The Impact of Takeover Rumours on Rival Firms

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ABSTRACT

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This paper examines the takeover rumour effects of potential U.S. acquisition targets on rival firms. On average, rival firms earn positive abnormal returns during the rumour period, despite the type and outcome of the rumour. Specifically, rumours concerning industry takeover activities and those regarding targets that undergo financial distress provide higher rival firm returns around the rumour date, while rumours that are seconded by analysts tend to lead to negative abnormal returns for rival firms. Rivals that subsequently become acquisition targets within one year following the rumour experience significantly higher abnormal returns. In related tests, we find that rumours proven to be credible, rumours denied by targets, rumours driven by insiders, rumours involving the PE finder, and rumours containing multiple informative signals are significant predictors of future rival acquisitions.

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1. Introduction

Previous studies have documented the effect of takeover rumours on the stock price of target firms (see Gupta and Misra, 1988; Jarrell and Poulsen, 1989; Clarkson, Joyce, and Tutticci, 2006; Betton, Eckbo, and Thorburn, 2008; Duso et al., 2011; Jain and Sunderman, 2014). Consistent evidence has shown that target firms earn positive abnormal returns at the time of a rumour (see Keown and Pinkerton, 1981; Pound and Zeckhauser, 1990; Chou, Tian, and Yin, 2010; Ahern and Sosyura, 2015; Betton, Davis, and Walker, 2016). However, the effect of takeover rumours on rivals of rumoured targets remains unknown, which is surprising considering that rumours could signal the market of profit opportunities for rival firms. Under the efficient market hypothesis, the market could process new information rapidly. In fact, significant rivals' abnormal returns have been observed around merger announcement dates (see Eckbo, 1983; Stillman, 1983; Bradley, Desai, and Kim, 1983; Eckbo and Wier, 1985; Banerjee and Eckard, 1998; and Duso et al., 2007). Similarly, we expect to see significant change in rival's performance around takeover rumour dates. In our paper, we examine how the market responds to takeover rumours through the changes in rivals' stock prices. Our paper aims to provide evidence on rumours' effects on rivals and contribute to the related literature through an event study.

Song and Walkling (2000) developed the acquisition probability hypothesis to explain the increase in rivals' abnormal returns after a merger announcement and argue that the announcement tends to increase the possibility of rival firms becoming acquisition targets as well. We examine rivals' post-rumour takeover activity and explore whether rivals that eventually become targets themselves after merger rumours experience a more significant impact from rumours compared to those that do not become targets. In addition, we estimate a series of logistic regressions of rivals' acquisition likelihood and different rumour types.

As existing studies on rumours' impact have mainly focus on target firms, our study can help shed some light on how merger rumours affect rivals by analysing their rumour period abnormal returns. By investigating specific rumours' impact according to their information and credibility, as well as looking into rivals' post-rumour acquisition behaviour, this paper is the first empirical study to examine rumours' impact by breaking down their content and aims

to provide a fairly thorough analysis of rumours' effects on rival firms, both at the time of the event and future takeover activity. We contribute to the literature by showing price run-up in rivals at the time of rumours, which indicates that market information can be quickly captured in rivals' stock prices. Though rumours' credibility and informativeness do not have a consistent significant impact on rivals' abnormal returns, they are statistically positive predictors for rivals' future takeover activity. This implies that investors tend to underreact to rivals involved in informative or credible rumours; thus, we recommend that investors refine their trading strategies by raising additional attention to the potential investment opportunities in such rivals.

The remainder of the paper is constructed as follows. We briefly review the previous related literature in Section 2. Section 3 introduces data measurement and research methodology. Specifically, we use 2,015 initial U.S. rumours over the period of 2002 to 2011 and locate a sample of 1,472 rival firms. In Section 4, we first conduct univariate and multivariate analyses to examine rumours' effects by type, and then we employ logistic regression models to discover how specific rumour content helps to predict rivals' post-rumour acquisitions. We find consistent proof that rival firms earn significantly positive abnormal returns during the rumour period. In particular, rumours concerning industry takeover activities and those regarding targets that undergo financial distress provide higher rival abnormal return around the rumour date, while rumours that are seconded by analysts tend to lead to negative abnormal returns for rival firms. Such findings remain robust when we change the risk model to obtain expected returns or use an alternative event window. Rivals that subsequently become acquisition targets within one year following the rumour experience significantly higher abnormal returns. In related tests, we find that rumours proven to be credible, rumours denied by targets, rumours driven by insiders, rumours involving the Private Equity (PE) finder and rumours containing multiple informative signals are significant predictors of future rival acquisitions. A rival's firm size is shown to be a negative predictor for future acquisition activity, which is consistent with previous literature. Finally, we conclude this paper in Section 5.

2. Literature review

2.1 Rumours and measurement

Prior to merger announcements, positive abnormal returns seen in target firms have been documented by extensive literature (Keown and Pinkerton, 1981; Dennis and McConnell, 1986). Keown and Pinkerton (1981) attribute this to the existence of illegal trading due to insider information before the announcement. However, it is often difficult to identify an insider trading activity; an alternative explanation of such price run-up has thus come to exist. It is said that this kind of price increase could be the result of market anticipation, as investors have already been expecting this merger according to media speculation, even before the merger is announced (Jarrell and Poulsen, 1989). This kind of market anticipation usually results from rumours.

To capture rumours, various proxies have been used in previous studies, though with certain flaws. As rumours typically originate from articles published in major newspapers and are usually not immediately confirmed by the merging firms, many studies obtain rumour information from major journals, such as the Wall Street Journal (Keown, Pinkerton, and Bolster, 1992; Jayaraman, Frye, and Sabherwal, 2001), Business Week (Mathur, Ike, and Waheed, 1995) and the Dow Jones News Retrieval (DJNR) system (Schwert, 2000). Recently, because more productive proxies are provided by the Internet, novel Internet indices such as the Hotcopper Internet Discussion Site (IDS) (Clarkson, Joyce, and Tutticci, 2006) and Google search volume (Siganos, 2013) have been utilised to capture rumour characteristics. Ahern and Sosyura (2015) use the media coverage of merger rumours and conclude that experience, educational background and professional expertise of journalists can greatly influence media accuracy. It is clear that simply looking at one journal or a single index from the Internet cannot give a complete picture of merger rumours.

Studies concerning the effects of merger rumours on target firms analyse their performance through stock price changes and abnormal returns (see Gupta and Misra, 1988; Jarrell and Poulsen, 1989; Clarkson, Joyce, and Tutticci, 2006; Betton, Eckbo, and Thorburn, 2008; Duso et al., 2011; Jain and Sunderman, 2014). Consistent evidence has shown that target firms earn positive abnormal returns at the time of the rumour (see Keown and Pinkerton,

1981; Pound and Zeckhauser, 1990; Chou, Tian, and Yin, 2010; Ahern and Sosyura, 2015; Betton, Davis, and Walker, 2016). Current classifications of rumours are either based on their credibility (Chou, Tian, and Yin, 2010) or specific rumour content (Betton, Davis, and Walker, 2016).

2.2 Rival and comparison studies

Rivals are commonly defined as firms with the same Standard Industrial Classification (SIC) code as the targets (see Eckbo, 1983; Eckbo and Wier, 1985; Hertzel, 1991). Song and Walkling (2000) use firms within the same Value Line industry as their rivals. However, most literature concerning rival gives a rather obscure description or uses the term as a given without specification of its definition.

