# Insiders and M&A Announcements: What are Those Insiders Up To?

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**Abstract**

This study examines two channels of insider involvement during the process of M&A and their impacts on deal completion and short-term performance. Using a distinctive trading suspension mechanism, we show that insiders not only profit from their privileged knowledge on the deal, but also attempt to intervene with private effort during the deal preparation phase to achieve further exploitation of deal profits. We find that implementation of insider trading regulations leads to a decrease of 4.1% in 3-day abnormal returns for trading based on privileged knowledge and a decrease of 6.6% for trading based on private effort.

Keywords: : insider trading; M&A; trading suspension; information asymmetry

JEL classification: G14 G18 G34 D82

# 1 Introduction

Insider trading, an illegal form of informed trading, is a prevalent phenomenon around the world.[1] Bhattacharya & Daouk (2002) document that 87 out of the 103 countries in their study established insider trading laws before 2000 in response to insider trading activities. A large body of literature documents the informativeness of insider trading activities (e.g. Cohen et al., 2012; Kacperczyk & Pagnotta, 2019; Kelly, 2018; Purnanandam & Nejat Seyhun, 2018). However, there have been fewer insights on the information content of insider trading activities around merger and acquisition deals (M&A). More specifically, do insiders trade based solely on static privileged knowledge of a deal's intrinsic qualities, or do they actively engage in private efforts in the deal process to achieve a higher trading profit? This question is difficult to answer empirically due to the endogeneity issue, as insiders usually make their trading decisions and private effort decisions concurrently. Biggerstaff et al. (2020) provided evidence on corporate insider activities in financial markets. For this study, we extend that focus to insider operational effort, considering its potential as another channel that affects both the probability of deal completion and insider trading profits. To separate the channel of insiders' privileged knowledge from that of engaging in private efforts, we exploit the distinctive setting of trading suspension in the Chinese stock market.

The trading suspension mechanism at M&A announcement is not unique to the Chi-

[1] In financial economics literature, informed traders are those who possess private information and are motivated to buy or sell financial securities based on such information. Informed traders' trading behavior serves to incorporate informed traders' private information into stock prices and strengthen stock price efficiency. Other market participants will also be better off if they become aware of changes in the condition of companies due to the informational leakage of informed trading. However, from the perspective of the source of their private information, informed traders can be further categorized into (illegal) insiders and (lawful) informed traders. Specifically, the private information of (illegal) insiders stems from their privileged access to material nonpublic information about the company, whereas the private information of (lawful) informed traders, which is also advantageous and unknown to others, results from their time and effort spent collecting and processing information from extraneously available public sources.

nese stock market. Similiar mechanisms like the *trading halt* have been established in the U.S. market since 1987 and have received considerable attention from the academics (e.g. Lee et. al. 1994, Corwin & Lipson 2000, Chrstie, Corwin & Harris 2002, Chakrabarty, Corwin & Panayides 2011, etc.). Nontheless, the prolonged suspension period granted in the Chinese market (usually two to three months versus typically five minutes to one day in the U.S.) provides a distinctive setting in which insiders can make private effort decisions after trading positions have been established. During an M&A deal, corporations in China voluntarily choose to suspend their trading for a relatively long period of time[2] immediately after an M&A announcement (Tian, 2019; Chen, Li, and Wei, 2017; He et al., 2019). During the suspension period, insiders can engage in private operational effort to intervene the deal's progress and thereby achieve a higher abnormal return than their position would afford prior to announcement of the deal and suspension of trading. Updated progress on the deal is released to the public one day prior to trading resumption. As a result, the outcome of the corporate insiders' private efforts during the suspension period becomes observable upon the second announcement and will be priced in as trading resumes. Hence, for non-insiders, one signal of the intrinsic quality of the deal is observed at the deal announcement and another signal of both the intrinsic deal quality and insiders' private efforts in the deal are revealed at trading resumption. Insider actions during the deal and information content reviewed at each phase will be further discussed in Section II when we formally introduce the institutional background.

Insider actions within a firm have been more thoroughly discussed in the corporate governance literature but have been less of a focus in insider trading studies. This is partly due to the aforementioned fact that it is empirically challenging for researchers, non-informed market participants, and regulators to directly observe insiders' private

[2]Trading suspension is similar to *trading halt* in the U.S. market. However, trading suspension in the Chinese market usually lasts from days to months, while U.S. market trading halts typically last for five minutes to an hour, and up to a maximum of ten days.

operational effort relative to a deal within the corporation. Outside participants only observe a noisy signal of the potential quality of the deal at the deal announcement, reflecting both the intrinsic quality of the deal and the outcome of insiders' private interventions. Even if regulators and non-informed traders could observe corporate insiders' trading activities through U.S. Securities and Exchange Commission (SEC) regulation, it is difficult to tell whether their trading activities are triggered by "cherry-picking" deals with superior quality, or by intentions to promote the deal for profitability. The expectation underlying our empirical approach is thus fairly straightforward: as quality-based and private-effort-based informed trading are separable in our distinctive setting, legislators and regulators could enforce trading laws to reduce insiders' private interventions in deals and illegal informed trading. Consistent with our arguments, the China Securities Regulatory Commission (CSRC) published two regulatory changes in 2011 and 2013, targeting, respectively, the private operational efforts of corporate insiders during major corporate transactions like M&A, and insider trading based on advance access to information. We apply an event study approach using these two regulatory changes as external shocks to the existing system in order to identify the underlying information content of the insider trades. Consistent with the intuition, we report that regulation of insiders' ability to trade quality deals reduces the predictability of deal completion by 0.8% per 1% increase in insider trading activities, while regulation of insiders' private effort reduces the probability of deal completion by 0.5% per 1% increase in insider trading. These findings suggest that insiders not only "cherry pick" deals that are more likely to be successful, but also engage in operational effort to promote deal completion for higher trading profits.

Unique to markets with a prolonged trading suspension mechanism, the duration of trading suspension, measured by the number of days between the suspension announcement and trading resumption, also demonstrate predictive power relative to deal out-

comes. While intuitively, one might expect that a longer suspension duration would be associated with weaker deals, we find that the suspension duration negatively predicts the probability of deal completion and abnormal returns even after controlling for deal quality. The predictive power of both deal-picking and operational effort on such deal outcomes also decays with the duration of the trading suspension. As negative associations are most prevalent among deals with a longer trading suspension period, deteriorating deal outcomes may suggest diminishing deal quality, decreased market valuation of the deal, or both. In addition, our test results show that financial constraints caused by prolonged trading suspension partially explain the drop in the probability of deal completion, but not the loss in abnormal return. The results seem to suggest that with a longer suspension, investor attention wanes, causing an under-reaction at resumption of trading, which explains the lower abnormal returns observed amongst deals with longer suspension periods.

Our paper contributes to the emerging literature on the informativeness of insider trading. In contrast to Biggerstaff et al.(2020), who focused on corporate insider efforts revealed by their after-hours trades on the stock market, we provide empirical evidence of private operational effort conducted by company insiders that would be nearly invisible to researchers without the unique setting of the Chinese market. Our paper is also related to Suk and Wang (2021), who studied the implications of insider trading activities on M&A outcomes. However, our focus differs in several ways. Suk and Wang (2021) examine insider trading one year before the M&A announcement, in which case insider trading profitability is derived from superior information on the long-term prospects of the target's fundamentals. In contrast, our study focuses on short-term and event-driven insider trading activities 10 days before the announcement. As discussed in Akbas et al.(2020), event-driven insider trades conducted by short-horizon insiders tend to be more informa-

tive.[3] The information privileges of our short-horizon insiders are three-fold: the time advantage (i.e., insiders learn about the deal prior to public announcement), the quality advantage (i.e., insiders have better information on the true quality of the deal) and the influence advantage (i.e., insiders can influence the firm's decisions and how the deal progresses). As a result, empirical findings in Suk and Wang (2021) regarding long-horizon insiders are interpreted as resulting from the superior quality of the target firms (quality advantage), while findings in our study are explained by both the quality advantage and by insiders' private operational effort and information leakage to the market (influence advantage). This difference of insider horizons also explains the discrepancy between our findings and those of Suk and Wang (2021) regarding firms' long-term performances, which will be discussed in detail in Section IV of this paper.

