Acquirer insiders' trades around M&A announcements

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Abstract

We contribute to the M&A and insider trading literature by characterizing the information advantage that motivates acquirer insiders to trade around takeover announcements. We analyze insider trading in acquiring firms in the US between 2005 and 2018. First, we show that acquirer insiders passively increase their net purchases by postponing their sales during both the pre- and post-announcement periods. Second, acquirer insiders increase their net purchases in deals with better fit in assets and sold through informal sales after acquirers sign the confidentiality agreement to the public announcement, which indicates higher dollar value captured by the acquiring firm. Third, acquirer insiders are strong net buyers in deals paid with stock rather than those with low acquirer market reaction from the public announcement until the deal completion date, particularly when they have unique fit in assets and organised as informal sales. It suggests that stock financed takeovers are not value destructive.

Keywords: mergers and acquisitions, insider trading, value creation, selling process
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1 Introduction

> *"As many as 26 per cent of mergers or buyouts were accompanied by evidence of insider trading, based on the abnormal volume and movement of stock options of both target companies and acquiring companies."*
>
> – Augustin, Brenner, and Subrahmanyam (2019)

Mergers and acquisitions (M&As) are among the largest and most important events in a corporation's lifetime. From the date when a bidder approaches a target or the selling firm contacts interested bidders, insiders in the target firm and contacted bidders (including the final buyer) have access to private information concerning the potential takeover. As target firms are usually sold at a premium, insiders in target firms have a tempting opportunity to profit on the deal information and buy extra shares at a lower stock price before the takeover becomes a public knowledge. Although acquiring firms on average experience a negative or zero announcement effect (Betton, Eckbo, and Thorburn, 2008), acquirer insiders may also take advantage of the private information if they expect significant stock price movements.

Empirical evidence shows that the tight insider trading regulation in the US is effective in prohibiting target insider purchases before the public takeover announcement (Seyhun, 1986b; Harlow and Howe, 1993; Agrawal and Nasser, 2012). Target insiders significantly decrease their purchases, but simultaneously reduce their sales even more, resulting in a passive increase in net purchases. Concerning acquirer insider trading, Seyhun (1990) shows that top managers in acquiring firms are on average optimistic about their deals before deal announcements, they increase their net purchases rather than net sales. Akbulut, Lee, and Lim (2014) use insider trading by acquirer managers to measure overvaluation and to show that overvalued stock takeovers destroy firm value.[1] In this paper, we ask the

[1] Ordu and Schweizer (2015) focus on illegal insider option trades and find that insiders in acquiring firms increase their option trading before the public announcement of stock deals.

question of what motivates acquirer insiders to trade. We explore the motivation to trade both before and after deal announcements.

Target insiders have an obvious profit opportunity once they learn that their firm is in play. Insider information advantage for acquirer insiders is somewhat less straightforward since the average value impact of takeovers for acquiring firms is close to zero. It is also less clear whether individual bidders would succeed in defeating other bidders to become the final buyer. Notwithstanding, insiders in acquiring firms also possess private material information and it is interesting to see what kind of information they use when trading. In line with results in Seyhun (1990), we expect that acquirer insiders engage in trading on positive rather than negative information around M&A announcements. This is because insiders are prosecuted more often when trading on future negative rather than positive news (Cheng and Lo, 2006). Given their higher expected penalties when trading on negative private informatin, insiders should refrain from net selling and should be more likely to increase their net buying. Furthermore, passive trading strategy taking advantage of negative private information is more difficult to implement because insiders on average execute less purchases than sales. Decreasing purchases is more restrictive than decreasing sales because of their lower frequency.

Before the public deal announcement, we focus on information concerning potential takeover synergies, asset complementarities with the target, and their bargaining power. This type of information is not in the public domain. After the public announcement, acquirer insiders possess less private material information and are more free to trade.[2] Still, acquirer insiders may disagree with the market concerning potential assessment of synergies created by the target-acquirer combination and their division between the two parties. Moreover, the information whether the sale was organized as a full-scale auction or a more informal negotiation (information on the selling mechanism) is usually disclosed

[2]We discuss the legal and regulatory issues associated with insider trading in the shares of their own firms before merger announcements in section 2.

to the SEC and the market only after the deal resolution.

We hypothesize that before the deal public announcement acquirer insiders use their private material information about potential synergies, asset complementarities with the target firm, and their perception of their bargaining power in the selling process to adjust their trading. The property rights theory of the firm suggests that complementary assets should be bound together under common ownership to reduce hold-up problems and underinvestment associated with incomplete contracting (Grossman and Hart, 1986; Hart and Moore, 1990). Moreover, mergers create greater synergies if the partners exhibit a high degree of complementarity (Rhodes-Kropf and Robinson, 2008). However, greater synergies are not the whole story because mergers involve negotiations. The NPV to the acquirer arises from acquirer's higher relative bargaining power, which depends on the acquirer's ability to locate another merger partner and its uniqueness for the target. A firm with the relatively more scarce assets will more easily locate another merger partner and therefore will garner more of the merger gains. The model in Rhodes-Kropf and Robinson (2008) predicts that the best targets and the best acquirers have the best outside opportunities and create together the most synergies. They endogenously choose to search for each other.

Similarly, Capron and Pistre (2002) argue that mergers create value to the acquirer when other potential bidders cannot duplicate their synergy. Competition among bidders cannot lever the target's position because the winning bidder (the acquirer) controls some unimitable, unique assets. In contrast, when the source of synergies resides with the target and all bidders are alike, the market allocates the full gains to the target because of competition between similar potential acquirers. This means that the unique fit in assets within the acquirer-target pair is closely linked with the NPV for the acquiring firm.

As a result, we hypothesize that better fit in assets, or higher asset complementarities, between the target and the acquirer are associated with higher synergy created in the merger and higher relative bargaining power for the acquirer, which then results in higher

dollar value captured by the acquiring firm. Moreover, the better fit in assets is also associated with a higher probability of being the winning bidder. Altogether, acquirer insiders increase their net purchases in deals with better fit in assets.

The choice of the selling mechanism – whether the selling firm negotiates only with a limited number of bidders or organizes a formal full-scale auction – may be taken as a revelation of the fit in assets between the target and the participating bidders and of the relative bargaining power of the parties. A full-scale auction reveals that the seller does not expect to have a unique fit with a bidder as it invites a large group of (similar) bidders to compete against each other. Intense competition in full-scale auctions among similar bidders levers up the target's bargaining power. A smaller number of bidders invited into the selling process in informal sales suggests a higher complementarity in assets for the merging pair. Negotiations with a few bidders with unique assets lower the relative bargaining power of the target firm and, at the same time, overall deal synergies are higher. Therefore, we hypothesize that informal sales are associated with higher dollar value captured by the acquiring firm, which means that acquirer insiders have motivation to increase their net buying.

After the deal announcement, acquirer insiders compare the market assessment of the deal economic impact with their view of the situation. As the market traditionally reacts very negatively to stock deals, we expect that acquirer insiders increase their net purchases for stock deals, particularly in stock deals with higher acquirer bargaining power – those with unique asset fit and those organized as informal sales. It is noteworthy that a revelation of the selling mechanism is usually not part of the public deal announcement and the merged pair reports on it to the SEC only once the deal is consummated.[3] As asset complementarity is at least to some extent observable immediately after the deal announcement, we expect that the increase in net purchases in stock deals with informal

[3]We do not claim that the selling mechanism remains a material private information, but it seems that it is not directly communicated as part of the public deal announcement and so remains partially concealed.

sales will be higher than for stock deals with good fit in assets.

Our data set covers 1,281 US publicly listed acquirers buying US publicly listed targets in the period from 2005 to 2018 for which we are able to download the asset similarity measurements or identify the sale method during the private selling process from SEC company filings. We employ the difference in differences approach (Agrawal and Nasser, 2012), which explores the change in insider trading before versus after learning about the deal while still adjusting for a corresponding change in matched firms.

First, we show that acquirer insiders postpone their sales and thus passively increase their net purchases during the period since they sign confidentiality agreement up to the deal announcement. The economic significance is also large: acquirer insiders increase their net purchases by 0.33 basis points, which represents for 23% of the unconditional average monthly net purchases during the control period (i.e., -1.41 basis points). Therefore, acquirer insiders don't expect takeovers to destroy their firm value (Seyhun, 1990). Acquirer insiders also passively increase their net purchases after the public announcement date until the deal is completed: the economic effect is 0.42 basis points and is somewhat larger than that in the pre-announcement period. This indicates that insiders trade on their intimate knowledge even after the deal announcement date when they have less information advantage.

Next, we explore the source of acquirer insider information advantage in the pre- and post-announcement periods. Our results show that in the pre-announcement period, acquirer insiders increase their net purchases in deals that have high relative similarity position (pairwise similarity) which indicates high fit in assets. The economic effects are between 0.43 and 0.49 basis points, which are 0.07 to 0.16 basis points larger than the base DiD effect. Acquirer insiders also increase their net purchases for deals sold through informal sales where the bargaining power of the acquirer is higher. The economic effect is 0.40 basis points. Acquirer insiders trade by combining the goodness of fit and selling mechanism and they increase their net purchases in deals with better goodness of fit and

sold in informal sales. This economic effect is 0.60 basis points, which is markedly larger than the pure DiD effects for the goodness of fit and informal sales.

In the post-announcement period, we also find that acquirer insiders increase their net purchases in deals with better fit in assets and sold in informal sales. The economic effects are between 0.62 and 0.66 basis points, which are remarkably larger than those in the pre-announcement period. Furthermore, we show that acquirer insiders increase their net purchases in stock deals and the economic effect is large at 0.82 basis points. They also increase their net purchases in deals having lower than median announcement abnormal returns. However, the economic effect is only 0.55 basis points and is markedly lower than that of stock deals. When combining the four characteristics, we show that the economic effect is around 1.14 basis points for stock deals with better fit in assets and sold through informal sales, which represents a sizeable increase of 37 percent from 0.82 basis points and almost tripling of the 0.42 basis points. The increase in net purchases is the highest at the 1.44 basis points when we further combine high asset fit, informal sales, and stock payment consideration. Furthermore, acquirer insiders increase their purchases for stock deals regardless of high or low acquirer market reaction and the economic magnitude of the coefficients of the good fit in assets (selling mechanism) and acquirer market reaction is lower than the corresponding coefficients in combinations with the stock payment. Therefore, it suggests that the stock payment rather than low market reaction that drives the net purchases by acquirer insiders after the public announcement date, particulary when they also have better goodness of fit and high acquirer bargaining power.

Our paper makes several contributions to the M&A and insider trading literature. First, we contribute to the recent M&A literature by showing acquirer insiders' perceptions concerning the bidder-specific synergies and selling mechanism. Dessaint, Eckbo, and Golubov (2021) show that acquirer returns are higher when the bidder-specific synergies are more unique and when the acquirer has higher bargaining power. Our result that acquirer insiders are net buyers in deals with better fit in assets between acquiring and

target firms provides additional support for the conjecture. Furthermore, we manually collect the selling mechanism of each M&A transaction, which reveals the bargaining power of the acquiring firm. Acquirer insiders increase their net purchases in informal sale deals when acquirer's bargaining power is higher. This evidence provides further support for the argument by Dessaint et al. (2021).

