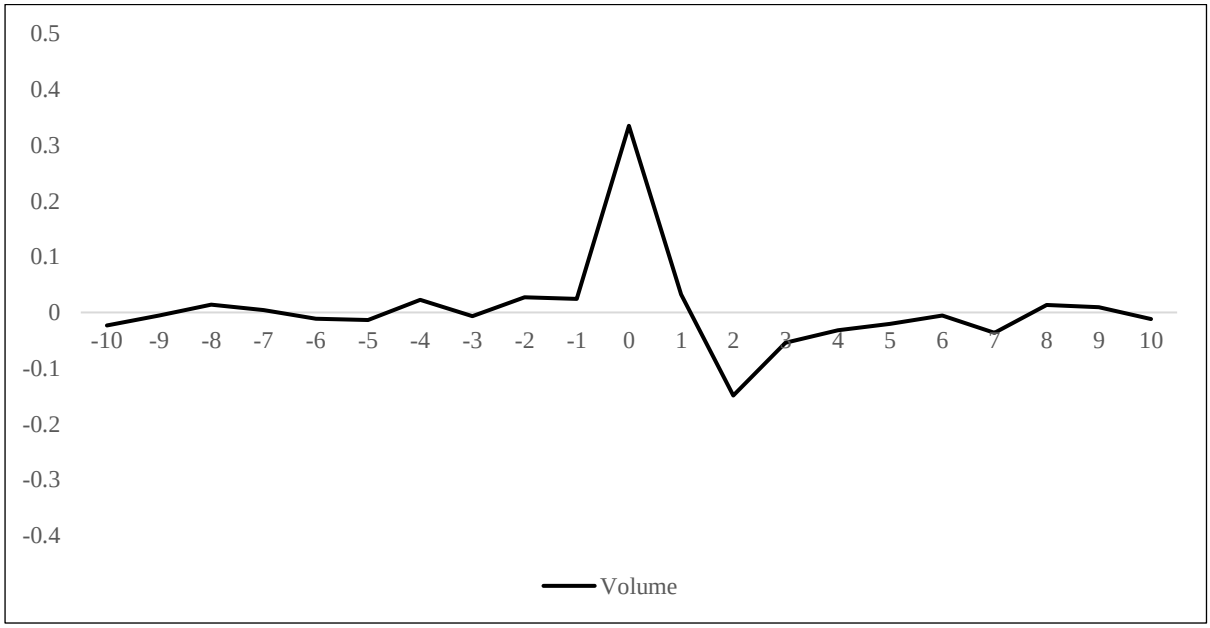
Panel D - Mixed	*N of deals*	*Volume*	*%*	*Trades*	*%*	*QSpread*	*%*	*RSpread*	*%*	*Espread*	*%*	*Volatility*	*%*	*Price*	*%*
pre-Announcement	689	286,729		591.00		0.2197		0.0236		0.1463		0.0181		18.02	
post-Announcement	689	321,596		666.20		0.2149		0.0222		0.1447		0.0194		19.10	
Difference		34,867 *	12.16	75.20 **	12.72	-0.0048	-2.18	-0.0014 *	-5.93	-0.0016	-1.09	0.0013	7.18	1.08 ***	5.99
t-stat.		1.68		2.01		-1.12		-1.9		-0.52		1.22		3.67	

Note: The table reports the t-test on the difference in average value of the daily volume, number of trades, quoted, percentage and effective spreads and price volatility in the acquirers' stock pre- and post-announcements across four sub-sample of acquisitions by method of payment (i.e. cash, earnout, stock, and mixed. Cash payment deals are when the payment for acquisition is paid in cash, stock payment involves paying for acquisitions by exchanging stocks of the acquirer, mixed payment involves the use of both cash and acquirer's stock (excluding earnout), and earnout is when payment includes payments guaranteed only by future performance. A *t*-test is constructed to test the null that mean values are statistically unchanged from 10 days before to 10 days after the announcement periods. *, **, *** denote significance at the 10%, 5% and 1% levels of statistical significance respectively. The sample of acquisition announcements includes takeover bids of privately held/unlisted or subsidiary firms by United States-domiciled firms listed on NYSE or NASDAQ between 03/06/1996 and 03/07/2014.

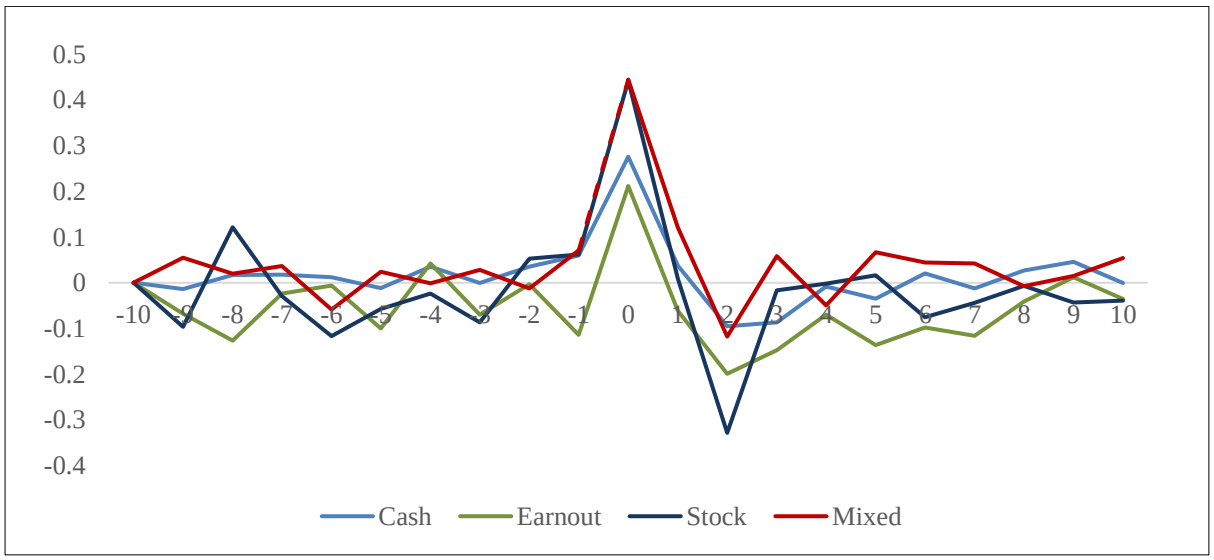
Figure 1. Average daily excess volume and trades around the announcements of acquisitions

The figure depicts the demeaned estimates daily trading volume and number of transactions in the stocks of acquirers around the day of the announcement of acquisition of unlisted/private firms and subsidiaries. Panels A and C show the demeaned volume and trades values in the stocks of acquirers for all acquisition announcements respectively, while Panels B and D show the demeaned volume and trades estimates in the stocks of acquirers for all acquisition announcements broken down by payment methods respectively. All panels present estimated changes for the event window (-10, +10). Each estimate is computed by demeaning daily average volume and transactions numbers for each day in the (-10, +10) event window using the mean estimates for -250 to -11 days before each acquisition announcement. Acquisition deals announcements are classified by payment method: cash deals are when the payment for acquisition is paid in cash, stock payment involves paying for acquisitions by exchanging stocks of the acquirer, mixed payment involves the use of both cash and acquirer's stock (excluding earnout), and earnout is when payment includes payments guaranteed only by future performance. The sample of acquisition announcements includes takeover bids of privately held/unlisted or subsidiary firms by United States-domiciled firms listed on NYSE or NASDAQ between 03/06/1996 and 03/07/2014.