Another major difference between the two papers lies in the definition of insiders. Our paper studies the activities of informed traders who possess private information about the event and could potentially impose operational effort to influence the deal. Suk and Wang (2021) follow the legal definition of insiders specified by the SEC[4] and build their study solely on legal transactions disclosed by insiders as required by law. As a result, in combination with the difference in methodology, our findings emphasize the trading activities of illegal insiders who engage in private efforts to obtain short-term profits while Suk and Wang (2021)'s study applies to legal insiders with a long investment horizon.

We begin by characterizing insider trading activities in M&A in China.[5] Univariate evidence suggests that insider trading is positively associated with deal completion. In addition, high insider trading activities leads to higher cumulative abnormal returns

[3]The "short-swing" rule enforced by the SEC discourages most short-term profitability in the U.S market. In the absence of rigorous enforcement of the short-swing rule in China, short-term insider trading is still a prominent phenomenon in China's A-share market.

[4]As per the SEC, insiders here are usually defined as officers, directors, and those that hold more than 10% of any class of a company's securities.

[5]In our study, we use the PIN measure before suspension and discuss the difference between the before-suspension PIN and the after-resumption PIN in Section 5.2.

(CARs) around trading resumption for various windows of observation. Specifically, a 1% increase in insider trading raises the probability of deal completion by 6.67%,[6] and the 3-day CAR by 13.50%. These findings provide initial evidence that insiders trade more actively when the deal is more likely to be completed and more profitable. The significance of positive associations, however, can be the result of either insiders' private operational effort, or insiders' private signals of superior deal quality, or both, as implied by Collin-Dufresne and Fos (2015). To establish causality, we employ the event-study approach. We use the two changes to insider trading regulations as external shocks to the existing system: one impacting insiders' ability to engage in private operational efforts as operation-based traders, and the other impacting their ability to trade as information-based traders. We document that both regulations induce significant impacts on the likelihood of deal completion in the presence of insider activities, while abnormal returns around trading resumption respond more evidently to the regulation that limits insider access to trading than the regulation of insiders' private operational effort. These findings suggest that the positive association between insider trading and deal completion is the outcome of both insiders' privileged information on deal quality and private efforts to promote the deal; the accumulated positive abnormal returns are better explained by the intrinsic deal quality, and less by insiders' private effort. In addition, the duration of the trading suspension weakens the predictive power of insider activities for both deal completion and market reaction.

In addition to these main results, we extend our study further by examining the market impact of insider trading activities with respect to market efficiency and long-term performance. We show that contrary to the notion that insider trading activities enhance market efficiency (Aktas et al., 2008; Cornell & Sirri, 1992; Meulbroek, 1992), with active

[6] We apply a logistic model for the binary variable of deal completion. The marginal effect is $\hat{\beta}_{PIN} \times F(\bar{X}\hat{\beta}) \times \Big(1 - F(\bar{X}\hat{\beta})\Big)$ , where $F$ represents the (non-linear) logistic function. $\bar{X}$ and $\hat{\beta}$ relate to mean values of independent variables and estimated coefficients.

presence of retail investors, insider trading may lead to investor herding and deteriorate market efficiency. Meanwhile, with a short investment horizon, insider trading activities have no significant predictive power relative to acquirers' long-term performance. We also conduct a detailed discussion on the impact of institutional settings on interpretations of the *probability of informed trading* ($PIN$) measure. Specifically, we show that the impact of frequently-triggered price-limits, common in emerging markets, is asymmetrical before and after trading suspension.

This paper is organized as follows. In Section II, we describe the institutional setting of the trading suspension mechanism in China and develop our hypotheses based on previous literature. In Section III, we discuss the data sample. Results are presented in Section IV. In Section V, we extend our discussion beyond the core results. Some robustness tests are presented in Section VI. Section VII concludes the paper.

# 2 Institutional Background, Literature Review and Hypothesis Development

## 2.1 Institutional Background in Chinese M&A

The Chinese M&A market differs from that of the United States in several ways. To better illustrate the differences, we provide a timeline of M&A in each respective market in Figure 1. In the top panel, we provide a timeline of the M&A process in China. A corresponding timeline in the United States is provided in the bottom panel. For Chinese companies in Phase I, N days prior to the announcement date, a preliminary consultation is conducted between the acquiring company and the target. Investment banks are hired with a confidentiality agreement signed between parties. In this phase, insiders obtain private information on the existence of the deal and potential signals of the quality of the

deal. However, at this early stage, little private effort can be inserted to influence the deal. At Day 0, an announcement is made to the public for trading suspension regarding the potential M&A. From Day 0 to Day T, independent advisors, financial consultants, lawyers, and accountants are hired to provide professional opinions on the deal, including asset valuation and earnings forecast. Audited results will be presented at the first board of directors meeting, during which a plan for the upcoming M&A deal will be voted on. The plan for the M&A deal will be released to the public on the next trading day and trading is resumed.[7] We call this Phase II for an M&A deal. In Phase III, X days after trading is resumed, the deal will be closed, either as a successfully completed deal, or as a failed deal.

[Insert Figure 1 here]

Comparing the M&A process in the United States to that of China, the majority of the preparation, valuation, and negotiations are concentrated in the first phase for U.S. companies before Day 0 when the M&A announcement is made. Consistent with empirical evidence that share prices tend to run up before the M&A announcement (e.g. Meulbroek, 1992), insiders are less likely to engage in private operational effort for trading purposes once the deal is announced and the news has already been priced. As insiders choose to engage in private effort before the deal announcement in Phase I, the signals that non-insiders observe at the merger announcement are noisy measures, containing both information on the intrinsic quality of the deal and insiders' private effort. In contrast, for insiders in Chinese companies, the opportunity to engage in private effort occurs during Phase II. At the time of the suspension announcement, only an agreement on the intention of potential M&A is required. In fact, in our collected dataset of M&A in China, only 31.56% of the deals had declared M&A events at the suspension announcement,

[7] The description of the M&A process in China is based on Chen et al.(2017), on published regulations regarding reorganizations of Chinese listed companies (2008; 2014), and on interview with M&A advisors.

with the remaining 68.44% of deals confirming M&A within the 10 days following the announcement. The announcement and trading suspension at the early stage of the deal limits insiders' ability to engage in private operational efforts in Phase I. As a result, at the time of the suspension announcement, outside investors observe a signal with less noise from corporate insiders' operational activities.

During Phase II of the M&A transaction, when voting, pricing, and further negotiations between the acquirer and target company proceed, insiders could engage in private efforts to create further information asymmetry before trading resumes. One day prior to trading resumption on Day T-1, the updated deal progress is released to the public as a noisy signal containing both the intrinsic deal quality and insiders' private efforts. However, given the first signal of deal quality revealed on Day 0 at the announcement of suspension, outside investors can make inferences regarding insiders' private efforts.

We now consider the possibility that corporate insiders have more certainty regarding the deal and choose to engage in private efforts early in Phase I. In such cases, the signals at deal announcement become a mixture of the deals' intrinsic quality and insiders' private effort. Although we cannot identify such deals explicitly, we argue that such cases are more likely to occur among deals with a shorter suspension period. As the CSRC mandates suspended companies to provide a set of reports within a few days of trading resumption that involve the acquiring company, auditing and investment bank advisors, a shorter suspension period suggests that the acquiring company enters Phase II with a consistent view of the deal within the company and engages in greater effort toward deal completion during Phase I. For example, in the case of BTG Hotels acquiring 70% of Nanyuan Group's common equity, BTG Hotels was suspended for 2 days on June 23rd and 24th, 2014, and trading resumed on June 25th. It is unlikely in this case that all negotiations, valuations, and independent opinions were prepared within only a few days, nor could any insiders engage in private effort to impact the deal in a material manner.

Therefore, we exclude deals with a suspension duration in the bottom quartile to partially resolve concern relative to the timing of insiders' private efforts. Regression results based on the full sample are also available in Section VI for robustness.