Second, our study is the first to investigate acquirer insiders' post-announcement trading behaviour. Acquirer insiders might disagree with the market reaction of the M&A deal (i.e., lower acquirer announcement returns and stock payment) by adjusting their trading strategy even after the public announcement date. We also contribute to the wide discussions on the value destruction of stock financed takeovers. We find that acquirer insiders are strong net buyers in stock deals after the public announcement date. This evidence is in conflict with the bidder opportunism prediction that investors would long in all cash acquirers and short in all stock acquirers (Myers and Majluf, 1984; Baker and Wurgler, 2002; Shleifer and Vishny, 2003). It rather, at the first time from the acquirer insider trading side, strongly supports that stock financed acquisitions are not value destructive investment projects (Golubov, Petmezas, and Travlos, 2016; Eckbo, Makaew, and Thorburn, 2018).

To our best knowledge, Seyhun (1990) is the only paper that directly focuses on acquirer insider trading and find that acquirer top managers overall actively increase their net purchases rather than net sales before the takeover public announcement date. Our paper is different from Seyhun (1990) in three ways. First, our results document that acquirer insiders are passive net buyers by postponing their sales rather than actively increase their purchases. Second, we focus on information concerning potential takeover synergies, asset complementarities with the target, and their bargaining power (i.e., selling mechanism) and show that acquirer insiders are net buyers only in deals with high fit in assets and organised as informal sales. Third, we highlight that acquirer insiders also adjust their trading strategies after the public announcement date when they have less information

advantage.

2 Regulatory issues and passive acquirer insider trading

In advance of major events such as M&A transactions, information is a very valuable asset (Lowry, Rossi, and Zhu, 2016). Financial regulation makes sure that insiders (who have access to such private information) do not take advantage of their material information at the expense of other uninformed investors. In the US, insider trading is regulated under the Securities Exchange Act of 1934 and the SEC is responsible for enforcing this law. Section 10(b) of the Act and SEC rule 10b-5 prohibit trades based on material, non-public information. Moreover, Section 16b of the Securities Exchange Act of 1934, known as the short-swing rule, requires registered corporate insiders to hand over to the company any profits on round-trip trades (i.e., a purchase followed by a sale, or vice versa) made within a six-month period. Importantly, SEC rule 14e-3 prohibits anyone from trading based on material, non-public information about an upcoming tender offer after the bidder has taken substantial steps toward making the offer. The Insider Trading Sanctions Act of 1984 (ITSA) further strengthens the insider trading rules that insiders are enforced to pay penalties of up to three times their illegal profits or losses they avoided. The 1984 Act also increases the maximum penalties from USD 10,000 to USD 100,000 when violating the Securities Exchange Act. The 1988 Act further increases the maximum penalties to USD 1,000,000 for individuals and USD 2,500,000 for firms. The 1988 Act also raises the imprisonment from 5 to 10 years.

Therefore, acquirer insiders face the threat of legal prosecution when actively trading in their company shares before takeovers are publicly announced. In other words, acquirer insiders are prohibited from actively buying and selling shares based on positive and negative material information, respectively. Notwithstanding, passively decreasing sales and purchases is not illegal when possessing positive and negative private information, respectively. Therefore, as a strategy to avoid the legal jeopardy, acquirer insiders are more

likely to rely on passive rather than active trading strategies (similar to target insiders, Agrawal and Nasser, 2012; Davis, Khadivar, Pukthuanthong, and Walker, 2020; Fidrmuc and Xia, 2021). However, it is noteworthy that the legal jeopardy is likely to be significantly smaller for acquirer insiders.[4] After the public announcement date, acquirer insiders are still in possession of private material information about the takeover and might also choose to passively rather than actively trade on the material information to avoid legal prosecution.

3 Data

Our main focus is to analyze insider trading in acquiring firms before and after the public takeover announcement date. The sample includes US M&A deals that were announced between January 2005 and December 2018 and that are covered by SDC. We apply the following three selection criteria: (i) both the acquirers and targets must be publicly listed companies in the US; (ii) the acquirers own 100% of the targets' shares after the deal; and (iii) acquirers have data in COMPUSTAT and CRSP concerning accounting and stock price data and we can find information concerning the selling process from the 'background of the deal' section of DEFM14A, PREM14A, SC14D9, or S-4 filings at the EGDAR filing collection site provided by the SEC. We hand collect information concerning initiation date, the date when the acquirer signs the confidentiality agreement, and the selling mechanism. We identify 2,023 deals in SDC, but are able to find SEC filings on EDGAR only for 1,538 deals. Furthermore, we are not able to get data from Compustat or CRSP for 257 acquirers. Altogether, the data collection results in a sample of 1,281 acquirers over the period from 2005 to 2018. Table 1 shows distribution of our deals across years in Panel A and Fama-French 12 industries in Panel B.

[4]Target firms are associated with positive and large stock returns around the takeover public announcement date while acquiring firms on average exhibit zero announcement effect (Betton et al., 2008). Agrawal and Nasser (2012) and Fidrmuc and Xia (2021) show that target insiders almost cease to purchase any shares before the deal public announcement date.

- insert Table 1 about here -

We find in Panel A that takeovers are more active in years 2005, 2006, 2007, and 2015 with the annual frequencies larger than 8%. The number of deals is only 54 in year 2011, which accounts for only 4.22% of the whole sample. Panel B shows that 401 (31.30%) deals are in the finance industry and 304 (23.73%) in the business equipment industry. The M&A transactions are the least active in the consumer durables (0.94%) and chemicals and allied products (1.48%) industries.

Table 2 Panel A shows summary statistics for these deals. Appendix A provides detailed variable descriptions. The average premium is 42.4% and the average 3-day acquirer announcement effect is -0.78%, both significant at the 1-percent level, which is consistent with the literature (see, for example, Eckbo, 2008). Stock or partial stock payments are present in 55% of all deals and 75% of all deals are sold through informal sales. Our pre-announcement period starts when the acquirer signs a confidentiality agreement with the target. This is the moment when the acquirer commits to serious negotiations and gains more precise information about the target. The average length from this date to the public announcement is 111 calendar days. It takes another 135 days from the public announcement to the deal completion – this is our post-announcement period.

- insert Table 2 about here -

To measure the fit in assets for the acquirer-target pair, we rely on the pairwise similarity in 10-K product descriptions reported the Hoberg and Phillips data library (Hoberg and Phillips, 2016). The acquirer-target pairwise similarity score measures the closeness of the merging pair in their product market space (Hoberg and Phillips, 2010). A higher number (restricted between 0 and 100) indicates that the product descriptions of the two merging firms are more overlapping. The mean value is 8.8, but varies quite widely from 0.53 for the 25^{th} percentile to 13.9 for the 75^{th} percentile. A weakness of this measure is that it does not reflect any information concerning how similar is the acquirer-target pair

relatively to potential pairings of the acquirer with other firms in the (TNIC-3) industry. In some industries, all peers have high pairwise similarity, so a high pairwise similarity score as such may not mean a good fit in assets for the pair. It may still result in a lower standing of the acquirer-target pair relative to other pairs in the industry. Panel B of Table 2 shows the number of acquirer peers and the average industry similarity across quintiles by pairwise similarity. We can see that pairwise similarity indeed correlates highly with both the number of peers and the average industry similarity.

Our second measure, the *relative similarity position*, addresses the weakness of pairwise similarity. We order all acquirer peers at the TNIC-3 level from the lowest to the highest value of their pairwise similarity with the acquirer, and then compute the relative similarity position for the target among all acquirer peers as the ratio of its ordered position to the total number of peers in the TNIC-3 industry.[5] By identifying the relative position of the target within other peers in the acquirer industry, we are better able to measure the target's fit is assets with the acquirer that takes into account the industry structure (such as high average similarity in the industry or the number of industry members).

The mean value for the relative similarity position is 0.52, which shows that, on average, targets are about half way between the least and the most similar acquirer peers. Sill, 75% of deals show the relative similarity position of at least 0.94: only 6% of firms in the industry have higher pairwise similarity than the target-acquirer pair. Panel B in Table 2 shows that the relative similarity position correlates highly with the pairwise similarity score. However, we can see that acquiring firms merge with their closest peers in the product market (highest quintile by relative similarity position) in industries with less than average number of peers (153 compared to the overall average of 171). This suggests that the relative similarity position measure breaks the industry-structure link documented for the pairwise similarity measure.

Panel C in Table 2 shows summary statistics for control variables including acquirer

[5]If the target is not in the TNIC-3 industry, its relative similarity position is set to zero.

and target characteristics. To save space, we report only statistics corresponding to the pre-announcement period, which are timed just before the initiation date.[6] The acquiring firms are on average very large (8.3 in log value of total assets in USD millions, which is around USD 4 billion), profitable (9% return on assets) and with low book-to-market ratio (0.48). Target firms are smaller (6.4 in log value of total assets), with higher book-to-market ratio (0.57) and lower profitability (3% return on assets). We find insignificant market adjusted daily abnormal returns for acquiring firms over the first, second, third, and forth quarter before the initiation date. The volatility of acquirer daily stock returns is 2.1% over the period from 250 to 126 trading days before the initiation date and the change in the volatility of acquirer daily stock returns is 0.02% over the period from 125 to 1 trading day versus the period from 250 to 126 trading days before the initiation date. 0.8% of acquirers' shares outstanding are traded in the market over one fiscal year before the initiation date and acquirer insiders on average own 5% of firm shares. The research and development over total sales for acquirers is on average 0.05.

The insider trading data is from Thomson Financial Insider Filings Table 1, which contains corporate insider non-derivative transactions that are required to be reported via Form 4 according to Section 16 of the Securities Exchange Act of 1934. We have information on the transaction date, transaction price, number of shares traded, person ID, firm ID, company name, resulting shares held and transaction code (purchase or sale). We exclude inaccurate filings [7] and transactions labeled as amendments of previous insider transactions[8] as in Agrawal and Nasser (2012). If a transaction price is missing, we replace it with the CRSP closing price on the transaction date. We merge multiple purchases (sales) made by one insider in one day. We are interested in examining insider purchases and sales separately and, therefore, we keep both purchases and sales transacted on the

[6]Statistics corresponding to the post-announcement period and the two control periods are not reported because they are very similar to the numbers reported in Panel C. They are available upon request.

[7]Indicated by Cleanse Indicators 'A' or 'S'.

[8]Indicated by Amendment Indicator 'A'.

same day as separate variables.

It is important that we compare acquirer insider trades in the pre- (post-)announcement period to a non-event control period within the same firm. Even though bidders start entering the selling process and obtaining information about the deal as of the initiation date, their commitment to deal negotiations increase substantially after they sign confidentiality agreements. They have also access to more precise information after this date. The date of signing confidentiality agreements thus, for our analysis, marks the beginning of the pre-announcement period. We add up all insider purchase (sale) transactions from the confidentiality signing date to the public announcement date. The post-announcement period covers all acquirer insider purchases (sales) from the public announcement up to the completion date. Even though the pre- and post-announcement periods have their own control periods, both control periods are placed before the initiation date to make sure that insider trading is independent of the deal. The two control periods are matched in length and dates to their corresponding event windows because the number and value of insider trades depend on the length of the analyzed period and also vary within a calendar year.[9]

The second dimension in the comparison relates to matched firms that do not experience a takeover. The main goal is to adjust the overall change/difference in acquirer insider trading for a 'normal' outcome – that is, a change in insider trading in firms that do not experience any information shock but are similar to the treatment/acquiring firms and operate over the same period of time. The change in insider trading from the control period to the event period for the matched firms would then measure the 'normal' effect. We use it to adjust the acquiring firm effect to get a clean treatment effect that is free of any time trends. This is the essence of the difference in differences approach.

