Trading Activities Prior To M&A Announcements: Beyond the Acquirer and the Target

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Abstract

I study the trading activities prior to M&A announcements. I find that not only acquirers and targets experience abnormal trading activities in stock and option markets, but also their rival firms. The results are especially strong for options that prior literature suggests the insiders are most likely to trade. I find that the implied volatility spread (IV spread) constructed from a rival's option prices the day before announcement can predict this rival's cumulative abnormal return (CAR) over the announcement window. There is also limited evidence that acquirer rivals' IV spread is negatively related with the acquirer's announcement CAR. As IV spread is widely adopted as a proxy for informed trading activities in option market, my findings provide evidence that informed traders may capitalize on their informational advantage regarding the M&A deals by trading rival firms.

1 Introduction

Informed trading has drawn extensive attention from both academics and practitioners. According to the Securities Exchange Act of 1934 (Williams Act), engaging in any trading practices that take advantage of information most investors do not have is considered fraud. In practice, corporate "insiders", e.g., corporate officers, directors, and substantial owners, are required to report to the S.E.C when they trade their companies , as these insiders have a significant informational edge relative to other investors when it comes to market movements during corporate events, such as earnings announcements, payout policy change, and M&A announcements.

A large body of literature studies informed trading activities in financial markets around these events.[1] These studies focus on the firms that hold these events, i.e., firms that make earnings announcements, announce payout policy changes, or announce plans for mergers and acquisitions. However, Ayres and Bankman (2001) suggest that there is "abundant evidence" that corporate insiders, who are explicitly prohibited by law from trading on material nonpublic fiduciary information, often leverage their informational edge and trade "substitute stocks". Rivals of the announcing firms are one of the main substitutes they discuss in-depth. They argue that the predictable correlations between substitutes will be much stronger from an insider's perspective than what informationally challenged outsiders would perceive. They also discuss the legality of such a practice. In a recent development in M&A literature, Anton, Azar, Gine, and Lin (2020) find that value-destroying acquisitions may get approved and completed by corporate decision makers when announcement losses from acquirer stakes can get mitigated by gains from not only target stakes, but also rival stakes with common ownership often shared between merging firms and their rivals. Their findings suggest that insiders potentially do have certain insights into how rival firms' share prices will react to an M&A an-

[1] See Keown and Pinkerton (1981), Meulbroek (1992), Jayaraman and Shastri (1993), Amin and Lee (1997), Chakravarty and McConnell (1999), and Chan, Ge, and Lin (2015), among others.

nouncement ex ante, and are able to make more informative decisions that benefit themselves accordingly. While translating nonpublic information into trading rival firms is technically still a practice that takes advantage of information most investors do not have, it has received much less attention from regulators or academics, and typically has not been considered illegal.

In this study, I examine the abnormal trading activities on the rival firms around an important type of unscheduled corporate event: M&A announcements. More specifically, while the previous studies in this literature look into the merging firms, I extend my investigation of abnormal trading activities in stock and options markets beyond the current scope and take the rivals of the merging firms into consideration. According to Ayres and Bankman (2001), corporate insiders do consider trading rival firms a "substitute to insider trading", and it is prevalent for them to take advantage of their insider information and capitalize the financial gain in markets of rival firms with much lower risk exposure to negative legal consequences. Prior literature has documented abnormal stock and option trading of acquirers (e.g., Chan, Ge, and Lin (2015)) and targets (e.g., Augustin, Brenner, and Subrahmanyam (2019)) prior to M&A announcements. A testable hypothesis is that abnormal stock and option trading activities occur to the rivals of the mergers prior to M&A announcements as well, and the direction of these trades should contain information that can predict how a rival's share price will react to the announcement.

Consistent with this hypothesis, I find that prior to the M&A announcement, abnormal trading does not only emerge in acquirers and targets, but also among their rival firms. The effect is especially strong for options that prior literature has suggested the insiders are most likely to trade. I also construct the implied volatility spread (IV spread), a measure that has been well adopted in literature as a proxy for the signed informed trading activities in options markets. I find that the IV spread constructed from a rival's option prices the day before announcement can predict this rival's cumulative abnormal return (CAR) over the announcement

window. When the pre-announcement implied volatility spread is larger, indicating more expensive call relative to put, this rival will experience higher announcement CAR. There is also marginal evidence that the magnitude of rival firms' implied volatility spread is negatively related with the merging firm's announcement CAR, even though it is not the firm that is directly involved in the M&A. These findings are consistent with the hypothesis that there are informed trading activities on rival firms prior to M&A announcement.

My findings contribute to the informed trading literature from a novel perspective. Both theoretical and empirical literature suggests that informed traders trade in both stock and option markets, especially options when the implicit leverage provided by options is high and the trading cost in option market is low (Back (1993), Easley, O'hara, and Srinivas (1998), Cao (1999), and Cremers and Weinbaum (2010), among others). Several studies have documented that stock and option trading activities prior to corporate events contain information about the events, such as earnings announcements and M&A announcements, suggesting that informed traders likely have taken advantage of their informational edge and earn abnormal returns in capital markets. Unlike earnings announcements, the general public are less likely to speculate on the timing of unscheduled events such as M&A; these events offer especially large information advantage, hence especially profitable, though illegal, trading opportunities for insiders. The informed trading activities that precede M&A announcements have been well studied, and ample evidence of such activities has been documented. However, so far the studies that examine informed trading in options markets prior to M&A announcements only consider the merging firms. To the best of my knowledge, my study is the first to extend the consideration to the merging firms' rivals. As the merging firms and their rivals rarely announce M&A activities at the same time, the results on merging firms and their rivals are more convincingly separable, which provides a great opportunity to study insiders' "substitute trading" activities. I explore this new channel that

the informed traders may have adopted to take advantage of their informational advantage regarding specific corporate events and gain in financial markets.

My findings also shed light on the informational connection between companies and their rivals during corporate events. The effect of M&A events on the mergers' rivals has been long studied. On one hand, theoretical literature suggests that a merger can create positive spillovers for non-merging rivals (Deneckere and Davidson (1985) and Perry and Porter (1985)). Empirically, positive effect of takeover announcements on rival firm stock returns has been documented in literature (Eckbo (1983), Eckbo (1985), Mitchell and Mulherin (1996) and Servaes and Tamayo (2013)). However, Derrien, Fresard, Slabik, and Valta (2017) suggest that rivals can lose value as losing competitive power, which can well happen when the targets are private, and the acquirer rivals negatively react to the M&A announcements. An insider of the merging firm can well possess insights into its rivals and into how an M&A announcement will affect their equity values, and capitalize on those insights. Therefore, in this study, I approach the rival firms' differential reactions to an M&A announcement from the trading perspective. I find that the rivals' differential reactions can be predicted by implied volatility spread derived from option prices prior to the announcement, while prior literature widely considers the said spread as a signed proxy for informed trading in options markets. These findings are consistent with the hypothesis that corporate insiders may have been taking advantage of the informational connection between a firm and its rivals and capitalizing their insider information during M&A events.

