Insider trading in the US and China: To what extent is there a significant difference in the cumulative abnormal returns of target firms prior to M&A announcements in the US and China, and how could this difference be explained?

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Abstract

This paper provides an empirical comparative study of insider trading in the US and China for the post-crisis period of 2010 until 2019. Cumulative abnormal returns (CARs) of target firms prior to M&A announcements are used as a proxy for insider trading. By evaluating a sample of 2.810 US deals and 2.100 Chinese deals, evidence is found of positive CARs of target firms prior to M&A announcements in both the US and China, significant at the 1% level. The CARs of US targets are significantly greater – ranging from 2,25% to 2,70% depending on the estimation model – than of Chinese targets. This dissimilarity mostly stems from an asymmetric distribution in deal types. In China, most bidders (1.973 out of 2.100) acquire a small percentage of targets (0-50%), whereas in the US, 1.969 out of 2.810 deals involve the acquirement of more than 50% of target shares. In addition, results show that friendly takeovers and deals that have been financed through borrowing have a significant positive influence on the CARs of target firms in the US. In China, this is the case for target EBITDA and percentage of shares acquired, whereas the opposite holds for target size and percentage of cash used in the transaction. These results indicate that insider trading is still a severe problem in both the US and China, and point towards particular target and deal characteristics for regulators to focus on.

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Introduction

Over the last couple of decades firms have been seeking to improve their performance through mergers and acquisitions (M&A) practices. M&As represent transactions where an acquirer or bidder buys a target or seller, also called a takeover (Berk & DeMarzo, 2017). At first, M&A activity was mostly concentrated in the United States (US) and the United Kingdom (UK), but recently firms have been using M&A practices more heavily on a global scale to strengthen their competitive advantage (Gugler et al., 2003; Cartwright & Schoenberg, 2006).

Nowadays, takeovers are firms' largest investments and therefore represent a significant part of the global economy (Bertrand & Betschinger, 2012; Hopkins, 2002). In fact, research has shown that when the economy is doing well, mergers increase, and vice versa. Within these merger waves, mergers cluster by industry (Rhodes-Kropf, 2004; Harford, 2005).

M&A practices have gained popularity for a variety of reasons. The rational explanation behind M&As would be managers that want to maximise shareholder's value. However, empirical research has shown little evidence that M&As create value for the acquirer. In fact, both Malmendier & Tate (2008) and Schneider & Spalt (2017) found significant negative acquirer return after the announcement of deals. These results complicate the validity of rational explanations of M&As.

Towards the end of the 20th century, Roll (1986) came up with a behavioural explanation for M&As. Attempting to answer the question why there are so many acquisitions, when there is little evidence that they create value for the acquirer, he formulated the *hubris hypothesis*. The building elements are rational investors and efficient markets, but also irrational overconfident managers of the acquiring firm. Roll found that managers of the acquiring firm are prone to be overconfident and suffer from a winner's curse. The winner of the auction - in this case the overconfident manager - has excessive confidence in their own valuation of the target and therefore overpays. This, in fact, can partly explain the significant negative acquirer return found by Malmendier & Tate (2008) and Schneider & Spalt (2017).

Contrary to the negative correlation between M&A activity and acquirer return, empirical research does show positive returns for targets when these are being acquired (Cartwright & Schoenberg, 2006; Owen & Yawson, 2010). However, for many targets this run-up in stock price occurs before the announcement of the deal has been made. Research shows that stock prices react to future M&A activity from a couple of days up to several months before M&A announcements (Keown & Pinkerton, 1981; Adnan et al, 2016; Tang & Xu, 2016). In many cases, this pre-announcement run-up in the target's share price is significant. This raises

the question whether or not 'insiders' are trading based on private information, also known as *insider trading* (Gao & Oler, 2012).

There are many examples of insider trading. In 2012, corporate investors from Asia bought a significant stake of Nexen, resulting in a 50% share price increase of this company before the deal was announced. The rationale behind their trading strategy was that once information about the deal became public, the share price of the company would increase further, after which the investors would sell their shares for which they would receive significant returns. Their trading strategy was based on private information and therefore illegal. The Nexen investors later received a fine of $10 million in combination with their assets being frozen (Rosenfeld, 2018).

Besides insider trading cases where multiple investors are involved, many cases exist where an individual is trading on private information. Ivan Boesky became an infamous American stock trader after his prominent role in an insider trading case in the mid-1980s. Mr Boesky traded for $200 million in corporate takeovers, in which many of the trading activity occurred only a few days before the corporations announced their takeovers. Similar to the investors in the Nexen company, Ivan Boesky was trading on private information. He was later charged and pled guilty after which he had to pay a fine of $100 million and was sent to prison for 3,5 years (Tang & Xu, 2016).

These are only a few of the many examples of insider trading that have occurred in the past. Insider trading has been a phenomenon in the world of finance for a long time, prompting some countries to implement specific laws aimed at preventing the opportunity of trading based on private information. Despite this, a big diversity exists among regions and countries regarding their insider trading laws and enforcement.

Looking at the differences between the European Union (EU) and the US, traditionally EU insider trading regulation has been somewhat more aggressive and successfully enforced. Several explanations have been given for this difference, focusing in particular on the diverging cultural attitudes towards insider traders and the differences in resources allocated to regulators (Ventoruzzo, 2015). Having said this, the EU and the US are quite comparable in terms of their overall regulation.

In addition to this, numerous papers have been published regarding the diversity in regulation between the US and emerging markets like China. Following developed countries, most emerging economies introduced insider trading laws, but their law enforcement appeared to be less effective than that of developed countries (He & Rui, 2016). In a comparative study between the US and China, Shen (2009) describes this issue. Shen (2009) demonstrates that the

unique features of the Chinese stock market, in particular the fact that the majority of listed stocks are state-owned, decrease the market efficiency and thereby also decrease the effectiveness of China's incipient insider trading laws and enforcement.

While many empirical papers have been published showing evidence of insider trading in the US, close to none have been published focussing on the Chinese stock market. However, much research has been done comparing regulation and enforcement of insider trading laws between the US and China. For these reasons, an empirical comparative study between the US and China is both relevant and a potentially significant addition to the existing literature. Therefore, this paper aims to answer the following research question:

To what extent is there a significant difference in the cumulative abnormal returns of target firms prior to M&A announcements in the US and China, and how could this difference be explained?

Cumulative abnormal returns (CARs) of target firms prior to M&A announcements are commonly used as a proxy for insider trading (Brigida & Madura, 2012; Tang & Xu, 2016). It shows the abnormal stock price run-up of targets for a selected event window before the announcement of the acquisition, which may be partially due to trading on private information.

The studied sample period is from January 2010 until December 2019 for the US, and July 2012 until December 2019 for China. The difference in sample periods for both countries stems from a lack of data availability for China for the period of January 2010 until July 2012. Given the fact that this research does not focus on the number of deals that have been completed, but rather on the characteristics around deals, in particular the CARs of target firms, the difference in sample periods for both countries should not have a negative influence on the quality of the results.

Evidence is found of positive CARs of target firms prior to M&A announcements in both the US and China, significant at the 1% level. The CARs of US targets are significantly greater – ranging from 2,25% to 2,70% depending on the estimation model – than of Chinese targets. In addition, results show that friendly takeovers and deals that have been financed through borrowing have a significant positive influence on the CARs of target firms in the US. In China, this is the case for target EBITDA and percentage of shares acquired, whereas the opposite holds for target size and percentage of cash used in the transaction.

This paper proceeds as follows. In section 1, literature on M&A activity in general and the effect of M&As on the share prices of targets and acquirers will be discussed. The section

will also give an introduction to forensic finance and different ‘types’ of insider trading as well as the diversity in regulation and enforcement between the US and China. In section 2, the main hypotheses will be presented after which section 3 elaborates on the data used to conduct this research. Section 4 will elaborate on the methodology used, after which the results are presented in section 5. This paper concludes with section 6, which also includes suggestions for further research.

1. Theoretical Framework

1.1 M&As

As previously mentioned, M&As are currently one of the most popular practices for corporations to strengthen their competitive advantage. In 2004, 30.000 acquisitions were completed on a global scale which equals one transaction every eighteen minutes. With total deal value being over $1900 billion, the value of all these acquisitions exceeded the GDP of many countries (Cartwright & Schoenberg, 2006). Fourteen years later, in 2018, deal volume increased only slightly to 35.800, but total deal value rose to over $3.000 billion (Kengelbach et al., 2019). This shows the significance of M&A deals in the current global economy.

Despite the impact M&A activity has on the global economy, researchers are still debating whether this impact is positive or negative. Bruner (2002) summarised evidence from 130 different studies after which he stated that, combined for the acquirer and target together, 'M&A does pay'. The mass of research, he states, shows that targets earn significant positive returns and acquirers earn zero adjusted returns, resulting in positive combined adjusted returns.

