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DEVELOPMENT OF MERGER TARGET RUN-UPS IN THE UK

What has the effect of insider trading regulation changes been?

Master's Thesis
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Abstract

It is widely established in the academic literature that the stock prices of merger targets incur abnormal returns before a deal is publicly announced, a phenomenon called a 'run-up'. In this thesis, I analyze the development and sources of merger target run-ups in the UK public target companies from 1989 to 2018, considering especially the effect of changes in insider trading regulation. In my sample, run-ups have decreased on average by 0.10 percentage points per year, with the median run-up being 4.14%. Full deal period returns have decreased at a similar rate, which supports the hypothesis that the run-up is an added cost to the bidder. My results show that the decline in run-ups can be explained by both market anticipation factors and changes in insider trading regulation. Moreover, changes in the level of deal mark-ups are not driving the decline. Of the six insider trading regulation events analyzed in this paper, Financial Services Act 2012 has had the most significant decreasing effect. It coincides with increased insider trading criminal indictment and conviction activity by the UK regulator, which may explain the strong effect, as the regulation change itself was not radical. Surprisingly, other major insider trading regulation changes are not significant. Studying the relation of insider trading regulation enforcement intensity and the run-ups would be a logical next step in the insider trading research in the UK.

Keywords target run-up, insider trading regulation, mergers and acquisitions

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Akateemisessa kirjallisuudessa on todettu yrityskauppakohteiden osakekurssien tuottavan epätavallisen paljon ennen yrityskaupan julkaisemispäivää. Tätä ilmiötä kutsutaan englanniksi termillä “run-up”. Analysoin tutkielmassani tämän ilmiön voimakkuuden kehittymistä ja lähteitä Isossa-Britanniassa listatuilla yrityksillä vuosina 1989–2018 keskittyen erityisesti sisäpiirikaupan regulaation muutosten vaikutukseen. Yrityskauppaa ennakoivat ylituotot ovat laskeneet keskimäärin 0.10 prosenttiyksikköä vuodessa mediaanin ollessa 4.14 %. Koko yrityskauppa-ajan tuotot ovat laskeneet samaa tahtia, mikä tukee hypoteesia siitä, että ennenaikainen osakkeen hinnan nousu on ostajayritykselle kustannus. Osoitan tutkielmassani, että markkinaodotuksia kuvastavat tekijät sekä muutokset sisäpiirikaupan regulaatiossa pystyvät selittämään yrityskauppaa ennakoivien ylituottojen laskun. Laskeneet yrityskaupan preemiot edellisen päivän osakekurssiin verrattuna eivät myöskään ole aiheuttaneet laskua. Käsittelen kuutta sisäpiirikaupan regulaation tapahtumaa, joista vain yksi, Financial Services Act 2012, on merkitsevä ja jonka vaikutus on laskeva. Tämä lainmuutos osuu samaan aikaan, kun Iso-Britannian markkinaviranomaisen sisäpiirikaupan rikosten tuomiot lisääntyivät, mikä saattaa selittää vahvaa vaikutusta, sillä lainmuutos itsessään ei ollut kovin merkittävä. Yllättäen muut tunnistamani sisäpiirikaupan regulaation tapahtumat eivät olleet merkitseviä. Sisäpiirikaupan regulaation valvomisen voimakkuuden ja yrityskauppakohteiden ennenaikaisten osakehintojen nousujen yhteys Isossa-Britanniassa olisi luonteva seuraava aihe sisäpiirikaupan tutkimukselle.

Avainsanat yrityskauppakohteen ennenaikainen osakehinnan nousu, sisäpiirikaupan regulaatio, yrityskaupat

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1. Introduction

It is widely established in the academic literature that the stock prices of merger targets incur abnormal returns before a deal is publicly announced, a phenomenon called a 'run-up' (see e.g. Bris, 2005; Keown and Pinkerton, 1981). In this thesis, I analyze the development and sources of merger target run-ups in the UK public target companies from 1989 to 2018, considering especially the effect of insider trading regulation changes. Run-up is an important factor in the area of mergers and acquisitions, as previous studies have found median pre-announcement cumulative abnormal returns to be around 4% in the UK, which makes around 24% of the full deal premium (Bris, 2005; Madura et al., 2014). My findings of the level of run-ups are similar. Run-ups have been found to be an increased cost to the bidder (Betton et al., 2008; Madura et al., 2014; Schwert, 1996), so analyzing the reasons for run-ups and possibly finding ways to decrease them is in the interest of acquirers and other market players. Also, one source of run-ups is illegal insider trading, so assessing the effects of insider trading regulation changes and enforcement gives tools to develop the regulation further.

There are two main hypotheses explaining merger target run-ups. The first one is called a market anticipation hypothesis where investors are able to predict deals based on target and deal characteristics (Asquith, 1983; Jensen and Ruback, 1983), such as rumors, form of payment, and number of advisors. The second one called is an insider trading hypothesis where the run-up reflects private, illegal information (Keown and Pinkerton, 1981). Insider trading has been illegal in some form in the US very long, since 1933, but was made illegal in the UK only in 1980. Multiple studies have found insider trading laws to reduce run-ups and insider trading by comparing run-ups before and after the enactment of the first insider trading law in a country (Bhattacharya and Daouk, 2002; Bris, 2005; Durnev and Nain, 2007). There are also studies that analyze the effect of a singular insider trading regulation event on run-ups, such as Bhabra and Hossain (2017) studying Sarbanes–Oxley Act in the US and Prevoo and ter Weel (2010) studying Market Abuse Directive in the Netherlands. However, there are only few studies that analyze run-ups within a single country over time taking into account the regulation changes. One of them is Dutordoir et al (2018) who find that each tightening of insider trading regulation has decreased run-ups in the US, and that overall, run-ups in the US have drastically decreased from 8.6% in 1980's to 2.1% in 2010's.

London Stock Exchange together with its sub-market London Alternative Investment Market has always been one of the largest stock exchanges with a history dating back to the 16th century. Still, there has been little research on run-ups in the UK compared to the US. Holland and Hodgkinson (1994) and Barnes (1996) study the sources of run-ups with data mainly before 1990; Bris (2005) and Madura et al. (2014) include the UK only as one of many countries in their articles; and Siganos and Papa (2015) study the effect of rumors on run-ups. Siganos and Papa (2015) touch the development of run-ups in their study period from 1998 to 2010 and speculate that there would be a decreasing trend, but to my current knowledge no paper has looked at the development of the UK run-ups in detail. Neither have the changes in the insider trading regulation been considered, even though there have been major changes in the regulation since the insider trading was first made illegal in 1980. To fill this gap in the literature, the purpose of this paper is first to establish whether there has been a decreasing trend in run-ups in the UK from 1989 to 2018, and then to analyze whether the market anticipation factors and changes in the insider trading regulation can explain the trend. In addition to analyzing the trend, I compare the effects of market anticipation factors to prior results from the US market and see whether the same factors affect run-ups in the UK as in the US.

My results show that there has been a significant, decreasing trend in run-ups in the UK, run-ups decreasing on average by 0.10 percentage points per year. Market anticipation factors can explain the decreasing trend, although adding the insider trading regulation events magnify the effect. Significant market anticipation factors are similar to the ones found in the US (Brigida and Madura, 2012; Dutordoir et al., 2018). Hostile deals, active industry, larger firm size, and larger mark-ups are correlated with lower run-ups, whereas higher number of bidders, whether the target is listed in London Stock Exchange, higher dividend yield, and higher sales growth are correlated with higher run-ups. I identify six insider trading regulation events within my research period that I hypothesize to have affected the run-ups. Of the six events, FSA2012, which created the Financial Conduct Authority (FCA), have had the largest negative effect on run-ups. Coinciding with the time period when FSA2012 became effective in 2013, the UK regulator had remarkably more criminal indictments and convictions of insider trading than before. This might have increased the effect that FSA2012 seems to have had. Surprisingly, other identified insider trading regulation events did not have a clear, significant effect on run-ups. One possible reason is that as long as the

probability of getting caught and the intensity of the law enforcement are low enough, the tightness of the regulation is not relevant.

The 30-year sample period of my research is long, and a lot has changed in the society during that time. One relevant change that I do not consider in this paper is the development of technology. The monitoring systems of regulators have improved to spot irregular trading patterns which could indicate insider trading, and also documentation requirements relating to trading activities have increased. So, on one hand, the technological development has made the job of regulators easier. On the other hand, it has given tools to insider traders, too, as everyone can have fast and easy access to markets all over the world and secure communication channels have been developed. Insider traders time their trades strategically to hide the irregularity (see e.g. Ahern, 2018), and on average the one to execute the illegal trade is three links away from the source of the information (Ahern, 2017), which further complicates the job of the regulators. It is thus difficult to speculate what the full effect of technological advancement has been on insider trading and run-ups.

This thesis is structured as follows. Section 2 reviews the literature on run-ups and potential causes behind them. It then discusses the development of insider trading regulation in the UK and compares it to the regulation in the US. Section 3 explains the sample selection criteria and run-up calculations, after which it analyzes the trend in run-ups in the UK. Section 4 first presents market anticipation factors and insider trading regulation events and analyzes their effect with univariate analysis, and then analyzes their combined effect with multivariate analysis. Section 5 discusses the results, limitations of the study, and possible areas for future research. Section 6 concludes.

2. Prior literature and background

This section summarizes the prior research on the subject of run-ups. First, I write about the sizes of run-ups in different countries and time periods. Second, I summarize the potential impact of run-ups on the deal premium. Third, I explore two different hypotheses of the source of run-ups starting from market anticipation hypothesis and then moving to insider trading hypothesis. Fourth, I describe the development of insider trading regulation in the UK over time, define insider trading, and compare the UK regulation to the US regulation. Finally, I touch the latest development of insider trading enforcement in the UK.

2.1. Target run-up size and impact on deal premium

It is established in the academic literature that the stock prices of merger targets incur abnormal returns before a deal is publicly announced, a phenomenon called a 'run-up' (see e.g. Bris, 2005; Keown and Pinkerton, 1981). The level of run-ups varies in different countries and time periods. In the US, Dutordoir et al. (2018) find the median cumulative run-ups to range between 2.1% and 8.6% from 1985 to 2016, with recent run-ups being lower. In EU-15 countries plus Iceland, Switzerland, and Norway, Madura et al. (2014) find median run-ups to range between 0% and 44% from 1997 to 2011. In Canada, King (2009) find median run-up to be 6.4% from 1985 to 2002. Regarding emerging markets, Chauhan et al. (2014) suggest in their review of run-up literature that more research should be done.

Table 1 summarizes the prior research on the run-ups in the UK. Holland and Hodgkinson (1994) are one of the first to study run-ups in the UK. They collect deal and stock data for a two-year period, from 1988 to 1989, and find the mean run-up to be 8.8% with announcement day return of 15.6%. Barnes (1996) finds the mean run-up to be 19.5% in one month prior to the announcement, and announcement day return to be 9.3%, with data from 1987 to 1991. Bris (2005) finds the median UK run-up to be 3.92% from 50 days before the announcement to one day before, with announcement returns being 16.33%, with data from 1990 to 1999. Madura et al. (2014) find median UK run-ups to be 4.7% from 60 days before the announcement to three days before, with data from 1997 to 2011. Aforementioned papers by Madura et al. (2014) and Bris (2005) include other countries than the UK in their analysis as well. Siganos and Papa (2015) find mean run-up to be 11.62%, announcement day return being 10.99%, with data from 1998 to 2010. They also notice the average run-up level to

Table 1: Previous literature of run-ups in the UK
This table lists a sample of papers that have studied UK run-ups in different time periods. *Sample period* is the time of the study period. *N* is the number of deals in the study. *Run-up window* is the period used for calculating run-ups relative to the announcement date. Days refer to trading days. *Return adjustment* is the measure of abnormal returns; *MM* refers to Market model, and *FF3* refers to Fama-French three-factor model. *Statistic* is the way the run-up measure is summarized over the sample. *Run-up* is the value of the run-up in percentages. *Ann. return* is the announcement period return in percentages.

Paper	Sample period	N	Run-up window	Return adjustment	Statistic	Run-up	Ann. return
Holland and Hodgkinson (1994)	1988–1989	86	[-29, -1]	MM	Mean	8.8	15.6
Barnes (1996)	1987–1991	608	[-30, -1]	MM	Mean	19.5	7.8
Bris (2005)	1990–1999	290	[-50, -2]	MM	Median	3.92	16.33
Madura et al. (2014)	1997–2011	248	[-60, -3]	MM	Median	4.70	-
Siganos and Papa (2015)	1998–2010	783	[-40, -1]	FF3	Mean	11.62	10.99

have decreased in later years of their sample, although they do not analyze the time trend any further. They speculate whether the fines given by FSA to individuals in 2004, which were the first fines ever given by FSA, might have had an effect on the run-ups.

I could not find articles analyzing UK run-ups for a full time period that I am using, from 1989 to 2018, or articles looking at a potential trend in UK run-ups. Creating a comprehensive view on run-ups in the UK based on articles presented in Table 1 is also difficult as the articles use different sample selection criteria, run-up periods, and abnormal return measures. Finally, the factors that are used to explain the run-up differ from each other.

A partly separate question from the level of the run-up is how it affects the deal premium, that is, the sum of pre- and post-announcement period returns. Pre-announcement period returns are referred as run-up and post-announcement period returns as mark-up. The effect on the deal premium makes the topic important also from a practical point of view, as it is possible that higher run-up increases the costs to the bidder. Schwert (1996) formulates two mutually exclusive explanations to the relation between the run-up and the premium: the *substitution hypothesis* and the *markup pricing hypothesis*. In the substitution hypothesis, the acquirer sees the source of the run-up as speculation on the to-be-announced acquisition, and thus does not adjust the bid to the higher stock price. In this case the deal premium is independent from the run-up. In the markup pricing hypothesis, the acquirer thinks that the run-up reflects new information, such as another bidder buying shares, or better performance of the company, and thus increases the bid accordingly. In this case, the deal premium and the

run-up are positively correlated, or in other words, the run-up is independent from the mark-up. Schwert (1996) finds support for the markup pricing hypothesis in the US so that the run-ups are an increased cost for the bidder with a ratio of close to one-to-one. Madura et al. (2014) come up with similar results with European data.