The remainder of the paper is organized as follows: in Section 2, I describe the data sample and the construction of the main variables of interest. In Section 3, I describe the methodology for the empirical analysis, and present and discuss the empirical results. In Section 4, I provide some further discussion on the potential informational link between rival and merging firms. In Section 5, I provide some concluding remarks.

2 Data

2.1 Data Description

The data used in this study come from the following primary sources. First, I gather the data on acquisitions by publicly traded US firms for the US targets between 2003 and 2013 from Securities Data Corporation (SDC) Mergers &Acquisitions database. All acquisitions for which Compustat or CRSP data is missing are excluded. Table 1 reports the number of deals and acquirers involved over years. These data include the percentage of target that the acquirer wants to acquire (Sought), whether the target management is opposed to acquisition by the acquirer (Hostile), whether the acquisition is completed (Completed), the size of acquisition in millions (Dealsize), and whether it is a cash merger (Cash Merger), defined as a merger where the primary payment is cash (i.e., the "% of cash" in SDC is greater than or equal to 50).

Second, I gather daily stock trading volumes, stock returns, closing prices, and shares outstanding for the merging firms and their rivals between 2002 and 2013 from the Center for Research in Security Prices (CRSP). I then construct the cumulative abnormal return (CAR) over the two-day window from the announcement day to the first day after.

Third, I obtain accounting information for the merging firms and their rivals from Compustat. Following Fee and Thomas (2004), I identify rivals as any firms, besides the bidder and target, which have at least one segment for the year before the M&A in the same four-digit SIC code industry group as the merging firm. The data used to identify rivals are also from the Compustat.

Fourth, I gather end-of-day historical option data between 2002 and 2013 from the Option Price Reporting Authority (OPRA) database by option series, i.e. unique underlying symbol, option type (call or put), strike price, and expiration date. These data include daily closing prices, closing NBBO bid and ask prices, contract volume,

and implied volatilities. I exclude daily option observations with zero or missing NBBO prices and implied volatilities. I also remove any daily option observation that has a bid price of zero or violates no-arbitrage restrictions.

2.2 Measures of interest

2.2.1 Abnormal trading

One of the main variables of interest in this study is the abnormal trading volume on merger firms and their rivals prior to M&A announcement. To measure the abnormal trading volume for both stock and options, I use the mean-adjusted abnormal trading volume approach. I take trading day -90 to day -31 prior to the announcement date as the benchmark period, which I denote as {-90, -31}. For each day, I calculate the daily volume as the number of traded stocks (option contracts across moneynesses and times-to-maturity, where each contract corresponds to 100 shares in the underlying stock). Then I calculate the average daily trading volume over this period as the benchmark daily trading volume. Over the pre-event period {-20, -1}, I define the abnormal mean-adjusted volume for subject firm i on day t during the pre-event period as:

$$Abnormalvolume_{it} = Volume_{it} - Benchmarkvolume_i \tag{1}$$

where

$$Benchmarkvolume_i = \frac{1}{60} \sum_{t=-90}^{-31} Volume_{it} \tag{2}$$

This measure shows on daily basis, how much more trading happens to a particular firm as the day that an M&A is announced approaches, relative to its regular

trading level. I construct this measure for all the merging firms as well as their rival firms, namely any firms which have at least one segment for the year before the M&A in the same four-digit SIC code industry group as the merging firms (Fee and Thomas (2004)).

2.2.2 Implied volatility spread

Implied volatility spread (IV spread) is the difference in implied volatilities between a pair of call and put options with the same time-to-maturity and strike price. Put-call parity suggests zero IV spread for European options. Cremers and Weinbaum (2010) argue that the emergence of non-zero IV spread, even for American options, is largely driven by the price pressure induced by informed trading in option markets, and find that the magnitude of the IV spread can predict future stock returns. The intuition is that the demand for a certain type of options from informed traders drives their prices in the direction consistent with the private information, which is not yet reflected in stock prices, but will be later on. For example, a larger IV spread indicates that call options are more expensive relative to the puts. Assuming the prices for calls are driven higher by the demand of informed traders, such a demand indicates that informed traders expect the underlying stock price will increase in the near future, which later on will happen in the underlying market. They also find supportive evidence consistent with the account that the predictive power of IV spread originates from the informed trading activities in options markets. Therefore, IV spread is widely adopted in literature as a signed proxy for informed trading activities.

Following Cremers and Weinbaum (2010), I construct IV spread as the average difference in implied volatilities between call and put options for the same security with the same strike price and the same maturity weighted by open interests. In particular, the IV spread is computed for each firm i on each day t as:

$$IVspread_{it} = IV_{it}^{calls} - IV_{it}^{puts} = \sum_{j=1}^{N_{it}} w_{jt}^{i}(IV_{jt}^{i,calls} - IV_{jt}^{i,puts}) \quad (3)$$

where j refers to pairs of call and put options with the same strike price and the same maturity; N_{it} is the number of put-call pairs for each stock i on day t; and w_{jt}^{i} is the weight, computed as the average open interest of call and put in each pair. IV_{jt}^{i} represents the Black and Scholes (1973) implied volatility for each call and put option.

2.3 Descriptive statistics

In this subsection, I summarize the M&A measures as well as the stock and option characteristics in the sample used in the empirical analysis.

Panel A and Panel B of Table 2 report summary statistics for the acquirers and targets, respectively. Much fewer targets in the sample are publicly traded with listed options relative to the acquirers (500+ vs. 11,000+). Most acquirers in the sample seek complete control of the targets once the deal is completed. The average deal size is 591.91 million dollars. The deals in which targets are publicly traded are much larger in size, averaging 3.50 billion dollars. In both samples deal sizes are highly positively skewed. Forty-five percent of the deals are cash mergers, in which at least half of the payments are made with cash. Ninety-one percent of the announced deals end up being completed. Note that this percentage is much lower in the mergers in which the target is a public company. Almost none of the deals are hostile.

Consistent with the literature, the average target announcement CAR is highly positive (19.13%). The average acquirer announcement CAR is close to zero (-.27%). The acquirer market capitalization averages 16.03 billion dollars, while the market capitalization for the publicly traded targets averages 3.70 billion dollars. Listed

options on those merging firms are not substantially different between acquirers and targets, both with near zero IV spreads and similar bid-ask spreads.