We match based on industry and acquirer total assets just before the initiation date (Shrieves and Stevens, 1979; Agrawal and Nasser, 2012). Our matching procedure is as

[9] Appendix B shows on a deal example how we construct the control period.

follows. From the pool of all potential matching firms with available accounting, stock price and insider trading data, we select firms that are both in the same Fama-French 30 industry and that come the closest in terms of total assets in the same fiscal year using a +/–25% range. In case we fail to find a matching firm, we repeat the process for the Fama-French 12 industries. If we still do not have a match, we apply the SIC code industries. We also require that the same publicly listed firm is not matched repeatedly to different acquiring firms and that those acquirers that are dropped out from our data set due to unavailable SEC filing data are not included as matched firms.[10]

We focus on trading by top executives and independent directors. Top executives manage their firms' day-to-day operations and should thus possess the most accurate information in terms of firm value and future prospects (Seyhun, 1986a; Fidrmuc, Goergen, and Renneboog, 2006). Independent directors should also be informed about the value and prospects of their firms, as they monitor top executives' work and are quite pivotal in takeover decisions (Ravina and Sapienza, 2010). Combining the two types of insiders creates a well-informed and relatively well-populated group for our analysis. For all studied periods, we aggregate all shares bought (sold) by top executives and independent directors over the whole period and then divide them by the length of the period in months. Scaling is necessary because the length of the pre- (post-)announcement period varies across deals and insider trading intensity is sensitive to the trading-window length.

Our main insider trading measure is the number of shares bought (sold) per month by top executives and independent directors as a fraction of shares outstanding in basis points. Net insider purchases are equal to insider purchases minus insider sales. We believe that scaling the number of shares traded by shares outstanding provides the best insider trading measure, as it incorporates both the trading volume and firm size, which is important for the difference in differences approach.

[10] Altogether, 1,004 acquiring firms are matched based on the FF30 industry, 157 based on the FF12 industry, 6 based on the three-digit SIC industry, 8 based on the two-digit SIC industry and 106 based on the one-digit SIC industry.

Table 3 shows mean of the fraction of shares traded per month in basis points for top executives and outside directors in acquirer companies. We report means for insider purchases, sales, and net purchases in the pre-announcement period (after acquirers sign confidentiality agreements until the public announcement date) in Panel A and in the post-announcement period (from the public announcement date until the resolution date) in Panel B. Columns 1 and 2 (Columns 3 and 4) show acquirer (matched-firm) insider trading for the event versus the control period, respectively. Columns 5 to 8 report differences in the means and their significance, with Column 8 showing the difference in differences. We winsorize all insider trading variables at the 5^{th} and 95^{th} percentiles due to a handful of large outliers which cause a large standard deviation.[11]

- insert Table 3 about here -

Panel A of Table 3 shows that acquirer insiders decrease their purchases in the pre-announcement period relative to the control period and matched firms and the difference in differences in Column 8 is negative and significant at the 1-percent level. Acquirer insiders also reduce their sales in the pre-announcement period and the difference in differences in Column 8 is significant at the 10-percent level. Combining purchases and sales into net purchases results in a positive and significant (at the 10-percent level) difference in differences effect.

Panel B shows that acquirer insiders do not change their purchases and sales significantly. However, combining purchases and sales into net purchases we find that acquirers increase their net purchases relative to the control period and matched firms: the difference in differences is significant at the 10-percent level.

[11] For sales and net purchases, winsorizing at the 5^{th} and 95^{th} percentiles instead of 1^{st} and 99^{th} percentiles is associated with almost halving of the standard deviation from 6.1–6.6 basis points to 2.8–3.1 basis points and for purchases, it shows a significant decrease of standard deviation from 0.93 and 1.2 basis points to 0.16 and 0.24 basis points, respectively.

4 Results

4.1 Base results

Before we discuss the difference-in-differences (DiD) regression results, Table 4 tests that insider trading in acquiring versus matched firms follows similar trends before our studied pre- or post-announcement event period. This is an important assumption behind the DiD approach. We test the parallel trend assumption for the pre- and post-announcement period in Panel A and B, respectively. For both event periods, we split the control period before initiation of deal negotiations into two parts: Control period 1 and 2. We set Control period 1 to take half of the median number of days for the corresponding event window, which is 40 days in Panel A and 60 days in Panel B. Control period 2 then covers the remaining days. Figure 2 in Appendix B illustrates this setup. The two panels in Table 4 show means for insider purchases, sales, and net purchases for both acquiring and matched firms during Control period 1 and 2. For each trading type, we first compute the 'distance' between target and matched firm's trading and then check that this distance does not change significantly from Control period 1 to Control period 2. The differences in Columns 3, 6, and 9 are not statistically significant at conventional levels for either the pre- or for the post-announcement period, which is in line with the parallel trend assumption. We conclude that insider trading in our acquirer firms follows similar patterns to insider trading in the matched firms in the period without any sale negotiations.

- insert Table 4 about here -

Table 5 shows our main regression results for insider trading patterns in acquiring firms before (Columns 1 to 3) and after (Columns 4 to 6) the public deal announcement date. The dependent variable is the number of shares traded by top executives and outside directors per month, scaled by the number of common shares outstanding and expressed in basis points. All regressions include the following control variables: total assets, book to market ratio, return on assets, R&D over total sales, prior average daily market adjusted

abnormal stock returns, volatility of daily stock returns, change in volatility of daily stock returns, liquidity, insider ownership, target total assets, target book to market ratio, target return on assets, pre- or post-announcement period length, year and Fama-French 12 industry dummies. The estimated coefficients for the control variables are consistent with the literature (Agrawal and Nasser, 2012).

Due to the DiD set up, our main variable of interest is the interaction term 'acquirer x event period' – the DiD coefficient. The two plain dummy variables are also included as regressors. All regressions are estimated using OLS rather than Tobit models because non-linear models suffer problems with interaction terms and their interpretation. Ai and Norton (2003) show that the magnitude of the interaction effect in nonlinear models does not equal the marginal effect of the interaction term. Following Norton, Wang, and Ai (2004), we use simple OLS regressions that do not suffer the interaction term problem, rather than Tobit models. We report p-values in parentheses by including the Hubert/White robust standard errors.[12]

- insert Table 5 about here -

Column 1 in Table 5 shows that acquirer insiders decrease their purchases in the period between acquirers signing the confidentiality agreements and the deal public announcement relatively to the control period and matched firms. At the same time, acquirer insiders decrease their sales even more (Column 2) so that overall their net purchases increase significantly (Column 3). The economic significance of the effect is also large: acquirer insiders increase their net purchases by 0.33 basis points per month relative to both the control period and matched firms.[13] Note that the unconditional average monthly net purchases during the control period in acquiring firms are -1.41 basis points in Table 3. These results are in line with Seyhun (1990) and suggest that acquirer insiders trade on

[12]Untabulated specifications with clustered standard errors at the Fama-French 30 or 49 industry levels show similar results and our conclusions are not affected.

[13]The increase is small because we scale our insider trading per month.

average on positive news in the period before the deal public announcement. In other words, the increase in insider net purchases implies that insiders put their money at stake, at least on average, which indicates that insiders do not knowingly destroy shareholder value when undertaking mergers. In this sense, insider net buying is in contrast with the negative and statistically significant market reaction of -0.78% at deal announcements. Our results confirm, in line with Seyhun (1990), that acquirer insiders do not expect takeovers to harm their firm value.

Columns 4 to 6 focus on the post-announcement period that ends with the deal consummation. Column 4 shows that acquirer insiders decrease their purchases, but the effect is very small and statistically insignificant. Given the nature of insiders' information advantage, insiders are not so worried about legal prosecution once the deal is publicly announced. Stopping buying is not so important any more, but they do not directly increase purchases either. Still, acquirer insiders decrease their sales significantly (Column 5), which then results in a significant increase in their net purchases (Column 6). The economic effect is 0.42 basis points per month and is somewhat larger than in the pre-announcement period. This suggests that insiders use their intimate knowledge of their firms to trade even after the public deal announcement when their information advantage should be significantly lowered.

The next subsection explores the source of acquirer insider information advantage in both the pre- and post-announcement periods.

4.2 Information advantage

For the pre-announcement period, we hypothesize that acquirer insiders increase their net purchases when the deal is likely to bring higher total synergy and acquirer bargaining power in takeover negotiations is higher. We conjecture that this is the case for deals with good fit in assets for the target-acquirer pair and deals sold in informal sales. Table 6 reports DiD regressions for net purchases where we split the sample by our two measures

of goodness in asset fit and the selling mechanism. We do not report separate results for insider purchases and sales as they follow the pattern reported in Table 5 – net purchases are driven by a significant decrease in sales. Panel A and B report results for pre- and post-announcement periods, respectively. They show only the DiD coefficients, and the two individual event firm and event period dummies. We use the same set of control variables as in the base regressions in Table 5, but we do not report them to save space.

- insert Table 6 about here -

As discussed in Section 3, we use two variables for the goodness of asset fit. The relative similarity position measures the relative place of the target between the acquirer peers in the TNIC-3 industry. It is a number between 0 and 1 and a higher value indicates a better asset fit as the target has more similar products with the acquirer than other firms in the acquirer environment. In Columns 1 and 2, we split all deals by the median value of the relative similarity position. In Panel A, for the pre-announcement period, the DiD coefficient is positive and significant only in Column 1 for deals with high relative similarity position, and not in Column 2 for deals where targets are far from their acquirers within the product space. The economic effect is 0.49 basis points increase relative to the control period and matched firms, which is 0.16 basis points larger than the base DiD effect in Table 5. Columns 3 and 4 use the pairwise similarity score to split the sample and we see similar results, though somewhat smaller and less statistically significant. Columns 5 and 6 split the sample by the selling mechanism. We can see that insiders increase their net purchases significantly only for the deals sold in informal sales where the bargaining power of the acquirer is higher. In economic terms, the increase is 0.40 basis points.

Table I.1 in the Internet Appendix shows results for DiD regressions where we check for the possibility that deals with the highest product market similarity between the target and the acquirer are 'too similar.' In particular, an acquirer-target pair with very similar products is perhaps not able to take advantage of new product introductions that would

differentiate the merged entity from its other peers in the industry (Hoberg and Phillips, 2010). In other words, similarity is good, but only to some level, beyond which firms cannot complement each other. To explore this possible effect, we split the high subsample in Column 1 (3) in Panel A of Table 6 into the top 10% of deals by the relative similarity position (pairwise similarity) that we denote Decile 10 and the remaining deals denoted Deciles 6 to 9. Results in Table I.1 show that only Columns 3 and 4 with the pairwise similarity measure show DiD coefficients consistent with our conjecture that assets of the acquirer-target pair could be too similar. We can see that the DiD coefficient for Deciles 6 to 9 in Column 4 is double the coefficient for Decile 10 in Column 3. Acquirer insiders are less enthusiastic about acquisitions of targets with very high pairwise similarity. Columns 1 and 2 with splits for the relative similarity position show a significant DiD coefficient for Deciles 6 to 9. However, the coefficient for Decile 10 is larger in size and significant at the 13 percent level. This shows, in our view that the relative similarity position partially adjusts also for the too similar effect.

Panel B in Table 6 focusses on the post-announcement period. We hypothesize that acquirer insiders compare the market assessment of the deal economic impact with their view of the situation. We expect that the selling mechanism and goodness of fit for the merging pair still matter significantly, but the effect should be stronger for deals paid in stock where the market may not take the extra information on the bargaining power of the acquirer into account. We also check whether insider net purchases depend on the market reaction to the deal public announcement. We can see that acquirer insiders increase their net purchases in deals with better fit in assets (Columns 1 and 3) and in informal sales (Column 5) also in the period between the public announcement and completion of the deal. The economic effect varies between 0.62 to 0.66 basis points per month. Insider trading does not change significantly for formal auctions and deals with lower fit in assets.