Another advantage to use data from the Chinese stock market is the limited variety of insider trading channels. In developed markets, insider trading strategies can be employed with a variety of financial instruments and positions, such as combinations of long and short positions to achieve an effective net buy position (Agrawal & Nasser, 2012), options (Cao et al., 2005; Augustin et al., 2019), corporate bonds (Kedia & Zhou, 2014; Li & Galvani, 2021), and a combination of equity and options (Dai et al., 2017). In contrast, insiders in China have a limited choice of financial instruments.[8] Access to short sale was not granted until 2010 (Chang et al., 2014), with subsequent regulated access, up until a tightening of regulations following the 2015 market crash, which was heavily criticized by the public as a result of short selling (Riley & Chang, 2015). The concentration of insider trading in equity market, dominated by the net long position, allows our research to capture a significant portion of insider trading activities in the market.

## 2.2 Literature Review and Hypothesis Development

It is well documented that insiders trading occurs in many financial markets (Bhattacharya & Daouk, 2002; Bris, 2005). Earlier researchers like Jaffe (1974), among others, document the existence of such traders who possess superior information, based on which they make trades. Agrawal & Nasser (2012) suggest that informed traders would increase their net purchase for about a one month period prior to the merger announcement and then net sell after the announcement. The existence of the suspension period and daily price limits in Chinese stock markets introduces more uncertainty for market insiders.

[8]The Chinese market currently does not allow option trading for individual corporate stocks on exchanges. The OTC market for options on corporate stocks was not available until 2016. Corporate bond market is represented by commercial banks' counter sales, which lack the essential liquidity for corporate insiders (Zhang, Huang, and Wang, 2019; Asian Development Bank, 2019).

Subject to the daily price limits in the market (which usually have a negative effect on liquidity), an informed trader would usually demand an extended period to build a net long position before the suspension announcement date. The profitability of the trader's position cannot be realized until trading resumes, as the suspension period could be days, weeks, or even months long.[9] Meanwhile, one day prior to the trading resumption date, the market also receives updated information on the status of the deal. If the market perceives a negative signal regarding deal completion, the market reaction on the first day of trading resumption may be less desirable for informed traders. Hence, to obtain relatively stable profits, informed traders are motivated to select deals with a higher probability of successful completion, or even assist in the deal negotiation process, such that a positive signal is released prior to trading resumption.

However, given the trading suspension, the effect of insider involvement on deal completion remains vague. Trading suspension right after deal negotiation in the early stage (Phase I) is usually associated with delayed informed trading and better private information contention. Consistent with this argument, prior literature shows that trading based on material non-public information imposes additional costs on the deal. For example, Meulbroek & Hart (1997) demonstrate that the takeover premiums for deals with detected illegal insider trading are approximately 10% higher. The prevalence of insider trading activities also signals weak corporate governance of the acquiring firm, as a well-established corporate governance system is expected to discourage insiders from exploiting their private information (Dai et al., 2016). In a study with a global sample of M&As, Moeller & Sarikas (2009) reported that only 49% of leaked deals are completed, while 72% of non-leaked transactions are completed. The higher external cost caused by

[9]The existing literature (e.g. Dodd, 1980; Schwert, 1996; Smith & Kim, 1994) suggests an insignificant price run-up in acquirer shares, which limits the timing for insiders to capitalize on their profits. It is possible for insiders to capitalize on their profits before the suspension announcement. However, this is more legally risky, as all registered corporate insider transactions in the 6-month period before the deal announcement will be closely scrutinized by regulators.

insider trading may dampen the probability of successful completion of the deal.

The overall contribution of insiders to successful completion of the deal is therefore unclear. Preliminary evidence suggests a positive correlation between a deal's successful completion and insider trading prior to a suspension announcement. Hence, we propose Hypothesis 1a to further test the effect of the presence of insider trading.

> *H1*a: *All else equal, a deal with more illegal insider trading activities has a higher probability of being completed.*

While the correlation between insider trading and merger success rates are positive and significant, the causality in the relationship remains equivocal. The positive association could be explained by informed traders acting only on deals that are more likely to be completed, or as the result of insiders' interventions on deals they have built a position on. To determine causality and distinguish between the two effects, we use an event study approach based on two legal reformations of insider trading in China during the period of 2011 to 2014. Insider trading laws were established in China in 1993, and the level of enforcement has varied over time (Peng et al., 2017; Bhattacharya & Daouk, 2002). In 2011, the CSRC, along with the Supreme People's Court of the People's Republic of China, published a memoir on identification of the legal liabilities of corporate insiders. The major impact of this regulation is an inverted presumption of innocence. That is, unless a corporate insider can provide evidence that they fulfilled their responsibility without involvement in insider trading activities, they will be considered guilty. This memoir indicates a significant increasing effort in law enforcement relative to insider trading, especially relative to corporate insiders' private operational effort. The number of convicted cases of insider trading increased by 21.4% in 2011 (Peng et al., 2017). Thus, if the relationship between insider trading and deal completion is the result of insiders' private effort, we expect to see the positive relationship weaken after 2011.

Similarly, in 2013, another interpretation of the law was published by the supreme court,[10] providing a unified extended definition of corporate insiders (Li, 2015). This regulatory shock should negatively affect insiders' ability to trade based on private information (Peng & Xiao, 2018). In their recent work, Huang & Zhang (2019) document an increase in the expected cost of insider trading after the 2013 regulation. Given the regulatory shock, even if insiders' ability to identify the deals more likely to be completed remains static, insiders are less likely to trade based on privileged information if there is greater legal risk. We therefore propose hypotheses H1b and H1c to include the impact of regulatory changes in our study.

> *H1b*: *All else equal, the positive relationship between illegal insider trading activities and the deal success rate is weakened after 2011.*
>
> *H1c: All else equal, the positive relationship between illegal insider trading activities and the deal success rate is weakened after 2013.*

The extant literature documents the positive abnormal returns around deal announcements in the United States (e.g. Fried, 1998; Rozeff & Zaman, 1988). We do not expect this to differ in our study, given the motivations of insider trading. Similar to Hypotheses 1c, we also expect the insider trading regulation in 2013, which explicitly limited insiders' ability to build a position prior to a merger announcement, to weaken the relationship between informed trading and short-term abnormal returns. Hypotheses H2s are formally proposed as following:

> *H2a: All else equal, deals with more illegal insider trading activities experience higher abnormal returns after trading resumes.*

[10] Interpretation of the Supreme People's Court and the Supreme People's Procuratorate on Several Issues Concerning the Specific Application of Law in the Handling of Criminal Cases of Engaging in Insider Trading or Leaking Insider Information.

*H2b: All else equal, the positive relationship between illegal insider trading activities and abnormal returns is weakened after 2011.*

*H2c: All else equal, the positive relationship between illegal insider trading activities and abnormal returns is weakened after 2013.*

Our paper contributes to the growing literature on the informativeness of insider trading. More specifically, our paper expands on Biggerstaff et al. (2020), who also studied the information content of corporate insiders. However, we contend that profit-seeking insiders not only increase their information advantage through trading, but also via operational efforts. The work of Biggerstaff et al. (2020) focused on external effort observable to researchers through their trading activities, while our paper focuses on internal effort otherwise invisible to researchers within the current institutional setting in the U.S. We also contribute to the fast-expanding body of studies on emerging financial markets. Our study suggests that an extended trading suspension period, which was initially designed to avoid excessive volatility during major transactions, helped regulators to enforce insider trading laws more effectively, as insiders' operational effort became more evident in the scheme. Another contribution of this paper focuses on the probability of deal completion. Given the uncertainty involved in mergers, a few factors demonstrated consistent predictive power on merger outcomes (Aktas et al., 2016a; Renneboog & Zhao, 2014; Cuñat et al., 2020). We show that measures of insider trading activities predict the probability of deal completion through the deal quality channel.