Table 3 summarizes the rival firms. On average, each acquirer has 31.55 rivals, with a median of 13. Each target has 33.40 rivals, with a median of 15. The average acquirer rival announcement CAR is -.04%, while the average target rival announcement CAR is .20%. The standard deviations for both acquirer and target rivals' CAR are relatively big though (3.92% and 4.81%, respectively).

3 Empirical methods and results

In this section, I describe my empirical methods, present the results of the empirical analysis, and provide a discussion of them. First, I study the abnormal trading activities for both merging firms and their rivals prior to M&A announcements. Next, I examine whether the magnitude of the IV spread, which is well accepted as a signed measure for informed option trading in literature, can predict announcement CAR for rivals of the merging firms, indicating the potential informed trading activities of rivals prior to M&A announcements.

3.1 Abnormal trading

Abnormal trading activities on merging firms before M&A announcements have been well documented by prior literature (Keown and Pinkerton (1981), Meulbroek (1992), Jayaraman, Frye, and Sabherwal (2001), Chan, Ge, and Lin (2015), and Augustin, Brenner, and Subrahmanyam (2019), among others). Ayres and Bankman (2001) suggest that there is "abundant evidence" that corporate insiders, though explicitly prohibited by law from trading on material nonpublic fiduciary information, often still leverage their informational edge and consider their rival firms substitutes, with much less risk exposure to negative legal consequences. Hence, we should expect to observe abnormal trading activities in the markets for the rival firms as well.

In this section, I examine stock and option trading prior to M&A announcements. I consider both merging firms and their rivals. I estimate abnormal trading volume over the time window {-20, -1} based on the benchmark trading volume over {-90,-31} for each acquirer, target, and their rivals. I consider both the daily abnormal volume and the cumulative abnormal trading volume over the 20-day window.

3.1.1 Results for merging firms

Figure 1 presents how the average abnormal stock and option trading volume evolves over the 20-day period prior to M&A announcements for acquirers. On average, there is a sizable growth in acquirer abnormal volume over the 20-day period prior to M&A announcements, though volatile. The total daily abnormal volume on stocks grows over time and exceeds 63,646 on average, while the average abnormal trading volume on options rises to 346 contracts the day right before announcement.

Figure 2 presents how the average abnormal stock and option trading volume evolves over the 20-day period prior to M&A announcements for targets. The trading activities are much heavier for targets. The abnormal stock trading spikes and reaches 1,902,197 and the abnormal option trading reaches 6227 contracts the day right before announcement. This is in line with the well documented effect that M&A announcement usually triger a significant positive reaction for the target's stock price. It is also consistent with the findings in Augustin, Brenner, and Subrahmanyam (2019) regarding the prevalent informed trading activities in target prior to the announcement.

Both calls and puts see substantial growth in abnormal volume, which supports Jayaraman, Frye, and Sabherwal (2001), who find that the absolute number of calls versus puts does not necessarily provide information regarding the sign of the sentiment.

Table 4 reports the cumulative abnormal trading volume of the merging firms over the 20-day period. Option results are reported by option type and moneyness

group for the merging firms. Consistent with the information conveyed in the figures, target firms' abnormal volumes are substantial across security types, option types and moneyness groups. The average cumulative abnormal volume of OTM calls over the 20-day window prior to M&A's is especially shocking. The cumulative abnormal volume in acquirer is not as substantial, but more significant in ATM calls and OTM puts.

In untabulated results, I find that the options with short time-to-maturity see the most increase in trading volume, and the open interests also experience significant rise, consistent with potential informed trading activities.

3.1.2 Results for rival firms

Figure 3 and Figure 4 present how the average abnormal trading volume evolve over the 20-day period prior to M&A announcements for acquirer rivals and target rivals, respectively . The increasing trend in abnormal volume for both acquirer and target rivals is, although slow and somewhat volatile, notable. For acquirer rivals, the average daily abnormal trading rises to 15,000 on stocks, and grows to exceed 100 contracts on options the day right before announcement. We see similar pattern and magnitude of increase in stock and options markets of target rivals. Note this is a measure averaged across all the rivals in the sample. When taking the fact that each merging firm on average has more than 30 rivals into account, the actual total abnormal option volume across all the rivals is very substantial.

Table 5 reports the cumulative abnormal option volume over the 20-day period for all the rivals of the merging firms. . Option results are reported by option type and moneyness group. Acquirer rivals experience significant abnormal volume in both ATM and OTM option groups, while target rivals see more abnormal volume in ATM group. Again, when the average number of rivals each merging firm has is taken into account, these abnormal trading activities in rival firms' options are considerable.

In untabulated results, similar with the merging firms, I find that the rival options with short TTM also see the most increase, and the open interests also experience significant rise, which are patterns consistent with potential informed trading activities.

In summary, abnormal volumes do rise in both stock and option markets as the M&A announcement day approaches, not only for merging firms, but also for their rivals. Overall, call options volume sees bigger increase, especially for ATM and OTM groups. Prior literature suggests that informed traders are more likely to trade ATM (for the sake of lower transaction costs and higher liquidity) and OTM (for the sake of greater leverage) options. My findings are consistent with the hypothesis that informed trading activities emerge in options markets prior to M&A announcements, for both merging firms and their rivals.

3.2 IV spread and announcement CAR

3.2.1 Empirical Methods

Chan, Ge, and Lin (2015) find that the magnitude of the IV spread constructed from option prices observed prior to M&A announcements can predict the acquirer's announcement CAR. As IV spread is well adopted in literature to proxy for the signed informed trading activities in options markets, they suggest that informed traders capitalize on their informational advantage in option markets. Built upon their work, and the evidence documented by Ayres and Bankman (2001) that insiders consider trading rival firms "substitutes for insider trading", my study does not only consider the merging firms, but also examine whether the magnitude of the IV spread constructed from rival firms can predict rival firm CAR over an announcement window as well. Consistent with Chan, Ge, and Lin (2015), the main regression model is specified as:

$$
\begin{aligned}
CAR_{it,t+1} = \beta_{0i} &+ \beta_{1i} IV\_Spread_{it-1} + \gamma_{1i} Completed_{it} \\
&+ \gamma_{2i} Saught_{it} + \gamma_{3i} Hostile_{it} + \gamma_{4i} CashMerger_{it} \\
&+ \gamma_{5i} MktCap_{it} + \gamma_{6i} Ret\_last\_monthit + \gamma_{7i} Ret\_last\_yearit \\
&+ \gamma_{8i} BM_{it} + \gamma_{9i} Year\_Fixed\_Effectit \\
&+ \gamma_{10i} Year\_Fixed\_Effectit + \epsilon_{it}
\end{aligned} \tag{4}
$$