The results of studies concerning a merger announcement's impact on a rival's stock return are mixed. Bradley, Desai and Kim (1983) and Banerjee and Eckard (1998) document significant value losses for competitors. Yet most literature has indicated that rival firms experience a significant increase in abnormal returns as a positive effect from a merger announcement (see Eckbo, 1983; Stillman, 1983; Eckbo and Wier, 1985; and Duso et al., 2007). Respective explanations have been given for such findings. One is that the merger announcements signal the market of profit opportunities of the rival firms. Song and Walkling (2000) develop the acquisition probability hypothesis that explains the increase in rivals' abnormal returns after a merger announcement and argues that the announcement tends to increase the possibility of rival firms subsequently becoming acquisition targets as well.

Research on rivals' reaction to events in the context of mergers and acquisitions is limited to announcements, and the effects of takeover rumours on rivals remain unknown.

3. Data and methodology
3.1 Data

3.1.1 Rumour data

To obtain the rumour data for our sample group, we[1] first defined a rumour as any public conjecture mentioned in business-related journals and/or publications that explicitly indicates a public U.S. firm, from the Centre for Research in Security Price (CRSP) database, to be a potential target for a future takeover. Combining most data sources mentioned in related studies, we began by going through databases including the S&P Capital IQ, S&P Takeover Talk, Zephyr, as well as online services, like Factiva and Pro-Quest, where thousands of other major publications are included, such as the Wall Street Journal, Economist, Bloomberg, BusinessWeek, Dow Jones Newswires and so on. Next, to take a closer look at these takeover rumours, we developed a proprietary algorithm containing the keywords of "strategic alternative", "buyout", "sale of the firm", "looking to be acquired", "takeover candidate", "takeover chatter" and other takeover terms, using S&P Takeover Talk, S&P Capital IQ and Zephyr, accompanied by a Google article search. Then, by employing the same algorithm to Factiva and Pro-Quest, we read through each rumour article to ensure that we did not exclude any takeover rumours and to guarantee the high accuracy of our rumour data. Each time a takeover rumour was identified, we incorporated the company name of the target firm to avoid any repetition of preceding rumours. By doing so, we ensured that the target group includes only the initial takeover rumour within a period of 90 days.

To roll out the possibility of a normal merger announcement delay, we verified all rumours by checking their announcement dates (if available) and excluded the ones that have an announcement on the same day or one day after the rumour. We also excluded mergers of equals or assets sales.

Thus far, we have collected information on 2,074 rumours from January 1, 2002 to December 31, 2011. However, when we conduct the event study on these 2,074 rumour targets to obtain their abnormal returns, 2,015 targets have sufficient data during the event window we need. Thus we arrive at our final rumour group of 2,015 firms. Panel A of Table 1 reveals the yearly distribution of our rumour data. The number of rumours increased every year and reached the peak of 424 in 2011, the last year of our sample period.

3.1.2 Rumour types

Once identified as an initial rumour in our data, the rumour was assigned to one or more of the first 18 basic rumour types based on its content, as specified in Panel A of Table 2. We created a rumour type, "Rumour credible", for rumours that led to a takeover announcement, of which the date can be found in Security Data Company's (SDC) US Mergers and Acquisitions database. Using the initial 18 rumour types and based on how much information is included in the rumour, we generated two additional rumour types, "Informative" and "Speculative". Excluding types of chatter and options, if at least 3 pieces of rumour information were true, we considered a rumour to be "Informative". Otherwise, if the rumour was simply of chatter or options, we categorised it as "Speculative".

Panel B of Table 1 gives the distribution of different rumour types in our rumour data and the number of industries covered by each rumour type. Specifically, the acquirer was mentioned in nearly half of the rumours (857), 514 rumours contained more than 3 types of takeover-related information and were considered informative, and only a quarter (415) of the rumours led to an actual announcement. Here we use the first 3-digit of the SIC to identify an industry. Overall, 177 industries are included in our rumour data.

3.1.3 Rival firms

We defined a rival as a firm that contains the same first 3-digit SIC code as its corresponding target firm and has a size that is within a 30% range difference of its target firm's size. Following previous studies, we first restricted the rival firms to be within the same industry[2] as the rumour target. Using the SIC code from COMPUSTAT-Capital IQ and controlling the time difference between the rival's data date and rumour date to be within 2 years, we located a pool of potential rivals for rumour targets. Then, we sorted the possible rivals according to their data dates and sizes and kept the one whose data is closest to the rumour date and that has a size within a 30% difference margin of the target's size. However, since many firms appeared more than once in this rival group, the results could be skewed due to these repetitive firms. Thus, to have relatively unbiased results for the rivals, we then

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[2] To identify rival firms and industry-level control variables (i.e. concentration ratio, sales shock), which are introduced later in the paper, industry firms includes all firms with the same 3-digit SIC code. If there are fewer than five firms in the industry, the 2-digit SIC code is used.

removed the firms that appeared more than once in the group and returned to choose the second or third best match of the potential rivals (if there are any). By doing so, we arrive at 1,708 rival firms. Out of these 1,708 rivals, 1,472 had sufficient data on their abnormal returns around the rumour date.

3.1.4 Control variables

Cornett et al. (2011) summarised previous literature on takeover target characteristics, examining both firm- and industry-level variables that can be used to predict takeover target candidacy, and they presented the predictability in merger candidacy of such variables. According to their results, we kept the variables that are significantly helpful to predict firm merger candidacy as our control variables. By incorporating such variables in the multivariate regressions and logistic models, we controlled additional factors that affect rivals' abnormal returns and future takeover behaviour and further explore takeover rumours' impact on rivals. In addition, we aimed to provide insight into the relation between rivals' characteristics and their performance at the time of a rumour as well as the post-rumour period.

As the calculations for some of these variables involve data from two years back, we used the quarterly data from January 1998 to December 2011 from COMPUSTAT-Capital IQ. Table 2 Panel B gives the definitions of these control variables.

3.1.5 Post-rumour takeover activity

As the rumours' effects on the rival firms could potentially lead to rivals' future acquisitions, we then checked rivals' post-rumour takeover activity and explored their acquisition likelihood. We collected the announcement dates for rival firms after the rumour date from the SDC's US Mergers and Acquisitions database (if available). By excluding announcements of firm repurchase and firms going private, we found that 74 rivals subsequently became a target within 3 years after a rumour, 37 of which become one within the first year following the rumour.

3.2 Methodology

3.2.1 Event study analysis

To calculate the abnormal returns and cumulative abnormal returns (CARs) for rival firms,

we conducted a standard event study using the market model. We use 100 trading days to estimate the expected returns, where a minimum of 70 valid returns should be found within these 100 days. We left a 50-day gap between the end of estimation window and the beginning of the event window to reduce the likelihood that the risk model estimation would be affected by the event-induced return variance.

We first collected 11 days[3] of abnormal returns for the rival firms to exam the cross-sectional effect from takeover rumours. Then, following earlier literature on the announcement period for abnormal returns, we obtained CARs during the most commonly used event windows, $(0,+1)$, $(-1,+1)$, $(-2,+2)$ and $(-5,+5)$. CARs are later used to create test statistics.

3.2.2 Multivariate analysis of abnormal returns

By using the CAR$(-1,+1)$ from the event study as our dependent variable, we successively included dummy variables of different rumour types and control variables, as mentioned above, to create multivariate regressions and test how rumour types affect the CARs of rival firms differently. To further explore their relation, we first replaced the dependent variable with CAR$(-1,+1)$ using market-adjusted model to estimate expected returns and then used CAR$(-2,+2)$[4] as the dependent variable to conduct robustness tests and examine whether the results hold with different abnormal return calculation methods and alternative event windows.

3.2.3 Logistic estimation of acquisition probability

Using the announcement dates for rival firms that subsequently became takeover targets, we then examined the relation between different rumour types and rivals' acquisition likelihood using logistic regression models. In addition to testing the rivals that became targets within the calendar year following the rumour, we employed the same regression models to rivals that became a target within 3 years as our robustness test.