# 3 Data

Our data on Chinese M&A deals,[11] insider trading, stock performance, and firm- and market-level data are collected from various sources. We first collected information on M&A deals from Wind Financial, with hand-collected high-frequency trading data book-

[11] We also include acquisition of major assets that are materially significant.

ending the M&A suspension announcement dates for the period of 2006 to 2018. Since our study focuses primarily on the stock performance of the acquirer, we then obtained firms' stock returns and fundamentals, as well as industry-level data, and corresponding market data from the China Stock Market & Accounting Research Database (CSMAR). The merged dataset contains 1768 M&A deals dated from March 2006 to June 2018, with high frequency data ranging from day -10 to +5 around the M&A suspension announcement date. For this study, we retained 1667 out of 1768 deals with acquiring companies. On average, acquirers experienced a positive abnormal return of 0.12% over the three-day period immediately after trading resumption. Moreover, approximately 65% of the deals were successfully completed. On average, the long-term performance of the acquiring company one year after the acquisition was only 0.3% after adjusting for risk factors. Summary statistics on the collected M&A deals are presented in Table 1.

[Insert Table 1 here]

We then retrieved confirmed cases of insider trading from the announcements of the China Securities Regulatory Commission (CSRC).[12] One hundred deals announced by the CSRC involved illegal insider trading while the remaining 1567 events could possibly be a mix of incidents of insider trading not yet confirmed or announced by the CSRC and deals without any insider trading. Given the possible existence of unconfirmed cases of insider trading, we needed to find a measure that could capture such information asymmetry carried out by insiders. Previous studies have proposed several measures to identify information asymmetry in financial markets, including the probability of informed trading (PIN)[13] (Easley et al., 1996), the Kyle model (Kyle, 1985), the conditional probabilities of an informed event (CPIE) (Back et al., 2018) and the Hasbrouck measure (Hasbrouck,

[12] http://www.csrc.gov.cn/pub/zjhpublic/index.htm?channel=3300/3313

[13] We are conscious that the informed trading measure, *probability of informed trading* (PIN), captures both (illegal) insider trading and (lawful) informed trading. However, because only illegal insider trading is affected by financial market regulation, our event study analysis leans toward insiders. Hence, throughout the paper, we consider the PIN to be an insider trading measure.

1991a; Hasbrouck, 1991b). We first tested the recent CPIE measure developed by Back et al. (2018). The CPIE measure is developed from both a PIN model that captures order flow and Kyle's model that strongly emphasizes price impact. However, unlike studies with U.S. data, our study finds that the predictive power of the CPIE measure is weakened by the daily price limits in Chinese stock markets.[14] Figure 2 shows that PIN can successfully distinguish identified and unidentified insider trades, while the CPIE cannot. Given the presence of daily price limits, it would distort the effectiveness of measures using price information (e.g. Back et al., 2018; Hasbrouck, 1991a, 1991b; Kyle, 1985). We also conduct a detailed ex post discussion on the effectiveness and behavior of PIN in Section 5.2. Hence, we use the PIN measure in our study, as proposed by Easley et al. (1996).

[Insert Figure 2 Here]

To control for other firm-level, deal-specific characteristics, we also extract information on the relatedness of the acquirer and target and the dates of decision and meeting related to M&A deals from companies' announcements listed on the websites of the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE). For parties that are not listed companies, information about the industry codes is based on information from Wind Financial Terminal and prepared according to "Guidelines about industry classifications of listed companies (version 2012)".[15]

As noted in Li et al.,(2017), Chen et al.(2017) and Peng & Xiao (2018), a distinguish feature of Chinese corporations is the State-Owned-Enterprise (SOE). We define the SOE status of a company based on the controlling owners' data from HiThink Data Service. We identified 444 companies that are SOEs. A complete list of all variables can be found

[14] In most cases, the daily price limits in Chinese stock markets are ±10% of the previous closing price. For stocks with special treatment, such limits are ±5%.

[15] Guidelines for the Industry Classification of Listed Companies (2012 Revision), http://www.csrc.gov.cn/pub/zjhpublic/G00306201/201211/t20121116_216990.htm

in Appendix A.

# 4 Empirical Results

## 4.1 Univariate Evidence

We begin with an examination of a set of variables predicted by previous literature to be associated with insider trading activities. The set of variables includes short-term stock-price reaction to merger announcement after trading resumption (*CAR(0,+1)*, *CAR(0,+3)*, *CAR(0,+5)*), short-term abnormal return before and after trading suspension (*CAR(-1,+1)*, *CAR(-3,+3)*, *CAR(-5,+5)*), market efficiency upon trading resumption (*Variance Ratio* and *Autocorrelation*), and long-term performance of the firm (*LT Performance*). The results are summarized in Panel A of Table 2. After trading resumption, short-term stock prices positively significantly react to the merger announcement. Similar results are also found for short-term abnormal returns before and after trading suspension with various windows of CARs. Both results suggest a net gain for insider traders around merger announcements. However, the market efficiency measured by variance ratio and autocorrelation declines after trading resumption. Our explanation is that when trading resumes, one-sided buy- or sell-pressure creates autocorrelation in trades and makes the price process deviate more from random walk. We do not find significant univariate evidence between the PIN and a firm's post-merger long-term performance.

[Insert Table 2 Here]

Panel B of Table 2 reports cross-sectional means for the set of measures before and after the two aforementioned regulatory events. As discussed in earlier sections, significant drops are observed in post-resumption market reactions and short-term abnormal returns across different windows both in the full sample and within the group of deals where the probability of insider trades is high. As insider trading only exists in some deals, we

expect the two regulations to affect a subset of deals with higher probability of insider trading activities. Thus, no significant change was observed within groups with medium and low levels of insider trading. Within the group with a high level of insider trading, abnormal returns decreased by 15.2% on average over a 3-day period after the 2011 regulation restricting insiders' private operational efforts. Another similar drop of 5.9% in 3-day abnormal returns can be observed again in 2013 when new regulation of insider trading access is put in place. For long-term firm performances, the 2011 regulation shows an improvement on firm performances of 1% for up to two years, suggesting that insiders' private operational efforts prior to the regulation diminish long-term firm values. Meanwhile, we do not observe significant impact on long-term performance with the 2013 regulation, which solely focuses on limiting insider access to trading.

## 4.2 Regression Analysis

### 4.2.1 Insider Trading and Deal Outcomes

Given the positive association between insider trading and positive short-term market reaction, and deteriorated market efficiency, we investigate whether this positive association persists after controlling for sets of variables that affect deal completion and market reaction. Specifically, we estimate the following model for deal completion:

$$f\left(IsCompleted_i = 1\right) = \frac{exp\left(\theta_i\right)}{1 + exp\left(\theta_i\right)}, \tag{1}$$

$$\theta_i = c + \delta_1 PIN_i + \delta_2 PIN_i * \mathtt{1}_{reg} + \delta_3 * \mathtt{1}_{reg} + \Pi^{'} M_i + e_i, \tag{2}$$

where $IsCompleted_i$ is a bivariate variable that takes the values of 1 or 0 to indicate whether the deal is completed or not, $PIN_i$ is the average 10-day PIN before suspension and $\mathtt{1}_{reg}$ is a dummy variable that takes the value of 1 if event occurs after the 2011

or 2013 regulation. Lastly, $M_i$ is the vector of other independant variables for event $i$. Following Cohen et al. (2012), we control for firm size, book-to-market ratio, and leverage of the acquiring company. Prior literature suggests that the cumulative abnormal return of bidders in all-equity deals differs from all-cash and mixed-payment deals in a significant way (e.g. Betton et al., 2008; Bradley & Sundaram, 2009). Thus, we also control for the type of payment used in the deal. Since the Chinese stock market is different from the U.S. market, we include a set of control variables unique to Chinese stock market studies, including whether the firm is an SOE (state-owned enterprise), whether the deal is a related deal within the same group, the concentration in the industry (HHI), and the acquirers' performance before the trading suspension. We also control for market level of liquidity prior to trading resumption (Lending rate) and market performance during trading suspension to capture the portion of the acquirers' abnormal return caused by the strong momentum, and changes in the overall market condition.