Columns 7 and 8 show that the deal payment consideration is also an important determinant of insider trading – acquirer insiders increase their net purchases significantly

in stock deals (Column 7) but not in cash deals (Column 8). The economic effect of 0.82 basis points for stock deals in Column 7 is large and shows that the payment method is indeed an important consideration for insider trading in the post-announcement period. Columns 9 and 10 show that insiders concentrate their net purchases in deals with lower than median announcement abnormal returns. The economic effect in Column 9 with low abnormal returns with 0.55 basis points is markedly lower than 0.82 basis points in Column 7 with stock payments.

In summary, the results in Table 6 confirm our hypothesis that acquirer insiders increase their net purchases and therefore trade (using a passive trading strategy) on positive private information concerning their deal for acquisitions with high fit in assets for the merging pair and for deals sold in informal sales. This is the case for both pre- and post-announcement event periods. Moreover, acquirer insiders increase their net purchases significantly in the period after the deal public announcement for stock deals.

Table 7 reports the DiD results when we split the sample across combinations of the goodness in asset fit versus the selling mechanism versus the payment consideration to establish their relative importance. Panel A again focusses on the pre-announcement period. Columns 1 to 4 show DiD coefficients across the relative similarity position and the selling mechanism. We can see that the DiD coefficient is positive and significant only in Column 1 for deals with good asset fit and sold through informal sales. The economic effect for the relative similarity position is 0.60 basis points, which is almost double the base effect in Table 5 and markedly higher than the pure DiD effects for the high relative similarity position and informal sales in Table 6 Panel A. The high DiD coefficient in Column 1 for the combination of the fit in assets and informal sales suggests relative important of the two deal characteristics for insider net purchase increases. Results for the pairwise similarity are included in the Panel A of Internet Appendix Table I.2 as they are similar but somewhat weaker than the results for relative similarity position in Columns 1 to 8.

Columns 5 to 12 in Panel A of Table 7 combine the relative similarity position and selling mechanism with the method of payment. The insignificant DiD coefficients suggest that the payment method is not an important trading determinant in the pre-announcement period. Columns 5 to 8 in Panel A of Internet Appendix Table I.2 combine the pairwise similarity and payment consideration and also find insignificant results.

- insert Table 7 about here -

Panel B in Table 7 shows results for the post-announcement event period. Columns 1 to 4 show that combining the relative similarity position with the selling mechanism results in a large increase in net purchases of 0.88 basis points, while the remaining combinations exhibit markedly smaller and insignificant DiD coefficients. Columns 5 to 8 (9 to 12) combine the relative similarity position (selling method) with the payment consideration. As the only large and significant DiD coefficients are in Columns 5 and 9 for stock deals with high relative similarity position and informal sales, we conclude that acquirer insiders combine these two determinants when trading during the post-announcement period. The economic magnitude of the DiD coefficients is around 1.14 basis points and represents a sizeable increase of 37 percent from 0.82 basis points in Table 6 and almost tripling of the 0.42 basis points in Table 5. The method of payment seems to play an important role for insider trading in this event period.[14]

Panel C in Table 7 explores combinations with the deal announcement abnormal returns.[15] Columns 1 to 4 combining the payment consideration with low versus high abnormal returns show that the DiD coefficient for stock deals is not purely driven by a negative market reaction to stock deals. Indeed, acquirer insiders increase their net purchases for stock deals regardless of whether the 3-day announcement abnormal return is low or high.

[14]Columns 1 to 4 (Columns 5 to 8) in Panel B of Internet Appendix Table I.2 report the results for combining pairwise similarity and selling mechanism (payment consideration) and show similar but somewhat weaker results than those for relative similarity position.

[15]We do not consider combinations with the announcement abnormal returns for the pre-announcement period because the market reaction to the deal announcement is not known yet when insiders trade in the pre-announcement period.

They consider all stock deals worth buying regardless of high or low market reaction. Columns 5 to 8 (Columns 9 to 12) which combine the relative similarity position (selling mechanism) with the stock market reaction show positive and significant DiD coefficients in combinations with low abnormal returns. However, the magnitude of the two coefficients is lower than the corresponding coefficients in Panel B in combinations with the stock payment.[16] It seems to be the stock payment rather than low market reaction that drives acquirer insider net purchases. Acquirer insiders disagree with the market negative assessment of stock-payment deals, specially if they also exhibit high fit in assets or are not sold in full-scale auctions that lever target bargaining power.

Panel A in Table 8 shows that combining high asset fit, informal sales, and stock payment consideration together leads to the highest increase in net purchases in the magnitude of 1.44 basis points (Column 1).[17] It is noteworthy that this combination of determinants is also well populated. Acquirer insiders consider stock deals with good fit in assets with the target and sold in informal sales as worth putting their own money on the line. We also combine high asset fit, informal sales, and abnormal returns in Panel B and find that net purchases increase by 1.28 basis points (Column 1), which is smaller than 1.44 basis points in Panel A Column 1. This confirms our finding in Table 7 that acquirer insider net purchases are driven by the stock payment rather than the low market reaction.

- insert Table 8 about here -

5 Conclusions

The main aim of the paper is to explore the motivation of acquirer insiders to trade both before and after the takeover public announcement date. To do so, we focus on the information advantage of acquirer insiders that motivate them to increases their net purchases

[16] Columns 9 to 12 in Panel B of Internet Appendix Table I.2 show results for combining pairwise similarity with acquirer announcement abnormal returns and show similar but somewhat weaker results than those for relative similarity position.

[17] The Internet Appendix Table I.3 show results for the pairwise similarity which they are similar but somewhat weaker than the results for relative similarity position.

in the pre- and post-announcement periods. The main contribution of such an analysis is to characterize the insiders' information advantage concerning potential synergies, asset complementarities with target firm, and their perception of their bargaining power in the selling process. In the post-announcement period, we also contribute to compare the market assessment of the deal economic impact with the acquirer insiders' view of the situation.

We examine insider trading patterns on a sample of 1,281 publicly listed US firms buying publicly listed US target firms during the period from 2005 to 2018, using the difference in differences approach that controls insider trading in the same firm during a control period and, at the same time, for change in insider trading in matched firms. Acquirer insiders passively increase their net purchases by decreasing their sales from the date when they sign the confidentiality agreement to the deal announcement date. This suggests acquirer insiders do not expect M&A transactions to be value destructive (Seyhun, 1990). Acquirer insiders are also passive net buyers in the period from the public announcement to the deal resolution with the economic effect somewhat larger than that in the pre-announcement period. It seems that acquirer insiders trade on their intimate knowledge even after the deal announcement when their information advantage is lowered.

Exploring the source of information advantage, we find that acquirer insiders increase their net purchases in deals with higher fit in assets and sold through informal sales in the pre-announcement period. These deals are associated with higher synergy created in the merger and higher relative bargaining power for the acquirer, which suggests higher dollar value captured by the acquiring firm (Dessaint et al., 2021). In the post-announcement period, we show that acquirer insiders are strong net buyers in deals paid with stock rather than those with low acquirer market reaction, particularly when they have better fit in assets between acquirers and targets and organised as informal sales. It suggests that stock financed takeovers are not value destructive (Golubov et al., 2016; Eckbo et al., 2018).

Appendix A Variable definitions

The table uses the following abbreviations: HPDL for Hoberg-Phillips Data Library, HC for hand collection, OC for own computations, and TIF for Thomson Insider Filings.

Variable	Definition	Source
Deal characteristics		
Premium	The final offer price relative to the target stock price eight weeks before the SDC announcement date in percentage points.	SDC
CAR(-1, +1)	The cumulative abnormal returns of acquiring firms from 1 day before to 1 day after the public announcement date where the benchmark is the CRSP equal-weighted market index.	CRSP, OC
Stock payment	A dummy variable equal to 1 in case the acquirer (partially) offers merged firm's shares as a payment consideration and 0 otherwise.	SDC
Informal sale	A dummy variable equal to 1 in case the target company is sold in a controlled sale or one-to-one negotiation and 0 otherwise (Boone and Mulherin, 2009). Private negotiation is when the target firm negotiates with only one bidder during the selling process. Controlled sale is when the target company decides to discreetly canvass offers from a limited number of bidders who have a serious interest in acquiring the company.	HC
Time since signing confidentiality agreements	The length in calendar days from the date when acquirers signing the confidentiality agreements to the public announcement date. We calculate the natural logarithm of the length and use it as the control variable in the regressions.	HC
Private selling process length	The length in calendar days from the initiation date to the public announcement date. We calculate the natural logarithm of the length and use it as the control variable in the regressions.	HC
Public selling process length	The length in calendar days from the public announcement date to the completion date. We calculate the natural logarithm of the length and use it as the control variable in the regressions.	HC
Full-scale auction	A dummy variable equal to 1 in case the target company is sold in a highly organized auction with pre-set rules and 0 otherwise (Hansen, 2001).	HC
Asset similarity		
Pairwise similarity	The similarity score for the acquirer-target pair at the TNIC-3 level, which is a number between zero and hundred. TNIC-3 is the text-based network industry classification following Hoberg and Phillips (2016) that corresponds to SIC three-digit coarseness. We divide the pairwise similarity score into high versus low groups by its median value in the DiD analysis.	HPDL
Relative similarity position	The relative position of the target among all acquirer peers at the TNIC-3 level according to the pairwise similarity with the acquirer. High position value indicates that the target has products more closely related to the acquirer products than other acquirer peers. We divide the target relative similarity position score into high versus low groups by its median value in the analysis.	HPDL

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Variable	Definition	Source
Number of acquirer peers	The number of firms in the acquirer's TNIC-3 industry. TNIC-3 is the text-based network industry classification following Hoberg and Phillips (2016) that corresponds to SIC three-digit coarseness.	HPDL
Average TNIC-3 similarity	The average across all pairwise similarity scores between the acquirer and other firms in its TNIC-3 industry. TNIC-3 is the text-based network industry classification following Hoberg and Phillips (2016) that corresponds to SIC three-digit coarseness.	HPDL
Dependent variables		
Top executives & outside directors	Our base insider group that includes top officers and all board members that are not employed by the firm (CB, CEO, CO, GC, P; AC, AF, CC, CFO, CI, CT, D, DO, EC, FC, GP, H, M, MC, MD, O, OB, OD, OP, OS, OT, OX, S, SC, TR, VC, AV).	TIF, OC
Purchase	The number of shares purchased as a fraction of shares outstanding in basis points by a given insider over a given period (pre-announcement, post-announcement or control period) in a given company (acquiring or matched firm) scaled on a monthly basis.	TIF, OC
Sale	The number of shares sold as a fraction of shares outstanding in basis points by a given insider over a given period (pre-announcement, post-announcement or control period) in a given company (acquiring or matched firm) scaled on a monthly basis.	TIF, OC
Net purchase	The number of shares purchased less the number of shares sold as a fraction of shares outstanding in basis points by a given insider over a given period (pre-announcement, post-announcement or control period) in a given company (acquiring or matched firm) scaled on a monthly basis.	TIF, OC
Independent variables		
Acquirer	A dummy variable is equal to 1 for acquiring firms and 0 for matched firms.	OC
Pre-announcement period	A dummy variable equal to one for the period after acquirers sign confidentiality agreements and 0 for the control period.	TIF, OC
Post-announcement period	A dummy variable equal to one for the post-announcement period and 0 for the control period.	TIF, OC
Control period	For each deal, this is a period that matches the same months as the pre-announcement (post-announcement) period but takes place before the initiation date. For example, if the pre-announcement period stretches from 30 October 2007 to 10 March 2008 and the initiation date is 04 August 2007, then the corresponding control period is from 30 October 2006 to 10 March 2007.	OC
Acquirer and target characteristics		
Acquirer (target) total assets	Natural logarithm of book value of total assets in USD millions at the fiscal year just before the beginning of the pre-announcement, post-announcement, or control period. In the regressions, we also control total assets for matched firms in the corresponding periods.	COMPUSTAT