Schwert (1996) also considers a possibility where the causality of the deal premium and run-up goes the other way. He proposes that the size of the run-up could be based on the deal premium and the probability of the bid succeeding. In this case, a higher run-up would be explained by a higher deal premium. This is also why Dutordoir et al. (2018) use the deal premium as an explanatory variable in robustness checks for the run-up; to ensure that the decreasing trend in the run-ups is not caused by decreasing deal premiums. Betton et al. (2014) study the subject of deal premiums in more depth. First, they find support for Schwert (1996) in that one dollar of additional run-up implies 0.80 dollar of larger mark-up. However, by assuming that the run-up is based on signals (rumors) that contain information about the synergies of the upcoming deal, they show that although there is correlation between run-up and mark-up, the increased mark-up is not an added cost to the bidder, as the high run-up and mark-up are both caused by the anticipated high synergies. Second, they find that the target run-up is positively correlated with the bidder announcement day returns, which supports the assumption that the run-up contains information about the upcoming deal. To sum up, it is possible that the run-up is not an added cost to the bidder although the mark-up and the run-up are correlated. It should be noted that Betton et al. (2014) do not address the source of the takeover signal that causes the run-up.

2.2. Causes for run-ups

What can explain the run-ups? Already in early articles, two different explanations are proposed. The first explanation is a *market anticipation hypothesis* (Asquith, 1983; Jensen and Ruback, 1983). Players in the market are able to identify possible targets based on fundamentals, they hear rumors, or they gain knowledge in other, legal ways. In literature, this hypothesis has been tested by creating merger anticipation proxies based on target, acquirer, and deal characteristics and testing how well they can explain run-ups. Some characteristics have been able to explain some of the run-up, examples of which are rumors about the deal, whether the deal is hostile, target size, target profitability, form of payment, number of bidders, and number of advisors (Brigida and Madura, 2012; Dutordoir et al.,

2018; Madura et al., 2014; Schwert, 1996). Sometimes news articles have been used as a proxy for rumors about a deal. Siganos and Papa (2015) find that Financial Times news mentions can explain 27% of run-ups in deals with rumors in the UK, although they do not consider other factors. In a related paper, Siganos (2013) compares Financial Times articles to Google search volume and finds that Google search volume can explain the run-ups better, 36% vs 27%, in the UK. However, it can be argued that Google search volume also contains illegal insider trading activity or other factors than just rumors. Aspris et al. (2014) analyze Australian market toehold purchases[1] taking into account rumors about a deal and find that short-term toeholds can explain the size of run-ups almost fully. The finding may explain the disagreement about the effect of a toehold position on run-ups because usually long and short-term toeholds are not separated in the analysis. Betton et al. (2014) also find that short-term toeholds increase run-ups, but when analyzing them together with deal mark-ups, it is not evident that the higher run-up caused by higher toeholds necessarily increases takeover costs. It should be mentioned that not all market anticipation factors used in previous studies to explain run-ups indicate necessarily legal trading. For example, increased number of advisors may lead to both legal trading based on rumors published in media and illegal insider trading based on insider information.

Second explanation given for the existence of the run-ups is an *insider trading hypothesis* (Keown and Pinkerton, 1981). To be precise, insider trading throughout this thesis refers to the illegal trading based on insider information and is not limited to the trading of insiders, such as CEOs. The insider trading hypothesis says that the run-ups are caused by illegal insider trading that increases the demand and thus the stock price before the announcement of the deal. As illegal insider trading is by nature hidden, its effects are difficult to study directly. Early evidence by Meulbroek (1992) finds by using data from Securities and Exchange Commission (SEC) that almost half of the run-ups are observed on days with insider trading. Ahern (2017) finds by using SEC and Department of Justice data that insider information moves usually through social ties based on family, friends, and geographic proximity. On average, it originates from corporate executives and reaches buy-side investors after three links in the network. This emphasizes the importance of keeping deal information private, as the information typically moves outside the imminent deal team before it is exploited. He also found that returns for insider trades in M&A cases are high, on average 43% in 31 days.

[1]Toehold purchases refer to the acquirer buying shares of the target company before the publication of the bid.

In a related paper, Ahern (2018) finds that insider trading based on long-lived information is difficult to detect by using measures of illiquidity because insiders time their trades strategically to avoid illiquidity. There is wide support for this type of behavior and it might explain why catching insider traders is difficult based solely on data about trading (Collin-Dufresne and Fos, 2015; Kacperczyk and Pagnotta, 2019; Korczak et al., 2010). Interestingly, Kacperczyk and Pagnotta (2018) find using SEC insider trading cases that insider traders react to higher enforcement risk by waiting to trade and splitting their trades further, and also concentrate on information of higher value. This indicates that higher enforcement risk does reduce insider trading, but insider traders are able to somewhat counter the effect by adjusting their behavior.

A more indirect way to separate the effect of illegal insider trading from legal trading based on market anticipation is to look at insider trading regulation changes and their effects on the run-ups. Laws making insider trading illegal were created in different countries at different times, most of them between 1985–2000. Using these dates for 52 countries, Bris (2005) finds that insider trading laws actually increase the profitability of insider trading; however, harsher laws reduce the amount of it. The reasoning is that if the penalties are low, law-obeying people stop insider trading while the ones who continue are hence able to capture higher profits. Findings from Bhattacharya and Daouk (2002) and Bhattacharya and Daouk (2009) support Bris (2005), although they add that enforcement of the law, not creating of the law, decreases the amount of insider trading, except when the law obedience is already high. Durnev and Nain (2007) further support the findings that stricter insider trading laws reduce insider trading. Bushman et al. (2005) show that the enforcement of insider trading laws increases analyst following in a country, indicating that the market has become fairer. Del Guercio et al. (2017) examine the effect of SEC enforcement on run-ups and find that high level of SEC enforcement deters illegal insider trading. Aleksanyan et al. (2016) show that news articles referring to illegal insider trading seem to decrease run-ups. Research of specific events also provide evidence that stricter insider trading laws can decrease run-ups and hence insider trading. Market Abuse Directive lowered run-ups in Amsterdam stock exchange (Prevoo and ter Weel, 2010), Sarbanes-Oxley Act in the US (Bhabra and Hossain, 2017; Brigida and Madura, 2012), and tighter insider trading laws in Brazil (Qiu and Balbinotti, 2016). To sum up, numerous studies have found support for insider trading regulation changes affecting run-ups.

2.3. Insider trading regulation in the UK

In this section, I provide an overview of the evolution of insider trading regulation in the UK and identify the key events in it. The key events relate to both new laws and to the enforcement of laws, highlighting the importance of enforcement (see Section 2.2). In the UK, 'insider trading' is usually referred as 'insider dealing' and that is why it is used when discussing about the UK law. There is no difference in substance between the two terms.

Insider trading was first made illegal in the UK in 1980 with the Companies Act 1980 (CA1980) when insider trading became a criminal offense (Alexander, 2001). CA1980 was enforced already in 1981 when there were two criminal cases of insider trading (Barnes, 2011). Provisions outlawing insider trading were consolidated in 1985 into Companies Securities (Insider Dealing) Act 1985 (CSIDA1985, effective July 1, 1985), and it was further supplemented by Financial Services Act 1986 (FSA1986, effective April 29, 1988) that strengthened the government's enforcement powers. CSIDA1985 was replaced by the Criminal Justice Act 1993 (CJA1993, effective March 1, 1994) which extended the basis of liability for the insider dealing offense with a broader definition of 'securities' and 'insider' than CSIDA1985. Current criminal offense of insider dealing is based on CJA1993 with a maximum prison sentence of seven years (Alexander, 2001).

Enforcement of insider trading regulation remained weak under the criminal offense defined by CJA1993 as the criterion for criminal prosecution was high, requiring proof 'beyond reasonable doubt' (Dubow and Monteiro, 2006; Korczak et al., 2010). Also, CJA1993 did not generally cover corporations but only natural persons (Alexander, 2001). To counter these problems, Financial Services and Markets Act 2000 (FSMA2000, effective December 1, 2001) introduced a civil offense of insider trading with unlimited fines and a standard of proof based on 'balance of probabilities'[2] (Barnes, 2011). In addition to lower standard of proof, civil offenses cannot be punished with a prison sentence, although an insider trader can be prosecuted for both civil and criminal offenses when applicable. Financial Services Authority (FSA) imposed the first civil penalty based on FSMA2000 on February 11, 2004

[2] In the UK, civil offenses include e.g. family disputes, personal injury cases such as road traffic accidents, breach of contract, and employment law. Criminal offenses include e.g. burglary, assault, murder and fraud. Criminal and civil offenses are not mutually exclusive and people can be prosecuted for both for the same incident. For insider trading purposes, the largest differences are that civil offenses cannot bring jail time and the difference in standard of proof. (https://www.slatergordon.co.uk/media-centre/blog/2018/04/criminal-vs-civil-law-understanding-the-differences/, visited October 2, 2019)

(Dubow and Monteiro, 2006), which means that it took over two years for FSA to prosecute a successful civil case. Also, the fines were not high. In the first and second (July 8, 2004) successful civil cases, the fines were only £15,000 to the individual[3]. This did not give a strong signal to insider traders in the market and instead may have given them relief. FSA gave its first successful criminal sentence only on March 17, 2009 (Goldman et al., 2014), although it was not the first criminal sentence for insider trading in general. As discussed in more detail in Section 2.4, the rate of criminal convictions for insider trading by FSA increased significantly after the first successful sentence.

Later development of UK insider trading regulation has not been transformational. Financial Services Act 2012 (FSA2012, effective April 1, 2013) divided FSA into two entities, Financial Conduct Authority (FCA) and Prudential Regulation Authority (PRA), of which insider trading cases fall under FCA (Collin, 2013). However, regarding insider trading cases, FCA's capabilities did not significantly increase except for the possibility to publish news about ongoing investigations earlier, so called warning notices. This has allowed FCA a better negotiating position. FCA also took a strong, active stance against insider trading from its inception (Hitchins, 2015). It is possible that these changes would affect the amount of insider trading but the connection is not obvious.

Some EU-level regulations are relevant to the UK insider trading regulation, although not most. First, Market Abuse Directive (MAD, effective July 1, 2005) did not change the UK law as the UK was already compliant with the directive (Greene and Schmid, 2013). There was a similar situation with the Transparency Directive (TPD, effective January 1, 2007), where the UK law did not need to be changed (Christensen et al., 2016). Finally, the UK opted out from Criminal Sanctions for Market Abuse Directive (CSMAD, effective July 3, 2016), which introduced an EU-wide minimum level of criminal sanctions, although the UK would have already complied with the required level (Hodges and Lorimer, 2016). However, Market Abuse Regulation (MAR, effective July 3, 2016), which was introduced at the same time as CSMAD, is relevant to the UK. MAR gives regulators more power to monitor insider trading and improves whistle blowing and insider lists (Edmonds, 2016), and thus could diminish insider trading as it increases the probability of getting caught.

[3] 'FSA fines headhunter £15,000 for market abuse', Independent, visited October 2, 2019. (https://www.independent.co.uk/news/business/news/fsa-fines-headhunter-acircpound15000-for-market-abuse-552475.html)

Based on this analysis, the most significant insider trading regulation events in the UK within my research period from 1989 to 2018 are: CJA1993 (March 1, 1994), FSMA2000 (December 1, 2001), first enforcement of FSMA2000 (February 11, 2004), first FSA's enforcement of criminal offense of insider trading (March 27, 2009), FSA2012 (April 1, 2013), and MAR (July 3, 2016). I will consider them again in Section 4.2 when I analyze the effects of the insider trading regulation events on the run-ups.

2.4. Insider trading definition and regulation in the UK compared to the US

Most of the research in the area of run-ups and insider trading have been done in the US. To better position my paper in relation to other papers, in this section I first explain the current definition of illegal insider trading in the UK and compare it to the US definition. Then, I summarize the overall strictness of the insider trading regulation and the enforcement of the regulation in the UK and the US. I finish by looking at the latest development in the UK enforcement. Insider trading regulation covers all insider trading and is not limited to mergers and acquisitions, although it is a key area in it.

I summarize Greene and Schmid (2013) to explain the current UK insider trading regulation. After the amendments introduced by FSMA2000, the definition has not changed significantly. According to FSMA2000, insider dealing occurs when:

> an insider deals, or attempts to deal, in a qualifying investment or related investment on the basis of insider information related to the investment in question.

For general investments, such as ordinary shares, insider information is defined to be information:

> of a precise nature which—(a) is not generally available, (b) relates, directly or indirectly, to one or more issuers of the qualifying investments or to one or more of the qualifying investments, and (c) would, if generally available, be likely to have a significant effect on the price of the qualifying investment or on the price of related investments.

FSMA further provides that information is 'precise' if it:

> (a) indicates circumstances that exist or may reasonably be expected to come into existence or an event that has occurred or may reasonably be expected to occur, and (b) is specific enough

> to enable a conclusion to be drawn as to the possible effect of those circumstances or that event on the price of qualifying investments or related investments.

Under FSMA, an 'insider' includes any person who possesses insider information as a result of:

> (1) being part of the administration, management or supervisory bodies of an issuer; (2) holding the capital of an issuer (i.e. a share or debenture holder); (3) having access to the information through the exercise of his or her employment, profession or duties (including outside counsel, and even contract cleaners); (4) engaging in criminal activities; or (5) obtaining the information by other means whilst he or she knows, or could reasonably be expected to know, that the information is insider information.

When comparing the definition of insider trading in the UK to the one in the US, one of the largest differences arises from the definition of insider. As explained above, in the UK, insider includes everyone who possesses inside information. However, in the US, the definition of an insider is based on a fiduciary duty to the company or other source not to misuse the information (Franklin, 2013; Greene and Schmid, 2013). It is said that the UK insider trading regulation is about fairness and the US insider trading regulation about theft, which describes the difference in defining insider. The difference is seen also when looking at the tipper (source of the inside information) and tippee (recipient of the insider information) relationship. In the UK, it is not relevant who the tipper is as long as the information 'is likely to have a significant effect on the price of the qualifying investment'. However, in the US, for the tippee not being allowed to use the received information, there are three conditions. First, there must be some kind of 'personal benefit' for the tipper, although this is satisfied by a friendly relationship. Second, the tippee knows or should know that there was a breach of duty by the tipper in disclosing the information. Third, the tippee used the tip to trade securities. Greene and Schmid (2013) give an example where a waitress overhears a CEO in a restaurant talking about an upcoming equity offering that will decrease the share price, after which she trades on the information. Because the tipper, the CEO, did not tip her intentionally and did not receive a personal benefit, the trading that the waitress did based on the information would most likely be legal in the US. However, in the UK, the tipper and tippee relationship is not relevant and both parties are evaluated separately, and thus the use of inside information by the waitress would be illegal.

Table 2: FSA/FCA criminal indictments and convictions of insider dealing 2002–2018
The data is from Hinton and Patton (2011) and McHugh (2018). They have collected the data from FSA/FCA press releases supplemented by a review of news articles. Indictments are allocated to years based on the date of indictment, whereas convictions are allocated based on the date of verdict. FSA/FCA financial year lasts from April 1 to March 31. Number for 17/18 contains only first half of the financial year, which is indicated by an asterisk (*). The table includes only named defendants.