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[3] The 11-day event window includes day -5 to day +5, where day 0 is the rumour date.

[4] Same with CAR$(-1,+1)$, CAR$(-2,+2)$ is obtained by using market model as the risk model to compute expected returns.

4. Empirical results

4.1 Cross-sectional abnormal returns for rival firms

Following Song and Walking (2000), Table 3 presents the abnormal returns to rival firms over an 11-day window surrounding the rumour date along with results for a t-test for differences in means and a non-parametric Wilcoxon rank-sum test for differences in medians. Though moving in a relatively moderate manner, rivals' abnormal returns had an identical pattern of changes during the rumour period as those of the rumour targets (Betton, Davis, and Walker, 2016). Similar to the findings on target firms (see Pound and Zeckhauser, 1990; Ahern and Sosyura, 2015; Betton, Davis, and Walker, 2016), rivals also experienced a noticeable rise in abnormal returns around the rumour date. From day -1 to day +1, rivals' abnormal returns increased from 0.02% to 0.20% on average. As rivals' abnormal returns move rather slowly across the event period, this rise is the most noticeable change for the rival group. This indicates that there is a possible impact on rivals from these takeover rumours. The changes in median abnormal returns have a similar trend as the means.

Significant abnormal returns are found across 3 rumour periods. Abnormal returns to rivals average 0.37% for rumour period (-1,+1), 0.50% during a longer period (-5,+5), and 0.35% for period (0,+1) at 1% significance level. These significant abnormal returns of rivals around the rumour date suggest that rivals are influenced by rumours regardless of rumours' credibility. This corresponds to previous finding on target firms that they earn positive abnormal returns at the time of a rumour as well (see Keown and Pinkerton, 1981; Pound and Zeckhauser, 1990; Chou, Tian, and Yin, 2010; Ahern and Sosyura, 2015; Betton, Davis, and Walker, 2016).

To shed additional light on the impact from these rumours, we proceeded to examine the relation between rivals' CARs and different rumour types in the following sections.

4.2 Univariate analysis

In Table 4, we begin our analysis of rivals CARs around the rumour period (-1,+1), conditional on rumour types. This is the first time in the literature that takeover rumours have been broken down into different rumour types to study their impact on rivals' stock price. In

addition to the rumour types introduced in Table 2, we included two categories of rivals' post-rumour takeover activity here, namely "Rival acquired" and "Rival acquired one year". As mentioned in Section 3, "Rival acquired" is for rivals that subsequently became a takeover target within 3 years after the rumour date, and "Rival acquired one year" only includes rivals that became a target within the first year following the rumour. In accordance with Table 4, we conducted a t-test for differences in means, as well as a non-parametric Wilcoxon rank-sum test for differences in medians.

With a significance level of 5% for CAR(-1,+1) on average, when including all rumour types, rival firms experienced significant positive CARs for 3 rumour types, "Industry activity", "Options" and "Rumour credible". Particularly, for rumours concerning takeover activity within the industry, the results are significant for both the t-test and Wilcoxon median test, at 5% and 1% significance levels, respectively. Rivals of these takeover rumour targets experience significant 1.44% CARs on average. This suggests that takeover rumours, specifically those related to industry activities, have a significant impact on the rivals' returns during the rumour period. This price run-up could be brought by investors anticipating a future takeover of the rival of this rumour target, when there are ongoing takeover activities in this industry. This confirms the finding that industry merger waves creates overall wealth in the same industry (Harford, 2003). The t-statistic for rumours that become true, "Rumour credible", is significant and this implies that rumours which were proven to be credible and led to announcements afterwards significantly enhanced the returns for targets' rivals and led to 0.70% CAR on average.

Another interesting finding is for rivals acquired within one year after a rumour ("Rival acquired one year"); their returns were significantly related to the post-rumour activity, yet this significant result did not remain when we examined all rivals that subsequently became the takeover target ("Rival acquired"). One possible explanation for this could be that for rivals acquired one year after a rumour came out, their takeover activity may not be the result of the rumour itself. As for rivals acquired within 365 calendars days following the rumour date, they had an average of 1.89% CARs around the rumour date, which is the highest abnormal return across all rumour types, regardless of the rumour's credibility. This is in line

with the acquisition probability hypothesis proposed by Song and Walkling (2000), which attributes the abnormal returns for rivals of initial targets to an increased probability that these rivals will be targets themselves.

Due to the fact that quite a few rumours in our data contain more than one piece of takeover information, a single rumour may fall into multiple rumour categories. Thus, it may not be convincing to reveal the true influence each takeover rumour has on the rival by looking at individual rumour types when one rumour could be a combination of two or more types. We then moved on to test the effect of different rumour types simultaneously on the rival's CAR.

4.3 Multivariate analysis

We used ordinary least squares (OLS) regression models that include every rumour type and all the control variables mentioned in the former part. We created dummy variables for each rumour type. That is, the value of rumour dummy variable equals one if that rumour contains a certain type of takeover information, and zero otherwise. For the dependent variable, we used CAR(-1,+1) obtained using standard event study methodology with expected returns based on the market model. To test our results' robustness, we changed the dependant variable to CAR(-1,+1) using market-adjusted model to obtain expected returns and then replaced CAR(-1,+1) with an alternative event window (-2,+2) as a new dependent variable.

4.3.1 Abnormal return regressions

As shown in Table 5, we examined the impact of different rumour content and rivals' post-rumour takeover activity on rivals' CARs around the rumour date. Specifically, we include the 18 basic rumour types in Model 1, and then we controlled for rumours' credibility and rivals' future takeover behaviour respectively in Model 2 and Model 3. Corresponding to the first 3 models, control variables predicting takeover candidacy (as per Cornett et. al, 2011) were incorporated in Model 5 to Model 7. In Model 4, we assessed how a rumour's informativeness affected the rival's performance as well.

We found 3 main rumour types that significantly influenced rivals' CARs, which are

rumours that contain information about analysts' opinions on the takeover ("Analyst source"), target firms undergoing financial problems ("Financial distress") and takeover activities within the industry ("Industry activity"). Specifically, "Industry activity" appears to have a significant positive impact on rivals' CARs in Model 1 and Model 5, which reinforces our finding in Table 4. Rumours where the target firm is reported to have financial struggles ("Financial distress") significantly drive up the rival's CAR, and remain positive, yet insignificant, with the presence of the control variables. As a firm's financial conditions affect its industry by impacting firm inventory, product quality and pricing (Hofer, Dresner, and Windle, 2005; Phillips and Sertsios, 2013), investors may project similar firms as potential future takeover targets. In contrast, rumours based on analyst opinions ("Analyst source") have a negative impact on rivals' CAR. This can be interpreted as the investors' faith in analysts and their disbelief of rival firms being acquired.

When we control rumours' credibility in Model 2 and 6, though credible rumours continue to have a positive impact on rivals' CAR, as shown in Table 4, they lose their significance here. It may be the case that it is not the credibility, but rather the perceived outcome from investors that affects rivals' stock prices. Rivals' post-rumour takeover activity does not appear to have a significant impact in Models 3 and 7. This implies that investors appear to predict rivals' future acquisition behaviours inaccurately.

When controlling for a rumour's informativeness in Model 4, the results for the dummy variables "Informative" and "Speculative" are not significant. Unlike the finding in rumour targets (Betton, Davis, and Walker, 2016), this suggests that the richness of information included in a rumour may not necessarily impact the rival's abnormal returns.