Regarding the short-term market reaction to the PIN, our estimate model is:

$$Performance_i = c + \delta_1 PIN_i + \delta_2 PIN_i * \mathtt{1}_{reg} + \delta_3 * \mathtt{1}_{reg} + \Pi' M_i + e_i \tag{3}$$

where $Performance_i$ relates to short-term performance and efficiency for event $i$. $PIN_i$, $\mathtt{1}_{reg}$ and $M_i$ share the same definitions as in equation (2). Deal success controls are the set of control variables unique to deal completion.

To establish causality, we use an event-study approach. As discussed in Section II, the 2011 and 2013 regulation changes caused exogenous shock to the established relationship between insiders and their ability to engage in private effort, and trading based on a private signal of deal quality. The results are presented in Table 3.

[Insert Table 3 here]

In Table 3 columns (1) to (3), we present the regression results with the success of the deal (1 for completed deals and 0 for failed deals) as the dependent variable. Column (1) reports the baseline regression results without controls for any regulatory shock. In contrast to our null hypothesis, the coefficient estimation of the PIN is positive, but not significant. This finding is then explained by the results in columns (2) and (3), which include the 2011 regulatory restriction of insiders' private effort and the 2013 regulatory change to insiders' access to the capital market, respectively. For both columns, the coefficients of the PIN are significantly positive, as well as the dummy variables for the 2011 and 2013 regulatory shocks. The positive coefficients are then offset by the negative and significant coefficient estimation of the interaction terms between the 2011 and 2013 regulatory shocks and the PIN, which explains the lack of significance in our base model.

The results in columns (2) and (3) suggest that insider activities positively predict deal completion before regulation intervention, but this predictive power is negated after regulations limit insiders' private effort and access to capital market in 2011 and 2013. With a 1% increase in PIN, deals are 12.28% and 10.96% more likely to be completed before the 2011 and 2013 regulations, respectively. After specified regulatory shocks, the probability of completion drops by 0.5% and 0.8% for each 1% increase in PIN. This result is robust after controlling for a set of related variables in the M&A literature, as well as controls unique to the Chinese M&A market. The negative effect of the PIN on deal completion after regulatory shocks is consistent with the argument that acquirers with weaker corporate governance are more likely to underperform and fail (Masulis et al., 2007; Aktas et al., 2016b; Renneboog & Vansteenkiste, 2019). These findings are consistent with our hypotheses 1b and 1c, suggesting that insiders will choose to act on deals that are more likely to be completed based on private information, as well as engaging in private effort to facilitate deal completion.

Deals with cash-payment are 11.89% more likely to be completed, consistent with

the findings in Huang et al. (2016). Another popular control for studies on the Chinese market is the level of SOE. We do not find evidence for an association between government ownership and the completion of a deal.

In Table 3 columns (4) to (6), we present the regression results for informed trading and abnormal returns. The coefficient estimation of the PIN is positive and significant in the base model in column (4). With a 1% increase in PIN, the 3-day CAR increases by 12.2%. The positive association between the PIN and CAR is significant at the 1% level up to 11 days before and after the suspension announcement date (5 days prior to the suspension date, and 5 days post the trading resumption date). To further confirm our findings, we also controlled for the firm's level of return before the suspension announcement (Prior Performance), the level of overall market return during the suspension period (Suspension Period Market Return), and the company's information release on the day of suspension (Mentioned). We find that information release on the day of suspension is negatively associated with abnormal returns. Deals that reveal key M&A information on the day of suspension experience 0.02% lower abnormal return 1 day after trading resumes, or a loss of 0.019% per day for up to 5 days following trading resumption.

Next, we consider the results of short-term abnormal return given two regulatory shocks. In columns (5) and (6), the coefficients of 2011 and 2013 regulation dummies are both significantly negative, along with positive and significant interaction terms. The negative and significant coefficients of regulation dummies confirm our arguments with univariate evidence, supporting the fact that both regulations effectively reduce the abnormal returns enjoyed by insiders. The positive coefficients of the interaction terms, however, indicate that deals with a higher PIN, and therefore more insider trading activities, experience higher abnormal returns, and thus increased insider trading returns. This finding may by explained by insider "cherry-picking". With increased legal risk after regulations, informed traders tend to trade only when they know that trading is more

likely to be profitable, which is consistent with the notion that in M&A deals, some informed traders (either individuals or financial institutions) take advantage of private information and engage in trading based on such information (Dai et al., 2017).

Our results in deal completion and CAR are in accordance. The 2011 regulatory shock on insiders' private effort caused significant disturbance in the predicting power of insider trading relative to deal completion, and also showed strong but lower impact on the predicting power of abnormal returns. These results suggest that corporate insiders do engage in private effort to improve the likelihood of deal completion, which improved the CAR they received from insider activities. With the 2013 regulatory shock, after the tightening of access to trading, the association between insider trading and deal completion, as well as abnormal returns, was dampened. This is consistent with our argument that insiders capitalized on their privileged information about the quality of the deal before 2013.

### 4.2.2 Suspension Duration

We will now further extend our discussion to the duration of the suspension period. We define the suspension duration as the number of trading days between trading suspension and trading resumption. This variable of critical interest is unique to the Chinese M&A market, as it typically lasts anywhere from days to months. The shortest suspension duration in our sample is one day, and the longest duration, in the case of Wasu Media Holding Co., Ltd. (Ticker: 000156), is 1594 days. The average number of suspension days is 87, with a median of 73 days. A preliminary test showed that suspension duration is negatively correlated with both the probability of deal completion (-0.068) and abnormal return (-0.067). Suspension duration was included in our previous models as a control variable. Results are shown in Table 3.

In Table 3, the coefficient estimates of suspension duration are found to be negative

and significant at 1% in almost all models except for column (1), which suggests that a longer suspension duration would lead to a lower probability of deal completion and lower abnormal return after resumption of trading. While it seems intuitive that a longer suspension duration may suggest weaker deals and hence lower abnormal returns, it is noteworthy that the negative significant relationship persists even after controlling for deal quality variables. This finding is consistent with the literature on investor attention, conjecturing that as investor attention on individual stocks wanes, the stocks tend to experience less abnormal returns after major corporate events (Griffin & Tversky, 1992; Peng & Xiong, 2006; Schmidt, 2019). We argue that in the context of our study, as deals go further into suspension, investor attention to the firm plummets due to investor distraction, and investor under-reaction peaks when firm trading resumes. An alternative explanation to the finding on suspension duration would be financial constraints. A prolonged suspension period would limit a firm's access to the public equity market.[16] A loss in firm value in the form of reduced post-resumption return seems natural in this case, as firms may have experienced financial constraints during suspension. Thus, we follow Whited & Wu (2006) and Huang et al. (2016) to construct the Whited-Wu index (WW Index) to proxy for firm-level financial constraints during the suspension period. We include the WW Index as an additional explanatory variable. Our second approach to capture the effect of financial constraints follows Hadlock & Pierce (2010). Specifically, we construct the Hadlock and Pierce Index (HP Index) which is based solely on firm characteristics.

[Insert Table 4 here]

We report estimation results in Table 4. While financial constraint does demonstrate some impact on the probability of a deal's successful closure, it fails to explain the

[16] Companies in suspension can only raise equity with the SEO in private placement; however, private equity is more costly than public equity (Brav, 2009).

short-term abnormal return. The coefficient of the PIN and suspension duration remains unchanged and significant. The results thus rule out the alternative explanation that the value loss is the result of financial constraints.

# 5 Extended Discussion

## 5.1 PIN Value and Daily Price Limits

Given the growing literature on insider and informed trading, the PIN measure has been the subject of increasing attention and discussion. In the context of our study, price limits distort the effectiveness of measures using price information (e.g. CPIE in Back et al., 2018) while keeping the validity of the PIN intact. The interpretations of the PIN, however, are affected by price limits, especially after trading resumption when both previously informed and non-informed traders rushed into the market to trade after the M&A announcement. In this section, we will conduct a detailed examination of changes in PIN previous to and post regulatory events, and before trading suspensions and after trading resumptions, respectively.

