

Siganos, A., and Papa, M. (2015) FT coverage and UK target price run-ups. European Journal of Finance, 21(12), pp. 1070-1089.

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Deposited on: 23 December 2015

FT Coverage and UK Target Price Run-ups

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This version: 6th May 2014

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Acknowledgements: We thank *British Academy* for their financial support through the Small Research Grant scheme. We are also grateful to Gillian MacIver for her support during data collection, to Jo Danbolt, Chris Veld and anonymous referees for valuable comments on the paper, and to FSA staff for an insightful discussion on the topic.

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Abstract: We focus on the explanation of the increase in share prices and trading volume of target firms before their merger announcements that have conventionally been attributed to either insider trading or market expectation. We use FT coverage as a proxy of merger expectation and search for relevant articles for 783 UK target firms between 1998 and 2010. We identify a total of 1,049 rumour articles and find that the FT market expectation proxy explains a small percentage of the target price run-ups. Results are strong during the sample period, even though the magnitude for both returns and trading volume tends to decrease within recent years. There is also a strong contemporaneous relation between abnormal returns and trading volume. Unexplained increases in target prices and trading volume may therefore be attributed to insider trading.

Keywords: Mergers and acquisitions, target firms, target price run-ups, media coverage

1. Introduction

The media often report the increase in targets' share prices before their merger announcements as an indication of insider activity (e.g., Morgenson, 27/08/2006). Pretzlik (10/11/1999, p.32) reports in the *Financial Times* (FT) that "The London Stock Exchange is examining dealings in Rugby Group... Shares in Rugby rose more than 16 per cent on Friday October 29, before RMC (Ready Mixed Concrete Group) approached it about a takeover on Sunday evening. Rugby said on Monday morning that it had received an approach, which was later disclosed as having come from RMC". Academic studies (e.g., Mathur and Waheed, 1995; King, 2009) confirm that targets' share prices increase weeks before their merger announcements, and a debate has arisen regarding the explanation of the target price run-ups pattern. Two hypotheses have been developed.

According to the insider trading hypothesis (Keown and Pinkerton, 1981), insiders are aware of prospective mergers and buy shares of these firms to gain from the expected premium. Insiders may be corporate staff working at the target or bidding firm or even at the financial institution that organises the merger. Cornell and Sirri (1992) report that informed investors can identify and follow insiders' transactions, generating the target price run-ups pattern. Meulbroek (1992) finds that almost half of the increase in targets' share prices is experienced on days when insiders traded in the firms. Eyssell (1990) and Seyhun (1990) even report that trading volume increases in line with the information level of insiders.

According to the market expectation hypothesis (Jensen and Ruback, 1983), investors predict the firms that will become targets before their merger announcements. Most studies use media coverage as a proxy of the market's awareness of the M&A, with investors managing to predict target firms if rumours were published earlier. In line with the attention hypothesis, as developed by Barber and Odean (2008), individual investors base their

decisions on media coverage to identify firms for long transactions, due to the large selection of firms available. Early studies (e.g., Pound and Zeckhauser, 1990; Zivney et al., 1996) focus on the newspaper coverage of a particular column, such as the columns *Heard on the Street* and/or *Abreast of the Market*, and later studies consider articles within a newspaper, but, due to the difficulty of collecting data manually, limit their research to a short horizon of a limited number of target firms. Holland and Hodgkinson (1994) analyse 86 UK target firms from 1988 to 1989, Murray (1994) 60 Australian target firms from 1988 to 1992, and King (2009) 399 Canadian firms between 1985 and 2002.

Most international studies show that press coverage partly explains the price run-ups of target firms, with the upwards reaction in target firms commencing days before the appearance of rumours. Gupta and Misra (1989) report that US target firms with rumours experience abnormal returns at 16 percent prior to merger announcements and 7 percent before rumours. Results remain robust when exploring the abnormal level of trading volume before rumours. Bris (2005) states that high trading volume in a firm is the first sign that illegal transactions may be made by insiders. Jarrell and Poulsen (1989) find that trading volume is higher before merger announcements, and Murray (1994) shows that the abnormal trading volume is 15 percent for firms with rumours. King (2009) uses Canadian mergers and finds that abnormal returns and trading volume prior to rumours are 6.42 and 2.82 percent.

Existing UK results are mixed. Holland and Hodgkinson (1994) analyse 86 target firms from 1988 to 1989 and show that FT coverage explains a significant part of the target price run-ups, especially when considering that FT reflects the prior day's news. The unexplained returns of target firms two days prior to rumours were insignificant at 0.28 percent. However Siganos (2013) explores 430 target firms from 2004 to 2010, based on data availability from Google volume trends, and finds that the target price run-ups commences

before the market could have predicted such pattern, supporting the alternative insider hypothesis.

We contribute to the literature in several ways. First, we explore the target price run-ups prior to the merger announcement of 783 UK target firms between 1998 and 2010 and therefore, the data period coverage is longer and the number of firms and rumours analysed larger in relation to prior literature (see Appendix A). Since existing UK results are conflicting, our study intends to provide further evidence whether the target price run-ups is present in the London Stock Exchange using one of the most complete dataset in the literature. Second, the significant length of the data set used offers the opportunity to explore the robustness of the target price run-ups during the sample period and whether fines to insiders may impact on the magnitude of the target price run-ups. Third, our study is the first that incorporates trading volume to explore the UK target price run-ups. According to Bris (2005), trading volume is the first sign of a potential illegal transaction and its incorporation may offer further evidence of illegal transactions. We further explore the interrelation between returns and trading volume that may offer further evidence of potential insiders' transactions.

Fourth, due to regulatory and market differences with the US, studying the UK target price run-ups allows us to make inferences about the pattern, outside of the US. Studying the target price run-ups in the UK avoids the standard criticism that observed regularities in the US may be a function of data mining. The Takeover Panel, in collaboration with the Financial Services Authority (FSA), has been responsible for administering, regulating and supervising the takeover rules since 1968. Bhattacharya and Daouk (2002) and Bris (2005) report that most UK prosecutions for insider trading tend to be less effective than those in the US, since defendants tend to settle without going to trial, and the fines issued to UK insiders

tend to be much lighter than those for US insiders. Since January 2002, prosecutions by the FSA have been published online,¹ and we find that only a few of these fines were for insiders who traded illegally before merger announcements. Individuals were fined only in the mergers of IFeelGood plc in April/May 2003 and Monterrico plc in February 2007, and the charges were limited, ranging between £15,000 and £176,254. The illegal transactions were committed by a friend/a former colleague and the brother of an insider rather than directly by the insiders. Since 19th September 2011, the Takeover Panel has also implemented various amendments to the takeover code,² showing awareness of limitations in recent legislation. A target firm needs to name any potential bidding firm with which it is in discussion or from which it has received an approach, and the potential bidding firm has up to 28 days to announce its intention to make an offer or not, or it will have to withdraw for the next six months. These changes have been made with the intention to offer transparency during merger negotiations by shortening the period of time target firms may be under discussion for a merger and by encouraging firms to focus only on genuine merger negotiations, thus avoiding leaks to the media. Overall, the UK regulator is aware of potential insider activity before mergers, and the overall UK framework shows signs that insiders may have been more likely to trade on their private information than their US counterparts. This generates an expectation of high pre-announcement returns for UK target firms.

In line with our hypothesis, we find evidence of a strong upwards price pattern before UK merger announcements. We follow an event study analysis and find that FT coverage can only explain part of the abnormal returns of target firms' share performance before merger announcements. FT coverage explains merely 27 percent of the target price run-ups in firms with prior rumours. Results remain robust when we estimate abnormal trading volume and

¹ <http://www.fsa.gov.uk/about/press/facts/fines> (last accessed March 2014).