where $CAR_{it,t+1}$ is the two-day cumulative abnormal return from the M&A announcement date t to the day next for each acquiring firm i, IV_SPREAD is the IV spread on day $t-1$ for each firm i, constructed as Cremers and Weinbaum (2010) do. *Sought* is the percentage of target that the acquirer wants to acquire. $Hostile$ is the dummy variable indicating whether the target management is opposed to acquisition by the acquirer. *Completed* is the dummy variable indicating whether the acquisition is completed. $Dealsize$ is the size of acquisition in millions, and $CashMerger$ is the dummy variable indicating whether it is a merger in which the "% of cash" in SDC is greater than or equal to 50. $MktCap$ is the natural logarithm of the acquirer market capitalization the day before the event day. BM is the natural logarithm of the ratio of book value to market capitalization for the acquirer. *Ret_last_year* is the acquirer buy-and hold return over day -250 to -21. *Ret_last_month* is the acquirer buy-and hold return over day -20 to -1.

In order to test whether the predictive power of IV spread for future stock returns varies in option market liquidity, I also consider the following specification:

$$
\begin{aligned}
CAR_{it,t+1} = \beta_{0i} + \beta_{1i} IV\_Spread_{it-1} + \beta_{1i} IV\_Spread_{it-1} * BA\_Spread_{it-1} \\
+ \gamma_{1i} Completed_{it} + \gamma_{2i} Saught_{it} + \gamma_{3i} Hostile_{it} + \gamma_{4i} CashMerger_{it} \\
+ \gamma_{5i} MktCap_{it} + \gamma_{6i} Ret\_last\_monthit + \gamma_{7i} Ret\_last\_yearit \\
+ \gamma_{8i} BM_{it} + \gamma_{9i} Year\_Fixed\_Effectit \\
+ \gamma_{10i} Year\_Fixed\_Effectit + \epsilon_{it}
\end{aligned} \tag{5}
$$

where BA_Spread_{it-1} is the open interest weighted option bid-ask spread as a percentage of their midpoint. According to Easley, O'hara, and Srinivas (1998) and Cao (1999), informed traders are more likely to trade in option market when options are more liquid.

3.2.2 Results for merging firms

Table 6 presents the results from the regression of the announcement CAR of the merging firms on their IV spread and controls, as seen in Chan, Ge, and Lin (2015). Consistent with the findings in Chan, Ge, and Lin (2015), IV spread has a strong predictive power for merging firms' CAR over the announcement window. Hostile deals usually cause the acquirer to have more negative CAR, and the target to have more positive CAR. Cash deals generate more positive market reactions for both acquirers and targets. Market capitalization has a negative effect on announcement CAR for both acquirers and targets.

However, note that, just as in Chan, Ge, and Lin (2015), the coefficient on the interaction term $IV\_SpreadXBid - Ask\_Spread$ is insignificant for both acquirer and target. If anything, it has a positive sign for acquirer. This is inconsistent with the prior literature that suggests informed traders are more likely to trade in options markets when options are more liquid.

3.2.3 Results for rival firms

Next, I study the information content of the IV spread constructed from a rival firm's options. I examine the predictive power of a rival firm's IV spread for the rival announcement CAR. I regress the rival announcement CAR on the rival's IV spread and other controls. Specifically, I also include the interaction between the IV spread and the bid-ask spread as one of the controls in order to investigate the impact of options markets liquidity on the potential informed trading activities for these rivals.

Table 7 reports the results of such a regression for all the acquirer rivals. The coefficient on the IV spread in this regression is positive and statistically significant at .01 level. The results are robust across all specifications. Furthermore, the coefficient on the interaction term $IV\_SpreadXBid - Ask\_Spread$ is negative and statistically significant at .01 level, consistent with the view in the prior literature that informed trader usually choose to trade in options markets when they are more liquid, indicating lower option transaction cost. In other word, the predictive power of the rival's IV spread for its CAR over the M&A announcement window is weaker when its options are more expensive to trade, indicated by larger bid-ask spread.

Interestingly, the coefficient on $Hostile$ is positive and statistically significant in two specifications and insignificant in the other two. This result provides marginal evidence that a rival is more likely to gain higher announcement CAR when the deal is hostile. Such an effect is erased by the industry fixed effect. Cash mergers are more likely to generate positive announcement CAR for acquirer rivals, which may relate to less uncertainty associated with cash mergers. In those deals that would eventually end up being completed, acquirer rivals are more likely to generate negative returns over the announcement window, consistent with the view that a to-be-completed M&A increases the acquirer's market power.

Table 8 reports the results for target rivals. The coefficient on the IV spread is positive and statistically significant, indicating that target rival's IV spread can also

predict the rival's announcement CAR positively. The results are robust across specifications. The coefficient on the interaction term IV_Spread X $Bid - Ask\_Spread$ is negative but statistically insignificant.

The coefficient on $Hostile$ is still positive and statistically significant in two specifications, suggesting that a target's rival is also more likely to gain higher announcement CAR when the deal is hostile. Such an effect is erased by the industry fixed effect. Cash mergers are more likely to generate positive announcement CAR for target's rivals as well. In those deals that would end up being completed, target's rivals are more likely to generate positive returns over the announcement window, consistent with the view that a to-be-completed M&A deal may indicates a higher probability for the target's rivals to become target as well.

The untabulated results suggest these findings are not driven by the regular predictive power of the IV spread for future stock returns documented by Cremers and Weinbaum (2010), as the results are either insignificant or less significant when a date other than the actual announcement day is selected.

3.2.4 Further discussion

In this subsection, I explore whether the informed trading activities in rival firms' options markets have any indication for the merging firm's announcement CAR. As target firms' announcement CAR's in general tend to be positive and lack variation, I study the information content in acquirer rival's IV spread and examine its connection with the acquirer's CAR over the two-day announcement window.

If an insider is confident that the acquisition will be perceived as an activity that will considerably increase the acquirer's market power, then she will likely expect the acquirer rivals' share prices react to the announcement negatively. Then she may enter short positions of the rivals. If she believes the opposite will happen, i.e., the acquisition is value destroying and makes her rivals more competitive, and expects the market is going to resonate with such a belief, she will likely enter long

positions of the rival. Therefore, the signed informed trading activities in acquirer's rival firms, proxied by the IV spread, will be negatively related with the acquirer's announcement CAR. On the other hand, however, there are value adding M&A's the positive effect of which can spillover to the rivals Deneckere and Davidson (1985). In that case, rival firms' IV spread may be positively associated with the acquirer's CAR over the announcement window.