	< 08/09	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18*	Total
Indictments	2	3	7	14	4	8	1	3	3	1	2	48
Convictions	1	3	1	5	1	12	1	3	1	5	0	33

Based on only the definition of the insider trading, the UK regulation is broader than the US. However, as Franklin (2013) describes, the history of insider trading regulation, and thus the enforcement, in the US goes far, to year 1933, when the Securities Act of 1933 was passed. Securities and Exchange Commission (SEC) was established in year 1934, compared to year 2001 when the UK equivalent FSA was established. This all has led to a stricter attitude towards insider trading in the US than in the UK. There are numerous papers that identify the ineffectiveness of FSA/FCA prosecutions in the UK due to early settlements, lighter fines and often no jail time (Barnes, 2011; Bhattacharya and Daouk, 2002; Bris, 2005; Coffee, 2007; Franklin, 2013; Ventoruzzo, 2015). Coffee (2007) presents statistics that compare the difference in the insider trading regulation enforcement between the US and the UK from 2001 to 2006. SEC brought over 300 insider trading enforcement actions against over 600 individuals, which makes about 50 actions per year. In addition, Department of Justice had more than 50 actions per year. This compares to the FSA's record of eight cases within the same period, which is a magnitude lower than the US comparable. The average fines in the UK were also lower than in the US.

Although the insider trading regulation in the UK covers the necessary actions to prohibit insider trading, the enforcement has not been very strong. However, in recent years, there have been more criminal actions of insider dealing pursued by FCA than before. Table 2 summarizes the number of criminal indictments and convictions of insider dealing. The data is from Hinton and Patton (2011) and McHugh (2018). Before 2008/09[4] there were only two indictments and one conviction. In 2009/10, the total increased to 12 indictments and five convictions. Year 2010/11 saw 14 indictments which is the record. In 2012/13, there were record high 12 convictions. From April 2013 to September 2017, the yearly number of

[4] FSA/FCA financial year lasts from April 1 to March 31.

indictments was around two and convictions around three. The difference between the periods before and after 2008/09 is large. The record year for convictions, 2012/13, is right before FSA2012 became effective and FCA was established, which may strengthen the effect of FSA2012 in the analysis in this paper.

3. Sample construction and target run-ups

In this section, I first define my sample and explain the sample selection criteria, which are borrowed from previous literature. Then, I explain the abnormal return and run-up calculations. Finally, I analyze the trend in run-ups and deal premiums in my research period.

3.1. Data and sample construction

My sample of deals consists of mergers and acquisitions between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange (LSE) or London Alternative Investment Market (AIM) and the deal is for a majority share of target's equity. I use SDC Platinum Mergers and Acquisitions Database for M&A and deal specific data, and Thompson Financial Datastream for stock price data. I fetch fundamental data from Worldscope through Datastream. The initial sample size from SDC is 4,643 deals. After removing targets without a Datastream code and selecting only the first bid per target, the sample size decreases to 3,335 deals. After applying all of the data selection criteria presented below, the sample size ends up to 697. To arrive at the final sample, I use similar criteria to existing literature, mainly Brigida and Madura (2012), Madura et al. (2014), and Dutordoir et al. (2018):

- I include deals that are announced between 1989 and 2018. Year 1985 would be the first to have international M&A data in SDC; however, the coverage of the deal information for UK deals is poor for the first few years. Year 1988 is the first one to have accurate dividend payment dates in Datastream for firms listed in the UK, and one year of accurate return data is required for market model calculation of returns, and hence 1989 is the first year to be used.
- The field 'Original Date Announced' (ODA) in SDC is used as the announcement date of the deal for the run-up calculations and sample selection purposes as Mulherin and Simsir (2015) suggest. They also find that in the US, many deals that should have ODA, do not have it, and thus the announcement date may sometimes be inaccurate

even when using ODA. Regardless, ODA is more accurate than 'Date Announced' (DA), as ODA is the date when '…the target company is first publicly disclosed as a possible takeover candidate.' The events that trigger ODA include rumors published in newspapers, publication of other bids, 'seeking for buyer' announcements, and disclosure of acquisition plans by the merging parties without any confirmed details. I manually checked a few cases where the ODA and DA differ, and they confirmed the better accuracy of ODA. In total, ODA is different from DA in 254 bids from the total sample of 697. Deals with the flag 'Date Announced is Estimated' are excluded.

- I include successful and unsuccessful initial bids that would end up the acquirer owning a majority share of the target's equity (SDC Deal Forms 'Acquisition of Majority Interest' and 'Merger'). I also require the deal to be for more than 50% of equity, excluding deals where the acquirer has a significant ownership in the target before the bid[5]. Deals with a status of 'Seeking Buyer' and 'Rumor' are excluded. If there are multiple bids for the target at the same announcement date, the one to be completed is selected for deal specific information purposes. If no bid will succeed, I select the one with more accurate data, which is a case for only a couple of bids.
- There should be at least 42 trading days of full stock price data with at least one non-zero return for the target before the announcement date, and at least 50% of daily stock return data from trading days -255 to -43 relative to the announcement date. I consider a day to be a trading day if the FTSE All Share Index fetched from Datastream has a value on that day. If the announcement day falls to weekend or other non-trading day, next trading day is used as the announcement day.
- Following Ince and Porter (2006), daily stock returns are calculated manually as the percentage change in the sum of price (P) and dividend (DDE) from one day to the next day. Also, based on their suggestion, targets with stock prices below one pence[6] at the announcement date are excluded. These measures mitigate problems in the way Datastream calculates the total return (TR) item.
- I exclude deals with a deal premium less than 5%, as no informed trader would risk being caught for such a small profit (Madura et al., 2014). For this purpose, the deal

[5] For example, if the acquirer had a 30% ownership in the target prior to the bid, and the bid would increase the ownership to 60%, the deal would fulfill the first condition ('Acquisition of Majority Interest'), but not the second ('deal to be for more than 50% equity').
[6] Stock prices are quoted in pence (£0.01) in London Stock Exchange.

premium is calculated as a sum of abnormal returns at days 0 and +1 relative to the announcement date. In addition, I exclude deals which have days within the main run-up period [-42, -1] with abnormal returns higher (lower) than 20% (-20%) (Prevoo and ter Weel, 2010). These types of abnormal returns indicate other corporate events in the run-up period and would thus obscure the run-up measure. These both exclusions also help to diminish possible errors in the announcement dates fetched from SDC.

- To tackle the possible problem of outliers in the data, I winsorize target run-ups and all continuous variables at the 5% and 95% levels.
- Deals with missing values for deal and merger anticipation proxies are excluded. I require the accounting currency reported in Worldscope to be in GBP (£). Utilities (SIC 49XX) are excluded from the sample due to specialties in their accounting data.
- Inflation-corrected (base year 2015) market value and deal value of the target are required to be at least £1 million. I use a UK consumer price index fetched from OECD.

My final sample consists of 697 deals. Table 3 contains some descriptive statistics of the sample. Further information of the variables is presented later in the thesis and in Appendix. Deal and firm values are inflation corrected based on consumer price index data from OECD.

Table 3: Descriptive sample statistics
This table summarizes the sample characteristics. The sample consists of initial merger bids for a majority share of target's equity between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange (LSE) or London Alternative Investment Market (AIM). After sample selection criteria, there are 697 initial bids in the sample. Sample selection is explained in Section 3.1 in detail. *Deal value* is from SDC. *Firm value* is the market value of the target 12 weeks before the announcement of the bid. *Run-up* is the market model estimated cumulative abnormal return in the period [-42, -1] relative to the announcement date, in percentages. *Mark-up, 1d* is the stock price of the target firm at day +1 relative to the announcement date divided by the stock price at day -1 relative to the announcement date. *Premium, 8w* is the stock price of the target firm at day +1 relative to the announcement date divided by the stock price at day -42 relative to the announcement date. All days are trading days. Further explanation of variables is in Appendix.

Statistic	Min	Pctl(25)	Mean	Median	Pctl(75)	Max	St. Dev.	N
Deal value (£ million)	1.6	41.8	797.4	121.9	457.6	46,698.3	2,800.0	697
Firm value (£ million)	1.6	29.5	550.0	79.4	305.0	28,111.5	1,801.4	697
Run-up [-42, -1] (%)	-11.2	-1.8	5.6	4.1	12.6	26.9	10.4	697
Mark-up, 1d (%)	9.0	16.7	30.3	26.3	38.9	75.3	17.5	697
Premium, 8w (%)	10.4	21.7	37.5	33.5	48.7	85.3	20.3	697

The base year is 2015. Later in the univariate and multivariate analysis, I take a natural log of firm value, but here they are only inflation-adjusted. The median deal size is £122 million with the maximum deal size being £47 billion. Most of the deals are in the small end, as 75% of the deals fall under £458 million, which is smaller than the mean deal value. Target market values measured at 12 weeks before the ODA (*firm value*) follow similar pattern, median market value being £79 million. Run-ups, mark-ups, and premiums are discussed in more detail in the following section.

3.2. Run-up calculations and trend in run-ups

The target run-up measure is calculated as a cumulative sum of market model adjusted abnormal stock returns, following standard methods (e.g. Dutordoir et al., 2018). The market model regression is estimated over a period of -255 days to -70 days relative to the deal announcement date. I use FTSE All Share index as a market portfolio. More formally, the market model regression is

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}, \tag{1}$$

where R_{it} is the daily stock return for the target firm *i*, R_{mt} is the market return, and the residual ε_{it} is the abnormal return. First, I calculate the parameters α_i and β_i over the estimation period. Then, I calculate the cumulative abnormal return (CAR) as a cumulative sum of abnormal returns, calculated using the estimated parameters, within the run-up period. My main target run-up measure is CAR over 42 trading days before the ODA. The formula is

$$CAR = \sum_{t=-42}^{-1} \varepsilon_{it}. \tag{2}$$

Commonly used starting days for the run-up period range from -20 to -60. I consider them in Table 4, and explain the use of 42 days in the following paragraph.

Table 4 shows how the sample is distributed and how the different run-up measures have developed over time. At the bottom of the table, means and medians are shown for the full period. Number of deals range from two in 1990 to tech bubble highs 84 in 1999, average being 23 per year. The first two years have only a few bids, and there is considerable variance in the number of bids per year also in later years, such as eight bids in 2013. Following

columns show different run-up measures over time. Looking at the whole period, means are generally larger than medians, and longer run-up windows produce higher run-ups.

When deciding about which run-up period to use, it is important to use a long enough window to capture all of the run-up while minimizing the amount of noise within the period (Schwert, 1996). The period I use, and that many others have used before, [-42, -1], is a good compromise in this regard with a median run-up of 4.14%. For a shorter window, [-20, -1], the median run-up would be considerably smaller, 2.56%, and for a longer window, [-60, -1], only a tiny bit larger, 4.80%. Figure 1 visualizes the way the abnormal returns accumulate by showing a median daily CAR with 25th and 75th percentile values from 60 days before to five days after the bid announcement date. There is little movement in the median price until 42 days before the announcement date, and most of the abnormal returns start to accumulate 30 days before the announcement date. There are many targets with negative run-ups, and also many targets with large run-ups. My findings about the level of the run-up are consistent with the previous literature presented in Table 1, such as Madura et al. (2014) who find the median UK run-up to be 4.7% in a window of [-60, -3] between 1997 and 2011.

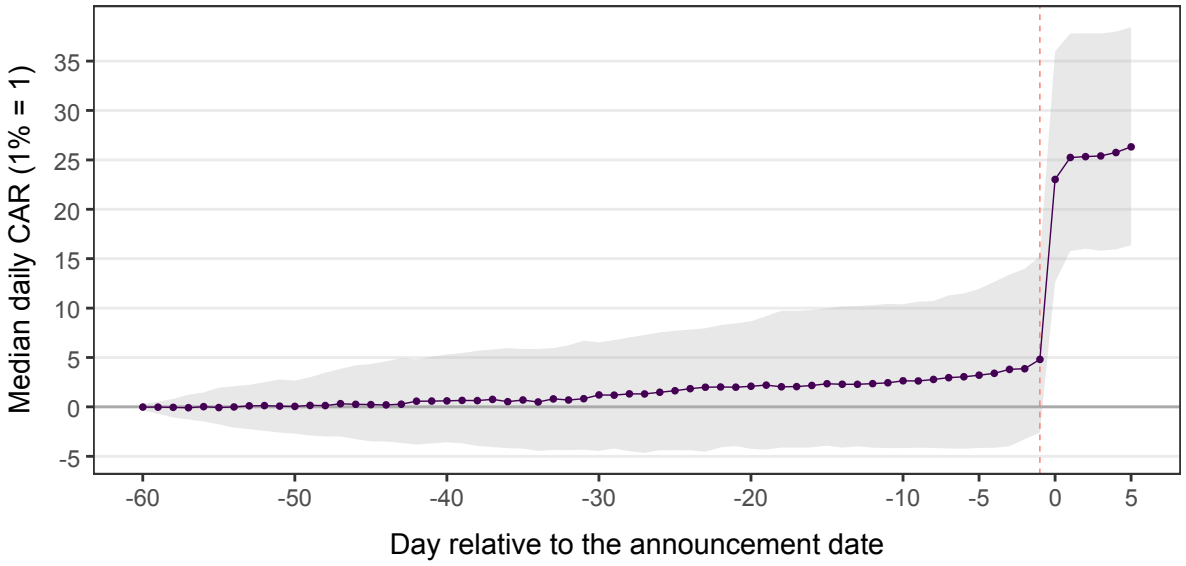

Figure 1: Median daily CAR with interquartile range before the bid announcement date
CAR is market model estimated cumulative abnormal return. The sample consists of initial merger bids for a majority share of target's equity between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange (LSE) or London Alternative Investment Market (AIM). All days are trading days. Dotted red line highlights the last day before the announcement of the bid, i.e. the day -1.

Table 4: UK run-ups and deal premiums 1989–2018

The sample consists of initial merger bids for a majority share of target's equity between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange (LSE) or London Alternative Investment Market (AIM). Initial merger bids are divided into years based on their announcement dates (ODA). Days in the square brackets refer to trading days relative to the announcement date. Values in the table are market model estimated CARs calculated with the respective brackets. *N* is the number of initial merger bids within the year. *Mean* is the mean of the variable within the year, *Med.* is the median of the variable within the year. *[-60, -1]*, *[-42, -1]*, and *[-20, -1]* are run-up measures. *[0, +1]* is a post-announcement period return (mark-up). *[-42, +1]* is a full deal period return. *[-42, -1] / [-42, +1]* is a run-up index, that is, a share of the full deal period return that is accountable to the run-up. Bottom part of the table shows values for the full time period. *Trend* is the coefficient of *Trend* from the regression $CAR_{y,i} = \alpha_i + \beta_i \times Trend$, where *y* is year. *p-value* is the significance of β. All values are in percentages (1% = 1).