² <http://www.thetakeoverpanel.org.uk/wp-content/uploads/2008/11/transitionalarrangements.pdf> (last accessed March 2014).

are strong during the sample period, even though the magnitude for both returns and trading volume tends to decrease within recent years that may be explained by FSA's fines on individuals. We further find that there is a strong contemporaneous relation between abnormal returns and trading volume, giving further evidence on potential illegal transactions prior to merger announcements. Although we only use FT coverage to proxy the market expectation hypothesis, unexplained upwards price and volume patterns may be attributed to insider trading.

The remainder of the paper is structured as follows. Section 2 explains the data and methodology used and Section 3 discusses the empirical results. Section 4 concludes.

2. Data and methodology

2.1 Methodology

We follow an event study analysis to explore whether FT coverage explains the target price run-ups pattern. We estimate daily abnormal returns following the risk-adjusted returns based on the three-factor model (Fama and French, 1993).

$$(1) \quad AR_{itFF3} = R_{it} - (\hat{a}_i + \hat{b}_{iM} R_{Mt} + \hat{b}_{iSMB} SMB_t + \hat{b}_{iHML} HML_t)$$

where SMB_t and HML_t reflect the size and book/market risk proxies. To estimate these factors, firms with negative book values and financial companies (ICBIC = 8,000) are excluded from the sample, and we rebalance portfolios each June. Eligible UK companies available from Datastream are independently ranked into three book/market portfolios (L-30, M-40 and H-30 percent) and two size portfolios (S and L, based on the median market values), and we construct six portfolios: LS, LL, MS, ML, HS and HL. The SMB_t factor reflects the daily return difference on the average three small-sized portfolios (LS, MS and

HS) and the three large-sized portfolios (LL, ML and HL), and the HML_t factor reflects the daily return difference between the average of the two high-book/market portfolios (HS and HL) and the two low-book/market portfolios (LS, LL). R_{Mt} shows the market (FTSE All Share) excess return over the risk-free rate of return. $\hat{a}_i, \hat{b}_{iM}, \hat{b}_{iSMB}, \hat{b}_{iHML}$ coefficients are estimated over the 150-day interval from -250 to -101 days.

In line with Bris (2005) and King (2009), we estimate daily abnormal trading volume as follows:

$$(2) \quad ATV_{it} = TV_{it} - (\overline{TV}_i + 2\sigma_{TVi}) \text{ if } \overline{TV}_i > 2\sigma_{TVi} \text{ or } 0 \text{ otherwise}$$

where \overline{TV}_i and σ_{TVi} are the mean and standard deviation of a firm's trading volume from -250 to -101 days before the merger announcement. The formation period is identical for both abnormal trading volume and return. Abnormal trading volume indicates that a firm has at least two standard deviations higher volume than normal. Abnormal trading volume is at minimum zero by construction.

2.2 Merger data

We use OneBanker to download information about UK target firms with at least a 50% level of acquisition between April 1998 and December 2010. We collect 1,173 target firms and their merger announcement dates, where eligible firms are those with available Datastream codes that are used to link OneBanker with Datastream. Datastream is employed to access targets' daily share returns and trading volume.³ We require that firms have 60 days of share returns prior to the merger announcement dates (day 0), with at least one non-zero return and

³ We use the Total Return Index (RI datatype) that incorporates dividend payments in the estimation of returns. We use firm volume (VO) adjusted by the total number of outstanding shares (NOSH) to measure trading volume.

at least 50 percent of returns available between -250 and -61 days.⁴ Firms should also have at least 50 percent of trading volume data between -60 and 0 and at least 20 percent between -250 and -61 days. The different data restriction rule that we follow is due to the limited data availability on volume.⁵ The interval between -60 and 0 is the target price run-ups period, and for that reason we follow stricter data restrictions. We exclude a few firms that had more than one merger within the same three-month pre-announcement period to eliminate bias. The final sample consists of 783 target firms.

Table 1 shows the number of target firms available during the sample and across industries. We find that apart from a large number of mergers in the late 1990s, the distribution of mergers within the remaining years is relatively similar. In line with Mitchell and Mulherin (1996), we find that there are merger waves within each industry. We estimate the maximum two-year cluster that explores the maximum two year concentration of mergers within each industry. We find that this percentage tends to be higher than that found in the total target sample (27 percent). For example, the two-year cluster is equal to 41 percent within the Consumer Goods industry, showing that 31 out of all 76 mergers in the industry took place within two years. Figure 1 shows the targets' cumulative abnormal share returns prior to merger announcements. We find that the increase in target share prices commences around 60 days prior to the merger announcement, which sets our time horizon. Most studies in the target price run-ups field (e.g., Holland and Hodgkinson, 1994) restrict the target price run-ups to the previous -29 days, but studies within the wider M&A field (e.g., Franks and Harris, 1989) show that the increase in share prices commences earlier.

[please insert Table 1 here]

⁴ Note that our firms are not dead and the requirement of at least one non-zero return prior to merger announcements aims to exclude a few highly illiquid firms that may bias results.

⁵ No firms have volume data for all 250 days, and only 91 firms have all trading volume data between -60 and 0.

[please insert Figure 1 here]

2.3 *FT data*

We use NewsBank to access daily FT coverage of these 783 target firms since January 1998. NewsBank's FT coverage restricted the sample to the post-1998 period; if a larger number of newspapers were to be included, we would have reduced the sample period further. We search for FT articles per target firm and a number of terms reflecting potential merger activity.⁶ We set the time span to three months before each merger announcement. The search is undertaken using the full text, rather than only headlines, to boost the number of relevant articles. Articles identified by NewsBank may not necessarily indicate rumours about the particular target firms, and we study the articles to ensure that they offer information about a potential merger.⁷ Appendix B shows an example of a rumour.

Tables 2, 3 and 4 show the descriptive statistics of FT articles found. Panel 1 of Table 2 shows the number of firms with FT coverage. We first explore whether FT covered the merger within two days after the announcement date (as reported by OneBanker), and find that the merger announcements of 198 (25 percent) firms were not reported. This is to some extent in line with Fang and Peress (2009), who report that within the US, over 25/42 percent of NYSE/NASDAQ firms have no coverage. Fang and Peress (2009) find that market capitalisation is one of the key determinants of media coverage, with small-sized firms experiencing low, if any, coverage. We find that firms with no coverage of their merger

⁶ We employ the following terms: merg*, acqui*, target, takeover, rumour*, rumor*, buyout and bid*, where * indicates that the searched term should have the letters prior to the star, followed by any alternative ending.

⁷ In 103 targets, more than 20 articles are identified as relevant by NewsBank; as an example, in the search for merger activity of 'Enterprise' on 19/02/2007, 745 articles are identified as relevant. The large number of articles concerning the particular firm is due to the firm's name, with most articles irrelevant to rumours. To minimise the manual work required, we include the name of the bidding companies in the search.

announcements were small capitalisation firms, with an average size of merely £285 million.⁸ Of the remaining 585 target firms, whose mergers were reported, 340 firms had rumours. Panel 2 of Table 2 shows how many rumours were reported per company. We find that most firms had a few articles available, and only 14 of the firms reported over 10 articles. Panel 3 of Table 2 shows that out of the total of 1,049 rumours, the potential merger was reported in 544 articles within the headline and in 505 within the text. Panel 4 of Table 2 shows the number of lines reported. The coverage was on average (median) 6 (4) lines, with 30 percent of the articles being merely one line in length.⁹ Table 3 shows how many days before the announcement these articles were reported, with most rumours appearing a few days before. As an example, 35 percent of rumours were reported within 10 days before the announcement, though there are rumours even 70 days before. Table 4 shows the distribution of rumours across years and industries. In line with Table 1, which explores the distribution of target firms, we find that apart from a large number of rumours in the late 1990s, the distribution of rumours is relatively similar across years. With the exception of oil and gas and technology firms that experience an increase in rumours in the late 2000s, there is a larger number of rumours in the late 1990s across the remaining industries. The correlation between the annual number of target firms and that of rumour articles is 0.85. The maximum two-year cluster in the number of rumours within each industry is higher than that found in target firms. The average clustering in target firms is 32 percent (Table 1) and that of rumours is 40 percent.