With M&A activity increasing over the last few years, researchers were able to provide more accurate insights into the value creation of M&As. The recent findings by Malmendier & Tate (2008) and others (Schneider & Spalt, 2007; Mueller & Yurtoglu, 2007), showing significant negative returns for acquirers after the announcement of deals, have changed the dominant opinion on the value creation of M&As. Some exceptions are still found, such as a study by Beltratti & Paldino (2013) showing positive abnormal returns for the acquirer during the financial crisis, but the most respected view nowadays is that acquirers earn negative to zero returns after completion of deals.

The fact that research does show positive returns for targets when these are being acquired (Cartwright & Schoenberg, 2006; Owen & Yawson, 2010) could be one of the reasons that M&A activity still increases. Other than that, most explanations for the continuous increase in M&As are behavioural, such as Roll's *hubris hypothesis*, as described earlier. The focus of this paper, however, will not be on explaining M&A activity, but rather on the returns it delivers, in particular the run-up of target returns before the announcement of deals. Evidence for this run-up is found by scientists that work in the field of *forensic finance*.

1.2 Forensic Finance

Forensic finance can be defined as "a field that combines criminal investigation skills with financial auditing skills to identify criminal financial activity coming from within or outside an organization" (Kenton, 2018). By combining these skills, forensic finance can play a significant role in improving the integrity of the financial world (Verwijmeren, 2014). Nevertheless, criminal activity does not apply solely to the financial world, but also to sports and other areas. Research that has been done in these areas can be useful to forensic finance scientists.

1.2.1 Sumo Wrestling

In 2002, Duggan & Levitt published a paper showing evidence of fraud in sumo wrestling. Sumo wrestling has been a traditional sport in Japan for over a thousand years. In a regular tournament of sumo wrestling, each player plays fifteen rounds in which the payoff structure of the first until the seventh win is almost linear, earning around three points in ranking per win. However, the eighth win delivers an eleven-point increase in ranking, making it almost four times more important than any other win. This payoff structure provides incentives for match fixing.

Duggan & Levitt (2002) analysed over 32.000 fights of sumo wrestling, looking for potential suspicious behaviour. Indeed, they found that sumo wrestlers who are at the margin of their eighth win are more likely to win their next fight than wrestlers who are not at the margin. In fact, wrestlers who are at the margin are even more likely to win from someone they had often fought against before. To make things more suspicious, they found that the next time the wrestlers met, the fighter who potentially lost on purpose the previous time was now more likely to win. This behaviour decreased as media attention on match fixing increased.

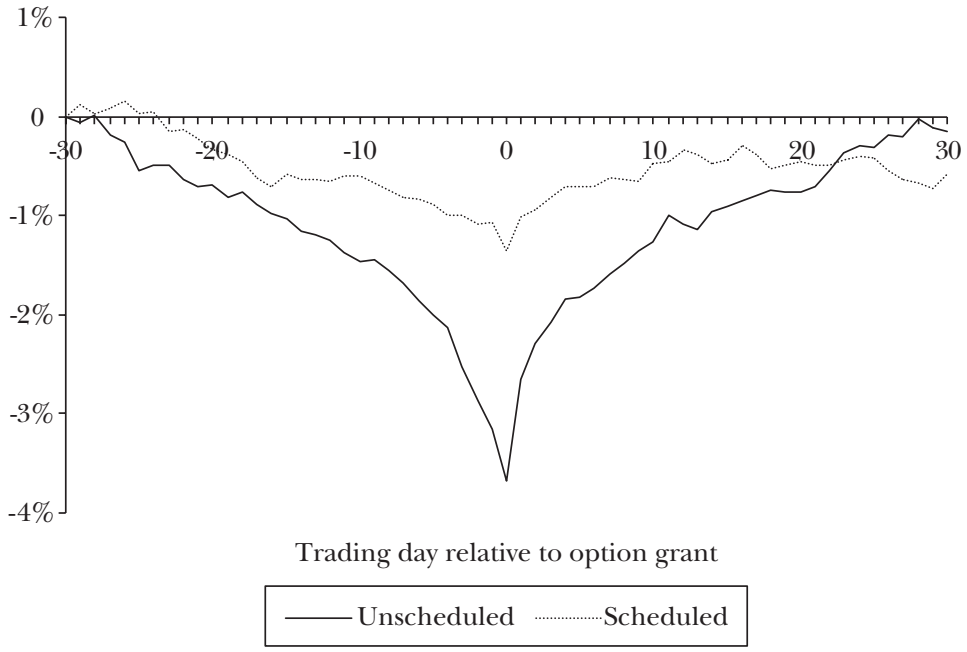
Taken together, this evidence suggests fraud in sports. Besides sumo wrestling, there have been rumours about match fixing in football, tennis and other sports but empirical research on this subject has been limited. Nevertheless, the evidence shows that researchers are able to reveal criminal suspicious behaviour by conducting thorough research on large datasets. By following a similar approach, fraud and collusion in the world of finance can also be exposed. Ritter (2008) describes three of the most well-known discoveries of forensic finance, which are summarised below.

1.2.2 Stock Option Backdating

One of the most famous findings of forensic finance is stock option backdating (Ritter, 2008). Executives often receive stock options of their own company as an extra incentive to maximise shareholder's value, now that they are shareholders themselves. These options are usually exercised when they are 'in-the-money', that is, when the current stock price exceeds the stock price of the grant date. Yermack (1997) examined the subjective timing of the date at which the options were awarded. His results show that, on average, stock prices increase immediately after the executives receive their options, with an average of around 2% per month. Almost two decades later, Lie (2005) found an even higher increase in stock prices after the grant date, but surprisingly also a decrease in stock prices just before this date (Figure 1). Lie stated his evidence supports the claim of stock option backdating. In other words, executives were subjectively backdating the grant date of their options to make them more valuable.

Figure 1

Cumulative Abnormal Stock Returns around Stock Option Grants (Lie, 2005)



Note: Figure 1 displays the cumulative abnormal stock returns from 30 days before to 30 days after stock option grants to CEOs. Abnormal stock returns are estimated using the three-factor model described in Fama and French (1993), where the estimation period is the year ending 50 days before the award date. An award is classified as scheduled if it occurred within one week of the one-year anniversary of the prior year's award date, and unscheduled if it did not occur within one week of this anniversary or if no options were awarded during the prior year. If insufficient information is available to classify an award, it is left unclassified (Lie, 2005).

1.2.3 Spinning of Initial Public Offerings

In the 1990s, investment banks assigned underpriced initial public offerings (IPOs) to the personal brokerage accounts of top executives of large corporations. This phenomenon was defined as *spinning*. Especially in the late 1990s, when underpricing was severe, this led to an average first-day return of sixty-five percent on 803 companies that became publicly listed. The question remains, why would a company agree to an underpriced IPO? This would only reduce the returns of pre-issue shareholders. In a working paper by Liu & Ritter (2007), results show that underpricing was more severe in companies where the executives were being 'spun' near the time of the IPO. Therefore, these companies were less likely to switch to other investment banks, and thus accepted the underpricing. In other words, investments banks took advantage of the agency problem which affected the actions of the executives. Liu & Ritter found that 113 executives were assigned an average of twenty-four underpriced IPO's generating profits of $436.000 on average per executive. Due to the spinning, issuers (and their shareholders) received $14.5 million less in proceeds than if the executives would not have co-opted.

1.2.4 Late Trading of Mutual Funds

In 2003, a late-trading scandal was revealed involving multiple large mutual funds. Usually, at the end of each trading day at 4 p.m., mutual funds calculate their net asset value. Orders received after 4 p.m. should be taken into account the following trading day. However, in 2003, some mutual funds permitted certain hedge funds to trade after 4 p.m. at the 4 p.m. closing prices, while telling investors that such trading was not permitted. Being able to trade at closing prices while the market is closed can deliver high returns, because one can take advantage of a stale price. Many large companies make their announcements after 4 p.m., which has an impact on their stock price the next trading day. Four years later, twenty mutual fund families got caught and had to pay $1.45 billion in restitution to their shareholders and $0.99 billion as a penalty.

1.3 Insider trading

Stock option backdating, the spinning of IPOs and the late-trading scandal of mutual funds are among the most well-known discoveries of forensic finance. Nevertheless, these are more short-period scandals in time, rather than longer period occurrences of fraud and collusion in financial history. One example of fraud that has taken place in the financial world for a longer period of time is insider trading. It involves trading based on private information and takes place in different circumstances (Verwijmeren, 2014), which will be summarised below.