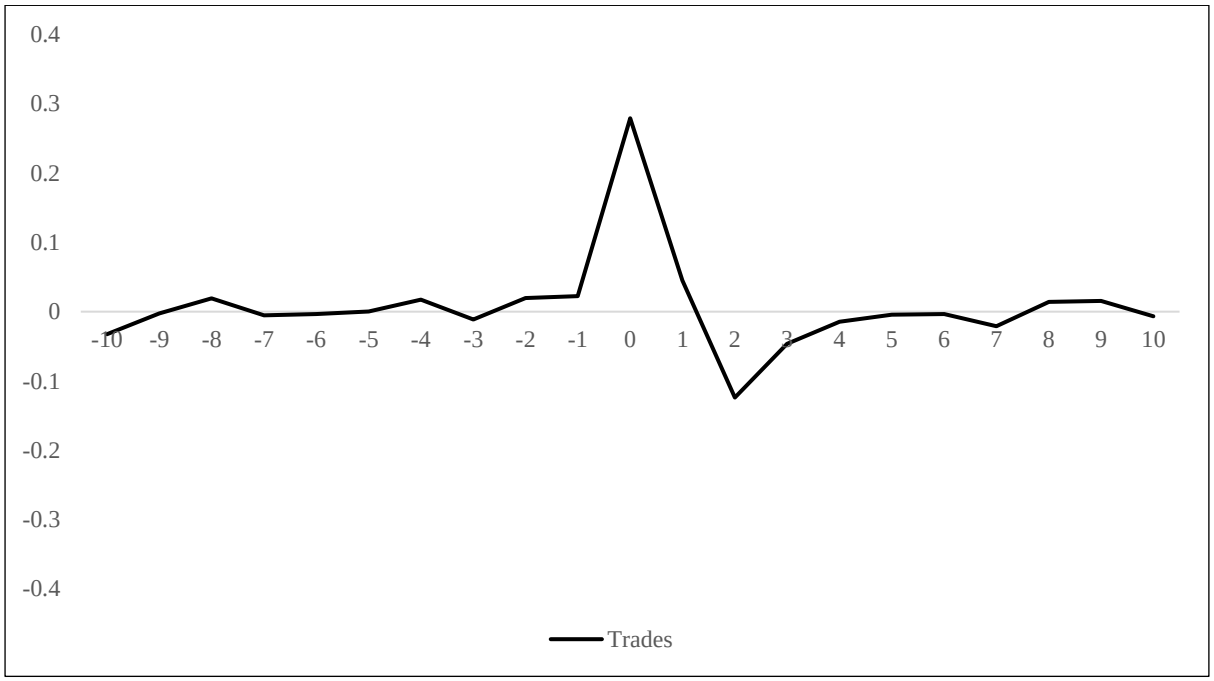
Panel A – Excess volume



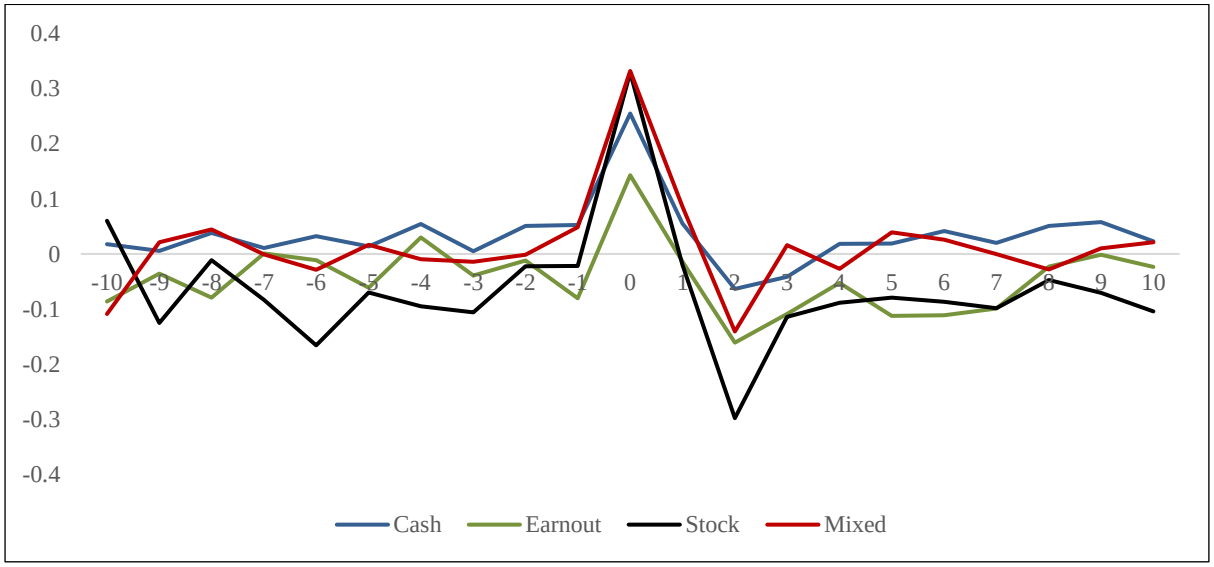
Panel B – Excess volume by method of payment



Panel C – Excess trades



Panel D – Excess trades by method of payment



The univariate results on the spread estimates suggest that changes in stock liquidity over the investigated periods are less pronounced. Although the results suggest marginal improvements in liquidity across all payment options, estimates show that only the relative spread liquidity proxy is statistically significant at a minimum 5% level, and only in the cases of cash and earnouts. The estimated differences in spread (*t*-statistics) are -0.0009 (-2.74) and -0.0019 (-2.05) respectively, showing that liquidity improvements are, on average, larger in earnouts. The two estimates thus show that on average the announcement of bids financed with cash and earnouts are linked with improvements in market liquidity. Thus, the increase in buy volume that typically follows such announcements are more often offset by sell volumes, leading to reduced order imbalance in the market for the acquirer's stock. The estimated relative spread difference between the pre- and post-announcement period for the mixed payment option is also statistically significant, but only at the 10% level. Therefore, when all the statistically significant estimates are considered, improvements in liquidity are more pronounced when bids are settled with earnouts than when other payment options are used. We argue that this is linked with a general fall in adverse selection risk associated with using earnouts when compared with other payment options. The lower level of adverse selection risk implies lower adverse selection costs, which is a component of the bid-ask spread. When earnouts are used the impact of information asymmetry is reduced, given that the payment for the acquisition is stretched out over a future period during which the acquirer can improve on their knowledge of the target firm's finances and operations.

4.3. Evolution of trading activity around acquisition announcements

We next employ multivariate event study approaches to investigate trading activity and liquidity effects around the announcement of acquisition deals involving the acquisition of unlisted targets. First, we focus on trading activity. Consistent with our approach in the previous section, we use an estimation period of 250 working days up to 6 days prior to each announcement, to construct more rigorous estimates of trading activity prior to each acquisition announcement. In testing for Volume and Trades in the event period, we control for the likely increase in trading volume over time, as suggested by Hedge et al. (2003). Specifically, we estimate the following pooled cross-sectional dummy variable model to capture the evolution of the trading activity around the announcement dates within a multivariate framework for each group of payment methods:

$$Trading\ Activity_{jt} = a_j + t\mu + \sum_{i=-5}^{+5} \beta_i D_{jt} + \beta_i Ln\ Acquirer\ Mv_j + \beta_i\ KZ\ Index_j\ + \beta_i\ Relative\ Size_j + \beta_i\ Perc.Shares\ Acquired_j + \beta_i Dummy\ Premium_j + \beta_i Dummy\ PrivateTarget_j + \beta_i Dummy\ Diversifying_j + \beta_i Dummy\ Foreign_j + \beta_i\ YearDummies_t + \varepsilon_{jt} \quad (4)$$

We proxy the trading activity using $Ln\,Volume_{jt}$ ($Ln\,Trades_{jt}$), which corresponds to the natural logarithm of trading volume in shares (number of transactions) for announcement *j* on day *t*, *i* is an identity matrix, D_i are dummy variables for each trading day in the event interval [-5, +5], and the coefficients of the dummy variables β_i capture the volume (trades) for each trading day in the event period [-5, +5]. The linear drift term, μ, captures the average change in trading volume per day, thus accounting for an expectation that volume rises over time, while α_j captures variations in trading volume across acquirer stocks. $Ln\ Acquirer\ Mv_j$ is the market capitalization of acquirers four weeks before an acquisition announcement; this is included because larger firms are likely to cope better with valuation risks and therefore are less likely to employ earnout options.

We also include the Kaplan-Zingales index [5] (1997), $KZ\ Index_j$, to control for the potentially biasing effect of the presence of financially constrained acquirers that are more likely to use the earnout payment in our sample, Bates et al. (2018) notes that earnout is a common source of acquisition financing when the external capital access is very limited. This control is also relevant because financially-constrained firms report a higher level of information asymmetry than unconstrained firms (see Morellec and Schürhoff, 2011). $Relative\ Size_j$ is the relative size of each deal, computed as the ratio of deal value to the acquirers' market equity value in the pre-event period; this captures the size of misvaluation risk to the acquirer, with higher risk increasing the likelihood that earnout will be deployed. We also add $Perc.Shares\ Acquired_j$, that is the percentage target shares acquired in the transaction to control for the potential deals in which the acquirers attempt to assume control of the target firm. The variable $Dummy\ Premium_j$ equals 1 if the takeover premium[6] is a positive number and 0 otherwise; the variable controls for whether the investors' reaction at around the acquisition is influenced by the perception that the price paid for the target is higher (or lower) than its equity's value (Kohers and Ang, 2001). $Dummy\ Private\ Target_j$ equals 1 if the target firm is a private firm that is not an unlisted subsidiary of a listed firm and 0 otherwise, and is included because information asymmetry is expected to be lower when a firm is a subsidiary to a

[5] The Kaplan-Zingales index (Kaplan and Zingales, 1997) is given by:
$-1.001909CF_{it}+3.139193TLTD_{it} - 39.36780TDIV_{it} - 1.314759CASH_{it} + 0.2826389Q_{it}$, with $CF_{it}, TDIV_{it}$ and $CASH_{it}$ divided by lagged total assets.

[6] Similarly to Kohers and Ang (2001) the takeover premium has been computed as the ratio of the total transaction value paid for the target divided by the private target's book value of equity (scaled by the percentage of shared acquired).

listed firm; $Dummy\ Diversifying_j$ takes the value of 1 (0) when the acquisition is diversifying (focused) acquisition. We classify the acquisition as diversifying when bidder and target are based in different 2-digit SIC industries and focused otherwise; this variable is included given that firms take greater risk by acquiring firms involved in businesses outside of their area of expertise. Hence, earnouts are likely to feature in such instances (Datar et al., 2001). $Dummy\ Foreign_j$ corresponds to 1 (0) when an acquisition is a foreign or cross-border (domestic) acquisition. We classify the acquisition as foreign when the bidder is a US-domiciled firm and the target is domiciled outside of the US, and domestic when both firms are US firms. Cross-border acquisitions are typically riskier, leading to a higher likelihood of deploying earnouts. The models are estimated for the period (-250, +5) using least squares with the year fixed effects, $YearDummies_t$; standard errors are robust to heteroscedasticity and autocorrelation.

Table 3 reports the results obtained when estimating equation (4). The results show that the volume changes during the period surrounding the announcements dates are only statistically significant from the announcement day (0) onwards (with the only exception being the case of the stock payment that reports significant estimates on both days -2 and -1). All estimates from day 0 onwards are also positive, indicating that trading volumes are, on average, higher on those days than on the other days over the estimation period. The day 0 estimates are statistically significant at the 0.01 level for all payment options, with the highest positive estimates recorded for stock (0.73) and mixed (0.60) payment options. As expected, trading volume changes are less pronounced for both cash (0.38) and earnout (0.43) payment options. Cash offers often indicate that the target firm's managers have no superior information regarding the value of their firm, hence adverse selection risk is seen as being low in such acquisitions, perhaps at a level comparable to acquisitions where earnouts are used as payment methods. The results here are generally consistent with the insights gained in Figure 1, where stock and mixed payment options are seen to generate the most impact in trading volumes around the announcement of an acquisition. Following the large and positive estimates recorded for the announcement dates, trading volumes remain largely sustained for one more day before they start to subside. In keeping with our hypothesis, the most rapid fall in trading volume estimates is recorded for the earnout payment option, falling from 0.43 on day 0 to 0.082 on day +5; day +5 estimate is also small enough not to be significantly different from the average trading volume over the estimation period on a statistical basis. For all the other payment options, estimates remain positive and statistically significant at the 0.01 level on day +5. Therefore, our first hypothesis is supported.