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Variable	Definition	Source
Acquirer (target) book to market ratio	Book value of equity over market value of equity at the fiscal year just before the beginning of the pre-announcement, post-announcement, or control period. In the regressions, we also control book to market ratio for matched firms in the corresponding periods.	COMPUSTAT
Acquirer (target) return on assets	Earnings before interest, taxes, depreciation and amortization over total assets at the fiscal year just before the beginning of the pre-announcement, post-announcement, or control period. In the regressions, we also control return on assets for matched firms in the corresponding periods.	COMPUSTAT
R&D over sales	Research and development over total sales for acquiring and matched firms at one fiscal year before the beginning of the pre-announcement, post-announcement, or control period.	COMPUSTAT
Stock return quarter $--q$	Average daily market adjusted abnormal return for acquiring and matched firms for the q^{th} quarter before the beginning of pre-announcement, post-announcement, or the control period. Based on Agrawal and Nasser (2012).	CRSP, OC
Return volatility	The standard deviation of daily stock returns for acquiring and matched firms over the period from 250 to 126 trading days before the beginning of the pre-announcement, post-announcement, or control period. Based on Agrawal and Nasser (2012).	CRSP, OC
Change in return volatility	The change in the standard deviation of daily stock returns for acquiring and matched firms over the period from 125 to 1 trading day versus the period from 250 to 126 trading days before the beginning of the pre-announcement, post-announcement, or control period. Based on Agrawal and Nasser (2012).	CRSP, OC
Liquidity	Daily average fraction of shares outstanding for acquiring and matched firms that is traded over one fiscal year before the beginning of the pre-announcement, post-announcement, or control period.	CRSP, OC
Insider ownership	The total fraction of shares outstanding owned together by top executives & outside directors in acquiring and matched firms just before the pre-announcement, post-announcement, or control period.	TIF, OC

Appendix B Control period timigs: An example

As an example, we take the takeover of WJ Communications Inc by TriQuint Semiconductor Inc. The deal started by an unsolicited bid on August 4, 2007 (initiation date). This bid was not pursued further and instead WJ Communications organized a formal auction with 45 invited bidders. On October 30, 2007, 14 bidders started signing confidentiality agreements (beginning of the pre-announcement event period). On March 10, 2008, WJ Communications and TriQuint announced that they entered into the Merger Agreement (announcement date – the end of the pre-announcement event period and the beginning of the post-announcement event period). The deal was completed on May 22, 2008.

Figure 1. Construction of the control periods.

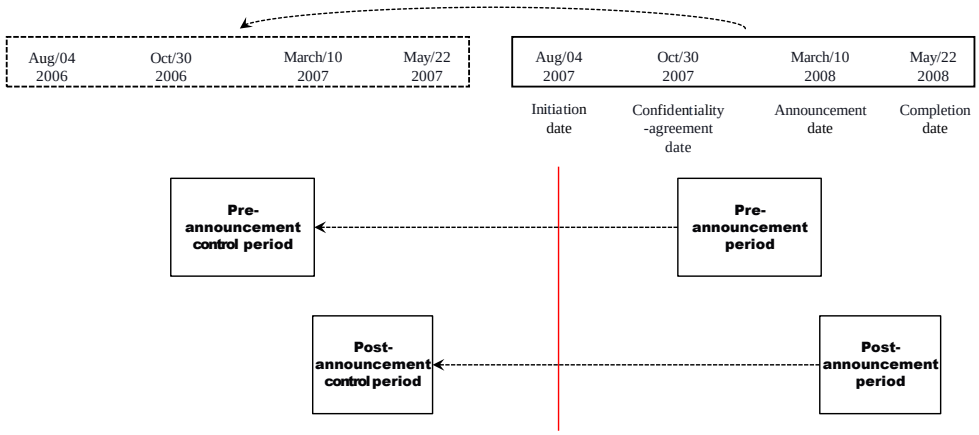
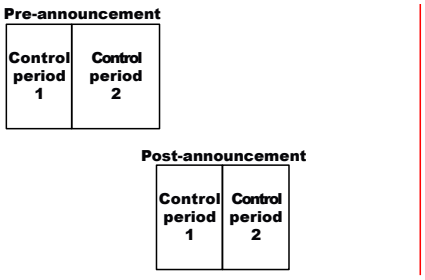


Figure 2. Parallel trend testing.



References

Agrawal, A. and T. Nasser (2012). Insider trading in takeover targets. *Journal of Corporate Finance 18*, 598–625.

Ai, C. and E. C. Norton (2003). Interaction terms in logit and probit models. *Economics Letters 80*, 123–129.

Akbulut, M. E., C. Lee, and S. C. Lim (2014). Insider trading, operating performance, and agency issues in M&A. Working Paper, University of Southern California, Wayne State University and Texas Christian University.

Augustin, P., M. Brenner, and M. G. Subrahmanyam (2019). Informed options trading prior to takeover announcements: Insider trading? *Management Science 65*(12), 5697–5720.

Baker, M. and J. Wurgler (2002). Market timing and capital structure. *The Journal of Finance 57*(1), 1–32.

Betton, S., B. E. Eckbo, and K. S. Thorburn (2008). Corporate Takeovers. In *Handbook of Corporate Finance: Empirical Corporate Finance*, Volume 2, Chapter 15, pp. 291–430. North-Holland: Elsevier B.V.

Capron, L. and N. Pistre (2002). When do acquirers earn abnormal returns? *Strategic Management Journal 23*, 781–794.

Cheng, Q. and K. Lo (2006). Insider trading and voluntary disclosures. *Journal of Accounting Research 44*(5), 815–848.

Davis, F., H. Khadivar, K. Pukthuanthong, and T. J. Walker (2020). Insider trading in rumored takeover targets. *European Financial Management*.

Dessaint, O., B. E. Eckbo, and A. Golubov (2021). Bidder-specific synergies and the evolution of acquirer returns. Working Paper No. 3437865, Tuck School of Business.

Eckbo, B. E. (2008). *Handbook of empirical corporate finance set*, Volume 2. Elsevier.

Eckbo, B. E., T. Makaew, and K. S. Thorburn (2018). Are stock-financed takeovers opportunistic? *Journal of Financial Economics 128*(3), 443–465.

Fidrmuc, J. P., M. Goergen, and L. Renneboog (2006). Insider trading, news releases and ownership concentration. *Joural of Finance 61*, 2931–2973.

Fidrmuc, J. P. and C. Xia (2021). Target insiders' preferences when trading before takeover announcements: deal completion probability, premium and deal characteristics. *European Financial Management Forthcoming*.

Golubov, A., D. Petmezas, and N. G. Travlos (2016). Do stock-financed acquisitions destroy value? new methods and evidence. *Review of Finance 20*(1), 161–200.

Grossman, S. J. and O. D. Hart (1986). The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy 94*, 691–719.

Harlow, W. V. and J. S. Howe (1993). Leverage buyouts and insider nontrading. *Financial Management 22*, 109–118.

Hart, O. D. and J. Moore (1990). Property rights and the nature of the firm. *Journal of Political Economy 98*, 1119–1158.

Hoberg, G. and G. Phillips (2010). Product market synergies and competition in mergers and acquisitions: A text-based analysis. *Review of Financial Studies 23*.

Hoberg, G. and G. Phillips (2016). Text-based network industries and endogenous product differentiation. *Journal of Political Economy 124*(5), 1423–1465.

Lowry, M., M. Rossi, and Z. Zhu (2016). Informed trading by adviser banks? A look at options holdings ahead of mergers. Working Paper, Drexel University.

Myers, S. and N. Majluf (1984). Corporate financing and investment decisions when firm have information that investors do not have. *Journal of Financial Economics 13*, 187–221.

Norton, E. C., H. Wang, and C. Ai (2004). Computing interaction effects and standard errors in logit and probit models. *The Stata Journal 4*(2), 154–167.

Ordu, U. and D. Schweizer (2015). Executive compensation and informed trading in acquiring firms around merger announcements. *Journal of Banking and Finance 55*, 260–280.

Ravina, E. and P. Sapienza (2010). What do independent directors know? evidence from their trading. *Review of Financial Studies 23*, 962–1003.

Rhodes-Kropf, M. and D. Robinson (2008). The market for mergers and the boundaries of the firm. *Journal of Finance 62*, 1169–1211.

Seyhun, H. (1986a). Insiders' profits, costs of trading, and market efficiency. *Journal of Financial Economics 16*, 189–212.

Seyhun, H. N. (1986b). Insiders' profits, costs of trading, and market efficiency. *Journal of financial Economics 16*(2), 189–212.

Seyhun, H. N. (1990). Do bidder managers knowingly pay too much for target firms? *Journal of Business 63*(4), 439–464.

Shleifer, A. and R. Vishny (2003). Stock market driven acquisitions. *Journal of Financial Economics 70*, 295–3113.

Shrieves, R. E. and D. L. Stevens (1979). Bankruptcy avoidance as a motive for merger. *Journal of Financial and Quantitative Analysis 14*, 501–515.

Table 1. Sample distributions

This table reports the distribution of the sample across years in Panel A and across Fama-French 12 industry groups in Panel B. The sample includes 1,281 M&A deals announced by U.S. publicly listed companies between 2005 and 2018.

Panel A: Years

Year	Number of deals	Percent of deals
2005	114	8.90
2006	128	9.99
2007	124	9.68
2008	74	5.78
2009	69	5.39
2010	85	6.64
2011	54	4.22
2012	85	6.64
2013	79	6.17
2014	99	7.73
2015	106	8.27
2016	95	7.42
2017	78	6.09
2018	91	7.10
Total	1,281	100

Panel B: Industries

Industry	Number of deals	Percent of deals
Consumer Non-Durables	33	2.58
Consumer Durables	12	0.94
Manufacturing	81	6.32
Oil, Gas, and Coal Extraction and Production	49	3.83
Chemicals and Allied Products	19	1.48
Business Equipment	304	23.73
Telephone and Television Transmission	39	3.04
Utilities	39	3.04
Wholesale, Retail, and Some Services	59	4.61
Healthcare, Medical Equipment, and Drugs	153	11.94
Finance	401	31.30
Other	92	7.18
Total	1,281	100