1.3.1 Insider Trading in Private Placements

Private placements are a type of financing that has become very popular over the last few years surpassing the seasoned equity market in both transactions and value (Chen & Schatzberg, 2010). Private placements are securities that are only issued to a limited number of large investors, such as hedge funds or pension funds. They provide opportunities for insider trading, especially due to the process of 'wall-crossing' (Berkman et al., 2017). In this process, potential investors are asked if they are interested in investing in the company that issues the private placement. If they are, they 'cross the wall' and receive private information about the company itself. Investors can then decide whether they want to invest in the company or not but are prohibited from trading in it until the information has become public.

However, investors are not prohibited from 'shorting' the company. When shorting a company, investors expect its share price to go down. Since most private placements are issued at a discount, this could be a reasonable strategy. In fact, numerous investors have been caught exploiting this strategy. In the same paper by Berkman et al. (2017), a significant increase in short interest is found from four days prior to the public announcement of these placements. This strategy is not a short-period isolated case, but merely a longer period form of widespread illegal behaviour. It shows evidence of insider trading and asks for regulatory implications.

1.3.2 Insider Trading in Targets and Acquirers

The stock price run-up of targets before the announcement of an acquisition are often used as a proxy for insider trading (Brigida & Madura, 2012; Tang & Xu, 2016). Several papers have been published on the potential sources of this run-up. In 2012, Brigida & Madura found that the target stock price run-up prior to acquisitions is associated with both bidder- and target-specific characteristics. Regarding bidders, Brigida & Madura discovered that the run-up is higher if the takeover is labelled as friendly, if the bidder is foreign or when the bidder is not a private equity firm. With respect to the target-specific characteristics, they showed that the price run-up of targets is greater when targets are smaller and are operating in a high-tech industry.

In a follow-up paper by Tang & Xu (2016), the authors tried to answer the exact same question: "What causes the target stock price run-up prior to M&A announcements?". Tang & Xu came to the conclusion that the run-up is significantly greater when media attention on this matter is lower. Furthermore, they found the same results for lower levels of institutional ownership.

Focussing on acquirers, empirical research has shown significant negative return for the acquirer after completion of a deal (Malmendier & Tate, 2008; Schneider & Spalt, 2017). If

investors are aware of these findings and have been informed a deal is going to take place, they can either short the acquirer or buy put options predicting a decrease in stock prices. Cumming & Li (2011) found evidence consistent with insider trading of acquirer's stock. Post-announcement returns are typically negative for high Tobin's q acquirers, stock transactions and foreign targets. Their research shows that pre-announcement run-ups move in ways that match these post-announcements expected effects.

1.3.3 Insider Trading in the US and China

As shown in previous sections, many empirical papers have been published showing evidence of target stock price run-up prior to acquisitions in the US. However, close to none have been published focussing on the Chinese stock market. Nevertheless, much research has been done comparing regulation and enforcement of insider trading laws between the US and China. Shen (2009) demonstrates that the unique features of the Chinese stock market, in particular the fact that the majority of listed stocks are state-owned, decrease the market efficiency and thereby also decrease the effectiveness of China's incipient insider trading laws and enforcement. Specific laws aimed to reduce the incentives of insider trading are needed, but even more so its enforcement. This, in particular, varies strongly between the US and China. For these reasons, an empirical comparative study of insider trading between the US and China is both relevant and a potentially significant addition to the existing literature.

Before studying which target and deal characteristics could possibly drive the differences in insider trading between these two countries, it is important to examine the diverse regulatory frameworks. The insider trading regulatory frameworks of the US and China will be summarised below.

1.4 Insider Trading Regulation US

1.4.1 The US Stock Market and its Regulator

The US stock market, in particular the New York Stock Exchange (NYSE) and the Nasdaq, is arguably the most influential stock exchange of the world. Founded on Wallstreet at the beginning of the nineteenth century, the NYSE currently bears a market capitalisation of $19.3 trillion (Winck, 2020). The Nasdaq, on the other hand, does not inhabit a physical space like the NYSE does, but that does not make its significance less profound. Having a market capitalisation of $13.8 trillion, it is the second biggest stock exchange on the globe (Winck, 2020).

Being one of the first countries to implement a stock exchange, the US also became one of the first jurisdictions to introduce specific insider trading regulations. This resulted in the founding of the Securities and Exchange Commission (SEC) in June 1934. The SEC is the main regulatory body of the US that enforces the securities laws in the stocks and futures markets (Shen, 2009). Since the SEC has existed for over eighty years, the US is often seen as setting the 'golden standard' for less developed countries in terms of their regulatory framework (Du & Wei, 2004).

1.4.2 The Insider Trading Regulatory Framework

The insider trading regulatory framework of the US is primarily based on a number of judicial opinions, some of which some were issued even earlier than the promulgation of the Exchange Act in 1934. For example, in 1909, the US Supreme Court held a corporate insider responsible for committing fraud when he bought shares of his own company knowing the share price was about to increase (Shen, 2009).

Using the judicial opinions, three principal theories have been developed to rationalise the prohibition on insider trading: (1) the equal access theory; (2) the fiduciary duty theory; and (3) the misappropriation theory (Shen, 2009).

The equal access theory states that "a corporate insider must disclose all non-public material information known to him before trading, or if disclosure is improper or impracticable, abstain from trading". This theory stems from the first SEC enforcement action towards insider trading and has since formed the foundation of insider trading regulation in the US (Langevoort, 1999).

On top of that, the misappropriation theory is applied which also incorporates the fiduciary duty theory. A fiduciary duty is the legal responsibility to act solely in the best interest of another party (McCombs School of Business, 2020). However, a distinction is made between 'insiders' and 'outsiders'. The equal access theory, which also includes the fiduciary duty, solely applies to insiders and has been integrated into the insider trading regulatory framework of many other countries as well. The misappropriation theory, on the other hand, applies to outsiders. According to this theory, even outside investors who happen to come across some non-public material information owe a fiduciary duty to corporations and its shareholders not to trade their securities using the private information they possess. This theory was first applied by the US Supreme Court in 1997 and has now become one of the major enforcement weapons of the SEC against insider trading, and in particular towards outsider traders (Shen, 2009).

Once charged and proven guilty, penalties for insider trading can be quite severe in the US, ranging from receiving fines to being send to prison for multiple years, as was shown in the case of Mr. Boesky (Tang & Xu, 2016).

1.5 Insider Trading Regulation China

1.5.1 The Chinese Stock Market and its Regulator

Relative to the US, the Chinese stock market is quite young. Its establishment stems from the early 1990s. Almost twenty years later, in 2008, 1.625 companies were listed on the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) combined (Shen, 2009). This number has grown to over 3.500 companies currently listed on the Chinese stock market (The World Bank, 2020).

Back in 2008, insider trading was already a severe problem in China. In fact, according to the Global Competitiveness Report's insider trading index, collated by Harvard University and the World Economic Forum, China scores as one of the highest countries on the index, whereas the US scores as one of the lowest (Bris, 2005). Following the regulation for insider trading in the US, many emerging markets such as China started implementing similar laws to prevent insider trading. In fact, the US insider trading regulation served as a core influence on China's insider trading regulatory framework (Potter, 2003). Rather than having to design a new regulatory regime themselves, the Chinese could use the best practices of the US regulation and optimise it in their own country (Shen, 2009). In China, the Chinese Securities Regulatory Commission (CRSC) is the general, statutory regulatory body of the Chinese stocks and futures markets. Founded in July 1999, it handles cases comparable to its US counterpart, the SEC (Shen, 2009).

1.5.2 The Insider Trading Regulatory Framework

Nowadays, the regulatory frameworks of the US and China are quite diverse. Having first implemented the best practices of US regulation, the Chinese government has now adapted its framework to its own standards. Where the US framework is mostly based on case studies, China has taken a statutory approach to regulation. This means that the Chinese designed a four-level regulatory framework that includes national laws, administrative regulations, department regulations and rules issued by self-regulatory organisations.

Regarding national laws, the Chinese Securities Law (2006) is the primary regulation with respect to the stocks and futures markets. Article 73 of the law states that, in general, an investor who holds more than 5 percent of shares of a particular company is classified as an

‘insider’ that owns private information. This investor is prohibited from using that information in trading securities. This also includes prohibition from short sale transactions.

With respect to administrative- and department regulations, the Provisional Regulations on Oversight of Stock Issuance and Trade (PROSIT) and the Provisional Measures on Prohibiting Securities Frauds (PMPSF) were both issued in 1993. However, these regulations merely defined insider trading in China, rather than providing laws that penalise such behaviour. Hence, it was not until 2006 that insider trading was specifically included in Chinese law. Lastly, rules have also been issued by self-regulatory organisations, which are mainly embodied by the SHSE and SZSE. These rules obligate investors to report insider trading transactions themselves. In reality, for obvious reasons, this almost never happens (Shen, 2009).