Table 3. Changes in trading volume around acquisition announcements

	Dependent variable: $Ln\,Volume_{jt}$			
Variables	Cash	Earnout	Stock	Mixed
Ln Acquirer Mv	0.724***	0.842***	0.716***	0.801***
	(0.002)	(0.003)	(0.004)	(0.003)
KZ Index	-0.000	0.001***	-0.007***	-0.001
	(0.000)	(0.000)	(0.001)	(0.000)
Relative size	0.006***	0.264***	0.024***	0.017**
	(0.000)	(0.006)	(0.009)	(0.007)
Perc. Shares Acquired	-0.005***	-0.001	0.021***	0.012***
	(0.000)	(0.001)	(0.001)	(0.001)
Dummy Premium	-0.243***	-0.274***	-0.258***	0.009
	(0.011)	(0.023)	(0.047)	(0.012)
Dummy Private Target	0.039***	0.093***	-0.096***	0.071***
	(0.005)	(0.010)	(0.015)	(0.009)
Dummy Diversifying	-0.047***	-0.119***	-0.090***	0.129***
	(0.005)	(0.010)	(0.012)	(0.009)
Dummy Foreign	0.042***	0.056***	-0.166***	-0.165***
	(0.007)	(0.012)	(0.018)	(0.012)
Linear drift	0.000***	-0.000	0.001***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
-5	-0.045	-0.059	0.088	-0.028
	(0.037)	(0.064)	(0.081)	(0.060)
-4	-0.038	0.039	0.099	-0.036
	(0.036)	(0.061)	(0.083)	(0.060)
-3	-0.067*	0.017	0.062	-0.008
	(0.038)	(0.064)	(0.085)	(0.059)
-2	-0.027	0.027	0.181**	0.010
	(0.036)	(0.062)	(0.078)	(0.060)
-1	0.006	-0.033	0.235***	0.077
	(0.036)	(0.065)	(0.082)	(0.060)
0	0.377***	0.433***	0.727***	0.597***
	(0.038)	(0.063)	(0.087)	(0.062)
1	0.479***	0.481***	0.792***	0.664***
	(0.038)	(0.068)	(0.082)	(0.059)
2	0.304***	0.319***	0.393***	0.389***
	(0.036)	(0.062)	(0.086)	(0.058)
3	0.173***	0.200***	0.355***	0.315***
	(0.037)	(0.063)	(0.078)	(0.057)
4	0.152***	0.183***	0.312***	0.203***
	(0.037)	(0.063)	(0.078)	(0.059)
5	0.105***	0.082	0.305***	0.194***
	(0.036)	(0.063)	(0.079)	(0.058)
Constant	6.790***	6.105***	5.512***	5.066***
	(0.050)	(0.104)	(0.149)	(0.117)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	399,010	124,699	77,341	137,641

Number of deals	1,828	569	400	689
Adjusted R-squared	0.387	0.399	0.441	0.407

Note: The table presents robust estimates (and standard errors) obtained from an estimation of the following pooled cross--sectional equation, using the Newey and West (1987) heteroscedasticity and autocorrelation consistent covariance matrix:

$$Ln\ Volume_{jt} = a_j + t\mu + \sum_{i=-5}^{+5} \beta_i D_i + \beta_i Ln\ Acquirer\ Mv_j + \beta_i\ KZ\ Index_j + \beta_i\ Relative\ Size_j + \beta_i\ Perc.Shares\ Acquired_j + \beta_i Dummy\ Premium_j + \beta_i Dummy\ PrivateTarget_j + \beta_i Dummy\ Diversifying_j + \beta_i Dummy\ Foreign_j + \beta_i\ YearDummies_t + \varepsilon_{jt}$$

where $Ln\ Volume_{jt}$ is the trading volume in the stock of the acquirer announcing a deal *j* on day *t*, *i* is an identity matrix, μ is a linear drift term, and D_i are dummy variables for each trading day in the event window (-5,+5).
The control variables are the following: $Ln\ Acquirer\ Mv_j$ is the market capitalization of acquirers' four weeks before an acquisition announcement, $KZ\ Index_j$ is the Kaplan-Zingales index (Kaplan and Zingales, 1997) calculated as follows: $-1.001909CF_{it}+3.139193TLTD_{it} - 39.36780TDIV_{it} - 1.314759CASH_{it} + 0.2826389Q_{it}$, with $CF_{it}, TDIV_{it}$ and $CASH_{it}$ divided by lagged total assets.
$Relative\ Size_j$ is the relative size of each deal, computed as the ratio of deal value to the market equity value in the pre-event period, $Perc.Shares\ Acquired_j$ is the percentage of target shares acquired in the transaction, $Dummy\ Premium_j$ equals 1 if the takeover premium (ratio of the total transaction value paid for the target divided by the private target's book value of equity scaled by the percentage of shared acquired) is a positive number and 0 otherwise.
$Dummy\ PrivateTarget_j$ is 1 if the target firm is a subsidiary firm and 0 otherwise, $Dummy\ Diversifying_j$ takes a value of 1 (0) when the acquisition is a diversifying (focused) acquisition. A diversifying acquisition is when a bidder and a target are based in different 2-digit SIC industries, and focused otherwise. $Dummy\ Foreign_j$ corresponds to 1 (0) when an acquisition is a foreign or cross-border (domestic) acquisition. $YearDummies_t$ are year fixed effects dummies, and robust standard errors are reported. Results are presented for acquisition announcements grouped by payment methods. Cash payment deals are when the payment for acquisition is made in cash, stock payment involves paying for acquisitions by exchanging stocks of the acquirer, mixed payment involves the use of both cash and acquirer's stock (excluding earnout), and earnout is when payment includes payments guaranteed only by future performance. The sample of acquisition announcements includes 3,486 takeover bids of privately held/unlisted or subsidiary firms by United States-domiciled firms listed on NYSE or NASDAQ between 03/06/1996 and 03/07/2014.
*, **, *** denote significance at the 0.1, 0.05 and 0.01 levels, respectively.

Table 4 shows the estimates obtained from estimating Equation (4) in relation to the change in $Ln\,Trades_{jt}$; the results are generally consistent with the trading activity estimates in Table 3. However, the results in this table more strongly support our first hypothesis, with the cash average trades estimates lowest on the announcement day 0 followed by the earnout group (coefficients 0.30 and 0.32 for the cash and earnout day 0 coefficient estimates, respectively). As in Table 3, average trades estimates are statistically significant from day 0 onwards, and all estimates are also positive. The day 0 estimates are again largest for stock and mixed payment options at 0.64 and 0.50 respectively. All day 0 estimates are statistically significant at the 0.01 level. In addition, the estimates for day -1 are also positive and statistically significant for both stock and mixed payment options, lending some credence to our conjecture, consistent with the literature (see Gorman et al., 2021) that there could be some pre-announcement news leakage the market. Despite having controlled for variations across acquirer stocks and rises in trading volume over time, the impact of possible news leakage, leading to anticipatory trading, is still captured here (see Easley and O'Hara, 1987). This

supports the expectation that paying with stocks without the option of an earnout engenders volatile trading activity in acquirer's stocks.

Table 4. Changes in trades around acquisition announcements

	Dependent variable: $Ln\ Trades_{jt}$			
	Cash	Earnout	Stock	Mixed
Ln Acquirer Mv	0.689***	0.878***	0.750***	0.801***
	(0.002)	(0.003)	(0.003)	(0.002)
KZ Index	-0.000***	0.002***	-0.006***	-0.004***
	(0.000)	(0.000)	(0.000)	(0.000)
Relative size	0.004***	0.212***	0.058***	0.025***
	(0.000)	(0.006)	(0.007)	(0.006)
Perc. Shares Acquired	-0.001	-0.004***	0.017***	0.009***
	(0.000)	(0.001)	(0.001)	(0.001)
Dummy Premium	-0.225***	-0.421***	-0.257***	-0.080***
	(0.009)	(0.018)	(0.038)	(0.010)
Dummy Private Target	0.078***	0.104***	-0.079***	0.092***
	(0.004)	(0.009)	(0.013)	(0.008)
Dummy Diversifying	-0.035***	-0.094***	-0.036***	0.102***
	(0.004)	(0.009)	(0.010)	(0.008)
Dummy Foreign	0.027***	0.001	-0.215***	-0.109***
	(0.006)	(0.010)	(0.015)	(0.010)
Linear drift	0.001***	0.001***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
-5	-0.037	-0.020	0.083	0.029
	(0.032)	(0.054)	(0.071)	(0.051)
-4	-0.027	0.049	0.056	0.020
	(0.031)	(0.053)	(0.072)	(0.051)
-3	-0.049	0.033	0.050	0.010
	(0.032)	(0.054)	(0.074)	(0.050)
-2	-0.026	0.033	0.132*	0.041
	(0.031)	(0.053)	(0.070)	(0.051)
-1	0.008	-0.005	0.192***	0.094*
	(0.031)	(0.053)	(0.073)	(0.051)
0	0.302***	0.320***	0.635***	0.500***
	(0.032)	(0.055)	(0.078)	(0.053)
1	0.369***	0.404***	0.696***	0.571***
	(0.032)	(0.058)	(0.074)	(0.052)
2	0.229***	0.258***	0.369***	0.327***
	(0.031)	(0.054)	(0.075)	(0.050)
3	0.130***	0.180***	0.280***	0.242***
	(0.032)	(0.054)	(0.069)	(0.050)
4	0.108***	0.168***	0.224***	0.197***
	(0.031)	(0.054)	(0.070)	(0.049)
5	0.096***	0.093*	0.222***	0.181***

	(0.031)	(0.054)	(0.072)	(0.049)
Constant	-0.597***	-1.008***	-1.424***	-1.805***
	(0.043)	(0.093)	(0.128)	(0.087)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	399,645	125,052	77,480	137,856
Number of deals	1,828	569	400	689
Adjusted R-squared	0.575	0.566	0.531	0.563

Note: The table presents robust estimates (and standard errors) obtained from an estimation of the following pooled cross--sectional equation, using the Newey and West (1987) heteroscedasticity and autocorrelation consistent covariance matrix:

$$Ln\ Trades_{jt} = a_j + t\mu + \sum_{i=-5}^{+5} \beta_i D_i + \beta_i Ln\ Acquirer\ Mv_j + \beta_i\ KZ\ Index_j + \beta_i\ Relative\ Size_j + \beta_i\ Perc.Shares\ Acquired_j + \beta_i Dummy\ Premium_j + \beta_i Dummy\ PrivateTarget_j + \beta_i Dummy\ Diversifying_j + \beta_i Dummy\ Foreign_j + \beta_i\ YearDummies_t + \varepsilon_{jt}$$

where $Ln\ Trades_{jt}$ is the natural logarithm of the number of transaction in the stock of the acquirer that announced the deal j on day *t*, *i* is an identity matrix, μ is a linear drift term, and D_i are dummy variables for each trading day in the event window (-5,+5).