In Table 5, we present the results for the equality of mean tests on the PIN before and after regulatory events. We first split PINs into two sub-groups by time: PINs before trading suspension and PINs after trading resumption. We separate these PINs for two reasons. First, the information content of PINs before suspension and after resumption differs dramatically, as the market level of information asymmetry was significantly reduced after the suspension announcement and press release. Second, the distortion of information caused by daily price limits is more pronounced during the latter period. For the period before trading suspension, on average, only 2.40% of transaction prices are bounded by price limits, with peak value one day prior to trading suspension at 4.6%. In contrast, for the period after trading resumption, 37.15% of transaction prices are

bounded by price limits on average, with peak value on the day of trading resumption at 72.95% and quick decay over time. The implications of this observation are important, as the values of the PIN for the latter period cannot be interpreted alone, absent the effects of price limits. While this finding does not affect the main findings of our paper, which focuses primarily on insider behavior in the earlier period, it is still intriguing and necessary to discuss the performance of the PIN in the latter period, as price limits exist in many economies. To further control for the level of informed trading caused by variations in deal quality, we sort M&A deals into terciles by their synergies (*Low/Medium/High Quality*[17]) before and after regulatory shocks. As we expect the interpretations of the PIN to differ in the two periods, for the rest of this section we will discuss the changes in PIN in these two periods separately.

[Insert Table 5 here]

We will begin with the first period before trading suspension. As transaction prices bounded by price limits are not commonly presented in this period, the interpretation of the PIN is identical to those in the existing literature where price limits are less of a concern. The PIN is interpreted as a measure of the probability of informed trading and mainly captures information asymmetry: a higher PIN indicates more insider trading activities. As regulatory shocks were introduced in 2011 and 2013, Table 5 shows that almost all PINs across different groups of deal qualities decrease (except for an insignificant increase in the medium quality group relative to the 2011 regulatory shock), suggesting a decrease in insider trading activities after regulation, which is consistent with the literature on insider trading law and finance.

For the period after trading resumption, because there is a news release just before resumption, our PIN is affected by the release-based herding trades and daily price limits, which bounded the trading price within *±10%* of the last closing price during the entire

[17] As in literature, we measure synergy as post-resumption total 5-day short term return.

trading day. Mathematically, the PIN measure is based on imbalanced orders, however, in the case of price limits, we identify the direction of trades according to the over-supply or over-demand at the price limits. For example, when trades occur at the upper price limit, we consider all trades to be buy-initiated because of the over-demand for stocks, which quickly accumulates imbalanced order flows and hence, increases the PIN. This phenomenon is evident in Figure 2, in which post-resumption PINs are significantly higher than pre-suspension PINs.

Now we will consider the joint effect of both price limits and insider activities. Right before resumption, all market participants received the same signal from announcements of progress on the deal, but corporate insiders still enjoy an informational advantage with knowledge of the true levels of deal quality and private effort. Intuitively, when an insider engages in effort relative to the deal during suspension, they know that the deal is actually not as appealing as it may appear. Thus, they tend to trade in the opposite direction, against previously non-informed investors, to lock in their profits. As a result, the presence of insiders will supply an opposite force to trades in the market and reduce the amount of imbalanced order flow accumulated from daily price limits, leading to a lower level of PINs. This effect can be observed from Figure 2, in which PINs for deals with insider trading activities after trading resumptions are lower than deals without confirmed insiders.

Similarly, as the regulatory shocks introduced in 2011 and 2013 limit insiders' access to the capital market and engaging in private effort, we would expect the PINs post resumption to increase after regulatory shocks, as the moderating effect of insider order flow evaporates. Table 5 shows that, as we expected, the post trading resumption PINs in the high-quality groups significantly increased. This finding is prominent among high-quality deals only, because insider trading profits among medium- and low-quality deals may not be sufficient to overcome the legal risks involved in insider trading. In addition,

it is harder to make low- and medium-quality deals appealing to a non-informed audience.

## 5.2 Market Efficiency and Long-term Performance

Another interesting topic in respect to market reaction to insider trading activities is the impact of insider trading on market efficiency, and its implication on long-term firm performance. As an extension, we repeat our exercise using short-term efficiency and long-term performance as dependent variables. The results are displayed in Table 6 below.

[Insert Table 6 here]

Column (1) and (2) represent the result for market efficiency, as proxied by variance ratio and autocorrelation (Lo & MacKinlay, 1988; Campbell et al., 1997). In contrast to empirical evidence suggesting that insider trading activities enhance price discoveries (Cornell & Sirri, 1992; Meulbroek, 1992), we find the exact opposite. For each 1% increase in PIN, we document an 8.8% increase in variance ratio and a 6.9% increase in autocorrelation, both indicating deteriorated market efficiency. This finding may be explained by the differences between investor structures in the United States and in China. While the U.S. market is dominated by institutional investors, the Chinese stock market is crowded by retail investors with a shorter investment horizon and greater cognitive capacity constraints. Given the significant proportion of retail investors in the Chinese stock market, after trading resumes, retail investors herd in response to the abrupt resumption price trend (Alhaj-Yaseen & Rao, 2019; Froot et al., 1992) and create persistent one-sided buy or sell pressure, which further results in autocorrelation in trades and deviation of price from random walk (Bikhchandani & Sharma, 2000). Column (3) and (4) demonstrate the results for long-term stock performance one- and two-year after trading resumption. In contrast to existing literature using U.S. data (e.g. Mitchell &

Stafford (2000); Loughran & Vijh (1997); Suk and Wang (2021)), our finding is similar to that of Bradley & Sundaram (2005), suggesting no significant association between insider trading and long-term performance of the firm. This finding remains intact as we extend the window to up to three years after trading resumption. The non-significant result is also in accordance with our earlier argument that our study focuses mostly on short-horizon insiders with information-driven rather than fundamental-driven trading strategies as in Suk and Wang (2021).

# 6 Robustness Tests

To further examine our results, we conduct robustness tests and present the results in this section. In Section 2, we discussed the timing of corporate insiders' private effort. To implicitly exclude deals where insiders choose to act in an earlier phase of the deal and generate a noisy signal at the suspension announcement, we exclude firms in the bottom quartile of suspension duration in our main results. In the first robustness test, we present our results including deals from the bottom quartile of suspension duration. The results are presented in columns (1) and (2) of Table 7.

[Insert Table 7 here]

The sign and significance of the PIN, our main variable of interest, as well as suspension duration, remain identical to our main results. The natural logarithm of the firm's total assets and book-to-market ratio also remains significant at the 1% level. To further test the robustness of our results, we also present the results of alternative definitions of CAR as a measurement of short-term performance. Columns (3) and (4) present the regression results with a 5-day and 11-day CAR as the dependent variable. In column (5), the dependent variable is the 3-day CAR measured as a return in excess of the actual market return instead of the Fama-French three-factor model. All coefficient estimates

remain similar, except that in column (4), the coefficient estimate of the PIN has the same sign but is only marginally significant at the 10% level. The loss of significance is well expected, as the influence of insider trading decays with the passage of time. In fact, in column (5), despite the consistent predictive power of *Suspension Duration* and *Transaction Percentage*, deal-specific explanatory variables lost their predictive power, while market-wide and firm-specific characteristics, such as *Lending Rate* and *Prior Performance*, demonstrate strong predictive power.

As we discussed in Section 3, while we use the PIN as a proxy of insider trading, the PIN measure is also widely used as a proxy for informed trading including both illegal and legal trading activities. In columns (6) and (7) of Table 7, we replace the PIN with the dummy variable Insider Trading, which is given a value of 1 if the deal is confirmed by the CSRC to be a case involving insider trading, and 0 otherwise. This measure is an ex-post indicator of insider trading activities and may be subject to a greater probability of a Type II error than the PIN measure. In columns (6) and (7), we report the results using the Insider Trading dummy variable as a proxy for insider trading. In column (6), for the logit model using the deal's completion as a dependent variable, almost all explanatory variables lose their predictive power. In column (7) with the 3-day CAR as the dependent variable, the results are in line with our main results with marginal significance given the small number of observations.