Despite all these regulations, it turns out enforcement of regulation is key. This seems rather difficult in China since the Chinese stock market is closely aligned to the economic performance of the Chinese state. The majority of shares outstanding, nearly two-third, listed on the Chinese stock exchange are state-owned (Wong, 2006). This leads to an inefficient market with the dominance of one single shareholder. As a result, any discussion related to the Chinese stock market or any case filed by the CRSC inevitably touches upon state dominated ownership and the state’s role in any illegal practices. Unsurprisingly, the interplay between these features of the Chinese stock market results in problems with respect to the enforcement of insider trading regulation. The Chinese stock market seems highly inefficient which provides more opportunity for trading on non-public information (Su, 1999). On top of that, the type of penalties received by inside traders are limited to only monetary punishment, in the form of fines (Shen, 2009).

In Table 1 below, a comparative overview is provided of insider trading regulation and enforcement in the US and China. The table has been categorised into three different sections: (1) stock markets and regulator characteristics; (2) the insider trading (regulatory) framework; and (3) insider trading cases (enforcement).

As shown in Table 1, China is lagging behind the US in terms of regulation and enforcement. The inefficient stock market, the lack of insider trading regulations such as the misappropriation theory, and the weak punishments all play a role in this.

Having said this, one should notice that these findings are more than a decade old. Since 2009, the Chinese stock market has grown rapidly and with it has its insider trading cases. Yang (2012) states that Chinese regulators have recognised the need to improve their insider trading regulatory framework. As a result, new laws have been implemented and penalties have become more severe. Unfortunately, it seems as though no papers have been published in the last few

years regarding these regulatory changes in China. When looking for insider trading regulation in the Chinese law, a language barrier was faced. All in all, making it very complex to gain the most recent insights on Chinese insider trading laws. However, Global Times China did report that the CRSC already filed twenty-six insider trading cases in the first half of 2019 (Global Times, 2019). This shows that insider trading regulation, and in particular its enforcement, has been put higher on the agenda of the CRSC.

Table 1

Comparative Overview of Insider Trading Regulation and Enforcement in the US and China (Shen, 2009)

Main variable	Sub-variable	US	China
Stock markets and regulator	Main stock market	NYSE (1817)	SHSE & SZSE (1990)
	Regulators	SEC (1934)	CRSC (1999)
	Type of shares	Common shares and preferred shares	State shares, legal person shares and public shares
Insider trading (regulatory) framework	Framework based on	Judicial opinions (case studies) from 1909 onwards	Statutory approach to regulation
	Theories that apply	(1) The equal access theory; (2) the fiduciary duty theory; and (3) the misappropriation theory	(1) The equal access theory; and (2) the fiduciary duty theory
Insider trading cases (enforcement)	Number of cases	300 from 2001-2008	12 from 1999-2008
	Type of punishment	Monetary punishment (fines), civil enforcement and criminal sanctions	Monetary punishment (fines)

Note: Table 1 displays the differences between the US and China in terms of stock markets and regulator characteristics, the insider trading (regulatory) framework and the insider trading cases (enforcement). All data is gathered from the paper by Shen (2009).

2. Hypotheses

All the facts combined show that insider trading is still a severe problem in both the US and China. While the Americans are a step further in terms of setting up a comprehensive insider trading regulatory framework, trading on private information remains an issue in the US to this day. China, on its part, has improved its regulatory framework using the best practices of the 'golden standard', but still has a long way to go.

As described earlier, this paper uses the CARs of target firms prior to M&A announcements as a proxy for insider trading. This method is commonly used (Brigida & Madura, 2012; Tang & Xu, 2016) and shows the abnormal stock price run-up of targets for a selected event window before the announcement of the acquisition.

For all reasons mentioned above, the first and general hypothesis of this paper will be:

Hypothesis 1: There is evidence of significant positive cumulative abnormal returns of target firms prior to M&A announcements in both the US and China.

As shown in Table 1 and described earlier, the insider trading regulatory framework and its enforcement have been less effective in China than in the US. Therefore, the second hypothesis of this paper will be:

Hypothesis 2: The cumulative abnormal returns of target firms prior to M&A announcements are significantly greater in China than in the US.

Once results for both of these hypotheses are found, it is important to look at factors that might be able to explain similarities and differences in the CARs between both countries. Papers described earlier by Tang & Xu (2016), Brigida & Madura (2012) and Augustin et al. (2015) find certain factors that explain the run-up of target stock prices prior to M&A announcements. Following up on their research, seven hypotheses regarding target and deal characteristics can be derived:

Hypothesis 3: The cumulative abnormal returns of target firms prior to M&A announcements are significantly negatively associated with target market value.

With respect to hypothesis 3, targets that are bigger are less likely to be exposed to asymmetric information, compared to small targets (Brigida & Madura, 2012). It is more

difficult to detect private information on big targets, before the market gets hold of this information, because big targets are more closely monitored, as opposed to small targets. Therefore, hypothesis 3 states that stock price run-up of targets is negatively associated with target market value.

Hypothesis 4: The cumulative abnormal returns of target firms prior to M&A announcements are significantly greater in target firms that operate in high-technology industries compared to targets that operate in other industries.

Regarding hypothesis 4, because of the complexity of the industry and the many parties involved, it is assumed that information asymmetry is more pronounced in the tech industry than in other industries. This might offer more opportunities to capitalise on private information (Brigida & Madura, 2012). Therefore, the stock price run-up of targets is expected to be greater in this particular industry, compared to targets operating in other industries.

Hypothesis 5: The cumulative abnormal returns of target firms prior to M&A announcements are significantly positively associated with the percentage of shares held by the acquiror prior to the transaction.

The stock price run-up of targets may be increasing in bidder ownership prior to the bid, because such a position might signal an imminent acquisition. This causes informed traders to be particularly focussed on targets in which a toehold equity position by the acquirer has already been established, increasing the probability of a run-up (Brigida & Madura, 2012).

Hypothesis 6: The cumulative abnormal returns of target firms prior to M&A announcements are significantly negatively associated with the percentage of shares acquired in the transaction.

In their 2016 paper, Tang & Xu find that the pre-announcement price run-up of targets is significantly greater when media attention on insider trading is lower. Yet, their paper applies solely to the US market. This paper also focusses on the Chinese market, which makes it more complicated to use this variable. Hypothesis 6, however, still tries to grasp this deal characteristic. It is assumed that the lower the percentage of shares that is acquired in a deal, the lower the probability that this deal will receive media attention. This paper will test if media

attention on larger deals has the same negative effect on the price run-up of targets as media attention on insider trading does.

Hypothesis 7: The cumulative abnormal returns of target firms prior to M&A announcements are significantly greater in target firms that have been taken over by a foreign bidder compared to target firms where this is not the case.

Considering foreign bidders, they may be subject to less restrictive laws on insider trading. La Porta et al. (1998) show that insider trading laws and investor protection in general are weaker in some foreign countries than in the US. If foreign bidders are subject to less regulation, they may lack boundaries to utilise private information. Brigida & Madura (2012) provide evidence that the target's stock price run-up is higher when foreign bidders are involved. Hence, hypothesis 7 argues that the price run-up is greater in target firms that have been taken over by a foreign bidder.

Hypothesis 8: The cumulative abnormal returns of target firms prior to M&A announcements are significantly greater in target firms that have been taken over in a friendly takeover compared to target firms where this is not the case.

With respect to hypothesis 8, it is assumed that friendly takeovers have been pre-negotiated and are therefore more exposed to insiders. A hostile deal, on the other hand, may be more sudden to targets. The acquirer is then motivated to keep information on the forthcoming deal from leaking and the target cannot leak any information for lack of knowledge. Accordingly, the target's stock price run-up would be greater for pre-negotiated friendly deals (Brigida & Madura, 2012; Tang & Xu, 2016).

Hypothesis 9: The cumulative abnormal returns of target firms prior to M&A announcements are significantly greater in target firms that have been taken over in a deal that is financed through borrowing compared to target firms where this is not the case.

Regarding hypothesis 9, if deals have been financed through borrowing, it means that another party in addition to the target and the acquirer is included, which is usually an investment bank. The acquirer keeps an investment bank responsible for placing the securities

before submitting the bid to the target. Because another party is involved, more opportunities are created for information leakage by the time the bid is submitted (Brigida & Madura, 2012).

Hypothesis 10: The cumulative abnormal returns of target firms prior to M&A announcements are significantly greater in target firms that have been taken over by bidders that use a high percentage of cash as payment compared to target firms where this is not the case.

Lastly, considering hypothesis 10, if bidders are in a position where they can use a relatively high portion of cash to acquire a target, they are most likely in a financially stable position. Both Harford (1999) and Brigida & Madura (2012) provide evidence that firms with excess cash are more inclined to pursue acquisitions. The efforts of firms to build a high cash balance (through retained earnings) may cause firms to be more closely monitored by informed traders who may anticipate a takeover.