The control variables are the following: $LnAcquirer\ Mv_j$ is the market capitalization of acquirers' four weeks before an acquisition announcement, $KZ\ Index_j$ is the Kaplan-Zingales index (Kaplan and Zingales, 1997) calculated as follows: $-1.001909CF_{it}+3.139193TLTD_{it} - 39.36780TDIV_{it} - 1.314759CASH_{it} + 0.2826389Q_{it}$, with $CF_{it}, TDIV_{it}$ and $CASH_{it}$ divided by lagged total assets.

$Relative\ Size_j$ is the relative size of each deal, computed as the ratio of deal value to the market equity value in the pre-event period, $Perc.Shares\ Acquired_j$ is the percentage of target shares acquired in the transaction, $Dummy\ Premium_j$ equals 1 if the takeover premium (ratio of the total transaction value paid for the target divided by the private target's book value of equity scaled by the percentage of shared acquired) is a positive number and 0 otherwise.

$Dummy\ PrivateTarget_j$ is 1 if the target firm is a subsidiary firm and 0 otherwise, $Dummy\ Diversifying_j$takes a value of 1 (0) when the acquisition is a diversifying (focused) acquisition. A diversifying acquisition is when a bidder and a target are based in different 2-digit SIC industries, and focused otherwise. $Dummy\ Foreign_j$corresponds to 1 (0) when an acquisition is a foreign or cross-border (domestic) acquisition. $YearDummies_t$ are year fixed effects dummies, and robust standard errors are reported. Results are presented for acquisition announcements grouped by payment methods. Cash payment deals are when the payment for acquisition is made in cash, stock payment involves paying for acquisitions by exchanging stocks of the acquirer, mixed payment involves the use of both cash and acquirer's stock (excluding earnout), and earnout is when payment includes payments guaranteed only by future performance. The sample of acquisition announcements includes 3,486 takeover bids of privately held/unlisted or subsidiary firms by United States-domiciled firms listed on NYSE or NASDAQ between 03/06/1996 and 03/07/2014.

*, **, *** denote significance at the 0.1, 0.05 and 0.01 levels, respectively.

4.4.Evolution of stock liquidity around acquisition announcements

To examine the evolution of acquirer's stock liquidity around the acquisition deals' announcements for each payment type, we first employ a univariate approach involving the construction of a ratio of the daily average quoted and effective spreads over various event intervals to their corresponding averages over the pre-event period over the trading days (-250, –11). We construct a t-test to test the null that the estimates are equal to 1. Table 5 reports the liquidity ratios as computed using quoted spread (Panel A) and effective spread (Panel B). Consistently in both

panels, there is an evident narrowing of the median spread estimates across the various event windows when compared with the average liquidity proxy estimates over the period (-250, -11). However, the narrowing of the spreads appears to be more pronounced for the earnout payment option in Panel B showing the effective spreads estimates. For example, in that panel, while the median estimates for the other payment options are typically larger than 0.8, especially for the smaller event windows, this is not the case for the earnout acquisitions' group, with all median estimates at or lower than 0.77. Furthermore, the proportion of spread ratios higher than 1.00 appears consistently lower for the earnout group than for the other payment option groups across both panels, with the exception of the stock payments group. The use of stocks as a form of payment would usually involve the issuing of new stocks, which in turn can improve the tradability of an acquirer's stock. Given that our proxy for liquidity relates to how quickly orders are executed with little or no price impact, it is unsurprising that liquidity is enhanced in the acquirer's stock when more stocks are issued, since there would now be more counterparties in the market, perhaps looking to cash in their newly issued stocks. And more importantly, the results support our third hypothesis that liquidity improvements following the announcement of acquisitions are typically more pronounced in the stocks of acquirers using earnouts as payment options. The second hypothesis that acquirers' stocks spreads increase on the announcement day and then decrease afterwards is also supported. The spread ratios are on average larger on day 0 than during the other event windows reported. For example, in Panel B, the day 0 mean (median) estimates of 1.06 (0.86), 1.12 (0.80), 1.08 (0.86) and 1.15 (0.88) for the cash, earnout, stock and mixed payment options respectively are the maximum estimates in each group; the estimates fall gradually afterwards. All estimates are statistically significant at the 0.01 level.

Table 5. Univariate analysis of the liquidity effects of payment method on acquirers' stocks

Panel A

	QSpread							
	Cash		Earnout		Stock		Mixed	
Event time	Mean (median)	Proportion with ratio >1.0	Mean (median)	Proportion with ratio >1.0	Mean (median)	Proportion with ratio >1.0	Mean (median)	Proportion with ratio >1.0
[0,0]	1.016 (0.91)***	40.43	1.022 (0.83)***	38.84	0.984 (0.84)***	35.00	1.082** (0.9)***	39.48
[–1,+1]	1.007 (0.9)***	39.99	1.001 (0.84)***	42.00	1.007 (0.86)***	36.25	1.056*** (0.88)***	40.64
[–2,+2]	1.004 (0.89)***	40.70	0.986 (0.83)***	39.89	1.002 (0.86)***	38.25	1.050*** (0.87)***	40.49
[–3,+3]	1.000 (0.89)***	40.70	0.979* (0.82)***	39.19	1.008 (0.87)***	38.00	1.051*** (0.88)***	42.24
[–4,+4]	0.998 (0.89)***	40.37	0.982 (0.82)***	39.89	1.010 (0.87)***	39.00	1.049*** (0.87)***	41.65
[–5,+5]	0.997 (0.89)***	41.96	0.988 (0.82)***	39.19	1.005 (0.86)***	38.00	1.039*** (0.87)***	41.65
[–6,+6]	0.996 (0.89)***	40.70	0.988 (0.82)***	40.42	1.005 (0.86)***	37.25	1.042*** (0.87)***	41.51
[–7,+7]	0.998 (0.89)***	40.59	0.987 (0.82)***	40.77	1.006 (0.86)***	37.75	1.041*** (0.87)***	41.80
[–8,+8]	0.997 (0.89)***	40.92	0.985* (0.82)***	41.83	1.004 (0.86)***	38.00	1.038*** (0.87)***	42.38
[–9,+9]	0.997 (0.89)***	41.14	0.980** (0.81)***	41.12	1.004 (0.86)***	38.75	1.037*** (0.87)***	42.53
[–10,+10]	0.997 (0.89)***	40.81	0.976*** (0.81)***	40.60	1.008 (0.87)***	41.00	1.039*** (0.87)***	41.80
N of deals	1,828		569		400		689	

Panel B

	ESpread							
	Cash		Earnout		Stock		Mixed	
Event time	Mean (median)	Proportion with ratio >1.0	Mean (median)	Proportion with ratio >1.0	Mean (median)	Proportion with ratio >1.0	Mean (median)	Proportion with ratio >1.0
[0,0]	1.056**	38.29	1.117**	36.03	1.080	37.50	1.152***	38.46
	(0.86)***		(0.8)***		(0.86)***		(0.88)***	
[–1,+1]	1.010	38.73	1.043	40.42	1.055**	40.75	1.095***	42.38
	(0.84)***		(0.77)***		(0.86)***		(0.86)***	
[–2,+2]	1.006	39.33	1.027	39.19	1.034*	42.25	1.070***	42.53
	(0.84)***		(0.77)***		(0.86)***		(0.85)***	
[–3,+3]	1.000	40.15	0.999	37.26	1.027	42.00	1.057***	41.65
	(0.84)***		(0.77)***		(0.85)***		(0.85)***	
[–4,+4]	0.998	40.43	1.005	38.84	1.049*	39.00	1.052***	40.06
	(0.84)***		(0.76)***		(0.85)***		(0.84)***	
[–5,+5]	0.999	40.81	1.004	38.66	1.036	37.25	1.043***	40.93
	(0.84)***		(0.76)***		(0.85)***		(0.83)***	
[–6,+6]	0.999	41.19	0.998	37.96	1.027	37.75	1.041***	41.22
	(0.84)***		(0.75)***		(0.84)***		(0.83)***	
[–7,+7]	0.998	40.70	0.995	38.14	1.023	37.00	1.040***	40.93
	(0.84)***		(0.76)***		(0.84)***		(0.83)***	
[–8,+8]	0.998	40.70	0.998	38.31	1.017	37.50	1.037***	42.09
	(0.84)***		(0.76)***		(0.84)***		(0.83)***	
[–9,+9]	0.997	41.03	0.992	38.49	1.016	38.25	1.035***	40.93
	(0.84)***		(0.75)***		(0.84)***		(0.83)***	
[–10,+10]	0.996	40.43	0.986	38.49	1.014	39.25	1.033***	41.51
	(0.84)***		(0.75)***		(0.84)***		(0.83)***	
N of deals	1,828		569		400		689	

Note: Panel A (Panel B) presents Quoted (Effective) Spread ratios for event windows around the acquisition announcements for each method of acquisition payment (cash, earnout, stock, and mixed). Cash payment deals are when the payment for acquisition is paid in cash, stock payment involves paying for acquisitions by exchanging stocks of the acquirer, mixed payment involves the use of both cash and acquirer's stock (excluding earnout), and earnout is when payment includes payments guaranteed only by future performance. Quoted spread is measured as the difference between the best ask and best bid prices for an intraday interval. Effective spread is defined as twice the absolute value of the difference between a trade's execution price and the midpoint of the prevailing ask and bid prices at the time of the trade. The ratios are computed as the average quoted/effective spread measured over each event window to the average quoted/effective spread measured over the estimation period (-250, -11). The cross-sectional mean and median (in parenthesis) estimates are presented. The null hypothesis that the mean (median) of the reported ratio is equal to unity is tested using a standard *t*-test *, **, *** denote significance at the 10%, 5% and 1% levels of statistical significance, respectively.