		CAR											
		[-60, -1]		[-42, -1]		[-20, -1]		[0, +1]		[-42, +1]		[-42, -1] / [-42, +1]	
Year	N	Mean	Med.	Mean	Med.	Mean	Med.	Mean	Med.	Mean	Med.	Mean	Med.
1989	4	9.0	8.5	9.6	11.1	3.7	3.0	18.4	17.4	27.9	30.5	26.2	35.3
1990	2	13.6	13.6	15.6	15.6	7.3	7.3	25.7	25.7	41.3	41.3	38.1	38.1
1991	8	11.4	9.7	12.6	9.2	7.0	8.0	22.8	22.4	37.2	36.4	32.4	25.3
1992	13	7.4	4.6	7.0	8.1	5.5	5.4	21.4	18.4	29.7	30.0	21.4	27.1
1993	7	1.4	0.1	-1.4	-3.2	0.7	-1.1	31.6	38.8	33.2	36.2	-8.7	-7.4
1994	7	3.6	2.2	0.4	2.9	0.8	2.0	24.6	24.1	24.1	16.7	-14.6	8.7
1995	18	7.8	5.6	5.4	3.1	3.3	0.8	23.1	22.0	28.3	22.4	8.8	13.4
1996	19	-0.5	-6.2	1.7	-1.6	0.5	-1.3	26.3	24.5	27.7	29.1	-12.3	-5.3
1997	37	6.0	7.5	4.0	4.5	1.7	1.4	24.4	21.9	28.2	23.5	5.4	16.9
1998	60	5.1	3.9	5.2	4.7	3.6	2.4	21.1	17.4	25.7	22.9	10.6	21.2
1999	84	10.9	11.0	9.3	7.9	6.2	6.3	20.3	17.9	30.5	28.3	24.6	34.7
2000	77	5.8	4.4	5.5	3.8	4.4	3.9	19.7	17.6	25.7	23.5	9.4	20.6
2001	20	4.9	4.5	4.9	4.8	3.2	2.9	16.9	13.1	21.9	21.5	17.4	18.7
2002	23	0.9	0.2	1.9	2.9	2.8	2.6	17.4	16.9	19.4	19.1	-3.0	12.0
2003	26	8.2	3.6	6.0	5.1	5.9	4.7	16.4	14.3	22.4	19.4	22.5	23.4
2004	23	3.5	0.7	3.6	1.1	2.6	2.1	23.6	22.8	27.4	27.0	8.6	8.5
2005	33	11.6	11.0	9.3	7.5	4.5	2.2	13.9	12.2	23.4	23.6	28.5	33.1
2006	26	9.4	6.6	8.3	6.3	4.4	2.7	12.6	11.8	20.9	18.7	31.7	40.4
2007	30	3.9	3.7	3.4	1.4	1.7	1.1	20.4	18.3	23.7	20.9	-0.9	8.4
2008	21	5.7	7.9	6.0	7.8	3.8	1.5	27.2	28.6	32.5	30.7	15.6	30.9
2009	12	5.0	3.6	4.8	6.2	4.6	4.5	20.9	18.4	27.0	22.2	14.4	23.3
2010	19	7.4	7.6	7.1	5.1	3.1	-0.5	30.9	29.3	39.9	45.4	6.7	10.1
2011	17	4.3	2.3	4.6	0.4	1.8	-1.2	27.1	23.8	31.1	24.2	4.2	1.8
2012	16	11.7	13.9	8.6	7.7	5.0	3.7	22.7	24.7	31.9	31.8	23.1	27.3
2013	8	8.2	10.4	5.1	4.8	5.8	4.0	21.9	22.0	26.9	22.0	11.9	16.2
2014	12	-1.3	-0.3	1.0	-0.3	1.6	1.3	20.4	16.9	22.5	21.7	0.4	1.8
2015	24	5.2	3.0	3.8	1.9	1.8	0.6	20.0	18.1	23.8	21.8	9.9	12.2
2016	21	1.6	1.8	2.9	2.0	3.7	1.6	22.2	20.2	25.0	24.7	3.9	9.6
2017	12	1.3	1.5	3.0	3.1	5.0	5.4	20.8	16.8	23.6	25.1	1.6	12.0
2018	18	4.9	4.7	3.1	0.3	2.5	-0.00	22.4	22.2	26.6	21.6	7.4	1.1
1989–2018	697	6.23	4.80	5.58	4.14	3.77	2.56	21.00	18.12	26.84	23.75	12.25	17.42
Trend		-0.13	-0.06	-0.13	-0.17	-0.02	-0.08	-0.05	-0.10	-0.19	-0.23	-0.28	-0.40
p-value		0.12	0.56	0.09	0.04	0.56	0.14	0.61	0.43	0.10	0.12	0.32	0.14

Under the full period means and medians in Table 4, yearly run-ups are regressed to a yearly time trend. *Trend* is the coefficient of the trend, and *p*-value is the significance of the coefficient. The time trend is negative for all run-up measures, although significant at the 5% level only for the median of CAR [-42, -1]. Siganos and Papa (2015) note that the FF3 adjusted run-ups ([-60, -1]) in the UK would have decreased between 1998 and 2010. In unreported tests, I do not find a significant time trend for this period with market model adjusted returns. Figure 2 plots all the initial bids in my sample based on their announcement date and run-up. In addition, a median yearly run-up with an interquartile range and a number of bids are shown. There is a sharp decline in the median run-up after 1992, after which the level starts to fluctuate around 4%. The level has stayed low after 2013. It should be noted that there are only a few initial bids between 1989 and 1994, which decreases the accuracy of the first years in the sample. The figure clearly shows the effect of winsorizing the run-ups with the row of bids in the top and bottom of the figure.

In Table 4, the deal mark-ups measured as CAR [0, +1] have varied between 11.8% and 38.8%, a median of the whole period being 18.12%. There is no significant time trend. Looking at the full deal premiums, CAR [-42, +1], the median is 23.75%. The time trend for the mean is significant at the 10% level with a negative coefficient, the median also having a negative coefficient, although not significant. So, it seems that the full period returns have decreased over time as well as the run-up returns. As the mark-up has stayed relatively stable, it seems that the decrease in run-ups has been the reason for the decline in the deal premiums. To analyze this relation further, in the two final columns a run-up index which was first introduced by Schwert (1996) is shown. It shows a share of the full deal period return that is accountable to the run-up. The level has varied a lot over the sample period, median being 17.42%. Run-up has been over 30% of the full period return in multiple years, being the highest, 40.4%, in 2006. The time trend is negative, but as it is not significant, it cannot be concluded that the share of run-ups of full period returns would have decreased. However, the run-up index shows well how major issue the pre-announcement run-up is. Previous studies (Madura et al., 2014; Schwert, 1996) have found that the run-up is an added cost to the bidder, and the high levels of run-up index emphasize the importance of this point.

As presented earlier in Section 2.1, Schwert (1996) proposes a theory that the run-up might be caused by the size of the deal premium and the probability of the deal being successful. If the hypothesis was true, run-ups and mark-ups would correlate with each other by moving in

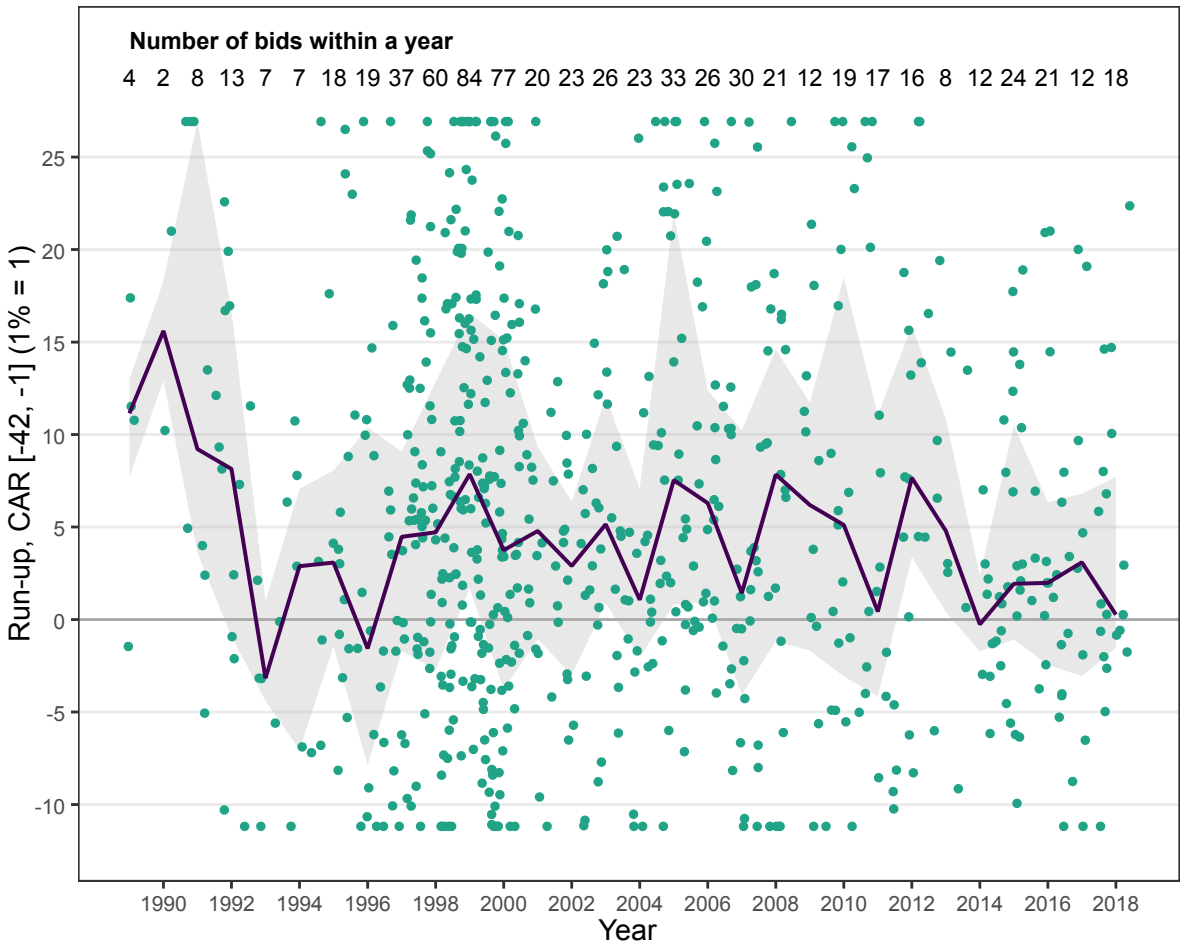

Figure 2: Median run-up by year with interquartile range and all initial bids
The sample consists of initial merger bids for a majority share of target's equity between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange (LSE) or London Alternative Investment Market (AIM). Run-up is the market model estimated cumulative abnormal return in the period [-42, -1] relative to the announcement date. The line represents the median run-up within the calendar year based on the announcement dates of the initial bids. The shaded grey area shows the 25th and 75th percentile values. Dots represent initial bids which are plotted continuously by their announcement date. Run-ups are winsorized at the 5% and 95% levels.

the same direction, as both are caused by high deal premiums. Also, run-up index would stay on average at the same level despite the absolute level of run-up, that is, run-up index and run-ups would not correlate with each other, assuming that the probability of the deal being successful stayed constant. Looking at the time trend, it would seem that the run-up and mark-up have moved in the same direction, as both have decreased. However, their pairwise correlation is negative, -0.27 (unreported), which is not what the hypothesis would predict. For run-up index, the time trend is not significant, although the coefficient is negative. The pairwise correlation with the run-up is 0.86 (unreported), which again is not what the

hypothesis would predict. So, it seems that deal premiums are not driving the level of run-ups.

This analysis shows that there are run-ups in UK deals, and that the level of the run-ups has decreased from 1989 to 2018. Also, the full deal premiums have decreased while the mark-ups do not have a significant trend. The run-up index has a negative time trend that is not significant, so it cannot be concluded that the share of run-ups of the full period returns have decreased. Finally, based on the time trends and correlations between run-ups, mark-ups and full deal premiums, the deal premiums are not driving the level of run-ups. In the next section, I present other potential explanations for the run-up and the trend.

4. Univariate and multivariate analysis of factors affecting run-ups

This section first presents the market anticipation factors based on previous literature and then analyzes their effect on the run-ups in the univariate analysis. Then, the section presents the insider trading regulation events and analyzes their effect on the run-ups in the univariate analysis. Finally, the section studies the effects of market anticipation factors and insider trading regulation events together in multivariate analysis and considers whether they can explain the trend in the run-ups.

4.1. Market anticipation factors

To analyze the effect of market anticipation factors to the level of run-ups, I use following factors adapted from Dutordoir et al. (2018), Brigida and Madura (2012), and Madura et al. (2014). All factors and sources of their data are explained in Appendix.

First, I present the deal and acquirer characteristics that might affect the run-ups:

- *Rumor*: A dummy variable equal to one if there have been rumors about the deal before its announcement. The effect is expected to be positive. The rumors may arise from the run-up itself, which would indicate reverse causality. However, it is more likely that the rumor is based on leaked information, and trading based on rumors published in newspapers or similar media is legal in the UK. It should also be noted that the variable will overstate the effect of rumors as the sample contains only bids that are later confirmed and not the ones which remained as rumors.

- *Toehold*: A dummy variable equal to one if the acquirer owns a stake in the target before the announcement of the bid. Acquiring a toehold position signals the market about a potential takeover which would increase the run-up (Brigida and Madura, 2012). However, Aspris et al. (2014) finds that only short-term, and not long-term, toeholds predict a run-up. I am not able to separate between the two with my dataset.
- *Cash financing*: The percentage of cash compensation of the total compensation. Cash-financed deals are more anticipated as they often require raising debt. Even if no debt is raised, collecting or saving cash in other ways could be noticed, although the effect on the run-up would be questionable. Dutordoir et al. (2018) and Brigida and Madura (2012) find support for this hypothesis.
- *Deal completed*: A dummy variable equal to one if the deal is eventually completed, regardless of whether the winning bid is the first bid published. Completed bids are more likely to incur a run-up as the eventual payoff for pre-announcement trading is on average higher than in the bids that do not materialize.
- *Hostile*: A dummy variable equal to one if the deal is hostile. Hostile deals are thought to be more surprising because the hostile acquirer does not want the target to have time to prepare a defense for the bid, compared to a friendly bid, which can involve long negotiations before the public announcement of the bid. The effect on the run-up is thus expected to be negative, as the information is less likely to leak before the announcement of the bid. Dutordoir et al. (2018) does not find hostile deals to have a statistically significant effect.
- *Poison pill*: This is also known as a shareholder rights plan, which is a type of defensive tactic against a takeover. Although Dutordoir et al. (2018) and other US studies propose this variable, it is not relevant in the UK as poison pills are not allowed by the Takeover Code. Targets with poison pill takeover defense would be expected to be less likely to become targets.
- *Number of bidders*: The information about the deal is more likely to leak when there are many bidders. In addition, competing toeholds may increase the stock price of the target. Dutordoir et al. (2018) find support for this hypothesis.
- *Active industry*: A dummy variable equal to one if there has been at least one acquisition in target's four-number SIC industry during the year prior to the deal. Bid

is more anticipated if a competitor has received a bid earlier. Dutordoir et al. (2018) do not find this variable significant.