3. Data

To conduct this research, data is collected from Thomson Financials Securities Data Company (SDC) and Datastream for deals data and stock data, respectively.

Regarding deals data, the first restriction states that the target is from either the United States or China. The sample period taken into account is from January 2010 until December 2019 for the US and July 2012 until December 2019 for China. The difference in sample periods for both countries stems from a lack of data availability for China for the period of January 2010 until July 2012. Given the fact that this research does not focus on the number of deals that have been completed, but rather on the characteristics around deals, in particular the CARs of target firms, the difference in sample periods for both countries should not have a negative influence on the quality of the results. Deal value is set at a minimum of $10 million, so that only deals with economic significance are taken into account. Furthermore, only publicly listed targets are included, since this paper specifically focusses on the run-up in target share prices. In total, there are 8.643 US deals and 4.049 Chinese deals meeting these criteria in Thomson's SDC database. Lastly, deals are excluded of which the percentage of shares acquired (0-100%) is unknown, since most of these deals also lack available data on all other variables. This leaves the sample size with 3.203 US deals and 2.363 Chinese deals.

The sample is merged with Datastream's stock data resulting in a final sample of 2.810 US deals and 2.100 Chinese deals, having excluded all deals where the daily stock price data is unknown or insufficient. The data for independent variables is drawn from the SDC database as well.

Table 2 summarises the main characteristics of the data sample in terms of number of deals and cumulative deal value per year. Important to note is the simultaneous increase and decrease in number of deals in the US and China over the entire sample. This shows again that M&A activity occurs in waves dependent on when the global state of the economy is doing well and vice versa. Furthermore, the number of deals and total deal value were at their peak in 2015 in both the US and China. This finding is supported by others, such as Szmigiera (2020), who show that M&A deal value worldwide was at its highest point (post-crisis) in 2015.

Table 2
Sample Distribution

	US		China	
Year	No. of deals	Deal value ($mil)	No. of deals	Deal value ($mil)
2010	286	270.479,0	-	-
2011	257	367.959,2	-	-
2012	273	219.736,9	56	19.033,3
2013	276	438.180,6	121	44.077,5
2014	308	472.892,2	218	52.458,0
2015	334	939.666,9	401	122.465,2
2016	298	642.934,8	310	55.893,0
2017	287	423.707,8	261	79.053,2
2018	291	714.123,1	371	45.415,5
2019	200	575.991,3	362	41.183,2
Total	2810	5.065.671,8	2100	459.578,8

Note: Table 2 summarises the sample of acquisitions of publicly traded US targets between 2010 and 2019 and Chinese targets between 2012 and 2019, collected from the SDC database. Deal value of all deals is set at a minimum of $10 million. Number of deals and cumulative deal value (in $million) per year are displayed. Deals are assigned to specific years according to their announcement dates.

4. Methodology

4.1 Cumulative Abnormal Returns

Cumulative abnormal returns (CARs) of target firms prior to M&A announcements are estimated for all events in the sample. This method is commonly used (Brigida & Madura, 2012; Tang & Xu, 2016) and shows the abnormal stock price run-up of targets for a selected event window before the announcement of the acquisition. According to the Efficient Market Hypothesis (EMH), all available information about firms is reflected in the firms' stock prices (Fama, 1970). For this reason, abnormal returns are applied, rather than abnormal trading volumes in target firms.

The daily abnormal returns are measured using an event window of (-30, -1) where each integer represents a trading day and with $t = 0$ being the day of the bid announcement (Brigida & Madura, 2012; Tang & Xu, 2016). CARs are calculated for US and Chinese targets separately by summing the market-model residuals ($\tilde{\varepsilon}_{it}$) for each target firm i:

$$\tilde{\varepsilon}_{it} = r_{it} - \left(\tilde{\alpha}_i + \tilde{\beta}_i r_{mt}\right)$$

where r_{it} is target *i*'s return on day *t* and r_{mt} is the return of the respective market benchmarks (including dividend distributions) on day *t* (Officer et al., 2010; Brigida & Madura, 2012; Tang & Xu, 2016). Market-model parameters ($\tilde{\alpha}_i$ and $\tilde{\beta}_i$) are estimated using daily returns from trading day -295 to trading day -45 relative to the deal announcement date. The market returns are approximated by the S&P 500 index for US targets and the MSCI China Index for Chinese targets (Tang & Xu, 2016). The CAR for each target firm *i* is then equal to:

$$CAR_{it} = \sum_{t=-30}^{-1} \tilde{\varepsilon}_{it}$$

where $t = 0$ is the announcement date.

To ensure that results are robust to the choice of estimation parameters used to calculate the CARs, the run-up is also estimated using the Fama-French 3-factor and Fama-French 5-factor model (Fama & French, 1993; Fama & French, 2015). Daily factor loadings are retrieved from the Fama & French data library (Fama & French, 2020). Regarding China, the Asian-Pacific 5-factor sample (excluding Japan) is chosen, given the fact that the Fama & French library does not provide factor loadings solely focussed on the Chinese market.

Finally, a regression is conducted on the CARs of all US targets and Chinese targets separately, to test the significance of the CARs across all companies.

4.2 Univariate Analysis

By conducting a univariate analysis, different target and deal characteristics are compared to test if they are statistically different for US and Chinese targets. These variables are mainly based on papers by Officer et al. (2010), Brigida & Madura (2012) and Tang & Xu (2016). In the sections below, the different characteristics are summarised. All data and definitions of the variables are extracted from Thomson's SDC database.

4.2.1 Target Characteristics

The first target characteristic is target size (SIZE). This variable is defined as the target's market capitalisation four weeks prior to the acquisition announcement. The second and third

target characteristics are target EBITDA (EBITDA) and target intangible assets (INTASS). These variables are both added as extra explanatory variables to verify the potential difference in target size between US and Chinese targets. Target EBITDA is defined as the earnings before interest, taxes, depreciation and amortization over the last 12 months prior to the deal announcement. Target intangible assets is defined as the value of assets having no physical existence, yet having substantial value to the firm prior to the deal announcement. Examples are patents and goodwill.

Lastly, an indicator variable (HTECH) is included that takes the value of 1 if the target operates in a high-tech industry and 0 otherwise. Thomson's SDC database provides output in the form of SIC codes for targets that operate in high-tech industries. These SIC-codes are transformed into the value of 1, turning the output into an indicator variable.

4.2.2 Deal Characteristics

The first deal characteristic is the percentage of common shares outstanding held by the acquiror six months prior to the transaction (PCTHELD).

Second, the variable percentage of shares acquired (SHACQ) is included. This variable is defined as the number of common shares acquired in the transaction divided by the total number of shares outstanding.

Thirdly, FRGN is an indicator variable that takes the value of 1 if the bidder's ultimate parent is a foreign firm and 0 otherwise.

The next deal characteristic taken into account is the attitude code of the transaction (FRNDLY). The SDC database provides five different options: friendly, hostile, neutral, unsolicited and not applicable. Given the very few cases, unsolicited and not applicable deals are left out. The variable is transformed into an indicator variable by applying a value of 1 to friendly takeover, a value of -1 to hostile takeover and a value of 0 to neutral takeovers.

The fifth deal variable is BORROW. This is an indicator variable that takes the value of 1 if the deal is financed through borrowing and 0 otherwise. Unfortunately, Thomson's SDC database does not provide information on how many and which parties were exactly involved in the takeover. For this reason, an indicator variable is used.

Finally, the percentage of consideration paid in cash is taken into account (PCTCASH).

4.2.3 The Analysis

Means and medians of US and Chinese target and deal characteristics are analysed separately to identify the difference between the two. To test for the equality of means between

US and Chinese targets, an unpaired two-sample *t*-test is performed. Regarding the equality of medians, a Wilcoxon rank-sum test as well as a *k*-sample equality-of-medians test is executed (Bargeron et al., 2008; Brigida & Madura, 2012). The Wilcoxon rank-sum test tests the hypothesis that two independent samples are from populations with the same distribution. The *k*-sample equality-of-medians test tests the null hypothesis that the *k*-samples are drawn from populations with the same median.

4.3 Multivariate Analysis

4.3.1 Model (1)

In order to test hypothesis 2 until 10, Ordinary Least Squares (OLS) regressions are conducted. The dependent variables are the CARs for each target firm *i* as estimated by the market-model, the Fama & French 3-factor model and the Fama & French 5-factor model.