In a second and more robust step, we employ a set of pooled cross-sectional regression models similar to Equations (4) and (5). Specifically, we estimate the following regression for each of

$$Spread_{jt} = ia_j + t\mu + \sum_{i=-5}^{+5} \beta_i D_{jt} + \beta_i LnVolume_{jt} + \beta_i\, Volatility_{jt} + \beta_i\, Controls_j + \beta_i\, YearDummies_t + \varepsilon_{jt} \quad (6)$$

where $Spread_{jt}$corresponds to one of quoted spread and effective spread. In addition to the variables already defined for Equations (4) and (5), we also control for two other likely determinants of liquidity. $\beta_i\, Volatility_{jt}$ is the standard deviation of intraday returns for the acquirer's stock linked to announcement *j* on day *t*, and $Ln\ Volume_{jt}$ is the transacted volume in the acquirer's stock linked to announcement *j* on day *t*. The model is estimated for the period (-250, +5) using least squares with the Newey and West (1987) heteroscedasticity and autocorrelation consistent covariance matrix. $Controls_j$ includes the same control variables reported in the Equations (3) and (4).

We address the potential endogenous determination of $Volume\ IV_{jt}$ by employing an instrumental variable (IV) approach proposed by Hasbrouck and Saar (2013); this approach satisfies two conditions: the IV used is highly correlated with the potential endogenous variable, $Volume\ IV_{jt}$, and largely uncorrelated with ε_{jt} Equation (6). The approach involves first separating all acquirer stocks employed in our sample into four groups according to the types of their acquisition payment, i.e. cash, earnout, stock and mixed. For each group, we further divide stocks inside one group into average daily trading volume quintiles. We then use the daily average volumes for each quintile as IV for $Volume\ IV_{jt}$ in a 2SLS regression framework. The first-stage F-statistics, testing the null of weak instruments, show that our models do not suffer weak instruments issues, with *F-statistics* significant at the 0.01 level for all groups of payments and large F-statistics values recorded. Moreover, Cragg-Donald (1993) and Kleibergen-Paap LM statistics reject the nulls of weak instruments and under-identification, based on the Stock and Yogo (2005) critical values, respectively.

Table 6 shows the coefficients (and standard errors) for equation (6). Panel A reports the least squares estimation based on quoted spread, $QSpread_{jt}$, while Panel B reports the least squares estimation based on effective spread, $ESpread_{jt}$. Firstly, we focus on the estimated coefficients for a few microstructure control variables. The signs are generally in line with our expectations. For example, in both Panels A and B, $Ln\ Volume_{jt}$ is negative and statistically significant consistently across the various payment groups. This is consistent with the literature on liquidity and trading activity (Barclay and Hendershott, 2003; Chordia, et al., 2001); the more trading occurs in a stock,

the higher the likelihood of traders finding counterparties to trade with, which then leads to lower price impact on stocks and narrower spreads/improved liquidity. Our expectation of a positive relationship between stock volatility and the liquidity proxies is borne out by the estimates in Table 6, with the coefficient estimates are statistically significant at the 0.01 level for all the four payment groups. Turning to the dummy coefficient estimates, looking at Panels A and B, we find that the estimates for days 0 and +1 are larger in comparison to those for the previous five days in all payment option groups; they then start to narrow thereafter. All the days 0 and +1 coefficients are also statistically significant. This supports our second hypothesis, stating that acquirers' spreads will widen on and around the day when acquisitions are announced, and then narrow afterwards. Furthermore, consistent with our third hypothesis, the coefficient estimates for the days from day 0 are generally lower for the earnout group when the estimates are statistically significant (mainly days 0 and +1). The positive estimates, however, suggest that, in comparison to the spreads for the estimation period/window, spreads on the announcement days and for the following days are typically higher on average. Again, this is in line with our second hypothesis. The results for the 2SLS estimations using the Hasbrouck and Saar (2013) prescribed IVs are presented for $QSpread_{jt}$ and $ESpread_{jt}$ in panels C and D respectively. The estimates are generally consistent with the insights obtained from the results in Panels A and B and thus underscore the view that the lower level of contemporaneous information relevance of earnout as a payment option also implies that it is associated with lower information asymmetry since a significant portion of the payment is linked to a target firm's future performance. Thus, the adverse selection risk faced by bidders are lower when they use earnout as a payment option (see Datar et al., 2001), and this implies that the adverse selection cost faced by the theoretical market maker facilitating trading in the bidder's stock around the announcement is low in comparison to if the deal is being financed with an option that signals contemporaneously relevant information. For example, using a stock payment option suggests that an acquiring firm believes that its own shares are overvalued or that expected synergy with the target firm is uncertain (see Draper et al., 1999; Myers and Majluf, 1984). In the next section, we test whether the variation in the liquidity effects of the announcements is driven by the informational effects linked to payment option by investigating the evolution of adverse selection costs around the announcement dates.

Table 6. Changes in Quoted and Effective Spreads around acquisition announcements

Panel A - Quoted Spread

	Dependent variable: $QSpread_{jt}$			
	Cash	Earnout	Stock	Mixed
Ln Acquirer Mv	-0.002***	0.010***	0.041***	0.017***
	(0.000)	(0.001)	(0.001)	(0.001)
KZ Index *x 100*	0.015***	-0.005**	-0.025**	0.008
	(0.000)	(0.000)	(0.000)	(0.000)
Relative size	-0.000***	-0.009***	-0.002**	-0.020***
	(0.000)	(0.001)	(0.001)	(0.001)
Perc. Shares Acquired	0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Dummy Premium	0.009***	-0.031***	0.046***	-0.023***
	(0.002)	(0.003)	(0.004)	(0.001)
Dummy Private Target	0.011***	0.015***	0.043***	0.001
	(0.001)	(0.001)	(0.002)	(0.001)
Dummy Diversifying	-0.012***	-0.012***	0.007***	0.019***
	(0.001)	(0.001)	(0.002)	(0.001)
Dummy Foreign	0.005***	0.001	0.025***	0.030***
	(0.001)	(0.002)	(0.002)	(0.001)
Ln Volume	-0.039***	-0.043***	-0.047***	-0.039***
	(0.000)	(0.001)	(0.001)	(0.000)
Volatility	0.521***	0.432***	0.260***	0.319***
	(0.042)	(0.070)	(0.043)	(0.040)
Linear drift	-0.000***	-0.000***	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
-5	-0.001	0.012	0.004	-0.011
	(0.005)	(0.011)	(0.012)	(0.007)
-4	0.001	0.006	0.021	0.004
	(0.005)	(0.010)	(0.013)	(0.008)
-3	0.004	0.002	0.009	0.012
	(0.006)	(0.010)	(0.012)	(0.009)
-2	0.002	0.000	0.010	0.001
	(0.005)	(0.008)	(0.012)	(0.009)
-1	-0.002	0.003	0.023*	0.009
	(0.004)	(0.009)	(0.012)	(0.008)
0	0.009**	0.014*	0.037***	0.022**
	(0.005)	(0.008)	(0.013)	(0.009)
1	0.021***	0.016*	0.046***	0.029***
	(0.005)	(0.009)	(0.012)	(0.010)
2	0.008*	-0.000	0.025**	0.013
	(0.004)	(0.007)	(0.012)	(0.008)
3	0.008*	0.007	0.026**	0.010
	(0.005)	(0.009)	(0.012)	(0.009)
4	0.001	0.011	0.020	0.009

	(0.005)	(0.009)	(0.012)	(0.009)
5	0.005	0.011	0.015	0.005
	(0.005)	(0.009)	(0.012)	(0.009)
Constant	0.623***	0.795***	0.892***	0.916***
	(0.006)	(0.014)	(0.022)	(0.016)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	380,761	118,461	73,340	131,527
Number of deals	1,828	569	400	689
Adjusted R-squared	0.228	0.179	0.293	0.245

*Statistical significance at 0.1 level.
** Statistical significance at 0.5 level.
*** Statistical significance at 0.01 level.