In order to answer the question of whether and how the IV spread of the rival firms can predict the announcement CAR of the merging firms empirically, I regress the acquirer's announcement CAR on its own IV spread, as well as the IV spread averaged across all its rivals. Table 9 presents the results of this analysis. While the coefficient on the IV spread still holds positive, the coefficient on the average rival IV spread is negative, but insignificant. I further split the sample by the primary payment method (whether $CashMerger$ equals 1), and present the results in Table 10. For cash mergers, the coefficient on $Rivals'IV spread$ is significantly negative. This implies that informed trading activities in the rivals' options markets, proxied by the IV spread averaged across all acquirer rivals, is negatively associated with the acquirer's announcement CAR. In untabulated results, such a negative relation appears to be driven by the value adding acquisitions and the rival firms' negative IV spreads right before those deals are announced. For non-cash mergers, this coefficient is insignificant.

4 Future Work

A more direct way to investigate whether an acquirer gains market power by an act of acquisition is to examine the Herfindahl-Hirschman Index (HHI) around M&A deals. Evidence that insiders can correctly predict which mergers are market power increasing, which subsequently leads to stronger negative market reactions for the rival firms, would support the view discussed in this study.

Second, corporate insiders' choice to capitalize on their information advantage regarding a particular corporate event may ultimately depend on how well they can predict the reaction of a rival's share price to that event. One way to assess such a predictability is to examine the past stock price correlation or co-movement between a merging firm and its rivals, especially during similar corporate events. I will study whether the IV spread of a rival has stronger predictive power for its own announcement CAR when historically it follows a certain pattern in its co-movement with the merging firm.

Third, insiders are much more likely to choose rival firms as an alternative way to capitalize on their private information when the risk of being caught is very high to trade their own firms. I will study which insiders at which firms are at higher risk of being caught for insider trading and whether their rival firms are more heavily traded prior to corporate events.

5 Concluding remarks

In this paper, I extend the scope of the current research studying stock and option trading activities prior to M&A announcements by taking rivals of the merging firms into consideration. I find that abnormal stock and option trading volumes grow as the announcement day approaches, not only for acquirers and targets, but also for their rivals. Further analysis suggests that the IV spread, which is well adopted in literature to capture informed trading in options markets, can predict announcement CAR, not only for merging firms, but also for their rivals. There is also marginal evidence that for certain M&A deals (for example, cash mergers), the rival firms' IV spread is negatively associated with the acquirer's CAR over the announcement window (0,1).

I contribute to the informed trading literature by exploring a new channel that insiders may have leveraged when explicitly prohibited by law to trade their own

firms with a significant informational edge relative to the rest of the market. I also document evidence on the informational link between merging firms and their rivals during M&A episodes. My findings are consistent with what Ayres and Bankman (2001) discuss in their study of corporate insiders' alternative approaches to insider trading - they may use related firms, such as rivals, as "substitutes for insider trading" and still capitalize on their non-public information.

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Table 1: M&A Over Time

Year	Number of Events	Number of Acquirers
2003	928	561
2004	984	587
2005	1082	620
2006	1157	666
2007	1213	681
2008	1015	623
2009	747	507
2010	979	591
2011	1080	640
2012	1172	672
2013	1172	699

Table 2: Summary Statistics of Merging firms

Table 2 presents the summary statistics for the acquirers (Panel A) and publicly traded targets (Panel B) on acquisitions by publicly traded US firms with listed options for the US targets between 2003 and 2013. *Sought* is the percentage of target that the acquirer wants to acquire. *Hostile* is the dummy variable indicating whether the target management is opposed to acquisition by the acquirer. *Completed* is the dummy variable indicating whether the acquisition is completed. *CashMerger* is the dummy variable indicating whether it is a merger in which the "% of cash" in SDC is greater than or equal to 50. A-CAR(0,1) (T-CAR(0,1)) is the acquirer (target) CAR over the 2-day period from announcement day to the day next. A-Mkt Cap (T-Mkt Cap) is the acquirer (target) market capitalization in billions. A-IVS (T-IVS) is the acquirer (target) implied volatility spread in percent. A-BAS (T-BAS) is the acquirer (target) bid-ask spread as a percentage of the their midpoint.

Panel A						
Variable	N	Mean	Std Dev	Lower Quartile	Median	Upper Quartile
Sought	11472	96.01	16.22	100	100	100
Dealsize	6301	591.91	3098.94	23.80	82.09	284
Cash Merger	11833	0.45	0.50	0	0	1
Completed	11833	0.91	0.29	1	1	1
Hostile	11833	0.00	0.04	0	0	0
A-CAR (0, 1)	11833	-0.27	4.69	-1.33	0.20	1.66
A-Mkt Cap	11833	16.03	41.96	.95	2.60	9.35
A-IVS	11736	-0.89	5.54	-2.09	-0.61	0.68
A-BAS	11503	32.85	23.52	16.54	26.45	41.38

Panel B						
Variable	N	Mean	Std Dev	Lower Quartile	Median	Upper Quartile
Sought	526	93.37	22.34	100	100	100
Dealsize	484	3498.17	7697.47	511.96	1328.18	3069.17
Cash Merger	547	0.49	0.5	0	0	1
Completed	547	0.77	0.42	1	1	1
Hostile	547	0.02	0.13	0	0	0
T-CAR(0,1)	546	19.13	21.54	5.12	14.72	28.53
T-Mkt Cap	547	3.70	8.5	.46	1.140	2.74
T-IVS	543	-0.71	8.56	-2.83	-0.61	1.23
T-BAS	527	35.14	21.13	20.56	30.61	42.70

Table 3: Summary of Rivals

Table 3 summarizes the rival firms. Panel A presents the distribution of the number of rivals for both acquirers and targets. Panel B presents the distribution of the announcement CAR for both acquirers and targets.

Panel A					
# of Rivals	Mean	Std Dev	Lower Quartile	Median	Upper Quartile
Acquirer	31.55	38.23	4	13	48
Target	33.40	37.47	4	15	54
Panel B					
Rivals CAR(0,1)	Mean	Std Dev	Lower Quartile	Median	Upper Quartile
Acquirer	-0.04	3.92	-1.61	-0.09	1.42
Target	0.20	4.81	-1.68	0.00	1.72

Table 4: Abnormal Trading of Merging Firms

Table 4 reports the cumulative abnormal trading volume on merging firms over the 20-day period prior to the announcements. Panel A presents the acquirers. Panel B presents the targets.