[please insert Tables 2, 3 and 4 here]

⁸ The average market capitalisation of firms with a reported merger announcement is £356 million, and for those firms with rumours, £881 million.

⁹ As an example of a short rumour, Hume and Orr (20/03/2007, p.40) report that “George Wimpey rose 3.4 per cent to 584p on vague bid rumours. Traders suggested that it could tie the knot with Taylor Woodrow, a rival, up 2.8 per cent to 410 1/4p”. George Wimpey plc was acquired by Taylor Woodrow plc on 26/03/2007.

We also explore the impact of rumours on abnormal returns and trading volume in excess of the average return and trading volume in days without any coverage. Table 5 shows that the average abnormal returns and trading volume of firms on the publication day of rumours is 0.79 and 0.50 percent. Abnormal values are significant at the 1 percent level. This result is to some extent in line with Clarkson et al. (2006) and Chou et al. (2010), who use internet discussion sites to identify rumours for potential target firms and show that rumours have an impact on targets' share returns. We explore whether the impact of rumours on returns and volume is different based on the sequence of appearance. We find that abnormal returns and trading volume at the time the first rumour appears are 1.32 and 0.48 percent. In line to some extent with the stale news hypothesis, as developed by Tetlock (2011), rumours that contain similar information and are reported on a later day have less of a positive impact.

[please insert Table 5 here]

Overall, we report that the target price run-ups effect commences around 60 days before the merger announcement, and that a large number of rumours before the merger announcement have an impact on firm share returns and trading volume. Later, we will explore whether these rumours explain the target price run-ups pattern.

3. Empirical results

3.1 Abnormal returns

We now estimate abnormal returns of target firms before their merger announcement to explore whether or not these returns can be explained by rumours. We present the daily abnormal returns until two days prior to the merger announcement and the Cumulative Abnormal Returns (CAR) every ten days over the previous 60 days, when day 0 reflects the

merger announcement date. Holland and Hodgkinson (1994) hypothesise that news coverage reflects the previous day's news, and we explore the lag between the coverage of news reported in a newspaper and the earlier time at which this information was available to market participants by estimating $CAR(-60,-2)$.

Column (1) of Table 6 shows the abnormal returns for the full sample of 783 target firms. We find that abnormal returns are positive, with the rate of the magnitude of abnormal returns becoming higher as the announcement day approaches. We find that $CAR(-60,-1)$, which shows the cumulative returns between -60 and -1 days prior to the merger announcement, is 13.91 percent, and these returns are significant at the 1 percent level. In unreported results, we find that the returns of target firms are positive for all 32 days before their announcement. The magnitude of these returns is strong in comparison to that found in international studies. King (2009) and Gupta and Misra (1989) for example report that Canadian and US target firms experienced CARs at a magnitude of around 6 and 12 percent. As discussed earlier, insiders may be more likely to trade on their private information within the UK context.

[please insert Table 6 here]

We present results separately for the 340 firms with rumours (Columns 3 and 4 of Table 6), the 245 firms with FT coverage of their merger announcements (Column 5 of Table 6) and the remaining 198 firms without any FT coverage (Column 6 of Table 6). These subsamples comprise the full sample of 783 firms. Firms with rumours have the highest target price run-ups $(-60,-1)$, at 16.09 percent, in comparison to firms with FT coverage of their announcement (12.89) and firms without any FT coverage (11.43 percent). Firms with FT coverage of the merger announcement have the strongest share price reaction at the time of the announcement, at 15.14, versus 8.52 and 10.10 percent in firms with rumours and in

firms without any FT coverage. These results show that firms with rumours experience larger upwards pressure. However, rumours cannot explain the target price run-ups pattern, since the price pattern for firms without any FT coverage is still upwards before the merger.

We explore whether these abnormal returns may be explained by FT coverage prior to the merger announcements. Columns 2 and 4 of Table 6 show the abnormal returns in relation to the first rumour or merger announcement date, with day 0 reflecting either the day that the first rumour was reported or the merger announcement date, for firms without rumours. In order for FT coverage to explain the upwards trend in target share prices, returns before rumours should become insignificant. We find that $CAR(-60,-1)$ and $CAR(-60,-2)$ for target firms are 13.00 and 7.70 percent, and corresponding returns for firms with rumours are 11.69 and 2.93 percent. These returns are significant at least at the 5 percent level, showing that the increase in share prices commences before rumours appear.

Figure 2 further shows the abnormal average daily returns in the interval between -60 and -1 during the sample period. Returns shown are those unexplained from FT rumours. We find that abnormal returns are strong during the sample period, even though there is the tendency the magnitude of returns to decrease within recent years. Such reduction may be explained by the FSA fining individuals for insider trading prior to the IFeelGood plc merger during April-May 2003.¹⁰ Bhattacharya and Daouk (2002) report that prosecution, rather than the passing of a law, has an impact on investor behaviour.

[please insert Figure 2 here]

Overall, we support the market expectation hypothesis, showing that the target price run-ups pattern is related with FT coverage. However, it remains a considerable unexplained return. Results are robust during the sample period.

¹⁰ <http://www.fsa.gov.uk/Pages/Library/Communication/PR/2004/107.shtml> (last accessed March 2014).

3.2 Abnormal trading volume

We also explore the abnormal trading volume before merger announcements. Table 7 shows the results. We find that abnormal trading volume is positive, with the rate of the magnitude of volume becoming higher as the merger announcement approaches. CATV(-60,-1) (cumulative abnormal trading volume) in the full sample of target firms is 5.29 percent and significant at the 1 percent level. The magnitude of abnormal volume is strong in comparison to that reported in international studies that followed a similar methodology to measure abnormal volume. King (2009) for example shows that the abnormal trading volume is 2.82 percent in Canadian target firms.

[please insert Table 7 here]

Firms with rumours have the highest abnormal trading volume in the interval between -60 and -1, at 6.56 percent, and firms with FT coverage of the merger announcement have the strongest abnormal trading volume on the merger announcement day. These results show that rumours have an impact on the magnitude of the abnormal trading volume. We also explore whether this abnormal volume can be explained by rumours. Columns 2 and 4 of Table 7 show the abnormal volume in relation to the first rumour or merger announcement date, whichever is earliest. We find that CATV(-60,-1) and CATV(-60,-2) for firms are 4.45 and 3.73 percent, showing that rumours can explain part of the abnormal volume. The increase in volume commences before the rumour is made public. Figure 3 further shows the abnormal daily trading volume in the interval between -60 and -1 on the duration of the sample period. Volume shown is that unexplained from FT. We find that there are strong abnormal volume during the sample period and the magnitude of such abnormality tends to decrease within recent years.