Panel B – Effective Spread

	Dependent variable: $ESpread_{jt}$			
	Cash	Earnout	Stock	Mixed
Ln Acquirer Mv	-0.002***	0.005***	0.034***	0.011***
	(0.000)	(0.000)	(0.001)	(0.000)
KZ Index *x 100*	0.007***	0.005**	-0.002	0.003***
	(0.000)	(0.000)	(0.000)	(0.000)
Relative size	-0.000***	-0.004***	0.002***	-0.012***
	(0.000)	(0.000)	(0.001)	(0.001)
Perc. Shares Acquired	0.000***	-0.000***	-0.001***	-0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Dummy Premium	-0.001	-0.013***	-0.005**	-0.018***
	(0.001)	(0.002)	(0.003)	(0.001)
Dummy Private Target	0.004***	0.010***	0.041***	0.003***
	(0.000)	(0.001)	(0.001)	(0.001)
Dummy Diversifying	-0.008***	-0.008***	0.003**	0.017***
	(0.000)	(0.001)	(0.001)	(0.001)
Dummy Foreign	0.004***	0.000	0.013***	0.020***
	(0.000)	(0.001)	(0.002)	(0.001)
Ln Volume	-0.021***	-0.022***	-0.030***	-0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
Volatility	0.516***	0.424***	0.381***	0.341***
	(0.040)	(0.067)	(0.092)	(0.042)
Linear drift	-0.000***	-0.000***	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
-5	0.000	0.002	-0.003	-0.007
	(0.003)	(0.007)	(0.010)	(0.005)
-4	-0.001	0.004	0.008	-0.000
	(0.003)	(0.007)	(0.010)	(0.006)
-3	0.005	-0.004	-0.005	0.009
	(0.005)	(0.006)	(0.010)	(0.007)
-2	-0.000	0.001	0.010	0.001
	(0.003)	(0.005)	(0.010)	(0.007)

-1	-0.002	-0.006	0.022*	0.006
	(0.003)	(0.005)	(0.012)	(0.006)
0	0.006	0.012**	0.035**	0.016**
	(0.004)	(0.006)	(0.015)	(0.007)
1	0.011***	0.014**	0.036***	0.022***
	(0.004)	(0.006)	(0.012)	(0.007)
2	0.005	0.002	0.024**	0.009
	(0.004)	(0.005)	(0.012)	(0.006)
3	0.002	0.001	0.025**	0.001
	(0.004)	(0.005)	(0.011)	(0.006)
4	0.001	0.007	0.017	0.004
	(0.003)	(0.006)	(0.011)	(0.006)
5	0.005	0.003	0.013	0.006
	(0.003)	(0.006)	(0.011)	(0.008)
Constant	0.380***	0.456***	0.614***	0.557***
	(0.004)	(0.010)	(0.019)	(0.011)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	380,761	118,461	73,340	131,527
Number of deals	1,828	569	400	689
Adjusted R-squared	0.215	0.183	0.253	0.248

*Statistical significance at 0.1 level.
** Statistical significance at 0.5 level.
*** Statistical significance at 0.01 level.

Panel C – Two-stage instrumental variable analysis on Quoted Spread change

Second-stage	Dependant variable: $QSpread_{jt}$			
Variables	Cash	Earnout	Stock	Mixed
Ln Acquirer Mv	0.004	0.025***	0.057***	0.027***
	(0.004)	(0.005)	(0.008)	(0.006)
KZ Index *x 100*	0.013***	0.013**	-0.031	0.0023
	(0.000)	(0.000)	(0.001)	(0.001)
Relative size	0.000	-0.001	0.003	-0.014***
	(0.000)	(0.006)	(0.012)	(0.005)
Perc. Shares Acquired	0.001	-0.001	-0.001	0.000
	(0.001)	(0.001)	(0.002)	(0.000)
Dummy Premium	-0.010	-0.028**	0.015	-0.023
	(0.011)	(0.013)	(0.051)	(0.015)
Dummy Private Target	0.019***	0.028***	0.040**	0.003
	(0.007)	(0.010)	(0.018)	(0.013)
Dummy Diversifying	-0.012	-0.012	0.002	0.025*
	(0.008)	(0.011)	(0.014)	(0.014)
Dummy Foreign	0.011	0.008	-0.002	0.028**
	(0.008)	(0.025)	(0.017)	(0.012)
Ln Volume	-0.046***	-0.062***	-0.071***	-0.056***
	(0.008)	(0.009)	(0.011)	(0.009)
Volatility	0.089***	0.001**	0.019	0.001***
	(0.031)	(0.001)	(0.014)	(0.000)

Linear drift	-0.000	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
-5	0.005	-0.000	0.007	-0.008
	(0.004)	(0.007)	(0.006)	(0.006)
-4	0.005	0.003	0.005	0.005
	(0.005)	(0.008)	(0.006)	(0.007)
-3	0.007	0.005	0.010	0.007
	(0.005)	(0.009)	(0.011)	(0.005)
-2	0.005	-0.011	-0.003	0.004
	(0.004)	(0.008)	(0.007)	(0.006)
-1	0.003	0.000	0.021**	0.012*
	(0.004)	(0.009)	(0.009)	(0.007)
0	0.023***	0.024***	0.062***	0.041***
	(0.005)	(0.008)	(0.010)	(0.010)
1	0.030***	0.035***	0.081***	0.053***
	(0.007)	(0.012)	(0.017)	(0.013)
2	0.013**	0.003	0.034***	0.023**
	(0.005)	(0.007)	(0.009)	(0.009)
3	0.009*	0.001	0.034***	0.023***
	(0.005)	(0.007)	(0.008)	(0.009)
4	0.007**	0.010	0.036***	0.018**
	(0.003)	(0.008)	(0.012)	(0.009)
5	0.009**	0.013*	0.018**	0.014
	(0.004)	(0.008)	(0.008)	(0.010)
Constant	0.530***	0.801***	0.855***	0.634***
	(0.063)	(0.158)	(0.187)	(0.077)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	136,749	42,029	26,460	56,505
Number of deals	1,453	452	280	608
Overall R-squared (%)	13.3	10.1	12.8	8.72
Cragg-Donald	120,000***	34,000***	19,000***	44,000***
Kleibergen-Paap LM	65,000***	19,000***	11,000***	25,000***

*Statistical significance at 0.1 level.
** Statistical significance at 0.5 level.
*** Statistical significance at 0.01 level.

Panel D – Two-stage instrumental variable analysis on Effective spread change

Second-stage	Dependant variable: $ESpread_{jt}$			
Variables	Cash	Earnout	Stock	Mixed
Ln Acquirer Mv	-0.002	0.012***	0.040***	0.015***
	(0.003)	(0.002)	(0.007)	(0.004)
KZ Index *x 100*	0.005**	0.017***	-0.006	0.023
	(0.000)	(0.000)	(0.001)	(0.000)
Relative size	-0.000	-0.000	0.009	-0.010***
	(0.000)	(0.003)	(0.010)	(0.003)
Perc. Shares Acquired	0.001	-0.000	-0.001	0.001*
	(0.000)	(0.001)	(0.001)	(0.000)
Dummy Premium	-0.014**	-0.014	-0.044**	-0.019
	(0.007)	(0.010)	(0.022)	(0.015)
Dummy Private Target	0.010**	0.018***	0.040***	-0.001
	(0.004)	(0.007)	(0.013)	(0.009)
Dummy Diversifying	-0.013**	-0.011	-0.001	0.021*
	(0.005)	(0.007)	(0.013)	(0.012)
Dummy Foreign	0.008	0.005	-0.002	0.020**
	(0.005)	(0.014)	(0.009)	(0.010)
Ln Volume	-0.024***	-0.032***	-0.040***	-0.030***
	(0.004)	(0.004)	(0.008)	(0.007)
Volatility	0.096***	0.001	0.047**	0.001**
	(0.032)	(0.001)	(0.020)	(0.000)
Linear drift	-0.000	-0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
-5	0.009*	-0.006	-0.002	-0.005
	(0.005)	(0.005)	(0.008)	(0.005)
-4	0.001	0.002	0.062	0.002
	(0.003)	(0.005)	(0.048)	(0.005)
-3	0.008**	-0.003	-0.003	0.006
	(0.004)	(0.007)	(0.009)	(0.004)
-2	-0.001	-0.005	-0.001	0.007
	(0.003)	(0.007)	(0.012)	(0.006)
-1	0.002	-0.006	0.015	0.004
	(0.002)	(0.005)	(0.016)	(0.004)
0	0.016***	0.017***	0.059***	0.031***
	(0.003)	(0.006)	(0.013)	(0.007)
1	0.017***	0.023***	0.059***	0.036***
	(0.004)	(0.008)	(0.012)	(0.008)
2	0.011***	0.004	0.029***	0.017***
	(0.004)	(0.006)	(0.008)	(0.007)
3	0.002	-0.002	0.025***	0.009
	(0.003)	(0.005)	(0.008)	(0.006)
4	0.006**	0.005	0.036***	0.012*
	(0.003)	(0.007)	(0.010)	(0.007)
5	0.006**	0.006	0.010*	0.009
	(0.002)	(0.007)	(0.005)	(0.006)

Constant	0.312***	0.413***	0.524***	0.320***
	(0.032)	(0.060)	(0.181)	(0.069)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	136,749	42,029	26,460	56,505
Number of deals	1,453	452	280	608
Overall R-squared (%)	10.4	5.1	6.8	4.9
Cragg-Donald	120,000***	34,000***	19,000***	44,000***
Kleibergen-Paap LM	65,000***	19,000***	11,000***	25,000***

*Statistical significance at 0.1 level.
** Statistical significance at 0.5 level.
*** Statistical significance at 0.01 level.

Note: The table presents robust estimates (and standard errors) obtained from an estimation of the following pooled cross-sectional equation, using the Newey and West (1987) heteroscedasticity and autocorrelation consistent covariance matrix:

$$Spread_{jt} = ia_j + t\mu + \sum_{i=-5}^{+5} \beta_i D_{jt} + \beta_i Ln\ Volume_{jt} + \beta_i\ Volatility_{jt} + \beta_i\ Controls_j + \beta_i\ YearDummies_t + \varepsilon_{jt}$$

where $Spread_{jt}$ is the average Quoted or Effective Spread in the stock of the acquirer announcing a deal *j* on day *t*. *i* is an identity matrix, μ is a linear drift term, and D_i are dummy variables for each trading day in the event window (-5,+5). Panel A reports the changes in quoted spread measured as the difference between the best ask and best bid prices for an intraday interval, while Panel B shows the changes in effective spread defined as twice the absolute value of the difference between a trade's execution price and the midpoint of the prevailing ask and bid prices at the time of the trade. $Ln\ Volume_{jt}$ is the trading volume in the stock of the acquirer that announced the deal *j* on day *t*, and $Volatility_{jt}$ is the standard deviation of one-minute returns in the stock of the acquirer that announced the acquisition deal *j* on day *t*. The control variables are the following: $Ln\ Acquirer\ Mv_j$ is the market capitalization of acquirers' four weeks before an acquisition announcement, $KZ\ Index_j$ is the Kaplan-Zingales index (Kaplan and Zingales, 1997) calculated as follows: $-1.001909CF_{it}+3.139193TLTD_{it} - 39.36780TDIV_{it} - 1.314759CASH_{it} + 0.2826389Q_{it}$, with $CF_{it}, TDIV_{it}$ and $CASH_{it}$ divided by lagged total assets. $Relative\ Size_j$ is the relative size of each deal, computed as the ratio of deal value to the market equity value in the pre-event period, $Perc.Shares\ Acquired_j$ is the percentage target shares' acquired in the transaction, $Dummy\ Premium_j$ equal to 1 if the takeover premium (ratio of the total transaction value paid for the target divided by the private target's book value of equity scaled by the percentage of shared acquired) is a positive number and 0 otherwise. $Dummy\ PrivateTarget_j$ is 1 if the target firm is a subsidiary firm and 0 otherwise, $Dummy\ Diversifying_j$ takes a value of 1 (0) when the acquisition is a diversifying (focused) acquisition. A diversifying acquisition is when a bidder and a target are based in different 2-digit SIC industries, and focused otherwise. $Dummy\ Foreign_j$ corresponds to 1 (0) when an acquisition is a foreign or cross-border (domestic) acquisition. $YearDummies_t$ are year fixed effects dummies, robust standard errors are reported.