Panel A							
		ITM		ATM		OTM	
	Stock	Call	Put	Call	Put	Call	Put
Abnormal Volume	83056.99	131.38	315.74	1367.24	776.29	1190.72	1252.84
t-value	2.11	0.22	0.58	1.72	1.45	1.52	2.3

Panel B							
		ITM		ATM		OTM	
	Stock	Call	Put	Call	Put	Call	Put
Abnormal Volume	14069371.6	3197.69	5853.19	4455.94	3446.37	16254.37	11080.24
t-value	5.12	2.99	1.97	2.1	2.32	2.04	1.8

Table 5: Abnormal Trading of Rival Firms

Table 5 reports the cumulative abnormal trading volume on the rivals of the merging firms over the 20-day period prior to the announcements. Panel A presents the acquirer rivals. Panel B presents the target rivals.

Panel A							
		ITM		ATM		OTM	
	Stock	Call	Put	Call	Put	Call	Put
Abnormal Volume	10559.07	-29.66	68.16	505.59	306.43	343.50	232.91
t-value	2.17	-0.52	1.61	6.85	7.63	4.47	5.41

Panel B							
		ITM		ATM		OTM	
	Stock	Call	Put	Call	Put	Call	Put
Abnormal Volume	435417.24	-123.82	-67.17	619.36	404.24	136.64	284.65
t-value	2.21	-0.69	-0.5	2.7	3.44	0.55	1.94

Table 6: Implied Volatility Spread and Merging Firm Announcement CAR

Table 6 reports the regression of merging firms' announcement CAR on the IV spread and controls. For each stock, $IVspread$ is the spread in volatilities between a pair of call and put with the same strike and maturity weighted with each pair's average open interest. $Bid - AskSpread$ is the open interest weighted option bid-ask spread as a percentage of their midpoint. $Sought$ is the percentage of target that the acquirer wants to acquire. $Hostile$ is the dummy variable indicating whether the target management is opposed to acquisition by the acquirer. $Completed$ is the dummy variable indicating whether the acquisition is completed. $CashMerger$ is the dummy variable indicating whether it is a merger in which the "% of cash" in SDC is greater than or equal to 50. $MktCap$ is the natural logarithm of market capitalization the day before the event day. BM is the natural logarithm of the ratio of book value to market capitalization. $Ret\_lastyear$ is the buy-and hold return over day -250 to -21. $Ret\_lastmonth$ is the buy-and hold return over day -20 to -1.

	Acquirer			Target		
IV Spread	.0337***	.0275***	0.0159	0.0893	0.1282	0.0913
	(3.21)	(3.87)	(0.98)	(1.02)	(.93)	(0.97)
IV Spread						
X Bid-Ask Spread			0.0343			-0.1830
			1.47			-0.29
Completed		0.0029	0.0030*		0.0830***	0.0775***
		(1.6)	(1.86)		(3.62)	(3.79)
Sought		-0	-0		0.0016***	0.0014***
		(-.93)	(-1.01)		(4.30)	(3.8)
Hostile		-0.0280**	-0.0279**		0.1329**	0.130**
		(-2.32)	(-2.31)		(2.24)	(2.35)
Cash Merger		.0046***	0.0049***		0.1312***	0.1224***
		(5.51)	(5.38)		(7.28)	(6.38)
Mkt Cap		-.0013***	-.0013***		-0.0268***	-0.0272***
		(-4.89)	(-4.85)		(-4.32)	(-4.23)
Ret Last Month		0.0026	.0036		-0.1300**	-0.1317**
		(-.73)	(0.82)		(-2.41)	(-2.42)
Ret Last Year		-0.0028***	-0.0029***		-0.0253*	-0.0255*
		(-.4.02)	(-4.09)		(-1.64)	(-1.64)
BM		.0009	0.0009		0.0134	0.0133
		(1.48)	(1.37)		(1.19)	(1.18)
FE	No	Yes	Yes	No	Yes	Yes
N	11563	11079	10857	563	524	510
$AdjR^2$	0.0008	0.0115	0.012	0.0001	0.2535	0.2543

Table 7: Implied Volatility Spread and Acquirer Rival Announcement CAR

Table 7 reports the regression of acquirer rival announcement CAR on the IV spread and controls. For each acquirer rival, $IVspread$ is the spread in volatilities between a pair of call and put with the same strike and maturity weighted with each pair's average open interest. $Bid - AskSpread$ is the open interest weighted option bid-ask spread as a percentage of their midpoint. $Sought$ is the percentage of target that the acquirer wants to acquire. $Hostile$ is the dummy variable indicating whether the target management is opposed to acquisition by the acquirer. $Completed$ is the dummy variable indicating whether the acquisition is completed. $CashMerger$ is the dummy variable indicating whether it is a merger in which the "% of cash" in SDC is greater than or equal to 50. $MktCap$ is the natural logarithm of market capitalization of the acquirer rival the day before the event day. BM is the natural logarithm of the ratio of book value to market capitalization for the acquirer rival. $Ret\_lastyear$ is the buy-and hold return over day -250 to -21. $Ret\_lastmonth$ is the buy-and hold return over day -20 to -1.

	(1)	(2)	(3)	(4)	(5)
IV Spread	.0140***	.0118***	0.0117***	0.0132***	.0240***
	(20.78)	(19.94)	(16.68)	(16.62)	(20.23)
IV Spread X Bid-Ask Spread					-.0174***
					(-9.73)
Completed		-.0005**	-.0004**	-.0003	-.0004
		(-2.43)	(-2.51)	(-.40)	(-.42)
Sought		0**	0***	-0	-0
		(2.55)	(2.58)	(-.38)	(-.033)
Hostile		0.0064***	.0070***	-.0018	-.0016
		(4.6)	(4.59)	(-.30)	(-.26)
Cash Merger		.0003***	.0003***	.0003	-.0003
		(3.73)	(3.72)	(.57)	(.57)
Mkt Cap		-.0001***	-.0001***	0	0
		(-3.74)	(-2.86)	(.91)	(.85)
Ret Last Month		-.0014***	-.0015***	-.0040***	-.0039***
		(3.37)	(-3.41)	(-8.48)	(-9.43)
Ret Last Year		-.0033	-.0033**	-.0035***	-.0034***
		(-45.37)	(-45.41)	(-45.74)	(-43.21)
BM		.0006***	.0006***	.0005***	.0004***
		(10.61)	(10.72)	(9.19)	(8.24)
FE	No	No	Year	Year&Ind	Year&Ind
N	460102	454447	454447	454446	440126
$AdjR^2$	0.0007	.0017	.0018	.6283	0.6296