[please insert Figure 3 here]

Overall, we find evidence supporting the market expectation hypothesis, showing that abnormal trading volume is related with news coverage. However, FT coverage can only explain part of the abnormal volume, showing the robustness of conclusions within both returns and trading volume.

3.3 Robustness tests

We undertake a number of robustness tests. Panel 1 of Table 8 explores the robustness of the abnormal returns that cannot be explained by rumours. For brevity, we only show cumulative abnormal returns for the (-60,-1) and (-60,-2) interval periods, for the full sample of firms. We first estimate abnormal returns in excess of contemporaneous market return ($adj.AR_{itRm}$) and after adjusting for risk based on the Capital Asset Pricing Model ($adj.AR_{itCAPM}$). We find that the magnitude of abnormal returns remains significantly positive prior to merger announcements within alternative abnormal return estimations. For example, the unexplained cumulative returns in the (-60,-2) interval period are 9.97 percent, and significant at the 1 percent level, after adjusting for risk based on the Capital Asset Pricing Model. Note that the corresponding unexplained returns after adjusting for the three-factor model are 7.70 percent (as shown at Table 6).

[please insert Table 8 here]

We further exclude the five percent of the firms with the highest abnormal return prior to merger announcements and re-estimate abnormal returns. This test explores whether a few extreme return observations generate the target price run-ups. We find that after excluding these extreme observations as shown in the “sensitivity” column, the unexplained abnormal

returns may reduce by construction at 3.79 percent in the interval period between -60 and -2. However these returns remain significantly positive, indicating that our results are not driven by outliers.

We even undertake a non-parametric test, in addition to counterpart parametric approach followed above. We use the sign test¹¹ and find that there is a larger number of positive returns than would be present by chance. In line with Jaffe (1974) and Mandelker (1974), we also follow the portfolio method to deal with uncertainty in variances across firms. For every month, we estimate the average abnormal returns adjusted by prior month's standard deviation. We then calculate the average of the cumulative standardised values. As shown at the portfolio method column, we find that the alternative estimation shows the presence of abnormal increases in returns prior to merger announcements.

We also explore whether the target price run-ups is driven by any particular industry. We find that with the exception of telecommunications, the target price run-ups is present within the remaining industries. There are only 10 telecommunication firms available in our sample that may explain the weak pattern in the particular industry. In unreported results, we further estimate firms' abnormal returns above their corresponding contemporaneous industry returns and find that the magnitude of the abnormal returns prior to merger announcements remains significantly positive.

Panel 2 of Table 8 further explores the robustness in the increase of the abnormal trading volume prior to merger announcements that cannot be explained by rumours. We first estimate abnormal trading volume based on an alternative measure according to which we divide each firm's abnormal trading volume by the standard deviation of its trading volume between -250 and -101 days ($Adj.ATV_{itS\ tan\ d}$). We find that the magnitude of the unexplained

¹¹ $J_I = (N^+ / N - 0.5) * N^{1/2} / 0.5$ where N^+ is the number of returns with positive abnormal returns and N the total number of available returns.

trading volume remains similar within alternative volume definitions. We further explore the level of abnormal trading volume prior to merger announcements when excluding the top 5 percent firms with the highest increase in trading volume. Once again results show that outliers do not drive the increase in trading volume before merger announcements. After excluding the particular firms, there is still a clear upward trend in abnormal trading volume before merger announcements. We further show that the pattern is not driven by any particular industry, since we find a significant increase in abnormal trading volumes prior to merger announcements across industries.

Overall, we find that the abnormal increase in returns and trading volume prior to merger announcements is robust within alternative specifications.

3.4 Interaction between abnormal returns and trading volume

We also explore the interaction between abnormal returns and trading volume. As hypothesised by King (2009), a contemporaneous relation between returns and trading volume indicates potential insider trading, since insiders' transactions determine both returns and trading volume. Meulbroek (1992) finds that a large part of the target price run-ups occur on days when insiders trade in the firms, and even though insiders' transactions are small, the overall volume on those particular days increases. Theoretical propositions developed by Kyle (1985) are in agreement with these empirical results.

We first explore a single equation relation between abnormal returns and trading volume by estimating a Panel regression with fixed effects, random effects and the first difference method. The alternative methods test the robustness of our results. Panel 1 of Table 9 shows the results within (-60,-1) and (-100,-61) intervals. We use the (-100,-61) interval period as a control period. We find that the relation between abnormal trading volume and returns during

the (-60,-1) period is positive and significant at the 1 percent level, showing that there is a strong contemporaneous relation between returns and volume that indicates insiders' transactions. In particular, the parameter coefficient is 0.652, 0.626 and 0.576 when using fixed effects, random effects and the first difference method. During the (-100,-61) period, there may be a positive relation between returns and volume, but the coefficient is at a lower magnitude than that found in the target price run-ups period (0.383, 0.368 and 0.241 when using fixed effects, random effects and the first difference method). The relation between returns and volume in the control period is at most significant at the 10 percent level.

[please insert Table 9 here]

Panel 2 of Table 9 undertakes a multivariate analysis. We estimate the following Panel estimation only with fixed effects, since the Hausman test is statistically significant at the 1 percent level:

$$(3) \quad AR_{itFF3} = b_0 + b_1 ATV_{it} + b_2 Rumour_i * ATV_{it} + b_3 \ln Size_{it} + b_4 BM_{it} + u_{it}$$

where AR_{itFF3} is the three-factor risk-adjusted returns as estimated in equation (1), ATV_{it} is the abnormal trading volume as estimated by equation (2), $Rumour_i$ is a dummy variable coded 1 for firms with rumours, $\ln Size_{it}$ is the log market capitalisation and BM_{it} is the book-to-market. We find that the coefficient on $Rumour_i * ATV_{it}$ is positive within the (-60,-1) interval, showing that the relation between returns and trading volume is stronger within firms with rumours. This result may indicate that insiders leak their private information to the media to boost the target price run-ups pattern. We also find that the target price run-up is higher within large capitalisation value firms. The relations between returns and size, and returns and book-to-market are present during the control period (-100,-61). Therefore, the

particular results need to be interpreted with caution. In unreported results, we find that prior relations hold robust when estimating equation (3) within (-60,-2).

Overall, we find a positive relation between contemporaneous abnormal returns and trading volume during the target price run-ups period, offering further support of potential insider transactions within the UK market. The relation between returns and trading volume is stronger within firms that had a rumour.

4. Conclusion

Studies (e.g., Mathur and Waheed, 1995) find that the share prices of target firms increase before their merger announcements, and two hypotheses are developed to explain the price pattern. According to the insider trading hypothesis (Keown and Pinkerton, 1981), insiders trade in these firms before the announcement whereas according to the market expectation hypothesis (Jensen and Ruback, 1983), investors manage to predict the target firms before their merger announcements. We focus on the market expectation hypothesis by exploring FT coverage, with investors predicting target firms as long as rumours were reported.

In line with the UK context that shows signs of strong insider transactions, we find that there are strong high pre-announcement returns for UK target firms. We identify 1,049 rumours published in FT and find that these rumours have an impact on share returns and trading volume on the publication day. We follow an event study analysis and conclude that FT coverage explains part of the abnormal returns and trading volume. Results remain robust during the sample period, even though there is the tendency the abnormal returns and trading volume to decrease within recent years that may be explained by FSA fining individuals for insider trading. We also find that there is a contemporaneous relation between returns and trading volume, indicating further evidence of potential illegal transactions. We only use FT

coverage to proxy the market expectation hypothesis, but insider trading may contribute to the unexplained increase in returns and trading volume.