All three regression models are checked for independency of observations with the Durbin-Watson test and for linearity between the dependent and independent variables with scatterplots. These assumptions are not violated. In addition, variance inflation factors (VIFs) are calculated for the independent variables in all three regression models to test for multicollinearity. The mean variance inflation factor was 1,46 with no significant outliers indicating little multicollinearity (Brigida & Madura, 2012).

To test if the residuals are approximately normally distributed, a Jarque-Bera normality test is performed. The output of this test shows significant results, hence the null hypothesis of normality of the residuals is rejected. However, according to many authors (Jaccard & Becker, 2009; Hanna and Dempster; 2013, Pek et al., 2018), the assumption of normality can be relaxed when the sample size is large enough, which is the case in this study.

Lastly, a Breush-Pagan / Cook-Weisberg test as well as an IM-test are performed to check for heteroskedasticity. Significant results are found for both tests, which indicate the presence of heteroskedasticity throughout the dataset. Thus, in order to correct for heteroskedasticity, robust standard errors are applied in all three regression models (Croux et al, 2004; King & Roberts, 2015).

The first and most important independent variable of the multivariate model is an indicator variable (USYES) taking the value of 1 if targets operate in the US and a value of 0 if targets operate in China. This variable will test hypothesis 2 whether the CARs of Chinese target firms prior to M&A announcements are significantly greater than of US target firms.

The other independent variables are also target and deal characteristics that may influence the CARs. These independent variables are proxies for the characteristics identified in the hypotheses. Definitions for these independent variables can be found in the previous sections 4.2.1 and 4.2.2. However, regarding the variables SIZE, EBITDA, and INTASS, the natural logarithm is applied which is in line with Brigida & Madura (2012). The full model (1) is specified as:

$$CAR_i = \beta_1 USYES_i + \beta_2 SIZE_i + \beta_3 EBITDA_i + \beta_4 INTASS_i + \beta_5 HTECH_i + \beta_6 PCTHELD_i + \beta_7 SHACQ_i + \beta_8 FRGN_i + \beta_9 FRNDLY_i + \beta_{10} BORROW_i + \beta_{11} PCTCASH_i + \varepsilon_i$$

4.3.2 Model (2)

In order to better understand the dissimilarities in CARs between the US and China, another multivariate analysis is conducted. Compared to the previous model (1), the regression is now executed per country. Given the fact that this model is very similar to the previous one, the outcome of the tests of the OLS-assumptions are also comparable. Therefore, for the sake of brevity, they will not be discussed. The full model (2) is specified as:

$$CAR_i = \beta_1 SIZE_i + \beta_2 EBITDA_i + \beta_3 INTASS_i + \beta_4 HTECH_i + \beta_5 PCTHELD_i + \beta_6 SHACQ_i + \beta_7 FRGN_i + \beta_8 FRNDLY_i + \beta_9 BORROW_i + \beta_{10} PCTCASH_i + \varepsilon_i$$

5. Results

5.1 Cumulative Abnormal Returns

Table 3 shows the CARs - and their respective *t*-values - from day [-30,-1] prior to deal announcements in the US and China. Per country, returns are divided into three different columns: (1) deals where 0-50% of shares are acquired; (2) deals where 50-100% of shares are acquired; (3) all deals (where 0-100% of shares are acquired). As described in section 4, abnormal returns are estimated by the market-model, the Fama & French 3-factor model, and the Fama & French 5-factor model.

Results show evidence of positive CARs of target firms prior to M&A announcements in both the US and China. These findings support the first and general hypothesis of this paper. The evidence is significant at the 1% level for all deals except US deals where less than 50% of shares is acquired. Regarding the differences between the US and China, it appears that across all deals (2.810 in the US and 2.100 in China), on average, the CARs are greater in the US than in China. According to the market-model, the CARs of US targets are almost 1% greater (2,87%) than of Chinese targets (1,88%).

The average difference in CARs between the US and China mostly stems from an asymmetric distribution in deal types. In China, most bidders (1.973 out of 2.100) acquire a small percentage of targets (0-50%), whereas in the US, 1.969 out of 2.810 deals involve the acquirement of more than 50% of target shares. Possible explanations for lower CARs in deals where less than 50% of shares is acquired differ per country. In China, the greater part of these small acquisitions is done by the state, as described by Wong (2006) and Shen (2009). This naturally reduces the abnormal stock price run-up of targets that was due to trading on private information. In the US, on the other hand, the insignificant CARs for small acquisitions can most likely be explained by the fact that these deals involve a limited number of extra parties, such as investment banks. In addition, given the fact that these are smaller deals, chances are that they are more sudden to targets and less pre-negotiated. This all reduces the opportunities for trading on private information.

All things considered, it should be noted that the CARs are significant in China across all deals, whereas this is not the case in the US. On top of that, for deals where more than 50% of shares is acquired, the CARs are severe in China with an average coefficient of 6,62% (according to the market-model). This suggests the less dominant role of the state in this type of deals. However, this is the case for only 127 deals out of a total of 2.100, which causes the average level of the CARs to be lower in China than in the US.

Table 3

Cumulative Abnormal Returns of Targets from Day [-30,-1] prior to Deal Announcements in the US and China

	US			China		
% of sh. acq.	0-50% sh. acq.	50-100% sh. acq.	0-100% sh. acq	0-50% sh. acq.	50-100% sh. acq.	0-100% sh. acq.
n	841	1969	2810	1973	127	2100
CAR [-30,-1] – MM	0,5196	3,8552***	2,8710***	1,5747***	6,6169***	1,8797***
t-value	[0,77]	[9,36]	[8,09]	[4,24]	[3,19]	[5,06]
CAR [-30,-1] – FF3	0,6610	4,2578***	3,2037***	1,6812***	6,6615***	1,9824***
t-value	[0,96]	[10,33]	[8,94]	[4,31]	[3,20]	[5,11]
CAR [-30,-1] – FF5	0,6261	4,1885***	3,1439***	1,4966***	6,1576***	1,7785***
t-value	[0,88]	[10,26]	[8,75]	[3,85]	[2,91]	[4,59]

Note: Table 3 displays the cumulative abnormal return percentages (CAR) - and their respective *t*-values - of targets from 30 days until 1 day before deal announcements in the US and China. Per country, returns are divided into three different columns: (1) deals where 0-50% of shares are acquired; (2) deals where 50-100% of shares are acquired; (3) all deals (where 0-100% of shares are acquired). Abnormal stock returns are estimated using the market-model (MM) described in Officer et al. (2010), the three-factor model (FF3) described in Fama & French (1993) and the five-factor model (FF5) described in Fama & French (2015). The estimation period is from 295 days until 45 days before the deal announcements. CARs are calculated as the summation of the differences of the [-30,-1] actual daily returns and the predicted returns according to the MM, FF3- and FF5-model. *, ** and *** specify the significance of the differences at the 10%, 5% and 1% levels, respectively.

5.2 Results of Univariate Analysis

Table 4 shows results of the univariate analysis of target and deal characteristics. Means and medians (in brackets) are displayed for all characteristics of US deals, Chinese deals, and for the difference between the two. As described earlier, target and deal characteristics are based on Officer (2010), Brigida & Madura (2012) and Tang & Xu (2016). Definitions can be found in sections 4.2.1 and 4.2.2.

For all characteristics, the differences in means and medians of US and Chinese deals are significant at the 1% level, except for those characteristics that have the same median for both countries. These results show that US and Chinese deals are highly diverse.

Regarding target characteristics, US targets are bigger than Chinese targets in terms of their market capitalisation (SIZE), EBITDA (EBITDA) and intangible assets (INTASS), except for the median of SIZE. The mean of US SIZE is greater than that of Chinese targets due to a couple of big US targets, but this impacts the median to a lesser extent. Of all the deals in the sample, the chance that a US target operates in a high-tech industry (HTECH) is 37,04% whereas for a Chinese target this is 31,18%. The difference of 5,86% is significant at the 1% level.

With respect to deal characteristics, percentage of shares held by the acquirer prior to the transaction (PCTHELD) is significantly greater for Chinese deals than for US deals, whereas the opposite holds for percentage of shares acquired (SHACQ). Especially, the difference in percentage of shares acquired is striking. With an average of 15,49% and a median of 9% for Chinese deals compared to an average of 72,63% and a median of 100% in US deals, the differences are profound. As described earlier, the low average being in China can be explained by the fact that most deals in China are small acquisitions by the state (Wong, 2006; Shen, 2009). This is also underscored by the significant difference in foreign bidders (FRGN) for both countries. With an average of 7,44%, almost all targets in China were acquired by Chinese firms or by the Chinese state.

The next two deal characteristics are indicator variables that take the value of 1 if the deal is a friendly takeover (FRNDLY) or if the deal is financed through borrowing (BORROW). Despite the fact that there are 23,48% less friendly takeovers in China than in the US, one can still conclude that also in China most takeovers are friendly, keeping in mind that the variable FRNDLY could take the values: -1, 0 and 1. Given the fact that, on average, deals in the US are bigger in terms of percentage of shares acquired, it seems logical that the percentage of deals that are financed through borrowing is also significantly greater in the US than in China.