From Models 4 to 7, the results for two control variables, "ROA" and "Sales shock" appeared to have similar significance. A firm's ROA is shown to be negatively related to its CAR at the 1% significance level, while the absolute difference between a firm's two-year sales growth and the median industry two-year sales growth ("Sales shock") is positively related to a rival's CAR at the 5% significance level. Relating to the results of "Financial distress", the significant negative relation between ROA and CAR could be explained by investors predicting rivals with a lower ROA to be better candidates for future acquisition;

thus, the abnormal returns of these rivals may be driven up by this anticipation. Likewise, rival firms with extremely low sales growth could be seen as potential future takeover targets and consequently experience higher returns, which may explain the positive association between "Sales shock" and abnormal returns. This confirms previous findings that firms with less growth (Palepu, 1986; Song and Walkling, 2000) or low ROA (Akhigbe, Madura, and Whyte, 2004) are more likely to be acquired.

When comparing the results of Model 5 with those of Model 1, we find that the significance level of the rumour variables is lowered with the presence of the control variables. This may result from the high levels of significance of some of the control variables. With the addition of control variables, models' fitness improved, as seen in the increase of values of R^2 and the adjusted R^2 throughout the last 3 models.

4.3.2 Robustness tests

To avoid the possibility of the market model leading to misleading inferences, we first conducted a robustness test using the market-adjusted model to obtain rivals' expected returns. As shown in Table 6, the results are quite similar to those in Table 5. Before including our control variables, "Analyst source" continued to negatively affect rivals' abnormal returns, and "Financial distress" continued to have a positive impact at a similar significance level as that shown in Table 5. "Industry activity" was again proven to have a significant positive impact on rivals' CARs. As in the results shown in Table 5, the significance levels for these rumour dummy variables were relatively reduced when control variables were added to the models. However, the significance of the results of "ROA" disappeared, while the coefficient of "Sales shock" remained significantly positive. Evidently, the results in Table 6 closely parallel those in Table 5.

As previous studies on abnormal returns around takeover announcements have also examined other event windows, we then used an alternative event period (-2,+2) to determine whether the results were robust. Similarly, "Industry activity" continued to have a positive relationship with CARs at the 5% significance level in the first 3 models, and again its significance level dropped in Models 5 to 7 with the presence of control variables. In addition to "ROA" and "Sales shock", the control variable "Cash ratio" also had some significant

results, as shown in Table 7. As a highly liquid asset structure is found in many financially-distressed firms (DeAngelo H., DeAngelo L. and Wruck, 2002) and relating to the results of "Financial distress", rivals with higher cash ratios could be seen as potential takeover targets, which in turn may explain the positive relationship between "Cash ratio" and CARs.

In sum, we found consistent evidence that rumours relating to industry takeover activities have a significant positive impact on rivals' abnormal returns, regardless of a rumour's credibility. This remained robust when we employed different risk models for abnormal returns calculations and alternative event windows. This implies that when there is a takeover surge in the industry, investors tend to believe that rivals of rumour targets could be the next takeover targets. And this conception, in turn, drives up the rumour period abnormal returns for rival firms. Other rumour types, like "Analyst source" and "Financial distress" also have significant effects on the rivals' rumour period abnormal returns in some models.

4.4 Post-rumour takeover activity of rival firms

Through both univariate and multivariate analysis, there is sound evidence indicating that takeover rumours have a significant impact on rival firms, with additional findings on the impact of specific rumour content. It would be interesting to explore how rumour information helps to predict rivals' post-rumour takeover activity. Out of the 1,472 rivals, 74 were acquired within 3 years after the rumour date, and 37 of these 74 rivals were acquired within 365 calendars days. According to the univariate results in Table 4, the 37 rivals' abnormal returns around the rumour period were significantly higher on average, while the abnormal returns for all 74 rivals that were later acquired were not. Thus, we used the 365-day period for our main analysis and later used the 3-year period for our robustness test. We created dummy variables for these two scenarios as "Rival acquired one year" and "Rival acquired", where the dummy value equals one if the rival was acquired afterwards and zero otherwise. Using these dummy variables as our dependent variable, we employed logistic regressions to explore the predictive abilities different rumour types had on post-rumour rival acquisitions. The results from the logistic regressions could potentially help investors recognise valuable rival firms according to the rumour content.

We input all rumour dummy variables from the multivariate regression models into the logistic regressions here as our main predictor variables and later combined the control variables in the regressions.

For robustness purposes, we replaced "Rival acquired one year" with "Rival acquired" to assess whether the results hold without the time restraint on post-rumour activities. The test details and results are presented in the following part.

4.4.1 Acquisition probability of rival firms

After generating the new dummy variable, "Rival acquired one year", two rumour types ("Financial distress" and "Management concerns") have to be removed from the model due to the perfect prediction problem[5]. The results for the remaining rumour types are provided in Table 8.

Rumours in aggregate are significant negative predictors (at the 1% significance level) by themselves (unreported) or when controlling for basic rumour types (Model 1, Table 8). Identical results were found for rumour credibility and rumour types (Betton, Davis, and Walker, 2016). However, when separating rumours by their content, four types of rumour content ("Financial advisor", "Insider cited", "PE Fund" and "Target denies") stood out. In Model 1 and Model 3, these four rumour types were shown to be significantly positive predictors for rivals' future takeover announcements and persist as predictors at the same significance level with the presence of control variables. The 5% significant positive coefficient for "Target denies" indicates the high possibility of rivals becoming future takeover targets when the rumour target denies its involvement in any takeover activities. "Financial advisor", "Insider cited", and "PE Fund" are reported to be strong predictors of a credible rumour (Betton, Davis, and Walker, 2016). This implies that takeover rumours with such information that could lead to a credible rumour are positive predictors for rivals' future takeover activity as well. This interpretation was confirmed when we controlled for rumour's credibility in Models 2 and 4. "Rumour credible" was a highly significant predictor. Such significant results for credible rumours are not seen in our multivariate analysis, which

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[5] That is, for these two rumour types, they can predict one situation of the post-rumour takeover activity perfectly. And it is not mathematically possible in a standard logistic regression to determine the coefficient and standard error for such covariates.

indicates that, contrary to the overreaction to rumour targets shown in previous empirical studies (see Pound and Zeckhauser, 1990; Ahern and Sosyura, 2015), investors seem to underreact to rivals, specifically those involved in credible rumours, around a rumour period. Studies on behavioural finance attribute investor's underreaction to new information to their self-attribution bias (Daniel, Hirshleifer, Subrahmanyam, 1998), limited attention (Hirshleifer and Teoh, 2003), experience, sophistication, demographic factors and behavioural biases (Das and Krishnakumar, 2015).

Informative rumours are also ideal for predicting rivals' post-rumour takeover activities, as the coefficient for "Informative rumour" is positive at a 1% significance level in Model 5. As informative rumours did not appear to have significant impact on a rival's CAR in our multivariate analysis, this could also be the result of investors' poor investment perceptions on such rival firms, which corresponds to our findings regarding credible rumours.

The results from Model 6, where we only considered control variables, show the significant negative predictive ability of a rival firm's size. This is consistent with the finding on rumour target firms (Betton, Davis, and Walker, 2016) and confirms previous findings that smaller firms have a higher likelihood of being acquired (see Ambrose and Megginson, 1992; Song and Walkling, 1993; Moeller et al. 2004; Powell and Yawson 2007; Heron and Lie, 2009).

4.4.2 Robustness test

When we increased the time period of rivals' future takeover activity to 3 years and included a larger group of rivals that subsequently became acquisition targets, similar results were found, as shown in Table 9. "Financial advisor", "Insider cited", "PE Fund", "Target denies", "Rumour credible" and "Informative" remained statistically positive predicators, while a firm's size continued to be a negative predicator.