Panel C and D report the second stage estimates of the 2SLS regression that uses $Ln\ Volume\ IV_{jt}$ as instrument. $Ln\ Volume\ IV_{jt}$ is the average daily trading volumes for each sub-group payment (cash, earnout, stock, mixed) computed following Hasbrouck and Saar (2013).

Results are presented for acquisition announcements grouped by payment methods. Cash payment deals are when the payment for acquisition is paid in cash, stock payment involves paying for acquisitions by exchanging stocks of the acquirer, mixed payment involves the use of both cash and acquirer's stock (excluding earnout), and earnout is when payment includes payments guaranteed only by future performance.

Panel C and D estimates are based on a sample of 2,793 deals (1,453 cash payment, 452 earnout payment, 280 stock and 608 mixed payment) and consider an estimation period that cover 100 trading days up to 6 days prior to each announcement. The sample of acquisition announcements includes takeover bids of privately held/unlisted or subsidiary firms by United States-domiciled firms listed on NYSE or NASDAQ between 03/06/1996 and 03/07/2014.

*, **, *** denote significance at the 10%, 5% and 1% levels, respectively.

5. The evolution of adverse selection cost around announcement dates

Thus far we have shown a variation in the trading activity liquidity effects of M&A announcements across deals on the basis of their purchase methods. In developing our hypotheses, we argue that the informational channel driving the variation in these effects across the four payment options under consideration is the evolution in the adverse selection cost, the main component of the bid-ask spread (see Glosten and Milgrom, 1985; Kyle, 1985; Huang and Stoll, 1997), faced by market participants trading acquirers' stocks. In this section, we conduct further analysis to substantiate this argument.

A wide prior literature focus on the decomposition of spread into adverse selection cost, inventory cost and order processing cost components. The increase of spread is often due imposed by the market maker to protect herself against being adversely selected by more informed traders (Copeland and Galai, 1983). Hence, a widening of the spread, which implies a loss of liquidity, indicates the arrival of privately held information in the market and encapsulates a rise in the adverse selection component that accounts for significant portion of spread (Glosten and Milgrom, 1985). Using a sample of takeover targets, Conrad and Nide (1992) find a positive relationship between spread and adverse selection around acquisition announcement. Moreover, the investor trading behaviour and trading costs are influenced by the method of payment used in the acquisition as the latter reflects the managers views of the company (Draper and Paudyal, 1999) and influence the shareholder wealth post-acquisition. Therefore, given that the earnout payment is designed for resolving the conflicts between acquirers and targets, and reducing information asymmetry about the value of the latter (Datar et al., 2001; Cain et al., 2011; Bates et al., 2018) and the adverse selection costs (Kohers and Ang, 2000), we would expect a lower level of contemporaneous changes in adverse selection costs around earnout-financed deals announcements – and this would also explain the evolution of liquidity and trading activity reported in the preceding sections. The model we use in examining the evolution of adverse selection cost around the announcements dates is adapted from the framework presented in Equation (6). Firstly, we define adverse selection costs is computed as follows:

$$AdverseSelection_{i,\tau} = q_{i,\tau} \times \frac{midprice_{i,\tau+\Delta} - midprice_{i,\tau}}{midprice_{i,\tau}} \quad (7)$$

In this equation, we employ τ to identify the trade happening at time τ. Where $q_{i,\tau}$ is the buyer-seller indicators for the trade happening at time τ, which are calculated following the Lee and Ready (1991) classification algorithm. For buyer-initiated and seller-initiated trades are allocated values of +1 and -1 respectively. $midprice_{i,\tau}$ is the mid-price at time τ (when a trade is recorded), and $midprice_{i,\tau+\Delta}$ is the mid-price at time $\tau + \Delta$, which is employed to identify the movements of mid-

price for capturing adverse selection costs. In order to capture high frequency level of adverse selection, we compute $AdverseSelection_{i,\tau}$ at 60-second intervals. Finally, we calculate the volume-weighted adverse selection cost, $AdverseSelection_{i,t}$, for day *t*. We thereafter estimate the following regression model, investigate the evolution of adverse selection cost around M&A deals' announcement dates; the model is estimated using 2SLS and the Hasbrouck and Saar (2013) IV selection approach to instrument to $Ln\ Volume_{jt}$ as described in Section 4:

$$AdverseSelection_{i,t} = ia_j + t\mu + \sum_{i=-5}^{+5} \beta_i D_{jt} + Ln\,Volume_{jt} + \beta_i Inv.Close\ Price_{jt} + \beta_i\ Ln\ Trades_{jt} + \beta_i Order\ Imbalance_{jt} + \beta_i\ Volatility_{jt} + \beta_i Controls_j + \beta_i\ YearDummies_t + \varepsilon_{jt} \quad (8)$$

In addition to the previously-defined control variables included in Equation (6), we also include $Inv.Close\ Price_{jt}$, which corresponds to the inverse of the end-of-day stock's close price of the acquirer linked to announcement *j* on day *t*, and $Order\ Imbalance_{jt}$, the order imbalance for the acquirer's stock that announced a deal *j* on the day *t*. The variables are added to account for additional factors driving the evolution of adverse selection.

Table 7 reports the estimates obtained from the estimation of Equation (8) for each of the four payment options. Consistent with our expectations and the literature, we find that the coefficient for days 0 and +1 are positive and consistently larger in comparison to those for the five days preceding deals' announcements in all payment options and estimates for all but cash are statistically significant. The coefficient estimates decline and lose their statistical significance thereafter. The statistical significance and the relative magnitude of the coefficients for all but cash is in line with the expectation that cash payments suggest that the acquirer view the deal as low risk, therefore a cash offer indicates the target firm's managers have no superior information regarding the value of their firm and that, from the acquirer's perspective, the acquisition creates valuable synergies for the acquirer (Draper and Paudyal, 1999). This would account for the evolution of adverse selection around the announcement dates in the case of cash being not statistically and significantly different

for the preceding dates in the time series of (-250, +5) days employed in the regression model. It is also noteworthy that the coefficient estimates for cash, although not statistically significant, appear quite consistent across the (-5, +5) events window. The evolution of adverse selection cost around the announcement dates are also in line with the results presented in Tables 4 and 6 and thus show that the liquidity and trading activity effects observed are driven by the flow of private information and the activities of informed traders around the announcement dates. Specifically, estimates in Table 7 consistently show that the coefficient estimates for the earnout payment option is lower than those of stock and mixed payment options around the announcement dates. This is expected due to the lower contemporaneous information relevance of the use of earnouts, in comparison to e.g., stock, which would suggest that the bidding firm holds the view that its own shares are overvalued or that any anticipated synergy with the target firm is uncertain (see Draper et al., 1999; Myers and Majluf, 1984)

Table 7. Two-stage instrumental variable analysis on Adverse selection change around acquisition announcements

Second-stage	Dependent variable: $AdverseSelection_{i,t}$			
Variables	Cash	Earnout	Stock	Mixed
Ln Volume	-0.521***	-1.057**	-0.249	-2.430
	(0.165)	(0.435)	(0.400)	(1.777)
1/Close price	0.454**	1.427***	0.149	1.986
	(0.179)	(0.492)	(0.712)	(1.332)
Ln Trades	0.476***	1.053**	0.268	2.414
	(0.173)	(0.461)	(0.375)	(1.772)
Volatility	0.004*	0.010	0.000	0.002
	(0.003)	(0.010)	(0.000)	(0.001)
Order Imbalance	0.022	0.020	-0.040	-0.394
	(0.040)	(0.033)	(0.059)	(0.371)
Acq. Mv	0.000	0.000	-0.000**	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Kz Index *x 100*	0.000	-0.000***	-0.001*	0.009
	(0.000)	(0.000)	(0.001)	(0.008)
Relative size	0.001***	0.013	0.086	-0.045
	(0.000)	(0.029)	(0.132)	(0.081)
Perc. Shares Acq.	-0.003	-0.001	0.001	0.011
	(0.002)	(0.004)	(0.008)	(0.015)