- *Foreign*: A dummy variable equal to one if the ultimate parent of the acquirer is not from the UK. A foreign bidder may be more likely to leak information about the deal as it is more difficult to be identified by the UK officials. Also, a foreign bidder may need many advisors in multiple areas regarding the bid and thus it may be more difficult to hide its intentions. On the other hand, as a foreign bidder is located further away, the bid can be more of a surprise to the market. The effect on the run-up can thus be either positive or negative. Brigida and Madura (2012) find that the effect of foreign bidders is positive on the run-up.
- *Public*: A dummy variable equal to one if the ultimate parent of the acquirer is listed in a stock exchange. Public firms are followed more actively which would make it easier to predict a bid. However, public firms have more rigorous takeover policies and they may use better advisors than private firms, and thus they are better in hiding their intentions. In the US, Officer et al. (2010) find that public acquirers incur smaller run-ups; however, Bargeron et al. (2008) do not find a significant difference.
- *LBO*: A dummy variable equal to one if the deal is considered as an LBO deal. LBOs require raising debt which would spread the information, but to counter that, LBO firms are regular acquirers and their takeover policies should be advanced. Officer et al. (2010) find lower run-ups for LBOs in the US.
- *Number of target advisors*: Total number of target advisors, including financial and legal advisors. Based on Dai et al. (2017), higher number of advisors is expected to lead to higher run-up due to higher probability of information leaks, both intentional and accidental.
- *Number of acquirer advisors*: Same reasoning as target advisors, although Dai et al. (2017) did not find support for acquirer advisors having an effect on the run-up.

Table 5 divides the sample by market anticipation factors and shows a univariate analysis of the run-up. Continuous variables are divided into two groups by their median value, where 0 means ‘low’ (below median) and 1 means ‘high’ (above median) group. Means (medians) of the run-up with *p*-values from *t*-test (Wilcoxon test) are shown together with the number of occurrences. Panel A shows the results for the deal and acquirer characteristics. *Hostile* and

Table 5: Target run-ups by market anticipation factors
The sample consists of initial merger bids for a majority share of target's equity between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange or London Alternative Investment Market. Run-up is the market model estimated cumulative abnormal return in the period [-42, -1] relative to the announcement date, in percentages. Variables are explained in Appendix. *Panel A* contains the deal and acquirer characteristics and *Panel B* the target characteristics. For each variable, the sample is divided into two groups. Dummy variables are divided based on their value (0/1) whereas continuous variables are divided to low (0) and high (1) groups based on their median value. *diff* is the difference between the mean/median run-ups of the two groups. *t-test* and *Wilcoxon* columns contain the *p*-value from the corresponding tests of the significance of the difference. Last two columns (*N*) show the distribution of initial bids based on the two groups. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Run-up, CAR [-42, -1]	Mean				Median				N	
	0	1	*diff*	*t*-test	0	1	*diff*	Wilcoxon	0	1
Panel A: Deal and acquirer characteristics										
Active industry	6.07	4.82	*-1.25*	0.12	4.45	3.49	*-0.96*	0.13	421	276
Foreign	5.27	5.81	*0.53*	0.51	3.18	4.42	*1.24*	0.38	301	396
Public	5.32	5.72	*0.40*	0.63	4.41	4.11	*-0.31*	0.70	250	447
Cash financing	5.64	5.56	*-0.08*	0.93	4.48	4.00	*-0.48*	0.82	156	541
Deal completed	6.21	5.48	*-0.73*	0.52	4.22	4.12	*-0.09*	0.48	91	606
Hostile	5.79	3.62	*-2.17*	0.07*	4.45	1.44	*-3.02*	0.10*	627	70
LBO	5.61	5.39	*-0.23*	0.83	3.89	5.20	*1.31*	0.98	585	112
Number of bidders	5.33	7.73	*2.39*	0.08*	4.02	6.34	*2.32*	0.09*	626	71
No. of acquirer advisors	5.75	5.43	*-0.32*	0.68	3.89	4.41	*0.52*	0.80	323	374
No. of target advisors	4.87	5.74	*0.88*	0.38	3.17	4.42	*1.24*	0.42	132	565
Rumored	5.46	6.01	*0.55*	0.56	3.80	4.76	*0.96*	0.49	545	152
Toehold	5.36	6.55	*1.19*	0.27	4.16	3.90	*-0.26*	0.41	569	128
Panel B: Target characteristics										
Dividend yield	4.78	6.37	*1.58*	0.04**	3.16	5.02	*1.86*	0.04**	348	349
GR dummy	5.36	6.11	*0.75*	0.39	3.61	4.89	*1.28*	0.32	494	203
Leverage	5.67	5.48	*-0.18*	0.81	3.39	4.49	*1.10*	0.86	348	349
Liquidity	6.11	5.04	*-1.07*	0.18	4.44	3.58	*-0.86*	0.16	348	349
LSE	4.18	5.84	*1.66*	0.13	2.78	4.49	*1.71*	0.10*	110	587
Market-to-book	5.76	5.40	*-0.36*	0.65	4.05	4.38	*0.33*	0.59	347	350
Sales growth	5.01	6.14	*1.13*	0.15	3.17	4.93	*1.77*	0.19	348	349
Firm value	6.10	5.06	*-1.04*	0.19	4.72	3.52	*-1.20*	0.21	348	349

Number of bidders are the only ones to be significant, and they are at the 10% level. Run-up is about three percentage points lower for hostile deals. This is in line with the hypothesis that the acquirer is able to keep the bid secret, and thus the information does not leak to the market. Higher number of bidders predict a higher run-up, which supports the hypothesis that information is more likely to leak when there are more bidders. Another explanation is that the bidders start to accumulate shares in the target already before their bid, which also would increase the run-up. Of 71 number of bidders above the median, 62 include two bidders

(unreported). Unlike Officer et al. (2010), *LBO* and *Public* variables are not significant. Another difference to the findings of the previous studies is that the variable *Rumored* does not predict a higher run-up. This is most likely due to my use of ODA instead of DA, and it also highlights the importance of using the correct bid announcement date. Compared to other comprehensive run-up studies such as Dutordoir et al. (2018), Madura et al. (2014), and Brigida and Madura (2012), the findings from the deal and acquirer specific univariate tests are largely similar, also since not many variables are significant.

In addition to deal and acquirer characteristics, some target characteristics have been identified to predict a merger. All of the factors below are borrowed from Dutordoir et al. (2018), except *LSE*:

- *Market-to-book*: Low market-to-book ratio indicates that the target is cheap or that it has low growth opportunities and would thus gain from acquisition. Lower values would lead to a higher run-up.
- *Dividend yield*: High values indicate fewer investment opportunities and higher agency costs, which both would predict a possible merger.
- *Sales growth*: High sales growth firms are less likely to be acquired as their business is doing well.
- *GR dummy*: Growth-resource mismatch. A dummy variable equal to one for firms with high sales growth, low liquidity, and high leverage, or vice versa. Sales growth, liquidity, and leverage are explained in separate bullets. Targets with the GR mismatch are more likely to be taken over as they are in an unbalanced state. Either they are growing and they lack resources, or they are not growing and they have spare resources.
- *Leverage*: Measured as debt to total assets. Highly leveraged firms are less likely to be acquired.
- *Liquidity*: Measured as cash and equivalent to total assets. Opposite to leverage, high liquidity firms are more likely to be acquired.
- *Firm value*: Natural logarithm of the inflation corrected market value of the target firm. Smaller firms are more likely to be acquired.

- *LSE*: A dummy variable equal to one for firms listed in the London Stock Exchange (LSE) in contrast to London Alternative Investment Market (AIM). I speculate that firms in AIM are monitored by fewer investors and thus information would be easier to be kept private. On the other hand, firms listed in LSE are under more rigorous oversight by regulation, which would tighten the information handling.

Panel B in Table 5 shows the results for the target characteristics. *Dividend yield* is significant, and the effect is positive to run-up. This finding is in line with previous studies. Targets listed in LSE incur higher run-ups than those in AIM. Other variables are not significant, which is not a big surprise, as the link between fundamental firm data and the run-up is only weak. The fundamental data is from the last full financial year before the acquisition, and the run-up period is eight calendar weeks before the announcement. So even though these factors have been found to being able to predict mergers (Espahbodi and Espahbodi, 2003; Palepu, 1986), it is unlikely that the increase in stock price would be timed within the run-up period. However, it is more sensible that factors describing the target, acquirer, or the deal would explain the run-up, as they are relevant to the way information might leak and always relative to the deal announcement date.

4.2. Insider trading regulation events

If the insider trading hypothesis is true, tighter insider trading regulation and higher enforcement are expected to reduce insider trading and thus run-ups. Based on the analysis in Section 2.3, I consider following events to be significant insider trading regulation (ITR) events within my research period from 1989 to 2018:

- *CJA1993*: Effective March 1, 1994. Although insider trading was criminalized before, this law extended the basis of liability for the insider trading offense and is also the present criminal law. A person should be more unlikely to insider trade when he or she is more likely to be convicted. However, as it was later discovered, insider trading as solely a criminal offense was not very effective, as the required proof was high, which may diminish the effect of this event.
- *FSMA2000*: Effective December 1, 2001. This law introduced a civil offense of insider trading with a lower required proof than in the criminal offense and unlimited fines, which should have a negative impact on insider trading. This is relevant to

people who think about committing insider trading because they are more likely to be convicted. However, based on civil offense, a person cannot be sentenced to jail, but still the financial and reputational risks are large.

- *First enforcement of FSMA2000 (FE_FSMA2000)*: Conviction published February 11, 2004. It took over two years for FSA to impose a first civil penalty for insider trading. This is a relevant milestone and sends a signal that the new law is enforced in practice, which should decrease insider trading and thus run-ups. However, the imposed fine of £15,000 was not very high, which may have given relief to experienced insider traders.
- *First criminal enforcement of insider trading by FSA (FCE_2009)*: Conviction published March 27, 2009. This is the first successful criminal sentence of insider trading imposed by FSA. This signals to potential insider traders that a criminal sentence is a real possibility which should have even stronger effect on decreasing insider trading than the first enforcement of FSMA2000. However, CJA1993 was enforced before this case but not by FSA. The previous criminal case was from 2004.
- *FSA2012*: Effective April 1, 2013. This law created FCA with minor additional powers on insider trading. The creation of FCA was combined with stricter communication towards insider trading. This event also coincides with increased rate of criminal indictments and convictions of insider trading as explained in Section 2.4, which could boost the effect of this event significantly.
- *MAR*: Effective July 3, 2016. This EU-wide law increased regulatory powers, made insider lists more comprehensive, and improved whistleblowing channels. Although MAR does not specifically tackle insider trading, its content is related to the probability of getting caught.

For the regulation changes, I use the date when the law becomes effective as the event date. There is usually a lag between the date when the law passes and the date it becomes effective. For example, FSMA2000 received a royal assent on June 14, 2000, almost one and half years before it became effective. The effective date is thus predictable to the market actors. However, the new regulation should not change the behavior of market actors before it has become effective as they cannot be convicted based on the new law before the effective date. For ‘first enforcement events’, which are FE_FSMA2000 and FCE_2009, I use the date when

the successful conviction is published. This date gives the strongest signal to the market actors and is somewhat of a surprise to them, too. However, the indictment of the action has been published usually one to two year before the conviction, which increases the predictability of the event.

Figure 3 shows the median and mean run-ups over time, split to periods based on the ITR events. As in Table 4, the median run-up shows a decreasing trend while the trend in mean is not so clear. Before *CJA1993*, the median run-up was over 7%, after which it decreased close to 5%. After *FSMA2000*, it lowered further, close to 4%, where it stayed until *FSA2012*, when it decreased dramatically to 2%, and after *MAR* further to under 1%. Mean run-up increased back to 6% after *FE_FSMA2000* but decreased close to median values in the end. Based on the figure, some ITR events might have had decreasing effect on run-ups, namely *CJA1993*, *FSMA2000*, *FSA2012* and *MAR*.

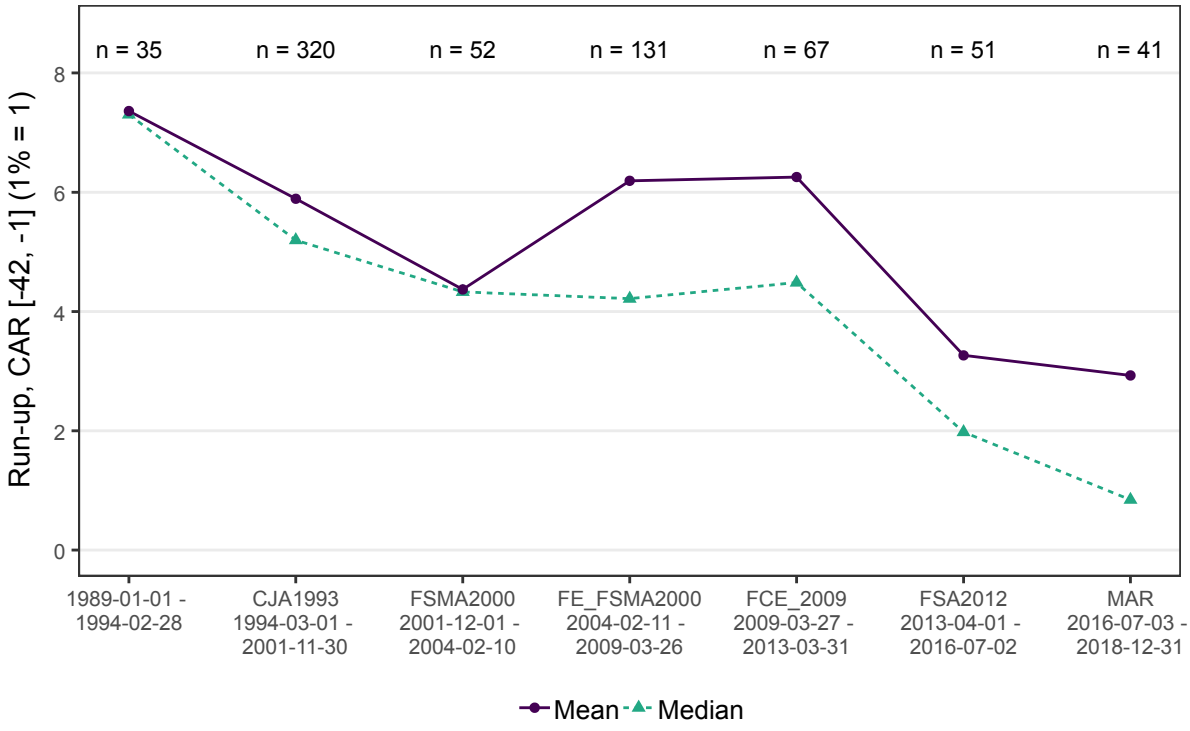

Figure 3: Mean and median run-ups split by the insider trading regulation events
The sample consists of initial merger bids for a majority share of target's equity between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange or London Alternative Investment Market. Run-up is the market model estimated cumulative abnormal return in the period [-42, -1] relative to the announcement date, in percentages. Variables and six insider trading regulation events are explained in Appendix. Each point in the graph shows the mean/median run-up within the period described in the x-axis. First date mentioned is the date when the insider event took place (for example *CJA1993* became effective 1994-03-01). Number of initial bids within the period is given in the top of the graph.