Future research may explore further proxies of the market expectation hypothesis. Toeholds may for example be used as an alternative merger signals according to which bidding firms acquire shares of the target before the merger announcement. Due to the lack of access in toehold data, we did not test the particular hypothesis.

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Appendix A. Media coverage in the target price run-ups literature

Study	Period	Country	# of firms	# of rumours
Holland and Hodgkinson (1994)	1988-1989	UK	86	54
Siganos (2013)	2004-2010	UK	430	127
Chou et al. (2010)	1990-2008	US	260	n/a
Gao and Oler (2012)	1990-2001	US	976	n/a
Gupta and Misra (1989)	1985-1986	US	87	83
Hallett (2007)	2003-2006	US	431	431
Jarrell and Poulsen (1989)	1981-1985	US	172	69
Mathur and Waheed (1995)	1981-1989	US	233	n/a
Pound and Zeckhauser (1990)	1983-1985	US	42	42
Zivney et al. (1996)	1985-1988	US	271	871
Aspris et al. (2014)	2001-2009	Australia	450	n/a
Clarkson et al. (2006)	1999-2000	Australia	118	189
Murray (1994)	1988-1992	Australia	60	n/a
King (2009)	1985-2002	Canada	399	99

Notes: # shows the number of target firms and the number of rumours analysed.

Appendix B. An example of a rumour article

Deutsche Bahn bid talk drives Arriva higher

Bid speculation made Arriva the main talking point on Tuesday as the London market edged higher. Shares in the transport group rose 2.1 per cent to 579½p, the highest in more than a year, amid rumours that Deutsche Bahn was eyeing an offer. The state-owned German group was rumoured to be in preliminary talks about a bid, with new chief executive Rüdiger Grube keen to expand outside the company's home market. Both companies declined to comment. Analysts said the combination made strategic sense, as it would bring together Deutsche Bahn's expertise in high-speed rail with Arriva's Europe-wide bus and train franchises. Financing for any deal, probably to be about £1.5bn, was unlikely to present a problem, they said. However, it was not clear where a deal for Arriva would fit into the German government's controversial and politically sensitive moves to privatise Deutsche Bahn. Local elections in May could make the timing difficult, dealers said.

Elder and Hume (16/03/2010)

Notes: Arriva plc was acquired by Deutsche Bahn AG on 18/03/2010.

Table 1. Distribution of target firms across years and industries

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total industry	Max cluster % in 2 years
Basic material	1	7	8	2	2	0	1	2	3	6	4	7	2	45	33
Consumer goods	6	20	11	8	2	4	4	7	4	6	1	1	2	76	41
Consumer services	14	28	19	10	16	14	7	17	21	13	5	7	4	175	27
Financials	11	16	21	11	7	2	3	8	6	10	8	7	3	113	33
Health care	3	7	4	2	1	4	4	1	6	8	5	7	2	54	26
Industrials	13	28	20	12	5	4	7	24	10	23	9	7	9	171	28
Oil and gas	1	1	1	0	1	1	1	4	0	6	4	2	3	25	40
Technology	0	12	5	5	12	4	4	9	10	15	15	4	5	100	30
Telecommunications	0	1	1	1	1	0	0	2	1	0	2	0	1	10	30
Utilities	1	0	1	0	2	0	0	2	3	1	1	1	2	14	36
Annual total	50	120	91	51	49	33	31	76	64	88	54	43	33		27
% of total	6	15	12	7	6	4	4	10	8	11	7	5	4		

Notes: This table shows the distribution of target firms across years and industries. We use OneBanker to download UK target firms with at least a 50 percent level of acquisition between April 1998 and December 2010. 'Max cluster % in 2 years' shows the two years with the maximum number of firms available adjusted by the total number of target firms per industry.

Table 2. FT coverage

	#
Panel 1: Firms with FT coverage	
No coverage of the merger	198
With coverage of the merger	585
With rumour articles	340
Panel 2: Firms' coverage with rumours	
1 article	129
2 articles	72
3 articles	44
4 articles	26
5 articles	23
6 articles	13
7 articles	9
8 articles	4
9 articles	4
10 articles	2
Over 10 articles	14
Total articles with rumours	1049
Panel 3: Articles with relevant headline	
Yes	544
No	505
Panel 4: Lines of articles	
Average	6
0.10	1
0.20	1
0.30	1
0.40	2
0.50	4
0.60	7
0.70	10
0.80	12
0.90	14

Notes: Panel 1 shows the number (#) of firms with FT coverage of the merger announcement and firms with FT coverage articles prior to the merger announcement. Panel 2 shows how frequently articles appeared about these firms. Panel 3 shows whether the relevance of the articles regarding potential merger activity is cited on the headline or within the text and Panel 4 describes the number of lines reported in FT.

Table 3. FT coverage before the merger announcement date

Day	#	%	Cumulative (%)
-1	72	7	7
-2	48	5	11
-3	47	4	16
-4	31	3	19
-5	33	3	22
-6	28	3	25
-7	45	4	29
-8	32	3	32
-9	21	2	34
-10	15	1	35
<hr/>			
(-10,-1)	372	35	35
(-20,-11)	218	21	56
(-30,-21)	162	15	72
(-40,-31)	110	10	82
(-50,-41)	94	9	91
(-60,-51)	72	7	98
(-70,-61)	21	2	100

Notes: This table shows when FT articles appeared in relation to the announcement date (day 0). # shows the number of articles.

Table 4. Distribution of rumour articles across years and industries

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total industry	Max cluster % in 2 years
Basic material	0	1	18	6	1	0	0	0	24	5	1	2	0	58	50
Consumer goods	5	44	12	25	2	1	7	11	0	10	0	0	0	117	48
Consumer services	32	67	24	12	23	62	8	41	37	11	2	1	3	323	31
Financials	1	18	26	9	12	1	2	0	7	8	1	6	2	93	47
Health care	0	9	11	5	0	8	3	0	1	5	13	8	1	64	33
Industrials	19	33	17	13	1	18	14	29	12	17	20	1	7	201	26
Oil and gas	2	3	1	0	4	1	2	6	0	2	18	13	8	60	52
Technology	0	12	12	4	8	3	0	2	15	13	17	5	6	97	31
Telecommunications	0	1	0	0	4	0	0	4	1	0	2	0	0	12	42
Utilities	1	0	10	0	4	0	0	1	5	3	0	0	0	24	42
Annual total	60	188	131	74	59	94	36	94	102	74	74	36	27		30
% of total	6	18	12	7	6	9	3	9	10	7	7	3	3		

Notes: This table shows the distribution of rumour articles across years and industries. 'Max cluster % in 2 years' shows the two years with the maximum number of rumours available adjusted by the total number of rumours per industry.