In their recent work, Suk and Wang (2021) report a positive association between insider trading and long-term performance when 3-year operating performance is used as the proxy. We repeated the test on long-term operating performance using our model and find no significance across most proxies for operating performance at various time horizons. We present the regression result with operating income as a proxy for operating performance in column (8) of Table 7. The absence of predictability in long-term performance in our data is consistent with the notion that insiders in our study have a

short investment horizon and are driven by a transitory information advantage over the public.

It is also noteworthy that we include both SOE and SOE Percentage in our regressions, in which SOE is a dummy variable equal to 1 if the firm is identified as a state-owned enterprise and 0 otherwise, and SOE Percentage is the percentage of state-owned shares of the firm. We include the SOE dummy as a standard set of control variables given the unique status, privileges and regulations imposed on state-owned enterprises. The variable SOE Percentage is included as a proxy for regulated industry. While utilities and financial industries are heavily regulated in the Chinese market, other industries such as aerospace and telecommunications are also under tighter regulation than their peers in other markets. Hence, in this case we use the percentage of state ownership as a proxy for the level of government intervention. Since neither the SOE nor the SOE Percentage demonstrated significant predictive power, alone or combined, we retain both variables in our models, given their prevalence in existing studies on the Chinese market.

# 7 Conclusion

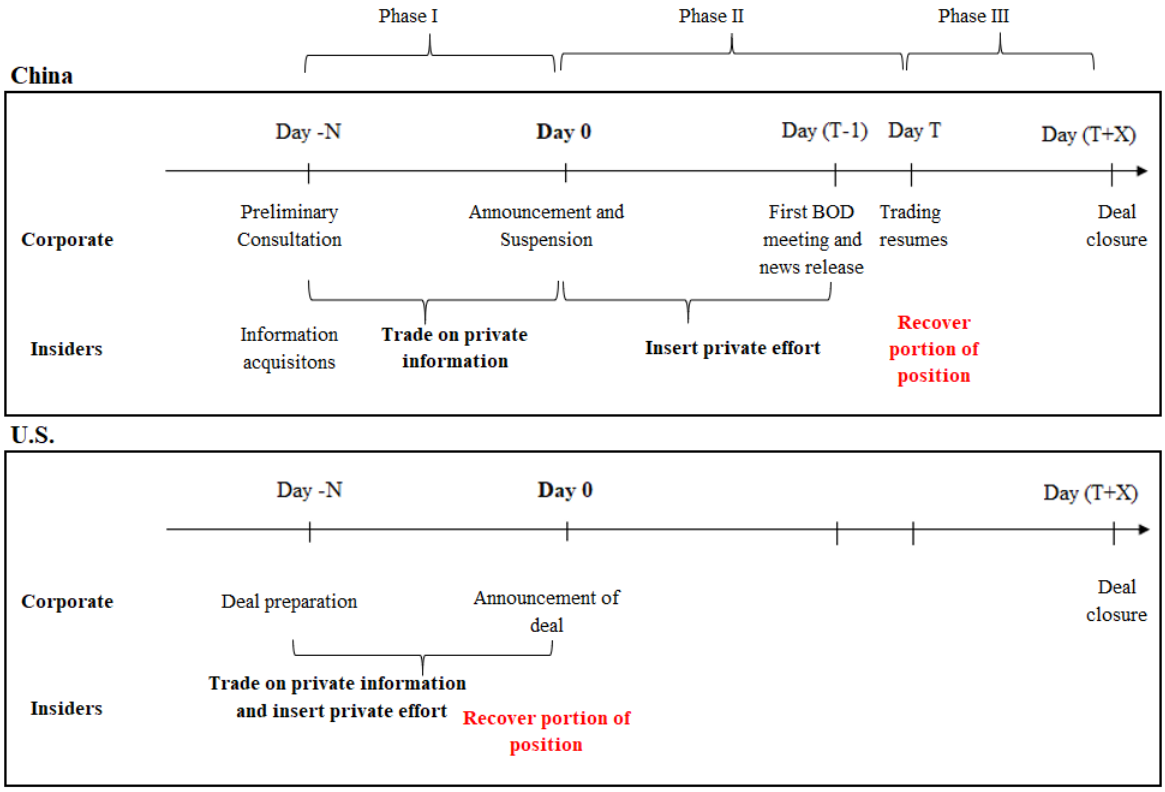
Our study provides new insights on informed trading activities by corporate insiders. Following the intuition that corporate insiders would maintain and increase their information advantage to achieve higher insider trading profits, we exploit the unique setting of trading suspension in China, to identify separate windows of insiders' private operational effort and insiders' trading activities. We first analyze the associations between insider trading activities and a set of established deal outcomes, including post-trading-resumption short-term performance and successful deal closure. Next, to establish causality, we use an event study approach with two regulatory shocks in 2011 and 2013, targeting insiders' private operational effort and trading activities, respectively. After controlling for a set of control variables, with each regulatory shock we observe decreased

association between insider trading and deal outcomes, suggesting that corporate insiders not only choose to trade on deals that are more profitable, but also engage in private efforts to affect deal outcomes and achieve higher trading returns. Our results contribute to the existing literature on the information content of insider trading activities.

We extend our study to the relationship between trading suspension duration and deal outcomes. Our finding is consistent with the literature on investor attention, suggesting that deals with longer trading suspension periods during M&A tend to experience less abnormal returns due to loss of investor attention. We also conducted a detailed discussion on the choice of PIN as a proxy for insider trading activities in China where there are daily trading price limits. Our results suggest that the PIN measure should be interpreted differently before trading suspension and after trading resumption.

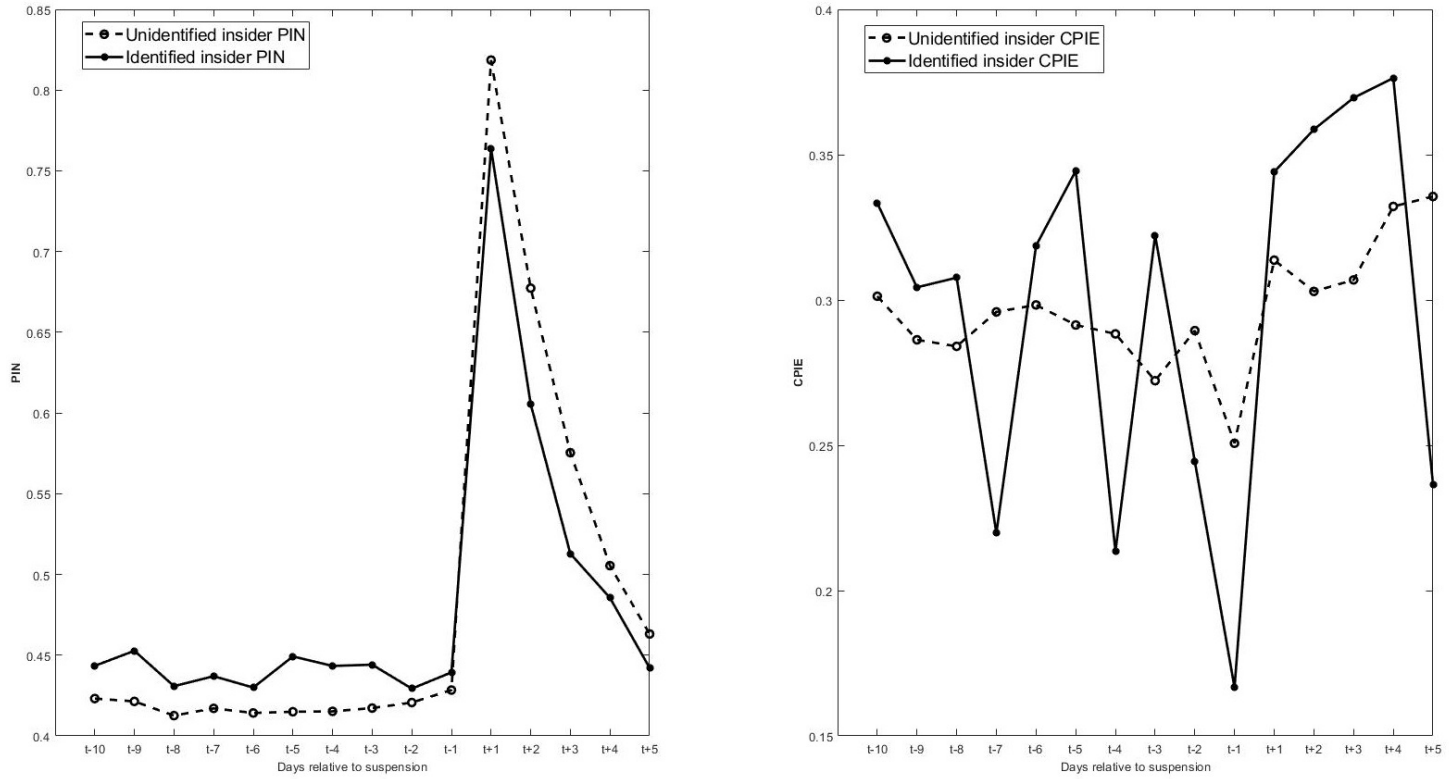
For future study, the transaction-level data of identified corporate insiders with direction of trading would allow more accurate interpretations of the information content of insider trading activities.