Table 6: Target run-ups by insider trading regulation events
The sample consists of initial merger bids for a majority share of target's equity between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange or London Alternative Investment Market. Run-up is the market model estimated cumulative abnormal return in the period [-42, -1] relative to the announcement date, in percentages. Variables are explained in Appendix. In this table, *Panel A* contains the whole sample period (1989–2018), *Panel B* a 504 day window around each insider trading regulation (ITR) event date ([-504, -1] and [+61, +564] relative to the ITR event date), and *Panel C* a 252 day window around each ITR event date ([-252, -1] and [+61, +312] relative to the ITR event date). In *Panel B* and *Panel C*, the pre- and post-periods do not overlap other ITR event dates, although some post-periods overlap some pre-periods, and vice versa. For each ITR event, the sample is divided into two groups. *0* is the pre-ITR-event period, *1* is the post-ITR-event period. *diff* is the difference between the mean/median run-ups of the two groups. *t-test* and *Wilcoxon* columns contain the *p*-value from the corresponding tests of the significance of the difference. Last two columns (*N*) show the distribution of initial bids based on the two groups. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Run-up, CAR [-42, -1]	Mean				Median				N	
	0	1	*diff*	*t*-test	0	1	*diff*	Wilcoxon	0	1
Panel A: 1989–2018										
CJA1993, 1994-03-01	7.36	5.48	*-1.88*	0.33	7.30	4.08	*-3.22*	0.29	35	662
FSMA2000, 2001-12-01	6.04	5.10	*-0.94*	0.23	5.33	3.02	*-2.32*	0.26	355	342
FE_FSMA2000, 2004-02-11	5.82	5.23	*-0.59*	0.46	4.93	2.92	*-2.01*	0.35	407	290
FCE_2009, 2009-03-27	5.91	4.44	*-1.47*	0.10*	4.75	2.19	*-2.55*	0.09*	538	159
FSA2012, 2013-04-01	5.95	3.11	*-2.84*	0.003***	4.72	1.68	*-3.04*	0.02**	605	92
MAR, 2016-07-03	5.74	2.93	*-2.81*	0.06*	4.38	0.84	*-3.53*	0.09*	656	41
Panel B: 504-day window										
CJA1993, 1994-03-01	3.49	5.15	*1.67*	0.61	2.12	2.95	*0.83*	0.63	19	28
FSMA2000, 2001-12-01	5.23	4.22	*-1.01*	0.53	4.15	4.33	*0.18*	0.83	102	48
FE_FSMA2000, 2004-02-11	4.33	7.94	*3.61*	0.05**	4.50	4.72	*0.22*	0.17	47	56
FCE_2009, 2009-03-27	3.96	7.03	*3.07*	0.26	2.58	2.91	*0.33*	0.35	43	36
FSA2012, 2013-04-01	5.81	2.88	*-2.93*	0.23	4.49	1.36	*-3.12*	0.38	31	29
MAR, 2016-07-03	2.77	1.74	*-1.03*	0.54	1.68	0.27	*-1.41*	0.54	44	36
Panel C: 252-day window										
CJA1993, 1994-03-01	-2.11	4.04	*6.15*	0.19	-3.17	2.88	*6.05*	0.41	7	9
FSMA2000, 2001-12-01	5.94	2.37	*-3.57*	0.11	6.48	4.11	*-2.37*	0.13	26	23
FE_FSMA2000, 2004-02-11	6.55	6.90	*0.35*	0.90	5.50	3.90	*-1.60*	0.94	25	28
FCE_2009, 2009-03-27	5.37	5.99	*0.62*	0.87	6.80	3.79	*-3.01*	0.83	18	21
FSA2012, 2013-04-01	8.69	4.17	*-4.52*	0.32	7.66	2.79	*-4.87*	0.27	18	6
MAR, 2016-07-03	3.03	1.12	*-1.91*	0.48	1.98	-0.75	*-2.73*	0.46	21	19

Table 6 is structured the same way as Table 5 in Section 4.1. In Table 6, Panel A splits the whole sample period into two groups based on the ITR event dates. All run-ups in post-ITR-event periods are smaller than in pre-periods, and the differences for three latest ITR events are significant. For *FSA2012*, the difference in the mean is significant at the 1% level. As *FSA2012* itself should not have the largest effect of the ITR events, it might be that the

increased rate of criminal convictions amplifies the effect. Because this analysis considers the full sample period and the variables split the sample by time, any decreasing trend in run-ups may give significance to the ITR events, even when the trend would be caused by something else. Also, market players may find new ways to go around insider trading regulation after some time, so the effects of regulation may diminish. To tackle this problem, Panel B and Panel C use a window around the ITR event date to separate the effect of the specific ITR event. Panel B contains all initial bids announced in windows [-504, -1] and [+61, +564] relative to the ITR event date; Panel C all initial bids announced in [-252, -1] and [+61, +312] relative to the ITR event date. All days are trading days. The 60-trading-day gap after the ITR event date exists so that the run-up periods of the post-window initial bids do not overlap with the pre-windows. In Panel B, pre- and post-windows of one event do not overlap with other ITR event dates. In Panel C, in addition, the pre- and post-windows of one event do not overlap with other pre- and post-windows, either.

In Table 6, Panel B, the only significant result is when means of *FE_FSMA2000* are compared. The difference is, surprisingly, positive, which might be caused by outliers, as the difference in medians is not significant. However, as speculated before, the lenient fines by FSA could have had an opposite effect than anticipated. Panel C tells a similar story to Panel B and no ITR event is significant. However, looking at the results for *FSMA2000* is interesting. In Panel C, the event is close to being significant with high effect, -3.57%. In Panel B with wider window, the effect decreases, and with full period, it decreases even further. Could it be that *FSMA2000* did defer insider trading immediately after becoming effective, but when market players noticed that it is not being enforced, they continued insider trading as before?

Figure 4 plots the ITR events from Table 6, Panel C to separate graphs and shows the development of the CARs until 5 days after the deal announcement day. The shown run-up is a median daily CAR, starting from 42 days before the announcement day of the initial bid, and the day -1 is highlighted with a red dotted line. Mean daily CARs are not materially different (unreported). After *CJA1993*, run-ups were actually a little bit higher, and the deal premium was over 10 percentage points lower. *FSMA2000*, *MAR*, and *FCE_2009* seem to have decreased the run-ups. *FSA2012* has the largest difference in run-up. With *FSA2012*, it should be noted that the deal premium is also a lot lower, which could indicate that the deals

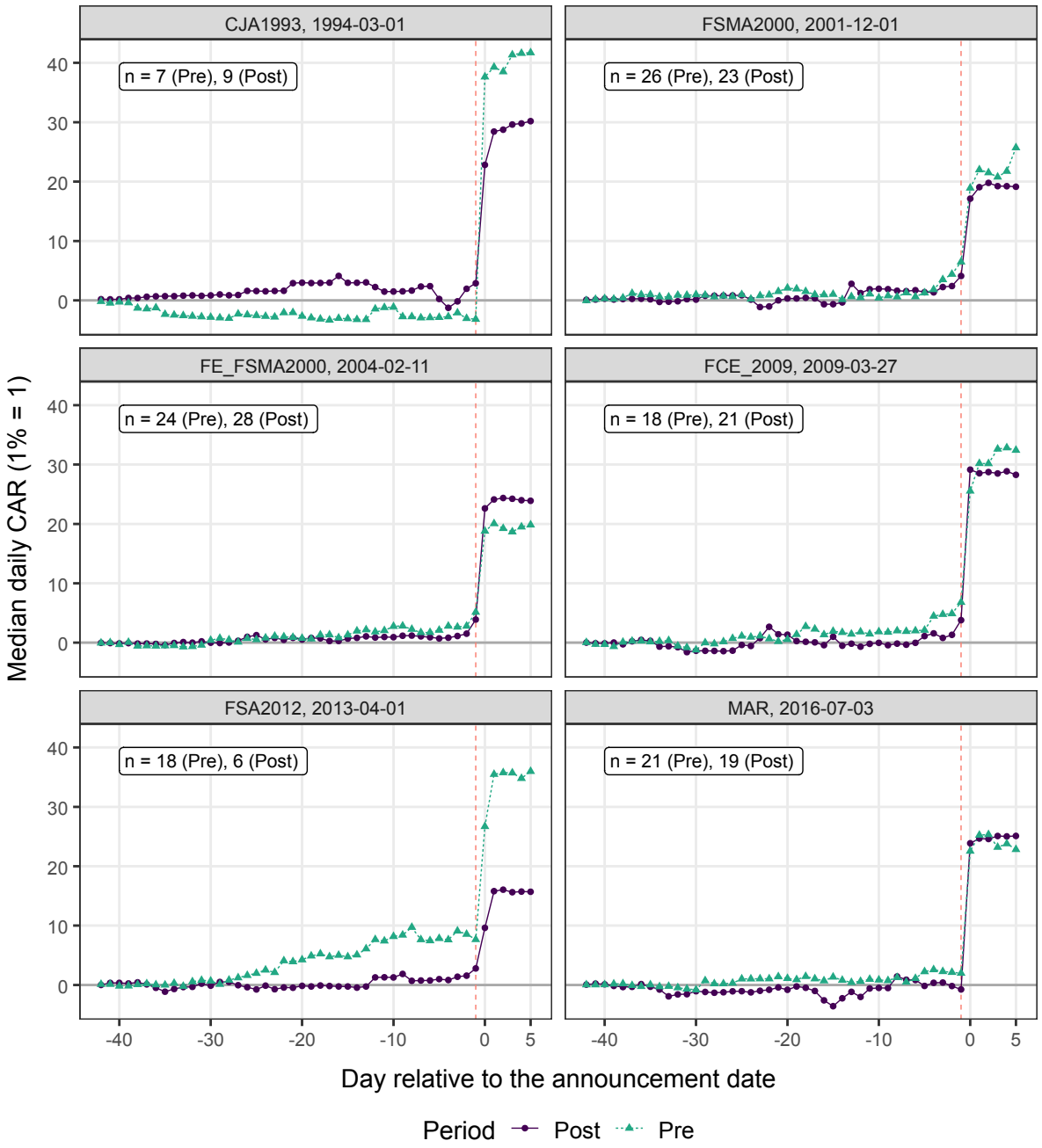

Figure 4: Median daily CARs before and after the insider trading regulation event
CAR is market model estimated cumulative abnormal return. The sample consists of initial merger bids for a majority share of target's equity between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange or London Alternative Investment Market. Variables and six insider trading regulation events are explained in Appendix. All days are trading days. Dotted red line highlights the last day before the announcement of the bid, i.e. the day -1. Number of initial bids within the pre- and post-periods is given in the top of each graph. *Pre* period includes bids announced in the window [-252, -1], and *Post* period bids announced in the window [+61, +312], relative to the insider trading regulation event date. Insider trading regulation event date is given after the name of the event in the title of each graph.

are materially different between pre- and post-periods. The number of deals, six, is also quite low.

Based on the univariate analysis of run-ups around the ITR events, some of the events might have an effect on run-ups, with *FSA2012* and *MAR* having the strongest effects. However, the deals before and after the ITR event may be different from each other. That is why next, I consider the market anticipation factors together with the ITR events.

4.3. Multivariate analysis

To analyze the effects of ITR events and deal anticipation factors together over time, I use a regression model similar to Dutordoir et al. (2018) and Brigida and Madura (2012). First, I examine whether there is a trend in the run-ups. Then, I try to explain the trend with market anticipation factors. After this, I add ITR event dummies and see how they affect the trend and if they can explain it. I also examine the ITR events individually with the market anticipation factors. Finally, for robustness, I add deal premiums as control variables and include only deals with UK acquirers.

The results from the regression analysis are in Table 7. In the first column, I regress run-ups only on the market anticipation factors. The results are similar to the univariate analysis in Table 5. *Number of bidders* is significant and positive, and *Hostile* deals incur lower run-ups as do targets listed in *LSE*. In contrast to the univariate analysis, *Dividend yield* is not significant anymore. *Active industry* is close to being significant and becomes significant with a negative coefficient in subsequent regressions. So, when there has been a bid within a year in the target's 4-code SIC industry, the run-up is lower. This is somewhat counterintuitive, as mergers in the same industry might help investors to predict new mergers, which would lead to higher run-up. However, the increase in stock prices can incur before the run-up period begins, and so the stock price is already high, and the market model returns within the run-up period can even be negative. Finally, *Sales growth* is significant with a positive coefficient. This is contrary to the hypothesis. The reason may be that growing firms are attractive merger targets.