Table 5. Impact of FT articles on abnormal returns and trading volume (%)

	AR_{itFF3}	#	ATV_{it}	#
1 st rumour	1.32***	340	0.48***	330
2 nd rumour	0.92*	179	0.70***	175
3 rd rumour	0.69	108	0.62**	102
4 th rumour	0.00	75	0.10	70
5 th rumour	-0.43	44	0.12	42
6 th rumour	0.32	25	0.44*	25
7 th rumour	-1.27*	17	0.72	17
8 th rumour	-1.07	12	0.30	11
9 th rumour	0.23	7	0.28	6
10 th rumour	-0.70	2	0.12	1
11 th rumour	-0.16	1	n/a	0
All rumours	0.79***	810	0.50***	779

Notes: This table shows the impact of FT articles on targets' abnormal share returns (AR_{itFF3}) and abnormal trading volume (ATV_{it}) on the day of the coverage. Rumours are ranked based on the sequence of their appearance in FT. Abnormal returns and trading volume are in excess of the average return and trading volume in days without any coverage. The significance levels indicate the average excess return/trading volume, above days without rumours, over all the firms with a rumour (e.g., 1st rumour) adjusted by the corresponding standard error and the number of observations. # shows the number of observations available. AR_{itFF3} is estimated as follows:

$AR_{itFF3} = R_{it} - (\hat{a}_i + \hat{b}_{iM} R_{Mt} + \hat{b}_{iSMB} SMB_t + \hat{b}_{iHML} HML_t)$ where SMB_t and HML_t reflect the size and book/market risk proxies and $\hat{a}_i, \hat{b}_{iM}, \hat{b}_{iSMB}, \hat{b}_{iHML}$ coefficients are estimated over the 150-day interval from -250 to -101 days. ATV_{it} is estimated as follows: $ATV_{it} = TV_{it} - (\bar{TV}_i + 2\sigma_{TV_i})$ if $\bar{TV}_i > 2\sigma_{TV_i}$ or 0 otherwise where \bar{TV}_i and σ_{TV_i} are the mean and standard deviation of a firm's trading volume from -250 to -101 days before the merger announcement. *, ** and *** show significance at the 10, 5 and 1 percent levels.

Table 6. Abnormal returns (%)

	(1) Full sample (N=783)	(2)	(3) With rumours (N=340)	(4)	(5) With FT coverage of announcement (N=245)	(6) Without any FT coverage (N=198)
	AR_{itFF3}	$adj.AR_{itFF3}$	AR_{itFF3}	$adj.AR_{itFF3}$	AR_{itFF3}	AR_{itFF3}
0	10.99***	8.06***	8.52***	1.44***	15.14***	10.10***
-1	2.32***	5.30***	1.67***	8.76***	3.49***	1.96***
-2	1.03***	1.34***	1.33***	2.10***	0.55***	1.11***
CAR(-10,-1)	6.29***	8.22***	7.04***	11.68***	6.91***	4.25***
CAR(-20,-11)	2.83***	1.19**	4.33***	0.35	1.20*	2.28**
CAR(-30,-21)	1.84***	0.89**	2.30***	-0.35	2.24***	0.57
CAR(-40,-31)	0.66	0.56	0.86	0.76	0.33	0.74
CAR(-50,-41)	1.45***	1.13**	1.15	-0.96	1.54***	1.87**
CAR(-60,-51)	0.83**	1.00*	0.42	0.21	0.67	1.72**
CAR(-60,-1)	13.91***	13.00***	16.09***	11.69***	12.89***	11.43***
CAR(-60,-2)	11.60***	7.70***	14.42***	2.93**	9.40***	9.47***

Notes: This table shows the abnormal returns in relation to the merger announcement date (day 0). We show results for target firms (Columns 1 and 2), for firms with rumours (Columns 3 and 4), for firms with FT coverage of announcement (Column 5) and for firms without any FT coverage (Column 6). CAR shows the cumulative abnormal returns. AR_{itFF3} shows the three-factor model's risk-adjusted returns: $AR_{itFF3} = R_{it} - (\hat{a}_i + \hat{b}_{iM} R_{Mt} + \hat{b}_{iSMB} SMB_t + \hat{b}_{iHML} HML_t)$ where SMB_t and HML_t reflect the size and book/market risk proxies and $\hat{a}_i, \hat{b}_{iM}, \hat{b}_{iSMB}, \hat{b}_{iHML}$ coefficients are estimated over the 150-day interval from -250 to -101 days. $adjAR_{itFF3}$ shows the abnormal returns in relation to the first rumour or, in case no rumours were reported, the merger announcement date. *, ** and *** show significance at the 10, 5 and 1 percent levels.

Table 7. Abnormal trading volume (%)

	(1) Full sample (N=783)	(2)	(3) With rumours (N=340)	(4)	(5) With FT coverage of announcement (N=245)	(6) Without any FT coverage (N=198)
	ATV_{it}	$Adj.ATV_{it}$	ATV_{it}	$Adj.ATV_{it}$	ATV_{it}	ATV_{it}
0	5.01***	2.82***	5.66***	0.60***	5.85***	2.83***
-1	0.43***	0.71***	0.38***	1.07***	0.66***	0.20**
-2	0.17***	0.12***	0.31**	0.22**	0.04**	0.06**
CATV(-10,-1)	1.45***	1.43***	1.90***	1.83***	1.30***	0.81***
CATV(-20,11)	0.97***	0.80***	1.06***	0.58***	0.87***	0.92***
CATV(-30,-21)	0.72***	0.62***	0.83***	0.62***	0.51***	0.78***
CATV(-40,-31)	0.80***	0.54***	1.17***	0.65***	0.40***	0.63***
CATV(-50,-41)	0.71***	0.51***	0.86***	0.46***	0.42***	0.80***
CATV(-60,-51)	0.66***	0.56***	0.74***	0.46**	0.57***	0.61***
CATV(-60,-1)	5.29***	4.45***	6.56***	4.60***	4.07***	4.55***
CATV(-60,-2)	4.87***	3.73***	6.18***	3.53***	3.41***	4.35***

Notes: This table shows the abnormal trading volume (ETV_{it}) in relation to the merger announcement date (day 0). We show results for target firms (Columns 1 and 2), for firms with rumours (Columns 3 and 4), for firms with FT coverage of announcement (Column 5) and for firms without any FT coverage (Column 6). CATV shows the cumulative abnormal trading volume. ATV_{it} is estimated as follows: $ATV_{it} = TV_{it} - (\overline{TV}_i + 2\sigma_{TV_i})$ if $\overline{TV}_i > 2\sigma_{TV_i}$ or 0 otherwise where \overline{TV}_i and σ_{TV_i} are the mean and standard deviation of a firm's trading volume from -250 to -101 days before the merger announcement. $adjATV_{it}$ shows the abnormal trading volume in relation to the first rumour or, in case no rumours were reported, the merger announcement date. ** and *** show significance at the 5 and 1 percent levels.

Table 8. Robustness tests (%)

Panel 1: Abnormal returns that cannot be explained by rumours										
	Full sample	Full sample	Full sample / Sensitivity	Full sample / Sign test	Full sample / Portfolio method					
	$adj.AR_{itRm}$	$adj.AR_{itCAPM}$	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$					
CAR(-60,-1)	13.59***	16.06***	8.78***	6.76***	10.88***					
CAR(-60,-2)	7.50***	9.97***	3.79***	5.20***	4.86***					
	Basic material	Consumer goods	Consumer services	Financials	Health care	Industrials	Oil and gas	Technology	Telecommunications	Utilities
	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$	$adj.AR_{itFF3}$
CAR(-60,-1)	18.06***	15.14***	9.78***	6.73***	15.04***	18.80***	12.79	12.90***	-3.38	5.51
CAR(-60,-2)	10.21*	8.29**	4.49**	4.89**	7.52*	12.88***	13.22	6.09*	-7.03	3.39
Panel 2: Abnormal trading volume that cannot be explained by rumours										
	Full sample	Full sample / Sensitivity								
	$Adj.ATV_{itS \tan d}$	$Adj.ATV_{it}$								
CATV(-60,-1)	1.29***	3.47***								
CATV(-60,-2)	1.25***	3.18***								
	Basic material	Consumer goods	Consumer services	Financials	Health care	Industrials	Oil and gas	Technology	Telecommunications	Utilities
	$Adj.ATV_{it}$	$Adj.ATV_{it}$	$Adj.ATV_{it}$	$Adj.ATV_{it}$	$Adj.ATV_{it}$	$Adj.ATV_{it}$	$Adj.ATV_{it}$	$Adj.ATV_{it}$	$Adj.ATV_{it}$	$Adj.ATV_{it}$
CATV(-60,-1)	8.11***	5.66***	6.60***	3.13***	3.96***	4.82***	7.63***	5.01***	4.91***	6.10***
CATV(-60,-2)	6.95***	5.24***	6.02***	2.96***	3.80***	4.39***	7.58***	4.57***	4.89***	5.91***