Table 2. Deal summary statistics

This table reports summary statistics for 1,281 M&A deals in our sample. We report the mean (column 2), standard deviation (column 3), 25^{th} percentile (column 4), median (column 5), and 75^{th} percentile (column 6) for deal and acquirer/target characteristics included in the analysis. For brevity, we report only statistics for the pre-announcement period. All variables are defined in Appendix A and winsorized at the 1^{st} and 99^{th} percentiles except all dummy variables.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Deal characteristics						
	# obs.	mean	st. dev.	p25	median	p75
Premium	1,106	42.39%	64.50%	16.43%	31.95%	51.47%
$CAR_{-1,+1}$	1,281	-0.78%	5.34%	-2.99%	-0.07%	1.33%
Stock payment	1,281	0.55	0.50	0	1	1
Informal sale	1,281	0.75	0.43	1	1	1
Time since signing confid.agree. (days)	1,281	111	106	46	80	134
Public selling process length (days)	1,281	135	81	76	119	173
Pairwise similarity	1,281	8.84	9.94	0.53	6.23	13.86
Relative similarity position	1,281	0.52	0.42	0	0.66	0.94
Number of acquirer peers	1,157	171	180	26	92	302
Average TNIC-3 similarity	1,121	4.67	3.37	2.33	3.30	6.45
Panel B: Asset similarity quintiles						
Quintile by pairwise similarity		0	1	2	3	4
Pairwise similarity		0	1.75	6.27	12.16	24.15
Number of acquirer peers		148	71	89	197	335
Average TNIC-3 similarity		4.17	2.66	2.95	5.08	8.10
Quintile by relative similarity position		0	1	2	3	4
Relative similarity position		0	0.24	0.65	0.91	0.99
Pairwise similarity		3.53	2.64	8.12	11.84	17.40
Number of acquirer peers		149	151	215	182	153
Average TNIC-3 similarity		4.29	3.72	5.40	5.15	4.19
Panel C: Acquirer and target firm characteristics						
	# obs.	mean	st. dev.	p25	median	p75
Acquirer total assets (ln)	1,254	8.29	2.00	7.07	8.37	9.66
Acquirer book to market ratio	1,210	0.48	0.33	0.25	0.44	0.66
Acquirer return on assets	1,247	9.01%	11.09%	2.33%	9.34%	15.64%
Target total assets (ln)	1,237	6.37	1.84	5.12	6.41	7.63
Target book to market ratio	1,205	0.57	0.55	0.27	0.48	0.81
Target return on assets	1,235	2.74%	18.61%	1.01%	4.46%	12.27%
R&D over sales	1,244	0.05	0.09	0	0	0.06
Stock return quarter–1	1,133	0.01%	0.28%	-0.15%	0.01%	0.16%
Stock return quarter–2	1,132	0.02%	0.26%	-0.12%	0.02%	0.16%
Stock return quarter–3	1,132	0.01%	0.26%	-0.13%	0.01%	0.15%
Stock return quarter–4	1,128	0.004%	0.26%	-0.13%	-0.002%	0.14%
Return volatility	1,134	2.05%	1.19%	1.31%	1.70%	2.35%
Change in return volatility	1,129	0.02%	0.82%	-0.33%	-0.03%	0.33%
Liquidity	1,123	0.77%	0.59%	0.38%	0.62%	0.97%
Insider ownership	1,281	5.00%	14.92%	0.003%	0.58%	2.56%

Table 3. Insider trading summary statistics

The table reports the mean insider purchases, sales, and net purchases in 1,281 acquiring firms and in 1,281 matched firms during the event period (Columns 1 & 3) and control period (Columns 2 & 4). Panel A shows means for insider trading in the period after acquirers signing the confidentiality agreements until the public announcement date and Panel B in the post-announcement period (starting from the announcement date until the completion date). The control period covers the same months as the corresponding event period, but before the initiation date. Insiders are defined as top officers and independent directors. Purchases, sales, and net purchases are measured as fraction of shares outstanding in basis points, scaled on a monthly basis. They are winsorized at the 5^{th} and 95^{th} percentiles. All variables are defined in Appendix A. We test for differences in means using the t-test allowing for unequal variances. ***, ** and * indicate significance at the one-, five- and ten-percent levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Acquiring firm		Matched firm					
	Event per.	Control per.	Event per.	Control per.	(1)−(2)	(1)−(3)	(3)−(4)	(5)−(7)
	Panel A: Pre-announcement							
Purchases	0.034***	0.058***	0.051***	0.052***	-0.024***	-0.017***	-0.002	-0.022***
Sales	1.040***	1.484***	1.241***	1.443***	-0.444***	-0.201*	-0.202*	-0.242*
Net purchases	-0.987***	-1.406***	-1.185***	-1.385***	0.418***	0.198*	0.200*	0.219*
	Panel B: Post-announcement							
Purchases	0.086***	0.093***	0.070***	0.075***	-0.006	0.016*	-0.006	-0.001
Sales	1.346***	1.766***	1.426***	1.647***	-0.421***	-0.081	-0.221*	-0.199
Net purchases	-1.239***	-1.682***	-1.361***	-1.557***	0.442***	0.121	0.197	0.246*

Table 4. Testing difference in differences assumptions

This table reports means for insider purchases, sales, and net purchases for 1,281 acquiring and 1,281 matched firms over the control period. The control period lies before the initiation date and matches the pre-announcement event period (Panel A) or post-announcement event period (Panel B) in length and calendar months. The cutoff date between the earlier versus later control period in Panel A corresponds to the date when acquirers sign the confidentiality agreements in the event period. The cutoff date in Panel B refers to 2 months after the public announcement date. It is equal to the completion date if the post-announcement period is shorter than 2 months. Insiders are top executives and outside directors. Purchases, sales, and net purchases are measured as fraction of shares outstanding in basis points, scaled on a monthly basis and winsorized at the 5^{th} and 95^{th} percentiles. We test for differences in means using the t-test allowing for unequal variances. ***, ** and * in columns 2, 4 and 6 indicate significance of differences in the corresponding partition at the one-, five- and ten-percent levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Purchases			Sales			Net purchases		
	Control per. 1	Control per. 2	Diff. (1)–(2)	Control per. 1	Control per. 2	Diff. (4)–(5)	Control per. 1	Control per. 2	Diff. (7)–(8)
				Panel A: Pre-announcement					
Acquiring firms	0.019	0.017		1.056	0.932		-1.014	-0.900	
Matched firms	0.017	0.016		1.061	0.868		-1.042	-0.837	
Target vs. matched	0.002	0.001	0.002	-0.005	0.064	-0.069	0.028	-0.062	0.090
				Panel B: Post-announcement					
Acquiring firms	0.055	0.046		1.425	1.093		-1.373	-1.032	
Matched firms	0.039	0.037		1.343	0.984		-1.291	-0.935	
Target vs. matched	0.015	0.009	0.006	0.081	0.109	-0.028	-0.082	-0.096	0.014

Table 5. Insider trading in acquiring firms before and after the public announcement date

This table reports OLS estimation results for insider purchases, sales, and net purchases in acquiring and matched firms before (Columns 1 to 3) and after the public announcement date (Columns 4 to 6). The pre-announcement period is the period after acquirers signing the confidentiality agreements until the public announcement date and the post-announcement period starts from the announcement date until the completion date. Insiders are defined as top officers and independent directors. Purchases, sales, and net purchases are measured as fraction of shares outstanding in basis points, scaled on a monthly basis and winsorized at the 5^{th} and 95^{th} percentiles. Acquirer is a dummy variable equal to 1 for acquiring firms and 0 for matched firms. Event period is a dummy variable equal to 1 for the pre-announcement (post-announcement) period in Columns 1 to 3 (Columns 4 to 6) and 0 for the corresponding control period. All regressions include year and industry fixed effects. We use Hubert/White robust standard errors and report p-values in parentheses. All variables are defined in Appendix A and winsorized at the 1^{st} and 99^{th} percentiles except all dummy variables. ***, ** and * indicate significance at the one-, five- and ten-percent levels.

	(1)	(2)	(3)	(4)	(5)	(6)
	Pre-announcement			*Post-announcement*		
	Purchases	Sales	Net purch.	Purchases	Sales	Net purch.
Acquirer x event period	-0.019**	-0.333**	0.331**	-0.005	-0.391**	0.421**
	(0.043)	(0.049)	(0.050)	(0.720)	(0.030)	(0.020)
Event period	-0.005	0.009	0.024	0.002	0.129	-0.134
	(0.429)	(0.940)	(0.846)	(0.802)	(0.309)	(0.290)
Acquirer	0.011	0.322**	-0.310**	0.030***	0.478***	-0.460***
	(0.100)	(0.010)	(0.013)	(0.002)	(0.000)	(0.001)
Total assets	-0.011***	-0.253***	0.224***	-0.013***	-0.306***	0.290***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Book to market	0.019**	0.241	-0.252*	0.035***	-0.189	0.208
	(0.039)	(0.105)	(0.090)	(0.009)	(0.175)	(0.137)
Return on assets	-0.075**	1.990***	-2.339***	-0.083*	1.075*	-1.071*
	(0.016)	(0.000)	(0.000)	(0.087)	(0.063)	(0.063)
Target total assets	-0.004**	-0.048	0.059*	-0.004	0.039	-0.045
	(0.019)	(0.153)	(0.071)	(0.152)	(0.291)	(0.223)
Target book to market	0.010	-0.165*	0.136	0.011	-0.179*	0.196**
	(0.102)	(0.075)	(0.133)	(0.191)	(0.053)	(0.035)
Target return on assets	-0.006	0.164	-0.144	0.017	0.472*	-0.430
	(0.755)	(0.578)	(0.613)	(0.451)	(0.069)	(0.100)
R&D over sales	-0.026	-0.502	0.094	-0.025	0.074	-0.118
	(0.560)	(0.532)	(0.891)	(0.699)	(0.935)	(0.897)
Stock return quarter–1	0.501	38.759**	-35.399**	-5.990***	92.603***	-99.295***
	(0.559)	(0.011)	(0.018)	(0.000)	(0.000)	(0.000)
Stock return quarter–2	-1.333	23.497	-21.726	-2.834**	30.121*	-32.057**
	(0.133)	(0.146)	(0.177)	(0.028)	(0.064)	(0.050)
Stock return quarter–3	-0.029	18.984	-18.346	-0.411	35.316**	-33.742**
	(0.975)	(0.214)	(0.227)	(0.756)	(0.037)	(0.047)
Stock return quarter–4	-1.519*	10.709	-9.328	0.166	24.160	-23.035
	(0.059)	(0.515)	(0.566)	(0.900)	(0.143)	(0.163)
Return volatility	-0.211	-28.495***	25.000***	1.251**	-34.257***	35.128***
	(0.555)	(0.000)	(0.000)	(0.029)	(0.000)	(0.000)
Change in return volatility	0.236	-16.148***	16.038***	1.664***	-24.840***	26.177***
	(0.535)	(0.006)	(0.005)	(0.008)	(0.000)	(0.000)
Liquidity	-0.991**	47.414***	-48.531***	-0.814	59.323***	-59.881***
	(0.024)	(0.000)	(0.000)	(0.209)	(0.000)	(0.000)
Insider ownership	0.097***	3.790***	-3.606***	0.465***	8.952***	-8.466***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Selling process length	0.008***	0.065	-0.060	0.028***	-0.224**	0.248***
	(0.002)	(0.217)	(0.236)	(0.000)	(0.015)	(0.007)
Constant	0.107***	5.258***	-2.869***	0.010	3.870***	-3.706***
	(0.005)	(0.000)	(0.000)	(0.878)	(0.000)	(0.000)
Observations	4,187	4,187	4,187	4,260	4,260	4,260
R^2	8.30%	11.40%	10.20%	12.50%	12.90%	12.50%