Dummy Premium	-0.008	0.053	-0.565*	0.193
	(0.042)	(0.099)	(0.315)	(0.209)
Dummy Private Target	-0.071	-0.011	0.259	-0.531
	(0.060)	(0.054)	(0.275)	(0.511)
Dummy Diversifying	0.091	-0.025	0.251	-0.251
	(0.064)	(0.037)	(0.190)	(0.222)
Dummy Foreign	0.027	0.009	0.448	0.799
	(0.071)	(0.057)	(0.477)	(0.789)
Linear Drift	-0.000	-0.001	-0.003	0.001
	(0.001)	(0.000)	(0.003)	(0.001)
-5	-0.065	-0.071*	0.071	-0.191
	(0.043)	(0.039)	(0.090)	(0.202)
-4	-0.063	-0.083**	0.044	6.489
	(0.043)	(0.042)	(0.076)	(6.598)
-3	-0.046	-0.036	0.081	-0.118
	(0.046)	(0.053)	(0.076)	(0.150)
-2	-0.057	-0.014	0.080	-0.253
	(0.044)	(0.031)	(0.077)	(0.232)
-1	-0.048	-0.021	0.105**	-0.174
	(0.043)	(0.030)	(0.048)	(0.177)
0	0.050	0.171***	0.245***	0.208**
	(0.047)	(0.053)	(0.047)	(0.084)
1	0.073	0.146***	0.275**	0.352**
	(0.056)	(0.049)	(0.125)	(0.155)
2	0.025	0.016	0.133**	0.025
	(0.050)	(0.046)	(0.060)	(0.097)
3	-0.001	0.084	0.103	-0.070
	(0.047)	(0.060)	(0.063)	(0.145)
4	-0.015	0.019	0.062	-0.049
	(0.049)	(0.038)	(0.062)	(0.108)
5	-0.078	0.067	0.118*	-0.054
	(0.056)	(0.049)	(0.067)	(0.138)
Constant	3.875***	6.502***	1.308	1.4429
	(1.033)	(2.498)	(3.592)	(1.0372)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	146,291	45,413	28,222	59,987
Number of deals	1,453	452	280	608
Overall R-squared (%)	4.00	1.20	5.00	3.00
Cragg-Donald	2,374.03***	398.54***	420.31***	642.30***
Kleibergen-Paap LM	2,336.51***	395.29***	414.50***	635.76***

*Statistical significance at 0.1 level.
** Statistical significance at 0.5 level.
*** Statistical significance at 0.01 level.

Note: The table presents robust estimates (and coefficient) obtained from an estimation of the following pooled cross-sectional equation, using the Newey and West (1987) heteroscedasticity and autocorrelation consistent covariance matrix:

$$Adverse\ selection_{jt} = ia_j + t\mu + \sum_{i=-5}^{+5} \beta_i D_{jt} + Ln\ Volume_{jt} + \beta_i Inv.Close\ Price_{jt} + \beta_i\ Ln\ Trades_{jt} + \beta_i Order\ Imbalance_{jt} + \beta_i\ Volatility_{jt} + \beta_i Controls_j + \beta_i\ YearDummies_t + \varepsilon_{jt}$$

where $Adverse\ selection_{jt}$ is the average adverse selection costs in the stock of the acquirer that announced the acquisition deal *j* on day *t*. The table reports the changes in adverse selection costs, that is the volume-weighted adverse selection costs based on the volumes of each trade as reported in the equation (7).
The table reports the second stage estimates of the 2SLS regression that uses $Ln\ Volume\ IV_{jt}$ as instrument to control for potential endogeneity. $Ln\ Volume\ IV_{jt}$ is the average daily trading volumes for each sub-group payment (cash, earnout, stock, mixed) computed following Hasbrouck and Saar (2013). *i* is an identity matrix, μ is a linear drift term, and D_i are dummy variables for each trading day in the window (-5, +5).
$Ln\ Volume_{jt}$ is the trading volume in the stock of the acquirer that announced the deal *j* on day *t*, and $Volatility_{jt}$ is the standard deviation of one-minute returns in the stock of the acquirer that announced the acquisition deal j on day t.
$Inv.Close\ Price_{jt}$, corresponds to the inverse of the end-of-day stock's close price of the acquirer linked to announcement j on day t, and $Order\ Imbalance_{jt}$, the order imbalance for the acquirer's stock that announced a deal j on the day t.
The $Controls_j$include the following variables: $Ln\ Acquirer\ Mv_j$ is the market capitalization of acquirers' four weeks before an acquisition announcement, $KZ\ Index_j$ is the Kaplan-Zingales index (Kaplan and Zingales, 1997) calculated as follows:$-1.001909CF_{it}+3.139193TLTD_{it}-39.36780TDIV_{it}-1.314759CASH_{it}+0.2826389Q_{it}$,with $CF_{it}, TDIV_{it}$ and $CASH_{it}$ divided by lagged total assets. $Relative\ Size_j$ is the relative size of each deal, computed as the ratio of deal value to the market equity value in the pre-event period, $Perc.Shares\ Acquired_j$ is the percentage target shares' acquired in the transaction, $Dummy\ Premium_j$ equals to 1 if the takeover premium (ratio of the total transaction value paid for the target divided by the private target's book value of equity scaled by the percentage of shared acquired) is a positive number and 0 otherwise. $Dummy\ PrivateTarget_j$ is 1 if the target firm is a subsidiary firm and 0 otherwise, $Dummy\ Diversifying_j$takes a value of 1 (0) when the acquisition is a diversifying (focused) acquisition. A diversifying acquisition is when a bidder and a target are based in different 2-digit SIC industries, and focused otherwise. $Dummy\ Foreign_j$ corresponds to 1 (0) when an acquisition is a foreign or cross-border (domestic) acquisition. $YearDummies_t$ are year fixed effects dummies, robust standard errors are reported.
Results are presented for acquisition announcements grouped by payment methods. Cash payment deals are when the payment for acquisition is paid in cash, stock payment involves paying for acquisitions by exchanging stocks of the acquirer, mixed payment involves the use of both cash and acquirer's stock (excluding earnout), and earnout is when payment includes payments guaranteed only by future performance.
Estimates (multiplied by 100) are based on a sample of 2,793 deals (1,453 cash payment, 452 earnout payment, 280 stock and 608 mixed payment) and consider an estimation period that cover 100 trading days up to 6 days prior to each announcement. The sample of acquisition announcements includes takeover bids of privately held/unlisted or subsidiary firms by United States-domiciled firms listed on NYSE or NASDAQ between 03/06/1996 and 03/07/2014.
*, **, *** denote significance at the 10%, 5% and 1% levels, respectively.

6. Conclusion

Prior studies have examined the effects of types of payment on the price return of both target and acquiring firms in M&As. However, only a few studies document changes in trading activity (Draper and Paudyal, 1999) or liquidity (Lee and Chung, 2013; Lipson and Mortal, 2007) linked to acquisition announcements. These studies focus on several acquisition payment methods, such as cash, stock, and mixture of stock and cash settlements. None has examined the trading activity and liquidity effects of the earnout payment method on the value of acquiring firms, as measured by their stock prices. Furthermore, the existing studies focus only on the acquisition of public targets, and not on private or subsidiary targets, where information asymmetry is expected to play a more significant role in the bidding process. The need to minimise the information asymmetry and, by extension, the adverse selection involved in acquiring privately-held firms, is the significant driver behind the use

of the earnout payment option (see Datar et al., 2001). Although there are no prior studies on the effect of earnout on trading activity and market liquidity around acquisition announcements, prior studies investigating the use of earnout clauses in acquisitions (Barbopoulos and Sudarsanam, 2012; Datar, et al., 2001; Kohers and Ang, 2000) highlight the role of this method of payment in reducing the risks faced by bidders when valuing privately held targets, as well as in other types of acquisitions where information asymmetry is high (e.g. cross--border or diversifying acquisitions).

In this paper, we therefore contribute to the literature by investigating and presenting novel evidence on the trading activity and liquidity effects of the announcement of acquisitions of privately--held firms and unlisted subsidiaries on the stock prices of acquiring firms by payment options. Specifically, we compare the trading activity and liquidity effects for acquisition announcements involving four payment options, namely earnout, cash, stock, and mixed (excluding earnout) payment options. We test three hypotheses founded on the expectation that acquirers' risk of being adversely selected is on average lower for acquisitions where earnouts are used than for non-earnout-financed. In line with our expectations, our results show that there is an increase in trading activity for acquisitions involving all payment options, including the earnout option. However, volatility in trading activity is lower around the announcement of acquisitions financed with earnouts. In most cases, the estimates for acquisitions settled with cash also have trading activity evolution profiles similar to those of acquisitions settled with earnouts. This is linked to the belief that a cash offer indicates that the acquirer is confident that the target firm's managers have no superior information regarding the value of their firm and that, from the acquirer's perspective, the acquisition creates valuable synergies for the acquirer. Thus, in acquisitions where cash is paid outright for targets, adverse selection risk would also be considered low and comparable to the average level of risk holding for acquisitions where earnouts are used as a means of payment. We also find that spreads widen around announcement dates, i.e. liquidity decreases, for all acquisition payment options; however, this reduction in liquidity is consistently less pronounced for earnout-financed and cash acquisitions. This is in line with the view that cash payment deals signal the belief of the acquirer that their acquisition poses no risk of information asymmetry, and that earnouts lower any risk of adverse selection faced by acquirers. We further demonstrate the relevance of the information channel driving these results by analysing the evolution of adverse selection costs around the announcement dates and provide evidence of the link between adverse selection and the liquidity and trading activity effects reported. Nevertheless, potentially, there could be varied channels explaining our results. For example, the finding by Bates (2018) that acquirer firms using earnout as a payment option are more likely to be financially-constrained is a potential information channel deserving of further analysis. Future research could examine this and other potential channels.

Our findings contribute to several streams of the financial economics literature. Firstly, we extend the stream examining the implications of payment options on corporate acquisition (see as an example, Barbopolous and Danbolt, 2021) by showing the relevance of short-horizon trading and liquidity effects of payment options. Secondly, our analysis contributes to the stream on earnout agreements in M&A (see as examples, Cain et al., 2011; Barbopoulos et al., 2018; Datar et al., 2001; Elnhas et al., 2017; Erel, 2018; Viarengo et al., 2018), and thirdly, we add to the broader literature on the liquidity effects of corporate announcements (see as an example, Hegde and McDermott, 2003). Furthermore, the practical and policy relevance of our contribution is reflected in our demonstrating variations in payment decisions for private targets can have significant implications for trading and firm value by eliciting liquidity effects. For example, the more severe loss of liquidity observed around announcement dates for stock-financed acquisitions in comparison to e.g. earnout and cash options indicate a potential loss of acquirer firm value not linked directly to the firm's fundamentals. This has significant practical implications for corporate decision making and could offer managers new insights into how secondary decision-making could impact firm value.

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