In sum, certain rumours appear to be helpful with projecting future rival acquisition behaviours. Consistent results from the main analysis and robustness test show that rumours proven to be credible, rumours denied by targets, rumours driven by an insider, rumours involving the PE finder and rumours containing multiple informative signals are significant predictors of future rival acquisitions. Consistent with results from the existing study, a rival's

firm size is shown to be a negative predictor for future acquisition activity.

5. Conclusions

This paper examined the takeover rumour effects on rivals of initial US acquisition-rumoured firms. As existing studies on rumours' effects have only looked at target firms, our study can help shed light on how merger rumours would affect rivals by empirically analysing their rumour period abnormal returns and post-rumour acquisition behaviour. Additionally, our paper is also one of the first studies to examine rumours' effect by breaking down their content.

We assessed 2,015 U.S. initial rumours over the period of 2002–2011 and located a sample of 1,472 rival firms. Each rumour was categorised into one or more rumours types according to its content, credibility and informativeness.

From univariate analysis, we found that rival firms on average earn positive abnormal returns during a rumour period, despite the type and outcome of the rumour. Specifically, according to the results of our multivariate analysis, rumours concerning industry takeover activities and rumours that mention targets undergoing financial distress provide higher rival firms' returns around the rumour date, while rumours that are seconded by analysts drive down rivals' abnormal returns. However, rumours' credibility and informativeness did not appear to have a consistent significant impact on rivals' abnormal returns.

Rivals that subsequently became acquisition targets within a year following a rumour experienced significantly higher abnormal returns. We also found that rumours denied by targets, rumours driven by an insider, and rumours involving the PE finder were significant predictors of future rival acquisitions. In addition, credible rumours and informative rumours were shown to be significant predictors. Regarding the results of our multivariate regressions, this suggests that though investors are quickly responding to market information in general, they do not seem to recognise the potential value of the rivals specifically involved in informative or credible rumours at the time when the news come out.

By investigating specific rumours' impact according to their information and credibility, as well as looking into rivals' acquisition behaviours after the rumours, this paper is the first

empirical study to examine rumours' impact on rival firms by breaking down rumour content and provides a fairly thorough analysis of rumours' impact on rival firms, both at the time of the event and future takeover activity. We contribute to the literature by showing price run-up in rivals at the time of rumour, which indicates that market information can be quickly incorporated into the stock price very early on. However, investors tend to underreact to rivals involved in informative or credible rumours, as these rumours turn out to be statistically positive predictors for rivals' future takeover activity. Thus, we recommend that investors refine their trading strategies by paying additional attention to the potential investment opportunities in rivals of these rumour targets.

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Appendices

Table 1

Summary statistics on takeover rumours

We identify 2,015 initial U.S. takeover rumours from S&P Capital IQ, S&P Takeover Talk, Zephyr, Factiva, and Pro-Quest for the period 2002 through 2011. Panel A presents information on the number of rumours per year. We assign each rumour to one or more rumour types on the basis of its content. The distribution of different rumour types is presented in Panel B.

Panel A: Number of rumours per year	
Year	*N*
2002	47
2003	84
2004	103
2005	107
2006	186
2007	179
2008	188
2009	354
2010	343
2011	424
Total	2,015

Panel B: Rumour type distribution		
Rumour Type	*N*	Number of 3-dig SIC
Acquirer mentioned	857	105
Analyst source	608	92
Bidder denies	25	13
Block purchase	64	22
Chatter	564	86
Financial distress	86	30
Financial advisor	227	59
Financing source	38	12
Industry activity	252	39
Insider cited	271	56
Management concerns	47	15
Options	359	81
PE fund	234	63
Synergy	79	24
Target denies	12	7
Target initiates	350	85
Undervalued	372	74
Unusual activity	38	19
Rumour credible	415	85
Informative	514	80
Speculative	342	61
Rumours	2,015	177

Table 2

Variables descriptions

Panel A specifies the definitions used to categorize rumour types. We assign each rumour to one or more. All rumour information is hand-collected and verified by reading through each rumour related news in S&P Takeover Talk, S&P Capital IQ, Zephyr, Factiva and ProQuest. Following Cornett et al. (2011), we identify variables that are helpful in predicting target merger candidacy and use them as control variables in our empirical analysis. Panel B provides definitions for these variables. To calculate the variables, we collect quarterly data from January 1998 to December 2011 from COMPUSTAT-Capital IQ.

Panel A Rumour type definitions and data sources	
Rumour Type	Definition
Acquirer mentioned	The name of potential bidder is mentioned in the rumour.
Analyst source	Rumour is the result of one or more analysts reasoning that a takeover seems logical.
Bidder denies	Bidding firm denies the parties are in negotiations of any kind.
Block purchase	Whenever a large purchase in the company is used as support for the rumour.
Chatter	This is a minimalist category designed to reflect unsubstantiated discussion with minimal details provided.
Financial distress	Whenever the rumour appears to be supported by the fact that the target firm is or recently has been experiencing substantial financial or operating distress (e.g. "struggling").
Financial advisor	Target has retained the services of an investment bank or advisor.
Financing source	Details of how the financing would occur are mentioned.
Industry activity	When rumour mentions that the industry appears ripe for such takeovers, this can be offered as support for rumour or bidder indicates interest in acquiring some firm in the industry.
Insider cited	Anonymous source cited or specific details provided without naming a source and not analyst speculation
Management concerns	Concerns with current management or changes in mgmt. recently occurred
Options	Option or volume increases mentioned as supporting rumour.
PE fund	PE or hedge find rumoured as buyer or involved in promoting deal (e.g. has many shares and seen as promoting sale of company) or conditions seen as ripe for leveraged buyout.
Synergy	Direct synergy estimates mentioned or specific attributes of the target mentioned as supporting the rumour.
Target denies	Target firm denies the parties are in negotiations of any kind.
Target initiates	The rumour is created by the target firm.
Undervalued	The rumour that indicates target firm is undervalued.
Unusual activity	Something odd (on behalf of either the target or potential bidder) seems to spark the rumour e.g. meetings cancelled.
Rumour credible	Rumour that ends up to be a takeover within two years.
Informative	This indicates that at least 3 rumour pieces of information are true, not counting options and chatter.
Speculative	The rumour simply contains information on chatter or options.

Table 2

Continued

Panel B Definition of control variables

Control Variables	Definition
Size	The log of total assets.
Sales growth	The change in the firm's sales in the past two years.
Return on assets (ROA)	The ratio of net income to total assets.
Share turnover	Ratio of the number of shares of stock traded for the firm to the total shares outstanding.
Cash ratio	Ratio of cash to total assets.
Concentration ratio	The ratio of sales of the largest four firms (in terms of sales) to total industry sales.
Sales shock	The absolute value of the difference between two-year median industry sales growth and the two-year firm sales growth.
Market-to-book ratio (MTB)	The ratio of closing price to book value per share.

Table 3

Cross-sectional abnormal returns to rival firms

This table presents abnormal returns to rumour targets and their rival firms over an 11-day window surrounding the rumour date, along with results for a t-test for differences in means and a non-parametric Wilcoxon rank-sum test for differences in medians. The abnormal returns for both groups are obtained using a standard event study with expected returns based on a market model. We use 100 trading days to estimate the expected return and residual return variance, where a minimum of 70 valid returns should be found within these 100 days. We leave a 50-day gap between the end of the estimation window and the beginning of the event window so as to reduce the likelihood that the risk model estimation is affected by the event-induced return variance.