Table 7: OLS regressions examining the trend in run-ups

The sample consists of initial bids for a majority share of target's equity between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange or London Alternative Investment Market. Run-up is the market model estimated cumulative abnormal return in the period [-42, -1] relative to the announcement date, in percentages. Variables are explained in Appendix. In first column, the run-up is regressed on the market anticipation factors, and in second column, only on trend. In third column, trend with market anticipation factors are included, and in fourth column, trend with insider trading event dummies. In fifth column all factors are included. Columns from 6 to 11 examine the effect of individual insider trading events together with the market anticipation factors and trend. *t*-statistics are in the parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	Run-up, CAR [-42, -1]										
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Trend		-0.10*	0.04	0.17	0.24	0.04	-0.01	-0.16	0.11	0.17*	0.09
		(-1.73)	(0.55)	(0.60)	(0.77)	(0.46)	(-0.05)	(-1.35)	(0.98)	(1.78)	(1.16)
Rumored	0.45		0.53		0.68	0.51	0.65	1.25	0.43	0.52	0.51
	(0.44)		(0.52)		(0.59)	(0.49)	(0.62)	(1.16)	(0.42)	(0.51)	(0.50)
Deal completed	-1.17		-1.18		-1.41	-1.23	-1.09	-1.03	-1.22	-1.28	-1.35
	(-0.96)		(-0.98)		(-1.12)	(-0.99)	(-0.89)	(-0.85)	(-1.00)	(-1.06)	(-1.11)
Number of bidders	2.50**		2.51**		2.52**	2.51**	2.47**	2.47**	2.48**	2.47**	2.46**
	(2.42)		(2.44)		(2.44)	(2.44)	(2.39)	(2.40)	(2.41)	(2.41)	(2.39)
Toehold	1.25		1.38		1.54	1.42	1.39	1.30	1.49	1.58	1.51
	(1.21)		(1.30)		(1.43)	(1.31)	(1.31)	(1.23)	(1.39)	(1.49)	(1.42)
Cash financing	-0.88		-0.96		-1.66	-0.98	-1.05	-1.28	-1.23	-1.44	-1.21
	(-0.40)		(-0.44)		(-0.75)	(-0.44)	(-0.48)	(-0.58)	(-0.56)	(-0.65)	(-0.55)
Hostile	-2.30		-2.43*		-2.52*	-2.45*	-2.36*	-2.44*	-2.44*	-2.36*	-2.41*
	(-1.64)		(-1.71)		(-1.76)	(-1.72)	(-1.66)	(-1.72)	(-1.72)	(-1.67)	(-1.70)
LBO	-0.31		-0.23		-0.42	-0.24	-0.22	-0.22	-0.28	-0.32	-0.37
	(-0.24)		(-0.17)		(-0.32)	(-0.18)	(-0.17)	(-0.16)	(-0.21)	(-0.24)	(-0.28)
Public	0.48		0.57		0.43	0.58	0.56	0.47	0.58	0.56	0.46
	(0.48)		(0.56)		(0.42)	(0.56)	(0.55)	(0.46)	(0.56)	(0.55)	(0.45)
Foreign	-0.16		-0.10		-0.11	-0.10	-0.13	-0.13	-0.14	-0.16	-0.08
	(-0.18)		(-0.11)		(-0.13)	(-0.11)	(-0.14)	(-0.15)	(-0.15)	(-0.18)	(-0.09)
No. of target advisors	0.31		0.30		0.33	0.30	0.31	0.35	0.32	0.29	0.31
	(0.76)		(0.72)		(0.79)	(0.72)	(0.74)	(0.84)	(0.77)	(0.69)	(0.76)
No. of acquirer advisors	-0.13		-0.15		-0.15	-0.15	-0.15	-0.16	-0.15	-0.16	-0.15
	(-0.42)		(-0.47)		(-0.48)	(-0.46)	(-0.48)	(-0.50)	(-0.47)	(-0.52)	(-0.47)
Active industry	-1.34		-1.32		-1.51*	-1.34	-1.34	-1.38*	-1.42*	-1.42*	-1.43*
	(-1.61)		(-1.58)		(-1.79)	(-1.59)	(-1.60)	(-1.66)	(-1.68)	(-1.70)	(-1.71)
LSE	1.90		2.04*		2.34*	2.04*	2.05*	2.23*	2.02*	2.20*	2.18*
	(1.59)		(1.67)		(1.90)	(1.67)	(1.68)	(1.83)	(1.65)	(1.80)	(1.78)
Firm value	-0.48		-0.49		-0.51	-0.49	-0.50	-0.55*	-0.51	-0.46	-0.48
	(-1.44)		(-1.48)		(-1.52)	(-1.47)	(-1.50)	(-1.67)	(-1.52)	(-1.38)	(-1.44)
Market-to-book	-0.25		-0.24		-0.26	-0.25	-0.24	-0.26	-0.26	-0.23	-0.23
	(-0.90)		(-0.88)		(-0.92)	(-0.89)	(-0.86)	(-0.94)	(-0.92)	(-0.83)	(-0.85)
Dividend yield	0.21		0.24		0.27	0.24	0.25	0.28*	0.25	0.26	0.26
	(1.35)		(1.45)		(1.60)	(1.44)	(1.52)	(1.73)	(1.50)	(1.57)	(1.59)
Sales growth	0.05*		0.05*		0.05*	0.05*	0.05*	0.05*	0.05*	0.05*	0.05**
	(1.86)		(1.92)		(1.89)	(1.92)	(1.91)	(1.93)	(1.93)	(1.83)	(1.97)
Leverage	0.01		0.01		0.01	0.01	0.01	0.01	0.01	0.01	0.01
	(0.34)		(0.39)		(0.30)	(0.40)	(0.38)	(0.27)	(0.38)	(0.37)	(0.42)
Liquidity	-0.03		-0.03		-0.04	-0.03	-0.03	-0.04	-0.03	-0.04	-0.03
	(-0.71)		(-0.73)		(-0.87)	(-0.73)	(-0.73)	(-0.81)	(-0.69)	(-0.86)	(-0.72)

GR dummy	0.93		0.90		0.87	0.91	0.91	0.88	0.89	0.92	0.89
	(1.00)		(0.97)		(0.93)	(0.97)	(0.97)	(0.95)	(0.96)	(0.99)	(0.95)
CJA1993				-2.66	-1.03	0.35					
1994-03-01				(-0.98)	(-0.37)	(0.17)					
FSMA2000				-2.22	-2.61		0.80				
2001-12-01				(-1.14)	(-1.28)		(0.55)				
FE_FSMA2000				1.23	2.83			3.52**			
2004-02-11				(0.62)	(1.32)			(2.14)			
FCE_2009				-0.74	-1.27				-1.42		
2009-03-27				(-0.36)	(-0.58)				(-0.82)		
FSA2012				-3.69	-3.03					-3.52**	
2013-04-01				(-1.63)	(-1.30)					(-2.07)	
MAR				-0.75	-1.47						-2.86
2016-07-03				(-0.33)	(-0.62)						(-1.43)
Constant	3.90	7.04***	3.07	6.84***	2.49	2.84	3.31	4.60	2.65	1.87	2.53
	(1.36)	(7.53)	(0.95)	(3.49)	(0.69)	(0.81)	(1.01)	(1.39)	(0.81)	(0.57)	(0.78)
Observations	697	697	697	697	697	697	697	697	697	697	697
R^2	0.04	0.00	0.04	0.01	0.05	0.04	0.04	0.05	0.04	0.05	0.04
F Statistic	1.45*	2.98*	1.40	1.19	1.38*	1.33	1.34	1.55*	1.36	1.53*	1.43*

The second column includes only a yearly time trend which is negative and significant. The value of -0.10% means that over the sample period from 1989 to 2018, the median run-up has decreased in total 3.00% due to 'trend' when no other variables are considered. Same way as Dutordoir et al. (2018), I aim to explain the negative time trend in run-ups first with the market anticipation factors and then add the ITR event dummies, which equal zero before and one after the event, to see what effect they have on the time trend. In column three, the market anticipation factors are added, and they make the time trend insignificant and close to zero. This indicates that the market anticipation factors can explain the time trend without the ITR event dummies.

Column four includes the time trend with ITR event dummies, without the market anticipation factors. The trend increases to positive and becomes insignificant, so it seems both the market anticipation factors and the ITR events can explain the time trend. In column five, I include both the market anticipation factors and ITR events with a time trend. The time trend increases to 0.24%, which indicates that the model lacks some other factors that could explain the positive time trend, although the time trend stays insignificant.

Looking at the ITR event variables in columns four and five, no event is significant. Coefficients and *t*-statistics of ITR event dummies are similar to the results of univariate analysis in Section 4.2. In columns six to eleven, I have included ITR event dummies one by one to the regression. *FSA2012* is negative and significant which might be partly a result of the increased criminal enforcement by FSA/FCA as the event itself should not have such a large effect. Counterintuitively, *FE_FSMA2000* is significant and has a positive coefficient. As speculated in Section 4.2, this could be due to low fines that were given. Overall, it seems that the ITR events have affected the level of run-ups over time, although most of them are not significant and thus it is not possible to be conclusive.

Table 8 contains robustness tests to further examine the factors affecting the trend in run-ups. First six columns examine the effect of mark-up on run-ups. As discussed in Section 3.2, Schwert (1996) introduces a deal anticipation theory, a possibility that the run-up is affected by the deal premium, with a higher premium tempting a potential insider trader due to higher potential gains. Betton et al. (2014) support this theory, too. So, the trend and variance in the run-up might be due to changes in the mark-up, although the preliminary analysis in Section 3.2 did not support this. In columns one to three, I use *Mark-up, 1d* as the mark-up measure which is the share price on day +1 divided by the share price on day -1. First column shows that the trend becomes insignificant but is almost at the same level as without the mark-up variable, so the mark-up variable cannot explain the trend in the run-ups very well. Adding the market anticipation factors diminishes the trend, and adding the ITR event dummies increases the trend further, just as in Table 7.

Columns four to six use the CAR over the bid announcement day and the next day as the mark-up measure, so the return is market model adjusted (which *Mark-up, 1d* is not). The results regarding the trend are nearly identical to columns one to three. Changes in the level of mark-ups cannot explain the trend in the run-up. The coefficients of the mark-up variables are positive and significant at the 1% level with a coefficient ranging from -0.18% to -0.28%. This does not support the deal anticipation theory in the first place, because the run-up and the mark-up should be positively correlated according to it. Instead, this is in line with the markup hypothesis, as the increase in mark-up is not compensated at a ratio of one-to-one in run-up.

Table 8: OLS regressions examining the trend in run-ups, robustness

This table introduces two robustness tests. The sample consists of initial bids for a majority share of target's equity between 1989 and 2018 where the target is a UK firm listed in London Stock Exchange or London Alternative Investment Market. Run-up is the market model estimated cumulative abnormal return in the period [-42, -1] relative to the announcement date, in percentages. Variables are explained in Appendix. In columns one to six, mark-ups are added as a potential explanation to run-ups. *Mark-up, 1d* is calculated as the target share price 1 day after the bid announcement day divided by the share price 1 day before the bid announcement day, minus one. *CAR [0, +1]* is the market model estimated cumulative abnormal return on days 0 and +1 relative to the bid announcement day. In columns seven to nine, deals with foreign bidders are excluded. Variables are explained in Appendix. *t*-statistics are in the parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

	Run-up, CAR [-42, -1]								
	Full sample						No foreign bidders		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Trend	-0.07	0.04	0.27	-0.10*	-0.01	0.20	-0.22***	-0.09	0.51
	(-1.29)	(0.62)	(0.91)	(-1.77)	(-0.20)	(0.66)	(-2.61)	(-0.90)	(0.94)
Mark-up, 1d	-0.18***	-0.21***	-0.22***						
	(-8.35)	(-9.53)	(-9.65)						
CAR [0, +1]				-0.24***	-0.27***	-0.28***			
				(-7.27)	(-7.78)	(-7.99)			
Rumored		-0.40	-0.31		-0.26	-0.10		-0.67	-2.21
		(-0.41)	(-0.29)		(-0.26)	(-0.09)		(-0.39)	(-1.15)
Deal completed		-0.37	-0.51		-0.50	-0.63		-1.08	-1.94
		(-0.32)	(-0.43)		(-0.43)	(-0.52)		(-0.54)	(-0.94)
Number of bidders		2.93***	3.06***		2.73***	2.85***		4.35**	4.12**
		(3.03)	(3.16)		(2.77)	(2.89)		(2.41)	(2.26)
Toehold		1.04	1.01		0.99	0.95		1.33	2.06
		(1.04)	(0.99)		(0.97)	(0.91)		(0.81)	(1.22)
Cash financing		0.99	0.82		0.62	0.40		-5.89	-5.70
		(0.48)	(0.39)		(0.29)	(0.19)		(-1.36)	(-1.30)
Hostile		-2.46*	-2.55*		-2.67*	-2.77**		-5.04**	-5.35***
		(-1.84)	(-1.90)		(-1.96)	(-2.02)		(-2.53)	(-2.66)
LBO		-0.59	-0.69		-0.59	-0.72		-0.88	-1.51
		(-0.48)	(-0.55)		(-0.47)	(-0.57)		(-0.32)	(-0.54)
Public		1.11	1.04		1.07	0.97		1.05	1.10
		(1.15)	(1.08)		(1.09)	(0.99)		(0.70)	(0.71)
Foreign		-1.02	-1.02		-0.67	-0.66			
		(-1.19)	(-1.19)		(-0.77)	(-0.76)			
Number of target advisors		0.41	0.39		0.40	0.38		0.53	0.47
		(1.06)	(0.99)		(1.00)	(0.96)		(0.87)	(0.77)
Number of acquirer advisors		-0.02	-0.02		-0.08	-0.08		-0.68	-0.65
		(-0.07)	(-0.07)		(-0.25)	(-0.26)		(-1.49)	(-1.39)
Active industry		-2.27***	-2.30***		-2.21***	-2.27***		-0.88	-1.28
		(-2.87)	(-2.88)		(-2.73)	(-2.79)		(-0.64)	(-0.91)
LSE		2.08*	2.38**		1.60	1.92		3.16	3.49*
		(1.81)	(2.07)		(1.36)	(1.64)		(1.55)	(1.68)
Firm value		-0.99***	-0.98***		-0.64**	-0.63*		-0.37	-0.31
		(-3.13)	(-3.08)		(-2.00)	(-1.96)		(-0.70)	(-0.57)
Market-to-book		-0.30	-0.29		-0.18	-0.16		-0.43	-0.52
		(-1.13)	(-1.10)		(-0.66)	(-0.61)		(-1.01)	(-1.21)
Dividend yield		0.21	0.20		0.08	0.07		-0.09	-0.14
		(1.39)	(1.29)		(0.52)	(0.46)		(-0.34)	(-0.51)

Sales growth		0.05*	0.04*		0.07***	0.07***		0.06	0.06
		(1.88)	(1.75)		(2.73)	(2.66)		(1.50)	(1.57)
Leverage		-0.00	-0.01		-0.01	-0.02		0.05	0.07
		(-0.15)	(-0.26)		(-0.43)	(-0.57)		(1.06)	(1.44)
Liquidity		-0.05	-0.06		-0.04	-0.05		-0.07	-0.06
		(-1.14)	(-1.44)		(-0.93)	(-1.21)		(-1.00)	(-0.76)
GR dummy		0.75	0.74		0.82	0.80		1.07	0.99
		(0.85)	(0.85)		(0.92)	(0.90)		(0.70)	(0.64)
CJA1993			-1.82			-2.01			2.80
1994-03-01			(-0.69)			(-0.75)			(0.55)
FSMA2000			-3.70*			-3.82*			-4.15
2001-12-01			(-1.93)			(-1.96)			(-1.14)
FE_FSMA2000			2.48			2.98			-1.55
2004-02-11			(1.23)			(1.45)			(-0.42)
FCE_2009			0.78			0.70			-2.73
2009-03-27			(0.38)			(0.33)			(-0.80)
FSA2012			-4.93**			-4.70**			-1.73
2013-04-01			(-2.24)			(-2.09)			(-0.51)
MAR			0.22			-0.48			-3.90
2016-07-03			(0.10)			(-0.21)			(-1.24)
Constant	12.05***	10.39***	10.34***	11.98***	9.74***	10.01***	8.90***	7.21	-0.05
	(11.21)	(3.31)	(2.96)	(10.61)	(3.02)	(2.79)	(5.86)	(1.36)	(-0.01)
Observations	697	697	697	697	697	697	301	301	301
R^2	0.10	0.16	0.17	0.07	0.12	0.14	0.02	0.11	0.12
F Statistic	36.54***	5.64***	4.84***	28.03***	4.20***	3.74***	6.79***	1.65**	1.46*

Adding the mark-up variables to the regression has some effects on the ITR events. *FSA2012* and *FSMA2000* become significant with negative coefficients, while other ITR events stay insignificant. Market anticipation factors are similar to Table 7 except that *Firm value* is significant and implies that higher market value of the target decreases the run-up. This might be due to the hypothesis that smaller firms are more likely to be acquired and thus the acquisitions could be predicted, but the reason may also be that the stocks of larger firms are more liquid and so the effect of increased demand for the stock does not show in the price as much as for smaller firms.