Notes: This table shows the robustness of abnormal returns (Panel 1) and trading volume (Panel 2) that cannot be explained by rumours. $adj.AR_{itRm}$, $adj.AR_{itCAPM}$ and $adj.AR_{itFF3}$ show abnormal returns above the corresponding market performance, CAPM model's risk-adjusted performance and the three-factor model's risk-adjusted returns. $Adj.ATV_{itS \tan d}$ shows abnormal trading volume according to which we divide each firm's abnormal trading volume by the standard deviation of its trading volume between -250 and -101 days. *Sensitivity* column shows results when excluding the top 5 percent of the firms with the highest abnormal returns/trading volume before merger announcements. *Sign* test is a non-parametric test estimated as $J_1 = (N^+/N - 0.5) * N^{1/2} / 0.5$ where N^+ is the number of returns with positive abnormal returns and N the total

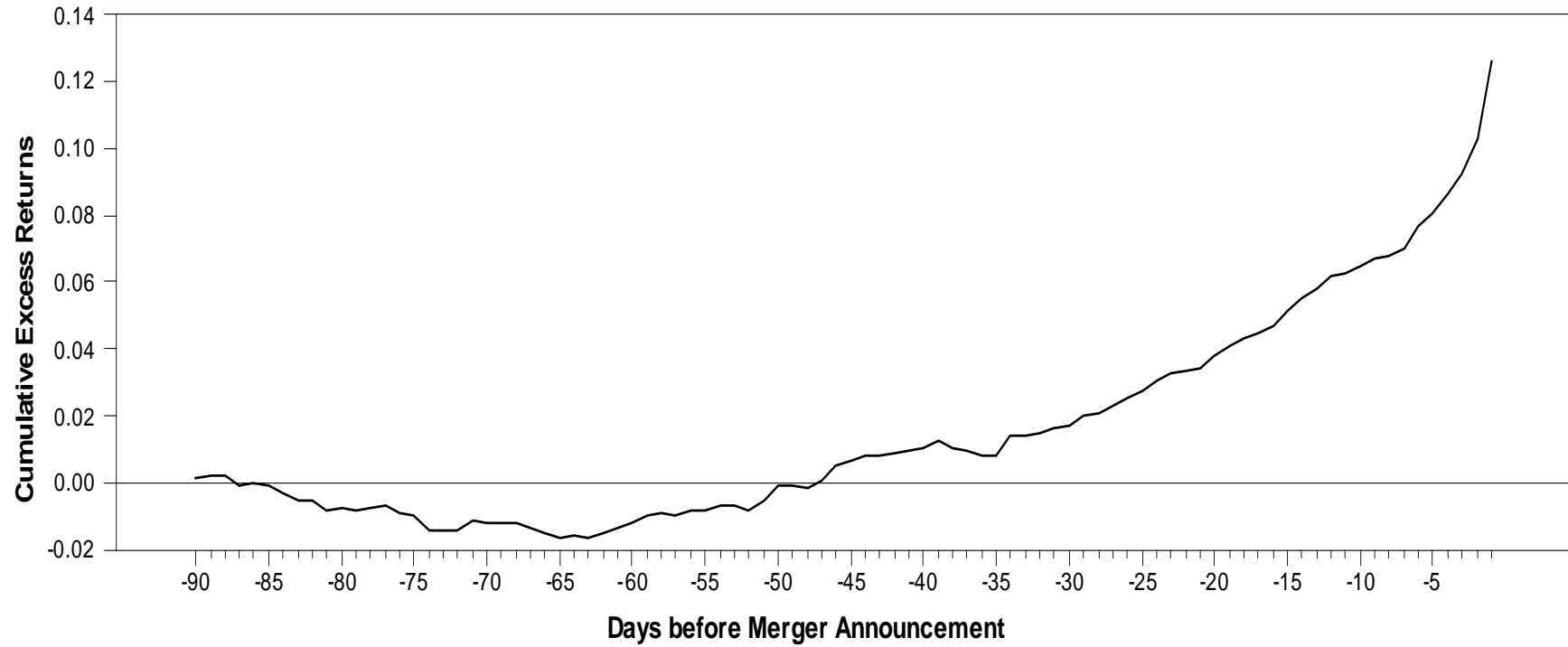
number of returns. In line with the portfolio method (e.g., Jaffe, 1974), we first estimate the monthly standardised average abnormal returns adjusted by prior month's standard deviation and then calculate the average of the cumulative standardised values. *, ** and *** show significance at the 10, 5 and 1 percent levels.

Table 9. Interaction between abnormal returns and trading volume

Panel 1: Single-equation results						
	(-60,-1) Fixed	(-100,-61) Fixed	(-60,-1) Random	(-100,-61) Random	(-60,-1) First difference	(-100,-61) First difference
Constant			0.002*** (0.000)	0.009*** (0.000)		
ATV_{it}	0.652*** (0.000)	0.383* (0.071)	0.626*** (0.000)	0.368* (0.076)	0.576*** (0.000)	0.241 (0.271)
#	43043	28648	43043	28648	39835	26316
Hausman test			22.716*** (0.000)	0.126 (0.723)		
Panel 2: Multivariate results						
	(-60,-1) Fixed	(-100,-61) Fixed				
ATV_{it}	0.430*** (0.000)	0.434 (0.217)				
$Rumour_i * ATV_{it}$	0.281*** (0.000)	-1.006** (0.039)				
$LnSize_{it}$	0.044*** (0.000)	0.060*** (0.009)				
BM_{it}	-0.004*** (0.000)	-0.030** (0.024)				
#	32165	21322				
F statistic	3.331*** (0.000)	1.241*** (0.000)				