Day	N	Mean AR (%)	p-value t-test	Median AR (%)	p-value Wilcoxon test
-5	1,469	0.07	0.48	-0.08	0.46
-4	1,470	0.11	0.25	-0.02	0.92
-3	1,472	0.03	0.76	-0.05	0.34
-2	1,472	0.01	0.30	-0.04	0.99
-1	1,471	0.02	0.83	-0.13	0.09
0	1,472	0.15	0.16	-0.03	0.89
+1	1,472	0.20	0.03	0.05	0.28
+2	1,472	-0.00	0.86	-0.12	0.08
+3	1,472	-0.01	0.30	-0.13	0.00
+4	1,470	-0.16	0.11	-0.13	0.04
+5	1,469	0.10	0.29	-0.06	0.36
(-1,+1)	1,472	0.37	0.02	0.02	0.15
(0,+1)	1,472	0.35	0.01	0.04	0.15
(-5,+5)	1,469	0.50	0.10	-0.18	0.81

Table 4

Distribution of abnormal rumour period (-1,+1) returns for rival firms according to industry activities and rival post-rumour takeover activity.

Rumours are categorized based on their content, credibility and informativeness. This table reports the CARs of rival firms in the same manner, along with two additional variables identifying the rivals' post-rumour acquisition outcomes. "Rival acquired" indicates rivals that subsequently become takeover targets within 3 years after the rumour date, and "Rival acquired one year" are rivals that become a target within one year following the rumour. Results on t-test and non-parametric Wilcoxon rank-sum test are also given in the table.

Rumour Types and Post-Rumour Takeover Activity	N	Mean CAR(-1,+1) (%)	p-value t-test	Median CAR(-1,+1) (%)	p-value Wilcoxon test
All rumours	1,472	0.37	0.02	0.02	0.15
Acquirer mentioned	616	0.41	0.14	-0.04	0.59
Analyst source	450	0.03	0.92	-0.01	0.46
Bidder denies	19	0.50	0.69	-0.62	0.60
Block purchase	44	0.25	0.71	-0.11	0.88
Chatter	421	0.39	0.19	-0.11	1.00
Financial distress	53	1.71	0.25	0.70	0.77
Financial advisor	168	-0.05	0.93	0.06	0.70
Financing source	23	1.29	0.37	0.15	0.72
Industry activity	178	1.44	0.03	1.02	0.00
Insider cited	191	0.31	0.46	0.08	0.63
Management concerns	34	-0.21	0.81	0.15	0.86
Options	359	0.58	0.06	0.05	0.22
PE fund	172	0.43	0.29	0.23	0.59
Synergy	57	0.22	0.74	0.48	0.47
Target denies	13	1.41	0.29	-0.15	0.55
Target initiates	236	0.31	0.25	0.03	0.54
Undervalued	265	0.49	0.14	0.11	0.86
Unusual activity	30	0.83	0.21	0.63	0.15
Rumour credible	293	0.70	0.02	0.08	0.14
Informative	360	0.34	0.39	0.08	0.24
Speculative	261	0.20	0.51	-0.06	0.89
Rival acquired	74	0.26	0.66	-0.23	0.89
Rival acquired one year	37	1.47	0.07	0.20	0.19

Table 5

OLS regression of rumour period abnormal returns (-1,+1) for rival firms

This table measures the impact of different rumour types on the stock prices of rival firms. CARs are obtained using standard event study methodology with expected returns based on the market model. We include dummy variables for each rumour type and our control variables in each OLS. Specifically, we include the 18 basic rumour types in Model 1, and then control for rumours' credibility and rivals' future acquisition respectively in Model 2 and Model 3. Corresponding to the first 3 models, control variables predicting takeover candidacy (as per Cornett et. al, 2011) are incorporated in Model 5 to Model 7. In Model 4, we assess how a rumour's informativeness affected the rival's performance.

	(1) CAR (-1,+1)		(2) CAR (-1,+1)		(3) CAR (-1,+1)		(4) CAR (-1,+1)	
Acquirer mentioned	0.00079	(0.831)						
Analyst source	-0.0078*	(0.079)						
Bidder denies	-0.00066	(0.965)						
Block purchase	-0.0015	(0.884)						
Chatter	-0.0019	(0.697)						
Financial distress	0.016*	(0.078)						
Financial advisor	-0.0073	(0.253)						
Financing source	0.0061	(0.649)						
Industry activity	0.014***	(0.007)						
Insider cited	-0.00079	(0.887)						
Management concerns	-0.0069	(0.536)						
Options	0.0030	(0.514)						
PE Fund	0.00086	(0.877)						
Synergy	-0.00042	(0.962)						
Target denies	0.0087	(0.627)						
Target initiates	0.0016	(0.798)						
Undervalued	0.0027	(0.545)						
Unusual activity	0.0055	(0.634)						
Rumour credible			0.0041	(0.317)				
Informative							0.000089	(0.983)
Speculative							-0.0030	(0.519)
Rival acquired one year					0.011	(0.278)		
Size							-0.00051	(0.610)
Sales growth							-0.000080	(0.483)
ROA							-0.056***	(0.009)
Share turnover							-0.0013	(0.338)
Cash ratio							0.010	(0.247)
Concentration ratio							0.0045	(0.596)
Sales shock							0.024**	(0.027)
MTB							-0.00030	(0.804)
Constant	0.0033	(0.487)	0.0029	(0.114)	0.0034**	(0.039)	0.016	(0.367)
N	1,472		1,472		1,472		1,357	
R^2	0.01		0.00		0.00		0.01	
Adjusted R^2	-0.00		0.00		0.00		0.01	
F	0.90		1.00		1.18		1.72	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5

Continued

	(5) CAR (-1,+1)		(6) CAR (-1,+1)		(7) CAR (-1,+1)	
Acquirer mentioned	0.00069	(0.855)				
Analyst source	-0.0068	(0.137)				
Bidder denies	0.00080	(0.957)				
Block purchase	-0.00070	(0.946)				
Chatter	-0.0030	(0.550)				
Financial distress	0.014	(0.134)				
Financial advisor	-0.0065	(0.325)				
Financing source	0.0076	(0.574)				
Industry activity	0.010*	(0.059)				
Insider cited	0.0010	(0.863)				
Management concerns	-0.0079	(0.484)				
Options	0.0041	(0.390)				
PE Fund	0.0037	(0.514)				
Synergy	0.000076	(0.993)				
Target denies	0.011	(0.540)				
Target initiates	0.0018	(0.780)				
Undervalued	0.0016	(0.725)				
Unusual activity	0.0056	(0.646)				
Rumour credible			0.0049	(0.247)		
Informative						
Speculative						
Rival acquired one year					0.0089	(0.395)
Size	-0.00081	(0.442)	-0.00048	(0.634)	-0.00054	(0.591)
Sales growth	-0.000085	(0.460)	-0.000088	(0.442)	-0.000084	(0.460)
ROA	-0.054**	(0.013)	-0.056***	(0.008)	-0.055***	(0.009)
Share turnover	-0.0015	(0.265)	-0.0013	(0.329)	-0.0013	(0.317)
Cash ratio	0.011	(0.231)	0.010	(0.241)	0.010	(0.242)
Concentration ratio	0.0041	(0.637)	0.0040	(0.635)	0.0044	(0.607)
Sales shock	0.023**	(0.037)	0.025**	(0.023)	0.024**	(0.028)
MTB	-0.00027	(0.824)	-0.00033	(0.790)	-0.00034	(0.783)
Constant	0.020	(0.294)	0.015	(0.403)	0.017	(0.356)
N	1,357		1,357		1,357	
R^2	0.02		0.01		0.01	
Adjusted R^2	0.00		0.01		0.01	
F	1.10		2.01		1.94	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6

Robustness test 1: OLS regression of rumour period abnormal returns (-1,+1) for rival firms

This table measures the impact of different rumour types on the stock prices of rival firms. CARs are obtained using standard event study methodology with expected returns based on the market-adjusted model. We include dummy variables for each rumour type and our control variables in each OLS. Following Table 5, we include the 18 basic rumour types in Model 1, and then control for rumours' credibility and rivals' future acquisition respectively in Model 2 and Model 3. Corresponding to the first 3 models, control variables predicting takeover candidacy (as per Cornett et. al, 2011) are incorporated in Model 5 to Model 7. In Model 4, we assess how a rumour's informativeness affected the rival's performance.