Table 8: Implied Volatility Spread and Target Rival Announcement CAR

Table 8 reports the regression of target rival announcement CAR on the IV spread and controls. For each target rival, $IV spread$ is the spread in volatilities between a pair of call and put with the same strike and maturity weighted with each pair's average open interest. $Bid - AskSpread$ is the open interest weighted option bid-ask spread as a percentage of their midpoint. $Sought$ is the percentage of target that the acquirer wants to acquire. $Hostile$ is the dummy variable indicating whether the target management is opposed to acquisition by the acquirer. $Completed$ is the dummy variable indicating whether the acquisition is completed. $CashMerger$ is the dummy variable indicating whether it is a merger in which the "% of cash" in SDC is greater than or equal to 50. $MktCap$ is the natural logarithm of market capitalization of the target rival the day before the event day. BM is the natural logarithm of the ratio of book value to market capitalization for the target rival. $Ret\_lastyear$ is the buy-and hold return over day -250 to -21. $Ret\_lastmonth$ is the buy-and hold return over day -20 to -1.

	(1)	(2)	(3)	(4)	(5)
IV Spread	.0125***	.0151***	0.0154***	0.0166***	.0217***
	(4.42)	(3.99)	(5.06)	(5.78)	(4.14)
IV Spread X Bid-Ask Spread					-.0100
					(-1.38)
Completed		.0016**	.0018***	.0031	.0029
		(2.36)	(2.58)	(.79)	(.80)
Sought		-0***	-0***	-.0001	
		(-3.97)	(-3.77)	(-.75)	(-.88)
Hostile		0.0082***	.0084***		
		(3.85)	(3.95)		
Cash Merger		.0017***	.0018***	-0	.0002
		(3.89)	(3.77)	(-.01)	(.05)
Mkt Cap		-.0005***	-.0005***	-.0005***	-.0005***
		(-3.43)	(-3.28)	(-3.29)	(-3.16)
Ret Last Month		-.0044***	-.0044	-.0049***	-.0048***
		(-13.10)	(-12.11)	(-13.19)	(-13.17)
Ret Last Year		-.0061***	-.0064	-.0075***	-.0072***
		(-4.10)	(-4.11)	(-5.19)	(-5.17)
BM		.0005**	.0004*	.0001	-.0024***
		(1.98)	(1.82)	(.59)	(-.51)
FE	No	No	Year	Year&Ind	Year&Ind
N	37818	37819	37818	38946	37900
$AdjR^2$	0.0052	.0063	.0063	.1169	0.1204

Table 9: Rival Implied Volatility Spread and Acquirer Announcement CAR

Table 9 reports the regression of acquirer announcement CAR on the average rival IV spread and controls. For each acquirer, $IVspread$ is the spread in volatilities between a pair of call and put with the same strike and maturity weighted with each pair's average open interest, and $Rivals'IVspread$ is the IV spread averaged across all rivals. $Bid - AskSpread$ is the open interest weighted option bid-ask spread as a percentage of their midpoint for the acquirer. $Sought$ is the percentage of target that the acquirer wants to acquire. $Hostile$ is the dummy variable indicating whether the target management is opposed to acquisition by the acquirer. $Completed$ is the dummy variable indicating whether the acquisition is completed. $CashMerger$ is the dummy variable indicating whether it is a merger in which the "% of cash" in SDC is greater than or equal to 50. $MktCap$ is the natural logarithm of the acquirer market capitalization the day before the event day. BM is the natural logarithm of the ratio of book value to market capitalization for the acquirer. $Ret\_lastyear$ is the buy-and hold return over day -250 to -21. $Ret\_lastmonth$ is the buy-and hold return over day -20 to -1.

	(1)	(2)	(3)
IV Spread	.0269***	.0291***	.0220***
	(3.21)	(3.23)	(2.96)
Rivals'			
IV Spread		-.0192	-0.0199
		(-1.24)	(-1.21)
Completed			0.0027*
			(1.65)
Sought			0.0000
			(-0.87)
Hostile			-0.0322***
			(-2.79)
Cash Merger			0.0043***
			(4.64)
Mkt Cap			-.0014***
			(-5.17)
Ret Last Month			0.0032
			(.68)
Ret Last Year			-0.0027***
			(-3.68)
BM			0.0012**
			(1.97)
FE	No	No	No
N	11563	11304	10831
$AdjR^2$	0.0008	0.0008	0.0073

Table 10: Cash vs. Non-Cash

Table 10 reports the regressions of acquirer announcement CAR on the average rival IV spread and controls for cash mergers and non-cash mergers. For each acquirer, $IV spread$ is the spread in volatilities between a pair of call and put with the same strike and maturity weighted with each pair's average open interest, and $Rivals' IV spread$ is the IV spread averaged across all rivals. $Bid - AskSpread$ is the open interest weighted option bid-ask spread as a percentage of their midpoint for the acquirer. $Sought$ is the percentage of target that the acquirer wants to acquire. $Hostile$ is the dummy variable indicating whether the target management is opposed to acquisition by the acquirer. $Completed$ is the dummy variable indicating whether the acquisition is completed. $Dealsize$ is the size of acquisition in millions, and $CashMerger$ is the dummy variable indicating whether it is a merger in which the "% of cash" in SDC is greater than or equal to 50. $MktCap$ is the natural logarithm of the acquirer market capitalization the day before the event day. BM is the natural logarithm of the ratio of book value to market capitalization for the acquirer. $Ret_lastyear$ is the acquirer buy-and hold return over day -250 to -21. $Ret_lastmonth$ is the acquirer buy-and hold return over day -20 to -1.