Table 6. Determinants of net purchases

This table reports OLS estimation results for insider net purchases in acquiring and matched firms in the pre- and post-announcement period in Panels A and B, respectively. We split the whole sample 4 ways: by relative similarity position (RSP in Columns 1 & 2), by pairwise similarity (PS in Columns 3 & 4), by selling mechanism (Columns 5 & 6), and by acquirer abnormal returns (Columns 7 & 8). Insiders are defined as top officers and independent directors. Net purchases (purchases less sales) are measured as the fraction of shares outstanding in basis points scaled on monthly basis and winsorized at the 5^{th} and 95^{th} percentiles. We divide the relative similarity position and pairwise similarity scores into high versus low groups by its median value. Acquirer is a dummy equal to 1 for acquiring firms and 0 for matched firms. Pre-announcement period is a dummy variable equal to 1 for the period after acquirers sign the confidentiality agreements and 0 for control period. Post-announcement period is a dummy variable equal to 1 for the period after the public announcement date and 0 for control period. All regressions include a set of control variables, year and industry fixed effects. We use Hubert/White robust standard errors and report *p*-values in parentheses. All variables are defined in Appendix A. All control variables are winsorized at the 1^{st} and 99^{th} percentiles. ***, ** and * indicate significance at the one-, five- and ten-percent levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	High RSP	Low RSP	High PS	Low PS	Inf.sale	Auction	Stock	Cash	Low AR	High AR
					Panel A: pre-announcement period					
Acquirer x pre-ann.	0.493**	0.119	0.425*	0.190	0.399**	0.053	0.283	0.394		
	(0.041)	(0.607)	(0.075)	(0.421)	(0.032)	(0.888)	(0.196)	(0.128)		
Pre-announcement	-0.099	0.028	0.076	-0.072	-0.052	0.153	-0.013	-0.028		
	(0.587)	(0.867)	(0.667)	(0.674)	(0.702)	(0.589)	(0.932)	(0.888)		
Acquirer	-0.329*	-0.244	-0.304*	-0.281	-0.296**	-0.252	-0.243	-0.400**		
	(0.064)	(0.157)	(0.089)	(0.102)	(0.030)	(0.375)	(0.127)	(0.038)		
Constant	-6.932***	-4.941***	-2.618***	-4.826***	-5.310***	-5.478***	-4.575***	-3.464***		
	(0.001)	(0.000)	(0.000)	(0.005)	(0.000)	(0.003)	(0.002)	(0.000)		
# observations	2,239	1,948	2,245	1,942	3,137	1,050	2,236	1,951		
R^2	13.80%	9.50%	12.60%	10.80%	10.80%	15.60%	11.90%	10.90%		
					Panel B: post-announcement period					
Acquirer x post-ann.	0.662***	0.180	0.641***	0.219	0.624***	-0.192	0.824***	-0.021	0.545**	0.250
	(0.010)	(0.476)	(0.010)	(0.405)	(0.002)	(0.620)	(0.001)	(0.936)	(0.021)	(0.367)
Post-announcement	-0.212	0.042	-0.200	-0.033	-0.228	0.092	-0.204	-0.026	-0.118	-0.091
	(0.244)	(0.812)	(0.265)	(0.856)	(0.110)	(0.745)	(0.243)	(0.888)	(0.494)	(0.629)
Acquirer	-0.402**	-0.584***	-0.460**	-0.530***	-0.622***	0.049	-0.552***	-0.323*	-0.356**	-0.570***
	(0.041)	(0.002)	(0.016)	(0.006)	(0.000)	(0.867)	(0.003)	(0.099)	(0.047)	(0.006)
Constant	-4.307***	-3.945***	-3.720***	-5.269***	-2.804***	-6.479***	-4.252***	-7.233***	-2.993***	-4.508***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.001)	(0.000)
# observations	2,272	1,988	2,283	1,977	3,192	1,068	2,273	1,987	2,267	1,993
R^2	12.80%	12.80%	14.00%	12.60%	12.70%	15.70%	12.90%	15.70%	14.60%	13.20%

Table 7. Combinations of determinants

This table reports OLS estimation results for insider net purchases in acquiring and matched firms in the pre- and post-announcement period. Panels A and B partition the sample across relative similarity position (RSP), selling mechanism, and payment consideration in the pre- and post-announcement period, respectively. Panel C partitions the sample across payment consideration, relative similarity position (RSP), and selling mechanism with acquirer abnormal returns in the post-announcement period. Insiders are defined as top officers and independent directors. Net purchases (purchases less sales) are measured as the fraction of shares outstanding in basis points scaled on monthly basis and winsorized at the 5^{th} and 95^{th} percentiles. All regressions include the same set of control variables as in Table 5, year and industry fixed effects, which are not reported. We use Hubert/White robust standard errors and report *p*-values in parentheses. All variables are defined in Appendix A. All control variables are winsorized at the 1^{st} and 99^{th} percentiles except all dummy variables. ***, ** and * indicate significance at the one-, five- and ten-percent levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	High RSP		Low RSP		High RSP		Low RSP		Inf.sale		Auction	
	Inf.sale	Auction	Inf.sale	Auction	Stock	Cash	Stock	Cash	Stock	Cash	Stock	Cash
Panel A: pre-announcement period												
Acquirer x pre-ann.	0.599**	0.307	0.159	-0.076	0.455	0.607	0.072	0.132	0.335	0.502*	-0.052	0.109
	(0.020)	(0.582)	(0.557)	(0.869)	(0.114)	(0.139)	(0.831)	(0.684)	(0.165)	(0.085)	(0.919)	(0.834)
Post-announcement	-0.198	0.156	0.026	0.177	-0.177	-0.083	0.131	-0.021	-0.088	-0.065	0.177	0.187
	(0.307)	(0.723)	(0.891)	(0.625)	(0.400)	(0.796)	(0.578)	(0.929)	(0.597)	(0.773)	(0.681)	(0.632)
Acquirer	-0.362*	-0.126	-0.227	-0.158	-0.290	-0.572*	-0.251	-0.196	-0.330*	-0.295	0.263	-0.528
	(0.055)	(0.768)	(0.251)	(0.671)	(0.157)	(0.067)	(0.321)	(0.406)	(0.060)	(0.169)	(0.501)	(0.177)
Constant	-7.131***	-8.112***	-5.573***	-2.170	-4.134*	-3.859**	-5.927***	-2.447*	-3.757***	-1.576*	-2.487	-8.896***
	(0.009)	(0.001)	(0.001)	(0.322)	(0.076)	(0.039)	(0.000)	(0.050)	(0.000)	(0.086)	(0.238)	(0.000)
# observations	1,665	574	1,472	476	1,309	930	927	1,021	1,823	1,314	413	637
R^2	12.90%	24.00%	11.50%	12.70%	14.70%	14.90%	12.20%	10.40%	12.20%	11.10%	22.30%	18.60%
Panel B: post-announcement period												
Acquirer x post-ann.	0.876***	-0.051	0.333	-0.274	1.135***	-0.129	0.301	0.062	1.138***	-0.057	-0.640	0.105
	(0.002)	(0.926)	(0.254)	(0.602)	(0.000)	(0.757)	(0.423)	(0.855)	(0.000)	(0.856)	(0.302)	(0.834)
Post-announcement	-0.363*	-0.195	-0.057	0.378	-0.325	-0.222	0.029	0.099	-0.303	0.046	0.665	-0.199
	(0.075)	(0.632)	(0.778)	(0.330)	(0.159)	(0.443)	(0.916)	(0.675)	(0.104)	(0.832)	(0.164)	(0.576)
Acquirer	-0.575***	0.286	-0.723***	-0.133	-0.551**	-0.074	-0.546*	-0.528**	-0.858***	-0.268	0.763	-0.407
	(0.009)	(0.498)	(0.001)	(0.743)	(0.029)	(0.810)	(0.054)	(0.035)	(0.000)	(0.243)	(0.115)	(0.259)
Constant	-3.587***	-4.097*	-3.409***	-6.748***	-4.621***	-4.516**	-5.132***	-7.424***	-5.296***	-2.529**	-6.379**	-9.240***
	(0.010)	(0.074)	(0.001)	(0.002)	(0.001)	(0.013)	(0.000)	(0.005)	(0.000)	(0.011)	(0.034)	(0.000)
# observations	1,706	566	1,486	502	1,349	923	924	1,064	1,857	1,335	416	652
R^2	12.90%	22.00%	15.00%	16.60%	16.50%	18.10%	11.70%	18.50%	13.30%	15.90%	13.70%	23.20%

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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Stock		Cash		High RSP		Low RSP		Inf.sale		Auction	
	Low AR	High AR	Low AR	High AR	Low AR	High AR	Low AR	High AR	Low AR	High AR	Low AR	High AR
	Panel C: post-announcement period with announcement ARs											
Acquirer x post-ann.	0.820***	0.837**	0.130	-0.175	0.960***	0.188	0.029	0.380	0.807***	0.394	-0.424	-0.095
	(0.007)	(0.044)	(0.733)	(0.633)	(0.005)	(0.632)	(0.928)	(0.340)	(0.002)	(0.227)	(0.451)	(0.858)
Post-announcement	-0.227	-0.059	0.090	-0.099	-0.173	-0.158	0.110	-0.009	-0.317*	-0.089	0.541	-0.204
	(0.314)	(0.830)	(0.729)	(0.699)	(0.485)	(0.557)	(0.648)	(0.974)	(0.083)	(0.690)	(0.232)	(0.586)
Acquirer	-0.376*	-0.842***	-0.328	-0.317	-0.380	-0.418	-0.370	-0.795***	-0.587***	-0.648***	0.604	-0.346
	(0.097)	(0.008)	(0.259)	(0.229)	(0.151)	(0.155)	(0.120)	(0.007)	(0.002)	(0.009)	(0.173)	(0.354)
Constant	-3.099***	-6.562***	-7.516**	-5.230***	-3.598***	-5.232***	-3.297**	-6.058***	-1.363	-4.766***	-10.310***	-4.387**
	(0.010)	(0.000)	(0.013)	(0.000)	(0.001)	(0.000)	(0.012)	(0.000)	(0.131)	(0.000)	(0.004)	(0.029)
# observations	1,412	861	855	1,132	1,245	1,027	1,022	966	1,780	1,412	487	581
R^2	14.70%	16.60%	18.80%	17.10%	13.50%	16.00%	16.80%	12.70%	15.50%	13.60%	21.40%	20.90%