	(1) CAR (-1,+1)		(2) CAR (-1,+1)		(3) CAR (-1,+1)		(4) CAR (-1,+1)	
Acquirer mentioned	0.00063	(0.864)						
Analyst source	-0.0100**	(0.023)						
Bidder denies	0.0041	(0.783)						
Block purchase	-0.0068	(0.507)						
Chatter	-0.0013	(0.779)						
Financial distress	0.017*	(0.061)						
Financial advisor	-0.0069	(0.278)						
Financing source	0.0083	(0.531)						
Industry activity	0.015***	(0.005)						
Insider cited	-0.0013	(0.814)						
Management concerns	-0.0075	(0.502)						
Options	0.0040	(0.380)						
PE Fund	0.0013	(0.807)						
Synergy	0.0025	(0.772)						
Target denies	0.00070	(0.968)						
Target initiates	-0.000021	(0.997)						
Undervalued	0.0018	(0.679)						
Unusual activity	0.0045	(0.699)						
Rumour credible			0.0040	(0.323)				
Informative							0.000088	(0.983)
Speculative							-0.0019	(0.680)
Rival acquired one year					0.012	(0.219)		
Size							-0.00069	(0.490)
Sales growth							-0.000085	(0.457)
ROA							-0.038*	(0.076)
Share turnover							-0.00084	(0.523)
Cash ratio							0.0066	(0.450)
Concentration ratio							0.0061	(0.477)
Sales shock							0.029***	(0.009)
MTB							0.00056	(0.645)
Constant	0.0047	(0.311)	0.0037**	(0.042)	0.0042**	(0.012)	0.011	(0.537)
N	1,472		1,472		1,472		1,357	
R^2	0.01		0.00		0.00		0.01	
Adjusted R^2	0.00		-0.00		0.00		0.00	
F	1.13		0.98		1.51		1.35	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6

Continued

	(5) CAR (-1,+1)		(6) CAR (-1,+1)		(7) CAR (-1,+1)	
Acquirer mentioned	0.00086	(0.818)				
Analyst source	-0.0089*	(0.052)				
Bidder denies	0.0057	(0.700)				
Block purchase	-0.0059	(0.568)				
Chatter	-0.0020	(0.685)				
Financial distress	0.013	(0.150)				
Financial advisor	-0.0048	(0.472)				
Financing source	0.010	(0.446)				
Industry activity	0.011*	(0.052)				
Insider cited	0.00022	(0.970)				
Management concerns	-0.0079	(0.481)				
Options	0.0050	(0.291)				
PE Fund	0.0040	(0.482)				
Synergy	0.0044	(0.624)				
Target denies	0.0036	(0.846)				
Target initiates	0.00094	(0.884)				
Undervalued	0.0011	(0.814)				
Unusual activity	0.0047	(0.699)				
Rumour credible			0.0052	(0.223)		
Informative						
Speculative						
Rival acquired one year					0.0095	(0.343)
Size	-0.00098	(0.351)	-0.00063	(0.528)	-0.00070	(0.485)
Sales growth	-0.000094	(0.413)	-0.000091	(0.423)	-0.000087	(0.442)
ROA	-0.034	(0.112)	-0.038*	(0.071)	-0.038*	(0.076)
Share turnover	-0.0011	(0.414)	-0.00084	(0.522)	-0.00087	(0.509)
Cash ratio	0.0074	(0.397)	0.0066	(0.443)	0.0065	(0.450)
Concentration ratio	0.0052	(0.553)	0.0056	(0.513)	0.0059	(0.487)
Sales shock	0.027**	(0.013)	0.029***	(0.007)	0.028***	(0.010)
MTB	0.00056	(0.649)	0.00057	(0.640)	0.00056	(0.646)
Constant	0.016	(0.412)	0.0096	(0.595)	0.011	(0.537)
N	1,357		1,357		1,357	
R^2	0.02		0.01		0.01	
Adjusted R^2	0.00		0.00		0.00	
F	1.06		1.64		1.58	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7

Robustness test 2: OLS regression of rumour period abnormal returns (-2,+2) for rival firms

This table measures the impact of different rumour types on the stock prices of rival firms. CARs are obtained using standard event study methodology with expected returns based on the market model. We include dummy variables for each rumour type and our control variables in each OLS. Following Table 5, we include the 18 basic rumour types in Model 1, and then control for rumours' credibility and rivals' future acquisition respectively in Model 2 and Model 3. Corresponding to the first 3 models, control variables predicting takeover candidacy (as per Cornett et. al, 2011) are incorporated in Model 5 to Model 7. In Model 4, we assess how a rumour's informativeness affected the rival's performance.

	(1) CAR (-2,+2)		(2) CAR (-2,+2)		(3) CAR (-2,+2)		(4) CAR (-2,+2)	
Acquirer mentioned	-0.0011	(0.809)						
Analyst source	-0.0053	(0.342)						
Bidder denies	0.0069	(0.713)						
Block purchase	-0.0020	(0.875)						
Chatter	-0.0100	(0.100)						
Financial distress	0.012	(0.305)						
Financial advisor	-0.016**	(0.042)						
Financing source	0.000010	(1.000)						
Industry activity	0.016**	(0.019)						
Insider cited	-0.0027	(0.701)						
Management concerns	-0.014	(0.339)						
Options	0.0100*	(0.087)						
PE Fund	0.0021	(0.765)						
Synergy	-0.00048	(0.965)						
Target denies	0.012	(0.601)						
Target initiates	0.0092	(0.245)						
Undervalued	0.0011	(0.842)						
Unusual activity	-0.0044	(0.768)						
Rumour credible			0.00038	(0.941)				
Informative							-0.0037	(0.480)
Speculative							-0.0049	(0.404)
Rival acquired one year					0.021	(0.169)		
Size							0.000041	(0.974)
Sales growth							-0.00016	(0.260)
ROA							-0.066**	(0.014)
Share turnover							-0.0019	(0.249)
Cash ratio							0.023**	(0.036)
Concentration ratio							0.0074	(0.498)
Sales shock							0.035**	(0.012)
MTB							-0.0020	(0.190)
Constant	0.0054	(0.365)	0.0045**	(0.049)	0.0042**	(0.043)	0.020	(0.380)
N	1,472		1,472		1,472		1,357	
R^2	0.01		0.00		0.00		0.02	
Adjusted R^2	-0.00		-0.00		0.00		0.01	
F	1.00		0.0054		1.89		2.29	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7