	Cash			Non-Cash		
IV Spread	.0201	.0285**	0.0296***	0.0369***	.0363***	0.0350***
	(1.46)	(1.99)	(2.07)	(3.09)	(2.95)	(3.40)
Rivals'						
IV Spread	-.0443*	-.0487*	-.0447*	-.0021	.0014	.0016
	(-1.76)	(-1.83)	(-1.74)	(-.12)	(.07)	(.08)
Completed		0.0026	-.0095		0.0063***	0.0069***
		(-.87)	(-1.05)		(2.98)	(3.53)
Sought		-0	-.0		-0	-0
		(-.15)	(-.15)		(-.94)	(-.03)
Hostile		-0.0117	-.0090		-.0529***	-.0539***
		(-.72)	(-.53)		(-3.05)	(-3.29)
Mkt Cap		-.0012***	-.0016***		-0.0015***	-.0013***
		(-2.70)	(-2.58)		(-4.30)	(-3.02)
Ret Last Month		.0083	.0083		0.0002	-0.0016
		(-.81)	(1.22)		(.08)	(-.29)
Ret Last Year		-0.0039***	-0.0035***		-0.0023**	-0.0026***
		(-3.81)	(-3.53)		(-2.28)	(-2.99)
BM		.0014	0.0012		0.0011	0.0028
		(1.41)	(1.13)		(1.41)	(.41)
FE	No	No	Year	No	No	Year
N	5106	4924	4923	6199	5908	5907
$Adj R^2$	0.0013	0.0065	0.9882	0.0013	0.0169	0.9675

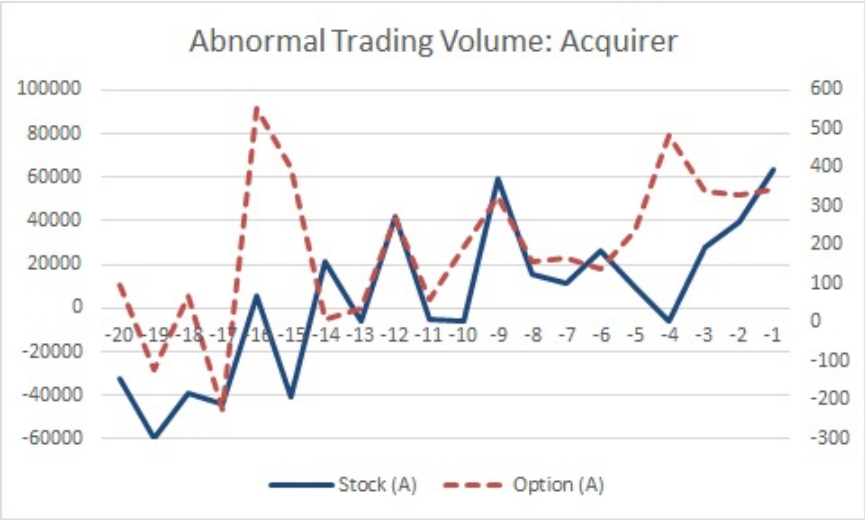

Figure 1: $Stock(A)$ and $Option(A)$ represent the average daily abnormal trading volume of acquirers' stocks and options over the 20-day period prior to the announcement, respectively.

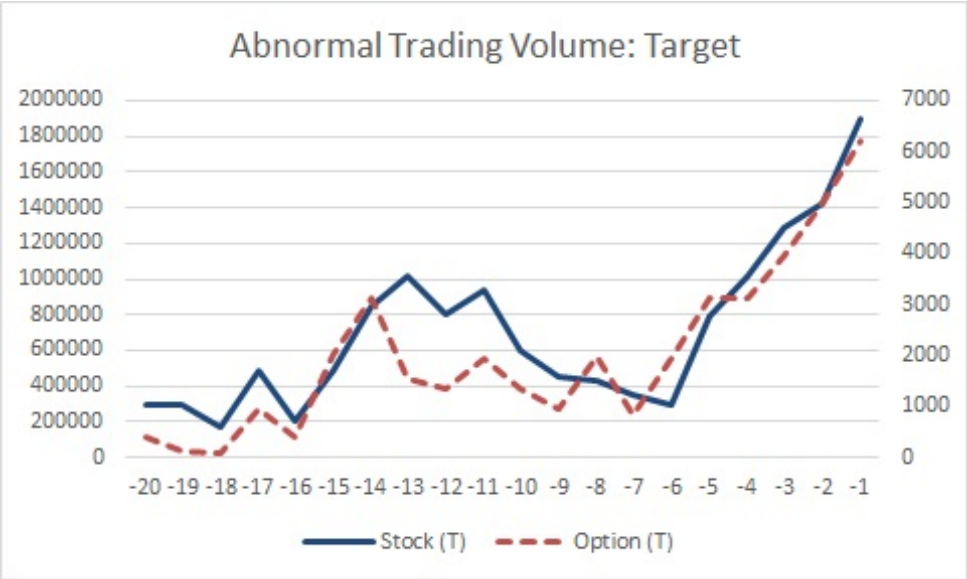

Figure 2: $Stock(T)$ and $Option(T)$ represent the average daily abnormal trading volume of targets' stocks and options over the 20-day period prior to the announcement, respectively.

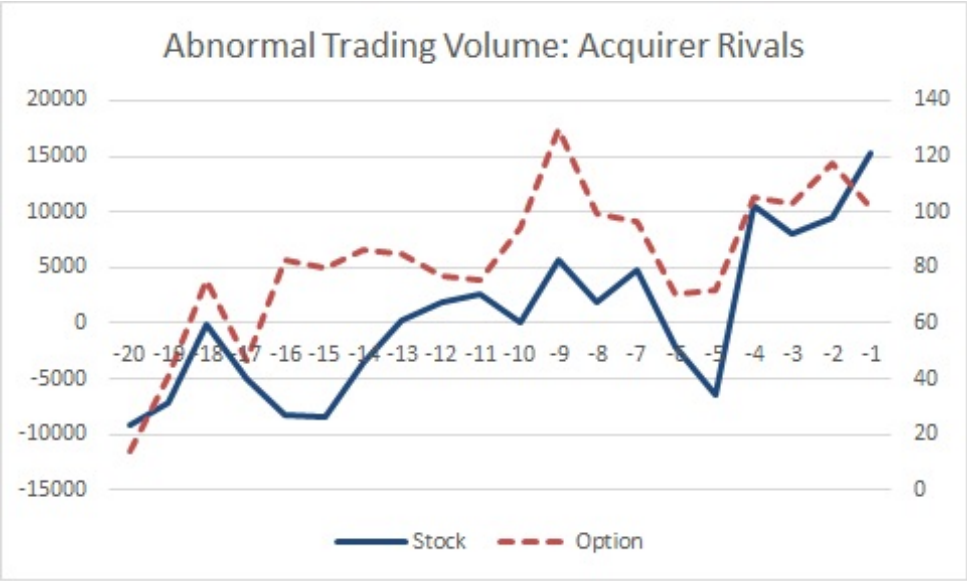

Figure 3: *Stock* and *Option* represent the average daily abnormal trading volume of the stocks and options over the 20-day period prior to the announcement for acquirer rivals, respectively.

Figure 4: *Stock* and *Option* represent the average daily abnormal trading volume of the stocks and options over the 20-day period prior to the announcement for target rivals, respectively