Columns seven to nine include only initial bids where the acquirer is from the UK. Many US studies, such as Dutordoir et al. (2018), have used this as a sample selection criteria, which is more feasible to do in the US than in the UK due to higher number of acquisitions. Changes in the UK insider trading regulation may have larger effect on acquisitions where all parties are from the UK and thus under more intense monitoring by the regulators. This criterion

more than halves the sample size from 697 to 301. The results stay largely similar to prior results. In column seven, the trend is -0.22% and significant at the 1% level, which is larger in magnitude and significance than before. In column eight, when adding the market anticipation factors, the trend disappears. In column nine, when adding the ITR event dummies, the trend increases to 0.51% while staying insignificant. *FE_FSMA2000* is now negative, although not even close to being significant. None of the ITR event dummies are significant, which can be caused by small sample size.

In unreported tests, I limit the sample to initial bids announced after 1994 to exclude the first years with fewer observations. This does not change the results for trend, market anticipation factors, or ITR events.

The multivariate analysis suggests that following market anticipation factors correlate with lower run-up: *Hostile, Active industry, Firm value, Mark-up 1d.* In contrast, following factors correlate with higher run-up: *Number of bidders, LSE, Dividend yield,* and *Sales growth.* Regarding ITR events, there is support that *FSA2012* and *FSMA2000* have decreased the run-ups, while the others are not significant. Finally, the mark-ups are not driving the trend in the run-ups, and a large share of the foreign bidders cannot explain the results, either.

5. Discussion of the results and limitations of the study

In this section, I discuss the results, the limitations of my paper, and potential avenues for future research. In Section 3.2, I find a decreasing trend in the run-ups in the UK over my sample period from 1989 to 2018. Then, I analyze the effects of market anticipation factors and ITR events on the run-ups separately. Finally, in the multivariate analysis, I study the effects of market anticipation factors and ITR events together. I find that market anticipation factors can explain the decreasing trend in run-ups, although adding the ITR events amplify the effect. Of the six ITR events, only FSA2012 is consistently significant.

Results for the market anticipation factors emphasize the importance of keeping the information related to the deal secure. As hostile deals incur lower run-ups and higher number of bidders incur higher run-ups, it seems that the information leakage is a large part of the causes for run-ups. Together with run-ups being an added cost to the bidder, this can create conflicting interests relating to the deal information leakage, because the sell-side party

may want to leak the information to increase its share price and attract more bidders and thus achieve a higher deal price, whereas the acquirer prefers to keep the information secret in all cases. Other than that, it is difficult to draw conclusions from the results for the market anticipation factors.

Of the six ITR events, FSA2012 has the strongest impact. As speculated before, instead of the regulation change, the main reason for the decreased run-ups after FSA2012 may relate to the increased criminal indictment and conviction rate of FSA/FCA as presented in Section 2.4 and in Table 2. Previous research such as Bhattacharya and Daouk (2002) has found that the enforcement of the law matters more than the law itself, and it can be that in the UK, only the significantly increased enforcement activity started working as a deterrence to insider traders. I also find some support for the FSMA2000 to have impacted the run-ups. This would be feasible as the introduction of the civil offense should have made it easier to achieve successful insider trading convictions. Interestingly, the first enforcement of FSMA2000 (FE_FSMA2000) has a positive coefficient in the analysis. It could be due to the low fines given by the UK regulator which gave relief to potential insider traders or just an artifact in the data.

Studying the effect of the changes in insider trading regulation is complicated, although the mechanism through which tighter insider trading regulation would diminish the amount of insider trading seems at first glance straightforward. As an example, let us consider FSMA2000 which should be a major tightening of the regulation by introducing a civil offense of insider trading. First, for it to be effective, people are required to get caught. So, if the insider traders are clever and can avoid getting caught, they may continue just as before. Even if they are caught, they might be able to settle the case early for small fines, which does not have a large deterrence effect. These types of considerations are applicable to all of the events. So, in the end, the level of enforcement intensity is what finally matters, and it depends on the regulatory agency, its budget and other resources, the management, and the culture in the country. This is a potential area for future research in the UK. Del Guercio et al. (2017) study the enforcement intensity of SEC in the US through the level of budget and number of staff positions and find that high intensity deters insider trading. In the US, Dutordoir et al. (2018) found a clear effect of five insider trading regulation changes on the run-ups. It could be that because SEC and Department of Justice are strong regulators in the US, regulation changes have had stronger effects there than in the UK.

Finally, something totally different from the variables used in this paper might have affected the trend in run-ups, such as technological advancements or changed trading patterns. They are especially relevant from the point of views of insider trading and information leakage. Electronic chats, easier access to markets, faster and more secure information flows, and increased automatic monitoring by the regulators all relate to run-ups. Although the automatic monitoring and detecting of abnormal trades have improved, it is difficult to say whether they can catch the sophisticated traders who adjust their trading to hide the abnormality (Ahern, 2018), and who are on average three links away from the source of the information (Ahern, 2017).

There are also some other limitations in this paper. As discussed in Section 3.1, the data about the initial bids is not without errors. The announcement dates are not manually checked and SDC is known to sometimes have inaccurate data (Mulherin and Simsir, 2015). Related to this, the run-up period can include other abnormal events, such as earnings surprises, which would distort the run-up measure. Although the errors affect the run-up both positively and negatively and thus on average be zero, they add noise to the data and thus diminish the explanatory power of the variables. Also, all deals in my sample are not typical mergers or acquisitions with a clear control premium which also adds noise. Finally, the data requirements for calculating the market anticipation proxies decrease the sample size significantly.

6. Conclusion

My thesis is the first comprehensive look on the development of run-ups in the UK from 1989 to 2018, combining the effects of market anticipation factors with the effects of changes in the insider trading regulation. There are two reasons why understanding the size and sources of the run-up is important. First, the run-up is mostly an added cost to the bidder, and second, a large part of the run-up is due to illegal insider trading. I find that the run-ups have decreased from 1989 to 2019 on average 0.10 percentage points per year with a median run-up being 4.14% over the whole period. Full deal period returns have decreased at a similar rate, which supports the hypothesis that the run-up is an added cost to the bidder.

My results show that the decline in the run-ups can be explained by both market anticipation factors and changes in the insider trading regulation. Moreover, changes in the level of deal

mark-ups are not driving the decline. Of the six insider trading regulation events analyzed in this paper, Financial Services Act 2012 (FSA2012) has had the most significant effect. It coincides with increased insider trading criminal indictment and conviction activity by the UK regulator, which may explain the strong effect, as the regulation change itself was not radical. Studying the relation of insider trading regulation enforcement intensity and the run-ups would be a logical next step in the insider trading research in the UK, similar to what Del Guercio et al. (2017) have studied in the US.

FCA, the UK regulator, has been under a lot of criticism for low enforcement activity despite continuous indications of high level of insider trading since the inception of its predecessor FSA in 2001. My thesis suggests that FCA has finally responded to the criticism and its higher enforcement activity during recent years has lowered the amount of insider trading.

Appendix: Variable definitions

Variable	Definition
Date announced (DA)	'The date one or more parties involved in the transaction makes the first public disclosure of common or unilateral intent to pursue the transaction (no formal agreement is required). Among other things, Date Announced is determined by the disclosure of discussions between parties, disclosure of a unilateral approach made by a potential bidder, and the disclosure of a signed Memorandum of Understanding (MOU) or other agreement.' – SDC definition. SDC data item: DA
Original date announced (ODA)	'The date when the target company is first publicly disclosed as a possible takeover candidate. ODA is used for the calculation of stock premiums. When multiple bidders exist, the ODA is recorded in the following cases: (1) If acquirer changes from 'Seeking Buyer' or 'Undisclosed Acquirer' to an actual entity; (2) Competing bids are announced; (3) Competing stakes are announced; (4) A defensive transaction is announced.' – SDC definition. SDC data item: DAO
Active industry	A dummy variable that equals one if there was another confirmed bid within 12 months in the four-digit SIC code industry of the target firm, and zero otherwise. The variable is manually constructed based on the deal information in SDC.
Foreign	A dummy variable that equals one if the ultimate parent of the acquirer is not from the UK, and zero otherwise. SDC data item: AUPNAT
Public	A dummy variable that equals one if the ultimate parent of the acquirer is public, and zero otherwise. SDC data item: AUPPUB
Deal completed	A dummy variable that equals one if the deal is completed, regardless of whether the eventual acquirer is the first one to bid. Bids announced within 12 months from the first bid are considered. Original date announced is used. The dummy is manually constructed. SDC data item: STAT
Hostile	A dummy variable that equals one if the deal is considered hostile, and zero otherwise. SDC data item: UNSOLICITED
LBO	A dummy variable that equals one if the deal is considered to be a LBO type, and zero otherwise. SDC data item: LBO
Number of bidders	Number of bidders according to the SDC data. SDC data item: BIDCOUNT
Rumored	A dummy variable that equals one if the deal was rumored, and zero otherwise. SDC data item: RUM
Toehold	A dummy variable that equals one if the acquirer owned any shares in the target before the bid, and zero otherwise. SDC data item: PHDA
Dividend yield	Dividend yield ratio of the target 12 weeks before the original announcement date. Datastream code: DY

GR dummy	Growth-resource mismatch. A dummy variable that equals one for combinations of: a) above-average growth, below-average liquidity, and above-average leverage, and b) below-average growth, above-average liquidity, and below-average leverage, and zero otherwise. Definitions of sales growth, liquidity, and leverage are in this Appendix. Data is from Worldscope.
Leverage	Ratio of total debt to total assets. Data is from Worldscope.
Liquidity	Ratio of cash and equivalent to total assets. Data is from Worldscope.
LSE	A dummy variable that equals one if the target is listed in the London Stock Exchange, and zero if it is listed in London Alternative Investment Market (AIM). AIM was established in 1995. SDC data item: TAEXCHC
Market-to-book	Market value of equity to book value of equity 12 weeks before the original date announced. Datastream code: MV
Number of target advisors	Total number of target advisors, summing legal and financial advisors together. SDC data items: TACOUNT, NUMTLEG
Number of acquirer advisors	Total number of acquirer advisors, summing legal and financial advisors together. SDC data items: AACOUNT, NUMALEG
Sales growth	Three-year average sales growth, calculated by dividing the sales last year with the sales three years before. Data is from Worldscope.
Firm value	Natural logarithm of the market value of the target 12 weeks before the original date announced. Datastream code: MTBV
Cash financing	Natural logarithm of one plus the percentage of cash used of the deal value. SDC data item: PCT_CASH
Premium, 8w	Target share price 1 day after the bid announcement day divided by the share price 42 days before the bid announcement day, minus one. All days are trading days.
Mark-up, 1d	Target share price 1 day after the bid announcement day divided by the share price 1 day before the bid announcement day, minus one. All days are trading days.
Run-up	The target run-up measure is calculated as a cumulative sum of market model estimated abnormal stock returns, following standard methods (e.g. Dutordoir et al., 2018). The market model regression is estimated over a period of -255 days to -70 days relative to the deal announcement date. I use FTSE All Share index as a market portfolio. I calculate the cumulative abnormal return (CAR) as a cumulative sum of abnormal returns within the run-up period. My main target run-up measure is CAR over 42 trading days before the announcement date, i.e. [-42, -1].
Deal value	Total value of consideration paid by the acquirer including equity and liabilities and excluding fees and expenses. SDC data item: HOSTVALUE

Trend	Trend is calculated as the number of calendars days between the ODA and 1988-12-31 divided by 365, scaling the trend to a yearly number. $Trend = \frac{ODA - 1988\text{-}12\text{-}31}{365}$
CJA1993 (1994-03-01)	Criminal Justice Act 1993, effective March 1, 1994. Extended the basis of liability for the criminal insider dealing offense with a broader definition of 'securities' and 'insider' than before. A dummy variable that equals one for deals with an announcement date after this insider trading regulation event date, and zero otherwise.
FSMA2000 (2001-12-01)	Financial Services and Markets Act 2000, effective December 1, 2001. Introduced a civil offense of insider trading with unlimited fines based on 'balance of probabilities'. A dummy variable that equals one for deals with an announcement date after this insider trading regulation event date, and zero otherwise.
FE_FSMA2000 (2004-02-11)	First enforcement of FSMA2000 (civil penalty) by FSA on February 11, 2004. A dummy variable that equals one for deals with an announcement date after this insider trading regulation event date, and zero otherwise.
FCE_2009 (2009-03-27)	First successful criminal sentence by Financial Services Authority (FSA) on March 27, 2009. A dummy variable that equals one for deals with an announcement date after this insider trading regulation event date, and zero otherwise.
FSA2012 (2013-04-01)	Financial Services Act 2012, effective April 1, 2013. Divided FSA into two entities and created Financial Conduct Authority (FCA). FCA was given only minor additional powers. A dummy variable that equals one for deals with an announcement date after this insider trading regulation event date, and zero otherwise.
MAR (2016-07-03)	Market Abuse Regulation, effective July 3, 2016. Gave regulators more power to monitor insider trading and also improved whistle blowing and insider lists. A dummy variable that equals one for deals with an announcement date after this insider trading regulation event date, and zero otherwise.
IT event	A dummy variable that equals one for deals announced in the window of [+61, +312] related to any of the insider trading regulation events, and zero for deals announced in the window of [-252, -1], and NA otherwise. The periods related to insider trading regulation events do not overlap each other.

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