Continued

	(5) CAR (-2,+2)		(6) CAR (-2,+2)		(7) CAR (-2,+2)	
Acquirer mentioned	-0.00074	(0.877)				
Analyst source	-0.0065	(0.268)				
Bidder denies	0.0086	(0.651)				
Block purchase	-0.0044	(0.740)				
Chatter	-0.011*	(0.094)				
Financial distress	0.010	(0.379)				
Financial advisor	-0.016*	(0.055)				
Financing source	0.00080	(0.963)				
Industry activity	0.012*	(0.096)				
Insider cited	-0.0027	(0.718)				
Management concerns	-0.015	(0.285)				
Options	0.0099	(0.106)				
PE Fund	0.0065	(0.372)				
Synergy	-0.0012	(0.917)				
Target denies	0.012	(0.606)				
Target initiates	0.0080	(0.331)				
Undervalued	0.00092	(0.876)				
Unusual activity	-0.0050	(0.749)				
Rumour credible			0.00075	(0.890)		
Informative						
Speculative						
Rival acquired one year					0.017	(0.262)
Size	-0.00038	(0.777)	-0.000017	(0.989)	0.000031	(0.980)
Sales growth	-0.00017	(0.249)	-0.00017	(0.255)	-0.00016	(0.257)
ROA	-0.065**	(0.017)	-0.066**	(0.016)	-0.066**	(0.015)
Share turnover	-0.0023	(0.181)	-0.0020	(0.239)	-0.0020	(0.234)
Cash ratio	0.024**	(0.032)	0.024**	(0.033)	0.024**	(0.032)
Concentration ratio	0.0065	(0.557)	0.0080	(0.464)	0.0079	(0.468)
Sales shock	0.033**	(0.018)	0.035**	(0.013)	0.035**	(0.013)
MTB	-0.0020	(0.212)	-0.0021	(0.178)	-0.0021	(0.184)
Constant	0.028	(0.264)	0.019	(0.410)	0.019	(0.414)
N	1,357		1,357		1,357	
R^2	0.03		0.02		0.02	
Adjusted R^2	0.01		0.01		0.01	
F	1.43		2.44		2.58	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8

Logistic regressions predicting rivals' post-rumour takeover likelihood

Out of the 1,472 rivals in our sample, 37 rivals are found to be acquired within 365 calendars days after the rumour date. We create a dummy variable, "Rival acquired one year" which equals one if the rival is acquired within one year after the rumour and zero otherwise. Using this dummy variable as our dependent variable, we employ a series of logistic regressions to explore the predictive abilities different rumour types have on post-rumour rival acquisition likelihood.

	(1) Rival acquired one year		(2) Rival acquired one year		(3) Rival acquired one year		(4) Rival acquired one year		(5) Rival acquired one year		(6) Rival acquired one year	
Acquirer mentioned	-0.21	(0.535)			-0.17	(0.634)						
Analyst source	0.34	(0.493)			0.39	(0.433)						
Bidder denies	0.17	(0.879)			0.17	(0.887)						
Block purchase	0.32	(0.662)			0.39	(0.605)						
Chatter	0.054	(0.927)			0.067	(0.910)						
Financial advisor	0.90*	(0.062)			0.71	(0.169)						
Financing source	0.46	(0.689)			0.34	(0.773)						
Industry activity	0.33	(0.567)			0.42	(0.477)						
Insider cited	1.04**	(0.017)			1.17**	(0.014)						
Options	0.22	(0.706)			0.34	(0.566)						
PE Fund	0.95**	(0.029)			0.88**	(0.037)						
Synergy	1.17*	(0.087)			1.28*	(0.067)						
Target denies	1.65**	(0.015)			1.65**	(0.020)						
Target initiated	0.11	(0.836)			-0.018	(0.976)						
Undervalued	0.28	(0.541)			0.31	(0.500)						
Unusual activity	0.29	(0.716)			0.54	(0.505)						
Rumour credible			2.95***	(0.000)			2.92***	(0.000)				
Informative									1.18***	(0.001)		
Speculative									0.051	(0.932)		
Size					-0.15	(0.137)	-0.095	(0.373)	-0.21**	(0.012)	-0.15*	(0.093)
Sales growth					-0.00015	(0.959)	-0.0032	(0.268)	-0.0012	(0.593)	-0.00017	(0.943)
ROA					1.52	(0.430)	1.66	(0.543)	1.16	(0.527)	1.81	(0.345)
Share turnover					-0.017	(0.911)	0.038	(0.837)	0.074	(0.616)	0.0049	(0.974)
Cash ratio					-0.058	(0.952)	-0.18	(0.861)	-0.39	(0.716)	-0.071	(0.938)
Concentration ratio					0.74	(0.397)	0.10	(0.907)	0.40	(0.659)	0.46	(0.566)
Sales shock					-0.17	(0.916)	0.57	(0.644)	0.17	(0.907)	-0.67	(0.724)
MTB					-0.24	(0.302)	-0.21	(0.292)	-0.17	(0.346)	-0.29	(0.178)
Constant	-4.50***	(0.000)	-5.11***	(0.000)	-3.38	(0.106)	-4.72**	(0.040)	-3.40	(0.123)	-2.48	(0.192)
N	1,458		1,458		1,345		1,345		1,345		1,345	
Pseudo R^2	0.07		0.19		0.08		0.20		0.01		0.02	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9

Robustness test: Logistic regressions predicting rivals' post-rumour takeover likelihood within 3 years after the rumour date

Out of the 1,472 rivals in our sample, 74 rivals are found to be acquired within 3 years after the rumour date. We create dummy variable, "Rival acquired" which equals one if the rival is acquired after the rumour and zero otherwise. Using this dummy variable as our dependent variable, we examine whether our results in Table 8 are robust.

	(1) Rival acquired		(2) Rival acquired		(3) Rival acquired		(4) Rival acquired		(5) Rival acquired		(6) Rival acquired	
Acquirer mentioned	-0.15	(0.583)			-0.063	(0.826)						
Analyst source	0.38	(0.287)			0.37	(0.324)						
Bidder denies	1.33**	(0.049)			1.46**	(0.039)						
Block purchase	-0.10	(0.864)			-0.094	(0.878)						
Chatter	-0.060	(0.891)			0.081	(0.854)						
Financial distress	-1.46	(0.181)			-1.39	(0.213)						
Financial advisor	1.42***	(0.000)			1.32***	(0.001)						
Financing source	-0.23	(0.840)			-0.28	(0.814)						
Industry activity	0.29	(0.493)			0.30	(0.511)						
Insider cited	0.93***	(0.003)			1.01***	(0.003)						
Management concerns	0.069	(0.928)			0.0039	(0.996)						
Options	-0.21	(0.670)			-0.25	(0.628)						
PE Fund	1.30***	(0.000)			1.38***	(0.000)						
Synergy	1.00*	(0.067)			1.19**	(0.036)						
Target denies	1.43**	(0.020)			1.43**	(0.023)						
Target initiated	0.40	(0.311)			0.34	(0.426)						
Undervalued	0.19	(0.602)			0.22	(0.571)						
Unusual activity	-0.82	(0.286)			-0.63	(0.417)						
Rumour credible			3.49***	(0.000)			3.42***	(0.000)				
Informative									1.20***	(0.000)		
Speculative									-0.23	(0.611)		
Size					-0.15*	(0.061)	-0.18**	(0.036)	-0.20***	(0.001)	-0.22***	(0.001)
Sales growth					0.00016	(0.953)	-0.0045*	(0.090)	0.0015	(0.507)	-0.00055	(0.802)
ROA					0.62	(0.644)	-0.24	(0.886)	0.80	(0.490)	0.68	(0.567)
Share turnover					0.0085	(0.940)	0.072	(0.597)	0.037	(0.723)	0.019	(0.856)
Cash ratio					0.12	(0.846)	-0.50	(0.463)	-0.17	(0.786)	-0.26	(0.664)
Concentration ratio					0.67	(0.324)	0.12	(0.852)	0.78	(0.204)	0.51	(0.387)
Sales shock					-0.038	(0.976)	0.87	(0.334)	-0.37	(0.766)	-0.61	(0.659)
MTB					-0.12	(0.356)	-0.12	(0.298)	-0.16	(0.227)	-0.21	(0.133)
Constant	-3.86***	(0.000)	-4.75***	(0.000)	-3.34**	(0.044)	-4.36**	(0.010)	-2.62*	(0.072)	-1.66	(0.222)
N	1,458		1,458		1,345		1,345		1,345		1,345	
Pseudo R^2	0.12		0.28		0.14		0.29		0.06		0.02	

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$