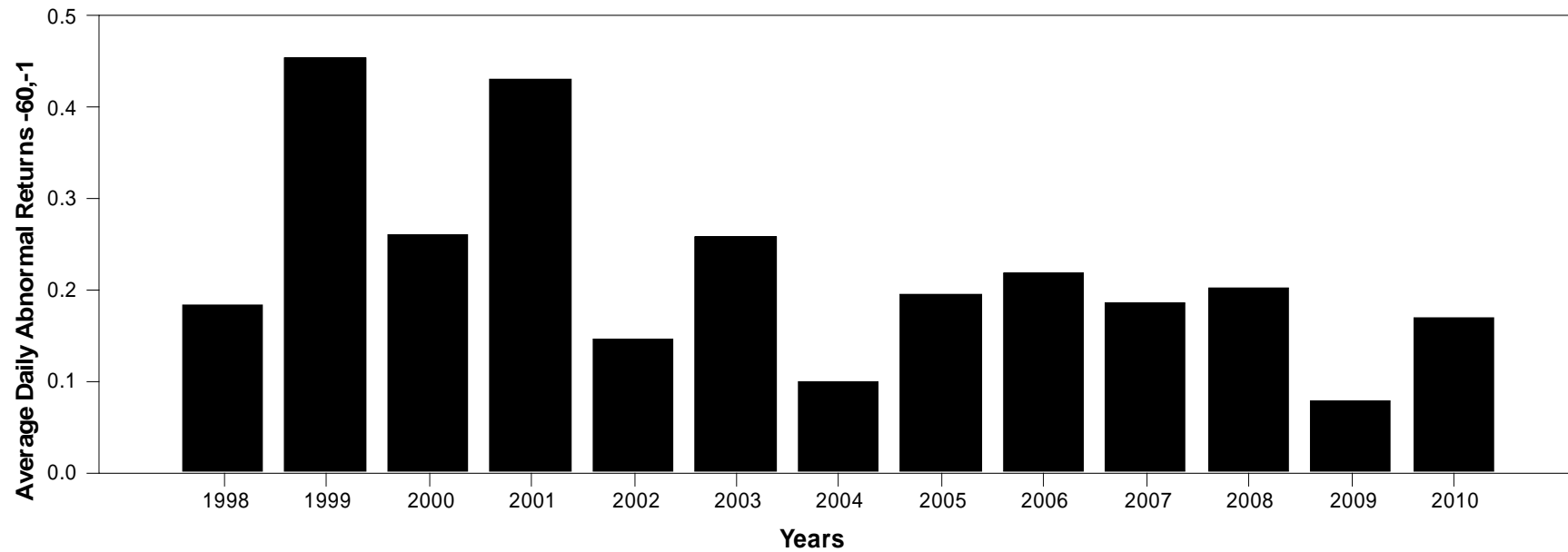
Notes: This table explores the interaction between abnormal returns and trading volume. Panel 1 follows a Panel estimation that explores the single-equation relation between contemporaneous abnormal returns and trading volume when using fixed effects, random effects and the first difference method. We then estimate the following Panel estimation with fixed effects (Hausman test is significant at the 1 percent level): $AR_{itFF3} = b_0 + b_1 ATV_{it} + b_2 Rumour_i * ATV_{it} + b_3 \ln Size_{it} + b_4 BM_{it} + u_{it}$ where AR_{itFF3} is the three-factor risk-adjusted returns as estimated in equation (1), ATV_{it} is the abnormal trading volume as estimated by equation (2), $Rumour_i$ is a dummy variable coded 1 for firms with rumours, $LnSize_{it}$ is the log market capitalisation and BM_{it} is the book-to-market. # indicates the number of observations used. The interval between (-60,-1) indicates the target price run-ups, and (-100,-61) is used as a control period. 0 indicates the merger announcement day. *, ** and *** show significance at the 10, 5 and 1 percent levels.

Figure 1. Prior to merger cumulative abnormal returns of target firms (AR_{itFF3})



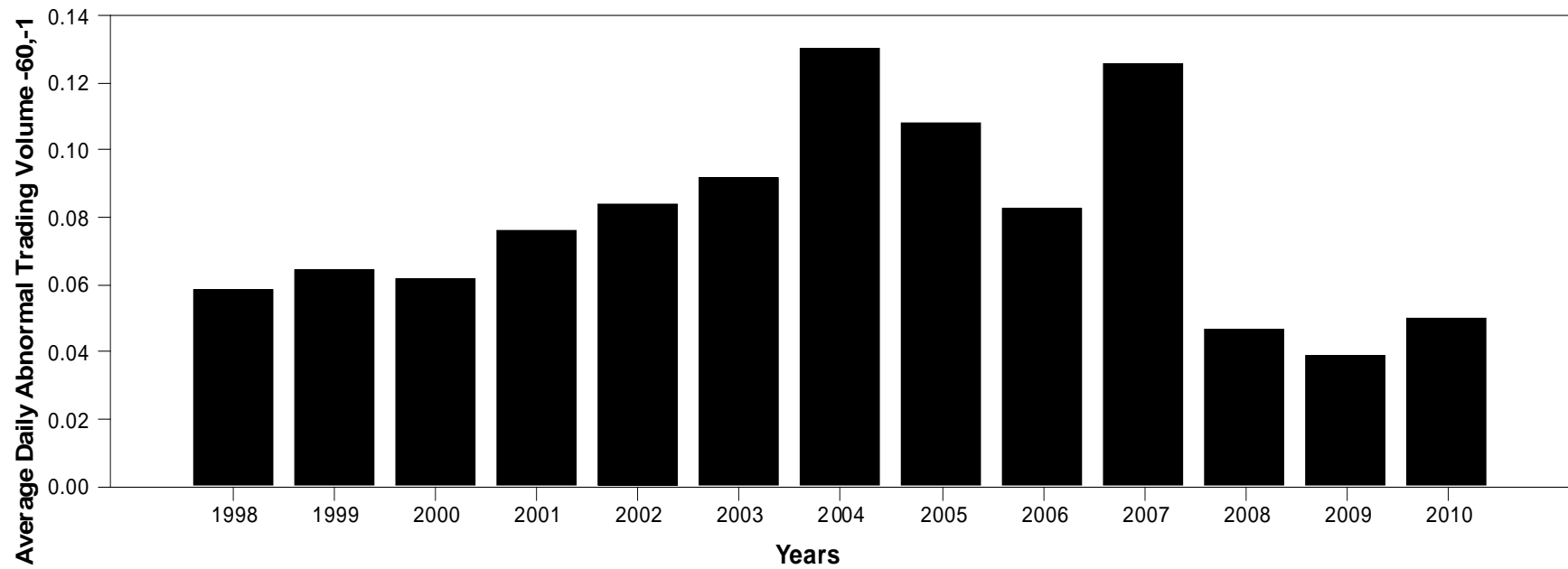
Notes: This figure shows the cumulative abnormal returns of target firms prior to the merger announcement (day 0). Abnormal returns on the day of the merger are not shown in the figure. AR_{itFF3} is estimated as follows: $AR_{itFF3} = R_{it} - (\hat{a}_i + \hat{b}_{iM}R_{Mt} + \hat{b}_{iSMB}SMB_t + \hat{b}_{iHML}HML_t)$ where SMB_t and HML_t reflect the size and book/market risk proxies and $\hat{a}_i, \hat{b}_{iM}, \hat{b}_{iSMB}, \hat{b}_{iHML}$ coefficients are estimated over the 150-day interval from -250 to -101 days.

Figure 2. Abnormal returns - annual analysis (%)



Notes: This figure shows the average daily abnormal returns of target firms in the interval between -60 and -1 (merger announcement day, 0) during the sample period. Abnormal returns are the three-factor model adjusted returns and are estimated as follows: $AR_{itFF3} = R_{it} - (\hat{a}_i + \hat{b}_{iM} R_{Mt} + \hat{b}_{iSMB} SMB_t + \hat{b}_{iHML} HML_t)$ where SMB_t and HML_t reflect the size and book/market risk proxies and $\hat{a}_i, \hat{b}_{iM}, \hat{b}_{iSMB}, \hat{b}_{iHML}$ coefficients are estimated over the 150-day interval from -250 to -101 days. Returns shown are those unexplained from FT rumours.

Figure 3. Abnormal trading volume - annual analysis (%)



Notes: This figure shows the average daily abnormal trading volume of target firms in the interval between -60 and -1 (merger announcement day, 0) during the sample period. Abnormal trading volume is estimated as follows: $ATV_{it} = TV_{it} - (\bar{TV}_i + 2\sigma_{TV_i})$ if $\bar{TV}_i > 2\sigma_{TV_i}$ or 0 otherwise where \bar{TV}_i and σ_{TV_i} are the mean and standard deviation of a firm's trading volume from -250 to -101 days before the merger announcement. Trading volume shown is that unexplained from FT rumours.