Table 4
Univariate Comparisons of US and Chinese Target and Deal Characteristics

Panel A: Target Characteristics			
	US	China	US - China
SIZE	2.506,5910	1.237,5190	1.269,0720***
	[551,3240]	[755,0000]	[-203,6760]***
EBITDA	362,5091	106,4749	256,0342***
	[72,4790]	[34,0000]	[38,4790]***
INTASS	835,2778	77,2933	757,9845***
	[123,2040]	[28,0000]	[95,2040]***
HTECH	0,3704	0,3118	0,0586***
	[0,0000]	[0,0000]	[0,0000]
Panel B: Deal Characteristics			
	US	China	US - China
PCTHELD	2,0476	6,6118	-4,5642***
	[0,0000]	[0,0000]	[0,0000]
SHACQ	72,6271	15,4891	57,1380***
	[100,0000]	[9,0000]	[91,0000]***
FRGN	0,1326	0,0744	0,0582***
	[0,0000]	[0,0000]	[0,0000]
FRNDLY	0,7772	0,5424	0,2348***
	[1,0000]	[1,0000]	[0,0000]
BORROW	0,1244	0,0409	0,0835***
	[0,0000]	[0,0000]	[0,0000]
PCTCASH	71,2350	59,6291	11,6059***
	[100,0000]	[100,0000]	[0,0000]

Note: Table 4 displays means and medians (in brackets) of target and deal characteristics for all acquisitions in the sample in the US and China. Target and deal characteristics are based on Officer (2010), Brigida & Madura (2012) and Tang & Xu (2016). Definitions for all variables can be found in sections 4.2.1 and 4.2.2. The first column reports statistics for US deals, the second column for Chinese deals and the third column displays the differences in statistics between the two countries. All data is from the SDC database. To test for the equality of means between US and Chinese targets, an unpaired two-sample *t*-test is performed. Regarding the equality of medians, a Wilcoxon rank-sum test as well as a *k*-sample equality-of-medians test is executed. *, ** and *** specify the significance of the differences at 10%, 5% and 1% levels, respectively.

The low percentage of deals in China that have been financed this way (4,09%) can also be explained by the majority of acquisitions being completed by the state.

Lastly, percentage of cash used (PCTCASH) in US deals is 11,61% greater than in Chinese deals. Since more acquirers have borrowed money, i.e. cash, to be able to execute the transaction, this seems logical. Next to that, since US targets are bigger on average and are more likely to work in a high-tech industry compared to Chinese targets, there is a greater chance that these targets are overvalued. If they are, they will not accept stock of the acquirer as a payment method, but will rather choose cash.

5.3 Results of Multivariate Analysis

5.3.1 Model (1)

Table 5 shows results of the OLS-regressions with the dependent variables being the CARs for each target firm *i* as estimated by the market-model, the Fama & French 3-factor model and the Fama & French 5-factor model. Definitions for all the independent variables can be found in sections 4.2 and 4.3. These independent variables are proxies for the characteristics identified in the hypotheses. However, regarding the variables SIZE, EBITDA, and INTASS, the natural logarithm is applied which is in line with Brigida & Madura (2012).

With respect to the first variable, USYES, results show that CARs of US target firms are significantly greater – ranging from 2,25% to 2,70% – than of Chinese target firms. The evidence is significant at the 1% level for CARs estimated by the market-model and at the 5% level for CARs estimated by the FF3 & FF5 models. This result is in line with the findings presented in table 3 which also show greater CARs, on average, for US targets than for Chinese targets.

Secondly, the variable SIZE is negative and significant over all three estimation models, supporting hypothesis 3 that the CARs are significantly negatively associated with target market value. This result indicates that there is less asymmetric information regarding larger firms, hence target stock price run-up is decreasing in target size. A 1% increase in the natural logarithm of target's market capitalization decreases the CARs with 0,42% to 0,48%. This result is significant at the 10% level for CARs estimated by the market-model and at the 5% level for CARs estimated by the FF3 & FF5 models.

Thirdly, the CARs of target firms that have been acquired in a friendly takeover are 1,35% to 1,73% greater than of target firms where this is not the case. This result is significant at the 10% level for CARs estimated by the market-model and at the 5% level for CARs estimated by the FF3 & FF5 models. These findings support hypothesis 8, which assumes that

Table 5
Multivariate Regression Analysis: Model (1)

	CAR [-30,-1] – MM	CAR [-30,-1] – FF3	CAR [-30,-1] – FF5
USYES	2,7022***	2,2472**	2,3636**
	[2,67]	[2,19]	[2,26]
SIZE	-0,4187*	-0,4813**	-0,4720**
	[-1,87]	[-2,20]	[-2,12]
EBITDA	-0,2747	-0,2192	-0,1747
	[-1,04]	[-0,81]	[-0,64]
INTASS	0,1240	0,1162	0,0829
	[0,56]	[0,53]	[0,38]
HTECH	0,8694	1,1521	0,9943
	[1,26]	[1,65]	[1,42]
PCTHELD	0,0580	0,0615	0,0574
	[1,08]	[1,02]	[0,92]
SHACQ	-0,0122	-0,0117	-0,0114
	[-1,33]	[-1,29]	[-1,25]
FRGN	0,1248	-0,7796	-0,5600
	[0,12]	[-0,74]	[-0,53]
FRNDLY	1,3491*	1,7298**	1,7249**
	[1,90]	[2,39]	[2,38]
BORROW	3,1816***	3,0456***	2,9344***
	[3,39]	[3,29]	[3,15]
PCTCASH	-0,0091	-0,0130	-0,0112
	[-1,17]	[-1,64]	[-1,40]
Constant	3,5261**	4,2800**	3,9402**
	[1,98]	[2,39]	[2,19]
Obs.	2.878	2.878	2.878
F-Statistic	4,09	4,48	4,09
p-Value	0,0000	0,0000	0,0000
Adj.-R^2	0,0143	0,0147	0,0136

Note: Table 5 displays the multivariate OLS-regression output with CAR [-30,-1] (MM, FF3 & FF5) being the dependent variables. All variables are based on Officer (2010), Brigida & Madura (2012) and Tang & Xu (2016). Definitions for all variables can be found in sections 4.2 and 4.3. *t*-values are displayed in brackets. *, ** and *** specify the significance levels of the estimated coefficients at the 10%, 5%, and 1% levels, respectively.

friendly takeovers have been pre-negotiated and are therefore more exposed to insiders.

Lastly, regarding deals that have been financed through borrowing, evidence shows that CARs of target firms in this type of deals are 2,93% to 3,18% greater (significant at the 1% level) compared to target firms where this is not the case. This result is in line with hypothesis 9 stating that more opportunities for information leakage are created if another party is involved, which in turn increases the target stock price run-up.

Results for all other independent variables are insignificant, hence no conclusions can be drawn from the output. The adjusted-R^2 values are rather low, but this matches the literature. Brigida & Madura (2012), for example, only focus on US deals and report adjusted-R^2 values ranging from 0,0425 to 0,0712.

5.3.2 Model (2)

From table 5, it was concluded that the variables USYES, FRNDLY and BORROW all have a significant positive influence on the CARs, whereas the opposite holds for the variable SIZE. This research, however, also tries to answer the question what drives the differences in CARs between the US and China. Table 6 shows results of the multivariate OLS-regressions per country with CAR [-30,-1] (MM, FF3 & FF5) being the dependent variables. These results provide extra insights to the results found in table 5.

Regarding the variable SIZE, evidence shows that an increase of 1% in the natural logarithm of target size, leads to a decrease of 3,69% to 3,84% of the CARs in China. These results are significant at the 1% level, whereas the results found in the US are insignificant. Hence, target stock price run-up is decreasing in target size for Chinese targets. Surprisingly, significant positive evidence at the 5% level is found in China for the influence of target EBITDA on the CARs. A possible explanation for these contrary results could be that bigger targets are indeed less likely to be exposed to asymmetric information, which in turn explains the significant negative coefficient for SIZE, but that this does not hold for target EBITDA. Targets who obtain solid earnings and profitability could acquire more interest from bidders, without necessarily being exposed to less asymmetric information. This could possibly explain why the influence of target EBITDA on the CARs in China is positive.

In the US, evidence is found for a significant positive influence of targets operating in high-tech industries (HTECH) on the respective CARs. This result, however, is only significant at the 10% level for two out of the three regression models. Therefore, combined with the overall findings provided in table 5, too little evidence is found supporting hypothesis 4.