Table 8. Triple combinations in the post-announcement period

This table reports OLS estimation results for insider net purchases in acquiring and matched firms in the post-announcement period (until the deal completion date) across the partitions for relative similarity position (RSP), selling mechanism, and payment consideration or acquirer abnormal returns. Insiders are defined as top officers and independent directors. We measure net purchases (purchases less sales) as number of shares purchased minus sold as a percentage of shares outstanding in basis points, scale them on a monthly basis and winsorize them at the 5^{th} and 95^{th} percentiles. Acquirer is a dummy variable equal to 1 for acquiring firms and 0 for matched firms. Post-announcement period is a dummy variable equal to 1 for the period after the public announcement date and 0 for control period. All regressions include a set of control variables, year and industry fixed effects, which are not reported. We use Hubert/White robust standard errors and report *p*-values in parentheses. All variables are defined in Appendix A and all control variables are winsorized at the 1^{st} and 99^{th} percentiles except all dummy variables. ***, ** and * indicate significance at the one-, five- and ten-percent levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	High RSP				Low RSP			
	Inf.sale		Auction		Inf.sale		Auction	
	Stock	Cash	Stock	Cash	Stock	Cash	Stock	Cash
	Panel A							
Acquirer x post-ann.	1.442***	-0.201	-0.304	0.178	0.614	0.039	-1.129	0.165
	(0.000)	(0.672)	(0.684)	(0.826)	(0.133)	(0.925)	(0.277)	(0.784)
Post-announcement	-0.500**	0.052	0.702	-0.724	-0.058	0.042	0.720	0.333
	(0.046)	(0.877)	(0.216)	(0.181)	(0.846)	(0.884)	(0.397)	(0.446)
Acquirer	-0.941***	0.056	1.065*	-0.429	-0.742**	-0.635**	0.448	-0.295
	(0.001)	(0.874)	(0.088)	(0.453)	(0.015)	(0.037)	(0.609)	(0.526)
Constant	-4.58***	-1.50	-3.19	-9.64***	-5.16***	-1.97	-3.84	-10.90***
	(0.004)	(0.304)	(0.447)	(0.001)	(0.000)	(0.156)	(0.438)	(0.001)
# observations	1,104	602	245	321	753	733	171	331
R^2	16.60%	17.30%	32.30%	28.80%	14.80%	20.50%	22.90%	27.20%
	High RSP				Low RSP			
	Inf.sale		Auction		Inf.sale		Auction	
	Low AR	High AR	Low AR	High AR	Low AR	High AR	Low AR	High AR
	Panel B							
Acquirer x post-ann.	1.284***	0.218	-0.425	0.236	0.214	0.566	-0.698	-0.220
	(0.001)	(0.615)	(0.580)	(0.774)	(0.530)	(0.257)	(0.421)	(0.741)
Post-announcement	-0.521*	-0.078	0.490	-0.901	-0.007	-0.114	0.689	0.373
	(0.058)	(0.801)	(0.422)	(0.121)	(0.975)	(0.726)	(0.339)	(0.413)
Acquirer	-0.632**	-0.422	1.125*	-0.386	-0.545**	-0.937**	0.359	-0.356
	(0.026)	(0.218)	(0.069)	(0.490)	(0.030)	(0.010)	(0.604)	(0.479)
Constant	-2.291	-3.470***	-13.890***	-0.691	-1.951	-6.185***	-9.250*	-5.786**
	(0.144)	(0.006)	(0.003)	(0.863)	(0.138)	(0.000)	(0.095)	(0.032)
# observations	969	737	276	290	811	675	211	291
R^2	15.70%	15.60%	30.10%	30.00%	19.80%	17.40%	24.90%	23.70%

Internet appendix to

"Acquirer insiders' trades around M&A announcements"

(not for publication)

This appendix presents supplementary results not included in the main body of the paper.

Table I.1. Asset similarity deciles in the pre-announcement period

This table reports OLS estimation results for insider net purchases (purchases less sales) in acquiring and matched firms in the pre-announcement period (until the public announcement date) across relative similarity position and pairwise similarity for decile 10 and deciles 6 to 9. Insiders are defined as top officers and independent directors. We measure net purchases as number of shares purchased minus sold as a percentage of shares outstanding in basis points, scale them on a monthly basis and winsorize them at the 5^{th} and 95^{th} percentiles. Acquirer is a dummy variable equal to 1 for acquiring firms and 0 for matched firms. Pre-announcement period is a dummy variable equal to 1 for the period after acquirers signing the confidentiality agreements and 0 for control period. All regressions include a set of control variables, year and industry fixed effects, which are not reported. We use Hubert/White robust standard errors and report *p*-values in parentheses. All variables are defined in Appendix A and all control variables are winsorized at the 1^{st} and 99^{th} percentiles except all dummy variables. ***, ** and * indicate significance at the one-, five- and ten-percent levels.

	(1)	(2)	(3)	(4)
	Relative similarity position		Pairwise similarity	
	Decile 10	Deciles 6-9	Decile 10	Deciles 6-9
Acquirer x pre-announcement	0.870	0.454*	0.233	0.494*
	(0.129)	(0.089)	(0.605)	(0.071)
Pre-announcement	-0.024	-0.083	-0.405	0.105
	(0.954)	(0.673)	(0.275)	(0.593)
Acquirer	-0.405	-0.357*	-0.058	-0.393*
	(0.338)	(0.069)	(0.851)	(0.059)
Constant	0.134	-2.624***	-6.188***	-3.461***
	(0.955)	(0.000)	(0.008)	(0.000)
# observations	452	1,787	436	1,809
R^2	21.50%	13.90%	20.90%	13.60%

Table I.2. Combinations of determinants

This table reports OLS estimation results for insider net purchases in acquiring and matched firms in the pre- and post-announcement period. Panels A and B partition the sample across acquirer target pairwise similarity (PS), selling mechanism, and payment consideration in the pre- and post-announcement period, respectively. Panel C partitions the sample across payment consideration, acquirer target pairwise similarity (PS), and selling mechanism with acquirer abnormal returns in the post-announcement period. Insiders are defined as top officers and independent directors. Net purchases (purchases less sales) are measured as the fraction of shares outstanding in basis points scaled on monthly basis and winsorized at the 5^{th} and 95^{th} percentiles. All regressions include the same set of control variables as in Table 5, year and industry fixed effects, which are not reported. We use Hubert/White robust standard errors and report *p*-values in parentheses. All variables are defined in Appendix A. All control variables are winsorized at the 1^{st} and 99^{th} percentiles except all dummy variables. ***, ** and * indicate significance at the one-, five- and ten-percent levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	High PS		Low PS		High PS		Low PS		High PS		Low PS	
	Inf.sale	Auction	Inf.sale	Auction	Stock	Cash	Stock	Cash	Low AR	High AR	Low AR	High AR
Panel A: pre-announcement period												
Acquirer x pre-ann.	0.476*	0.239	0.278	-0.078	0.357	0.563	0.123	0.242				
	(0.068)	(0.657)	(0.296)	(0.879)	(0.182)	(0.240)	(0.747)	(0.426)				
Post-announcement	-0.019	0.290	-0.075	-0.097	0.017	0.021	-0.111	-0.051				
	(0.924)	(0.444)	(0.692)	(0.812)	(0.929)	(0.954)	(0.682)	(0.820)				
Acquirer	-0.301	-0.228	-0.265	-0.208	-0.274	-0.417	-0.147	-0.319				
	(0.118)	(0.592)	(0.172)	(0.575)	(0.157)	(0.258)	(0.587)	(0.149)				
Constant	-1.951***	-7.763***	-5.181**	-6.840***	-3.950***	-5.529***	-5.801***	-2.645*				
	(0.001)	(0.000)	(0.037)	(0.007)	(0.009)	(0.010)	(0.007)	(0.064)				
# observations	1,705	540	1,432	510	1,514	731	722	1,220				
R^2	11.00%	25.40%	12.90%	15.00%	13.10%	16.00%	15.60%	11.00%				
Panel B: post-announcement period												
Acquirer x post-ann.	0.917***	-0.271	0.305	-0.117	0.833***	0.200	0.728	-0.115	0.845***	0.336	0.203	0.249
	(0.001)	(0.609)	(0.308)	(0.835)	(0.004)	(0.664)	(0.108)	(0.721)	(0.008)	(0.395)	(0.567)	(0.528)
Post-announcement	-0.338*	-0.002	-0.143	0.295	-0.296	-0.084	0.042	-0.026	-0.311	0.002	0.156	-0.167
	(0.100)	(0.997)	(0.479)	(0.470)	(0.159)	(0.805)	(0.896)	(0.903)	(0.187)	(0.994)	(0.538)	(0.514)
Acquirer	-0.662***	0.313	-0.636***	-0.137	-0.522**	-0.260	-0.549	-0.399*	-0.432*	-0.467	-0.352	-0.699**
	(0.002)	(0.444)	(0.004)	(0.750)	(0.018)	(0.470)	(0.113)	(0.084)	(0.076)	(0.123)	(0.190)	(0.014)
Constant	-3.106***	-2.814	-3.853***	-11.314***	-4.661***	-4.696***	-3.863***	-8.858***	-1.354	-6.026***	-5.952***	-5.178***
	(0.002)	(0.207)	(0.000)	(0.000)	(0.000)	(0.005)	(0.009)	(0.000)	(0.182)	(0.000)	(0.001)	(0.000)
# observations	1,723	560	1,469	508	1,534	749	739	1,238	1,276	1,007	991	986
R^2	12.90%	26.00%	15.60%	15.30%	14.90%	21.40%	10.70%	16.50%	14.90%	16.60%	17.40%	12.60%

Table I.3. Triple combinations in the post-announcement period

This table reports OLS estimation results for insider net purchases in acquiring and matched firms in the post-announcement period (until the deal completion date) across the partitions for acquirer target pairwise similarity, selling mechanism, and payment consideration or acquirer abnormal returns. Insiders are defined as top officers and independent directors. We measure net purchases (purchases less sales) as number of shares purchased minus sold as a percentage of shares outstanding in basis points, scale them on a monthly basis and winsorize them at the 5^{th} and 95^{th} percentiles. Acquirer is a dummy variable equal to 1 for acquiring firms and 0 for matched firms. Post-announcement period is a dummy variable equal to 1 for the period after the public announcement date and 0 for control period. All regressions include a set of control variables, year and industry fixed effects, which are not reported. We use Hubert/White robust standard errors and report *p*-values in parentheses. All variables are defined in Appendix A and all control variables are winsorized at the 1^{st} and 99^{th} percentiles except all dummy variables. ***, ** and * indicate significance at the one-, five- and ten-percent levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	High PS				Low PS			
	Inf.sale		Auction		Inf.sale		Auction	
	Stock	Cash	Stock	Cash	Stock	Cash	Stock	Cash
				Panel A				
Acquirer x post-ann.	1.251***	-0.035	-0.972	0.468	0.790	-0.113	0.293	-0.182
	(0.000)	(0.949)	(0.140)	(0.598)	(0.101)	(0.767)	(0.847)	(0.762)
Post-announcement	-0.535**	0.381	0.536	-0.759	-0.087	-0.105	0.721	0.162
	(0.019)	(0.362)	(0.316)	(0.228)	(0.802)	(0.667)	(0.492)	(0.724)
Acquirer	-0.991***	0.324	1.501***	-0.960	-0.503	-0.598**	-0.878	0.112
	(0.000)	(0.439)	(0.003)	(0.147)	(0.167)	(0.027)	(0.501)	(0.799)
Constant	-4.484***	-1.395	-5.082	-4.302	-4.854***	-3.023**	-1.870	-12.996***
	(0.001)	(0.459)	(0.152)	(0.213)	(0.003)	(0.018)	(0.878)	(0.000)
# observations	1,234	489	300	260	623	846	116	392
R^2	15.50%	20.20%	28.90%	35.20%	0.137	19.70%	31.70%	23.70%
	High PS				Low PS			
	Inf.sale		Auction		Inf.sale		Auction	
	Low AR	High AR	Low AR	High AR	Low AR	High AR	Low AR	High AR
				Panel B				
Acquirer x post-ann.	1.142***	0.533	-0.356	-0.320	0.410	0.263	-0.597	0.264
	(0.001)	(0.239)	(0.623)	(0.686)	(0.282)	(0.581)	(0.512)	(0.708)
Post-announcement	-0.580**	0.054	0.263	-0.077	-0.033	-0.247	0.671	-0.006
	(0.026)	(0.875)	(0.670)	(0.892)	(0.895)	(0.427)	(0.345)	(0.991)
Acquirer	-0.670**	-0.557	0.925	0.001	-0.512*	-0.772**	0.626	-0.591
	(0.010)	(0.119)	(0.127)	(0.999)	(0.075)	(0.026)	(0.391)	(0.263)
Constant	-0.715	-5.177***	-2.298	-2.381	-3.415**	-4.643***	-18.180***	-5.737*
	(0.571)	(0.000)	(0.546)	(0.535)	(0.016)	(0.001)	(0.001)	(0.050)
# observations	1,003	720	273	287	777	692	214	294
R^2	15.30%	15.50%	32.50%	33.70%	21.20%	15.80%	25.60%	22.70%