Another significant result, at the 5% level, is found for the influence of percentage of shares acquired (SHACQ) on the CARs in China. This result corresponds with the findings in table 3, showing an increase of more than 5% in CARs for deals where more than 50% of shares is acquired, compared to deals where less than 50% of shares is acquired.

Compared to the outcomes of the variable HTECH, it appears that foreign bidders (FRGN) also have a slightly significant influence on the CARs in the US. However, this influence is negative. Having said this, no real conclusions can be drawn from the output, given the fact that this variable is only significant at the 10% level for two out of the three regression models.

The opposite holds for the variable FRNDLY. Strong positive evidence is found for the influence of friendly takeovers on the CARs in the US, significant at the 1% level. As described in the previous section, these results support hypothesis 8, indicating that friendly takeovers have been pre-negotiated and are therefore more exposed to insiders. However, it appears that this assumption does not hold for Chinese targets. Estimated by the market-model, a negative influence of friendly takeovers on the CARs in China is found, significant at the 5% level. A possible explanation for this could be that most pre-negotiated friendly takeovers in China are done by the state, which decreases the chance of an abnormal target stock price run-up that is due to trading on private information.

Similar to the results shown in table 5, table 6 also provides evidence supporting hypothesis 9. If the chance that a deal is financed through borrowing (BORROW) increases by 1%, this increases the target stock price run-up in the US with 2,10% to 2,25%, significant at the 5% level. More opportunities for information leakage are created if another party is involved, which in turn increases the target stock price run-up. The results found for China are insignificant.

Lastly, little evidence is found for the negative influence of percentage of cash used in the transaction (PCTCASH) on the CARs in China. However, given the very low coefficients and significance levels, no real conclusions can be drawn from this output.

Results for all the other independent variables are insignificant. It should be noted that the adjusted-R^2 values have slightly increased, especially looking at the regression model of Chinese targets. As earlier described, Brigida & Madura (2012) report adjusted-R^2 values ranging from 0,0425 to 0,0712. Therefore, the adjusted-R^2 values in this particular model are also in line with the literature.

Table 6

Multivariate Regression Analysis: Model (2)

	US			China		
	CAR [-30, -1] - MM	CAR [-30, -1] - FF3	CAR [-30, -1] - FF5	CAR [-30, -1] - MM	CAR [-30, -1] - FF3	CAR [-30, -1] - FF5
SIZE	-0,1044	-0,1694	-0,1593	-3,8443***	-3,7775***	-3,6918***
	[-0,46]	[-0,76]	[-0,71]	[-3,76]	[-3,81]	[-3,63]
EBITDA	-0,2159	-0,1194	-0,1147	1,3891**	1,2968**	1,3327**
	[-0,62]	[-0,35]	[-0,33]	[2,44]	[2,20]	[2,25]
INTASS	0,1676	0,1419	0,1402	0,3293	0,274	0,1434
	[0,59]	[0,51]	[0,50]	[0,89]	[0,69]	[0,36]
HTECH	1,3499	1,5981*	1,4060*	-0,3699	-0,0624	-0,1088
	[1,62]	[1,94]	[1,70]	[-0,31]	[-0,05]	[-0,09]
PCTHELD	0,1209	0,1199	0,1129	-0,0126	-0,0021	-0,0042
	[1,12]	[0,99]	[0,89]	[-0,32]	[-0,05]	[-0,10]
SHACQ	-0,0134	-0,0124	-0,0122	0,0638**	0,0605**	0,0619**
	[-1,38]	[-1,30]	[-1,27]	[2,10]	[1,97]	[2,03]
FRGN	-1,9173	-2,3314*	-2,2062*	2,4389	0,4671	1,0054
	[-1,62]	[-1,94]	[-1,83]	[1,26]	[0,24]	[0,51]
FRNDLY	4,1968***	4,2424***	4,0788***	-2,7045**	-1,6390	-1,4991
	[4,43]	[4,57]	[4,33]	[-2,14]	[-1,21]	[-1,11]
BORROW	2,0962**	2,2466**	2,2166**	3,6934	2,3132	1,7772
	[2,05]	[2,26]	[2,21]	[1,57]	[0,91]	[0,69]

PCTCASH	0,0084	0,0045	0,0055	-0,0201*	-0,0252**	-0,0234*
	[0,69]	[0,36]	[0,44]	[-1,74]	[-2,06]	[-1,92]
Constant	0,4813	0,8397	0,8479	22,4275***	22,8466***	22,1934***
	[0,19]	[0,33]	[0,33]	[4,13]	[4,38]	[4,14]
Obs.	1.938	1.938	1.938	940	940	940
F-Statistic	5,12	5,89	5,14	4,17	3,50	3,13
p-Value	0,0000	0,0000	0,0000	0,0000	0,0001	0,0006
Adj.-R^2	0,0237	0,0241	0,0213	0,0604	0,0474	0,0464

Note: Table 6 displays the multivariate OLS-regression output with CAR [-30,-1] (MM, FF3 & FF5) being the dependent variables. All variables are based on Officer (2010), Brigida & Madura (2012) and Tang & Xu (2016). Definitions for all variables can be found in sections 4.2 and 4.3. The first three columns present results for US deals and the last three columns for Chinese deals. *t*-values are displayed in brackets. *, ** and *** specify the significance levels of the estimated coefficients at the 10%, 5%, and 1% levels, respectively.

6. Conclusion and Discussion

Over the last couple of decades firms have been seeking to improve their performance through M&A practices. The rise in M&A activity has resulted in an increasing number of studies investigating the value creation of M&As, either before or after the announcement of a deal. With respect to targets, empirical research has shown positive returns when these are being acquired (Cartwright & Schoenberg, 2006; Owen & Yawson, 2010), but in many cases the run-up of target stock prices occurs before the announcement of a deal (Keown & Pinkerton, 1981; Adnan et al, 2016; Tang & Xu, 2016). This raises the question whether or not 'insiders' are trading based on private information, also known as *insider trading* (Gao & Oler, 2012).

By using the CARs of target firms as a proxy for insider trading, the main goal of this paper was to provide an empirical comparative study between insider trading in the US and China. This paper builds on existing evidence of insider trading in the US, and on papers comparing regulation and enforcement of insider trading laws between the US and China (Wong, 2006; Shen, 2009). The main research question of this paper was: "To what extent is there a significant difference in the cumulative abnormal returns of target firms prior to M&A announcements in the US and China, and how could this difference be explained?".

Results show evidence of positive CARs of target firms prior to M&A announcements in both the US and China. The evidence is significant at the 1% level for all deals except US deals where less than 50% of shares is acquired. These results indicate the presence of insider trading in both countries. While there may not be a perfect instrument to measure insider trading, CARs of target firms are a commonly used measure (Brigida & Madura, 2012; Tang & Xu, 2016). It shows the abnormal stock price run-up of targets for a selected event window before the announcement of the acquisition, which may be partially due to trading on private information.

This paper also provides further insight into the drivers behind the CARs of target firms in the US and China, and, perhaps more importantly, into the extent to which there is a significant difference in the CARs of target firms in both countries. Results show that CARs of US targets are significantly greater – ranging from 2,25% to 2,70% depending on the estimation model – than those of Chinese targets. The dissimilarity in CARs of US and Chinese targets can partially be explained by the asymmetric distribution in deal types. In China, most bidders (1.973 out of 2.100) acquire a small percentage of targets (0-50%), whereas in the US, 1.969 out of 2.810 deals involve the acquirement of more than 50% of target shares. A greater part of small acquisitions in China is done by the state (Wong, 2006; Shen, 2009), which naturally reduces the risk of insider trading. In the US, on the other hand, deals where more than 50% of

shares are acquired, are likely to involve extra parties, such as investment banks, who lend money to the acquirer. As shown in the results, deals that have been financed through borrowing have a strong significant positive influence on the CARs in the US, giving some explanation to the higher CARs found for deals of which more than 50% of shares are acquired.

In addition, results show that the significant negative effect of target size on the CARs of target firms appears to only hold in China, whereas the significant positive effect of friendly takeovers on the CARs of target firms only holds in the US. Especially the fact that - estimated by the market-model - friendly takeovers have a significant negative effect on the CARs of Chinese target firms would be an interesting topic to investigate further.

The significant positive CARs of target firms found in both countries indicate that insider trading is still a severe problem in both the US and China. The implementation of an insider trading regulatory framework in both countries has helped to bring down the cases, but there is still a long way to go. In the US, regulators should particularly focus on friendly takeovers and deals that have been financed through borrowing, whereas in China the average CAR coefficient of 6,62% for deals where more than 50% of shares is acquired is striking and requires further attention. In addition, the significant negative effects of target size and friendly takeovers on the CARs of Chinese targets, combined with the positive effect of target EBITDA on these CARs, is a topic that should be further investigated.

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