Figure 1: Timeline for M&A in China and United States




The figure presents the differences in M&A timeline of Chinese and U.S. stock markets.

Figure 2: Identified Insider Trading PIN/CPIE Vs Unidentified Insider Trading PIN/CPIE Around Suspension




The figure presents the differences of PIN/CPIE in identified and unidentified insider M&A deals.

Table 1: Summary Statistics

This table presents the descriptive statistics of all variables used in this paper. Panel A contains continuous variables and Panel B shows statistics of dummy variables. The sample consists of 1667 suspensions in China from March 2006 to June 2018. Q1, Q2, and Q3 relate to the first, the second, and the third quartile, respectively. All variable definitions are given in Appendix A.

| Panel A | | | | | | |
|---|---|---|---|---|---|---|
| | N | Mean | Std | Q1 | Q2 | Q3 |
| PIN | 1568 | 0.479 | 0.110 | 0.394 | 0.468 | 0.556 |
| $PIN_{ex\text{-}ante}$ | 1568 | 0.419 | 0.098 | 0.351 | 0.408 | 0.479 |
| $PIN_{ex\text{-}post}$ | 1568 | 0.581 | 0.214 | 0.413 | 0.529 | 0.722 |
| log(Total Asset in M¥) | 1599 | 12.277 | 1.252 | 11.467 | 12.149 | 12.977 |
| Leverage | 1588 | 0.246 | 0.369 | 0.060 | 0.186 | 0.361 |
| Lending rate (%) | 1659 | 3.217 | 0.898 | 2.413 | 3.368 | 3.921 |
| B/M | 1567 | 0.281 | 0.303 | 0.147 | 0.245 | 0.376 |
| Prior performance | 1664 | -0.004 | 0.390 | -0.072 | 0.023 | 0.111 |
| State ownership (%) | 1666 | 3.562 | 11.524 | 0.000 | 0.000 | 0.000 |
| HHI | 1654 | 0.165 | 0.200 | 0.045 | 0.084 | 0.204 |
| ROA | 1654 | 0.006 | 0.056 | -0.001 | 0.006 | 0.015 |
| Suspension duration (days) | 1667 | 87 | 98 | 50 | 73 | 105 |
| Return before suspension | 1666 | 0.031 | 0.105 | -0.019 | 0.029 | 0.084 |
| Suspension Period Mrk Return | 1643 | 0.069 | 0.293 | -0.046 | 0.027 | 0.123 |
| Short-term performance [-1,+1] | 1667 | 0.102 | 0.752 | -0.007 | 0.075 | 0.117 |
| Short-term performance [0,+3] | 1667 | 0.143 | 0.770 | -0.044 | 0.123 | 0.264 |
| Short-term performance [0,+5] | 1667 | 0.160 | 0.787 | -0.067 | 0.107 | 0.328 |
| LT Performance: 1Y FF3 | 1667 | 0.003 | 0.092 | -0.028 | 0.000 | 0.032 |
| LT Performance: 1Y CH4 | 1667 | 0.006 | 0.129 | -0.029 | 0.000 | 0.035 |
| Efficiency: Variance ratio | 1346 | 0.201 | 0.071 | 0.156 | 0.203 | 0.246 |
| Efficiency: Autocorrelation | 1346 | -0.276 | 0.066 | -0.319 | -0.278 | -0.235 |

| Panel B | | | |
|---|---|---|---|
| | Value = 1 | Value = 0 | Total |
| Insider Trading Dummy | 100 | 1567 | 1667 |
| SOE Dummy | 444 | 1117 | 1561 |
| Related Transaction Dummy | 710 | 846 | 1556 |
| Deal Completion Dummy | 1092 | 575 | 1667 |

# Table 2: Univariate Analysis

This table reports results of univariate tests. In Panel A of the table, we report univariate relations of PIN with market reaction, short-term performance, long-term performance and market efficiency, respecctively. Panel B of the table reports cross-sectional mean before and after regulatory events. Insider trading levels high, medium and low correspond to PIN values in the top, middle and bottom tercile. To control the extrem value effect, we remove all the observations whose values are higher than 3 times of standard deviation. Test statistics are reported in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A

| | Market Reaction | | | Short-term Performance | | | Long-term Performance | | | Market Efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CAR (0, +1) | CAR (0, +3) | CAR (0, +5) | CAR (-1, +1) | CAR (-3, +3) | CAR (-5, +5) | 1-Year Abnormal | 2-Year Abnormal | 3-Year Abnormal | Variance Ratio | Autocorrelation |
| Coefficient | 0.143*** | 0.295*** | 0.280*** | 0.135*** | 0.364*** | 0.480*** | 0.017 | 0.014 | 0.009 | 0.136*** | 0.074*** |
| *t*-stat | 4.457 | 4.534 | 3.561 | 4.007 | 5.477 | 4.894 | 0.240 | 0.626 | 0.451 | 4.365 | 4.490 |

Panel B

| | Market Reaction | | | Short-term Performance | | | Long-term Performance | | | Market Efficiency | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | CAR (0, +1) | CAR (0, +3) | CAR (0, +5) | CAR (-1, +1) | CAR (-3, +3) | CAR (-5, +5) | 1-Year Abnormal | 2-Year Abnormal | 3-Year Abnormal | Variance Ratio | Autocorrelation |
| Full Sample - All levels of Insider Tradings | | | | | | | | | | | |
| *2011 Insider Private Effort Regulation* | | | | | | | | | | | |
| Before | 0.114 | 0.153 | 0.158 | 0.118 | 0.170 | 0.177 | -0.006 | -0.006 | -0.002 | 0.206 | -0.038 |
| After | 0.048 | 0.091 | 0.105 | 0.052 | 0.098 | 0.115 | 0.005 | 0.002 | 0.000 | 0.205 | -0.034 |
| Difference | -0.066*** | -0.062*** | -0.053* | -0.066*** | -0.072*** | -0.062** | 0.011* | 0.008*** | 0.002 | -0.001 | 0.004 |
| *t*-stat | -4.469 | -2.656 | -1.785 | -4.337 | -2.927 | -2.018 | 1.750 | 3.046 | 0.972 | -0.025 | 0.577 |
| *2013 Insider Trading Access Regulation* | | | | | | | | | | | |
| Before | 0.085 | 0.124 | 0.125 | 0.092 | 0.140 | 0.149 | 0.002 | 0.000 | 0.001 | 0.217 | -0.052 |
| After | 0.048 | 0.090 | 0.106 | 0.051 | 0.097 | 0.115 | 0.004 | 0.002 | 0.000 | 0.204 | -0.032 |
| Difference | -0.037*** | -0.034* | -0.019 | -0.041*** | -0.043** | -0.034 | 0.002 | 0.002 | -0.001 | -0.013** | 0.020*** |
| *t*-stat | -3.367 | -1.894 | -0.886 | -3.676 | -2.373 | -1.499 | 0.478 | 0.821 | -0.322 | -2.220 | 4.120 |
| Insider Tradings - High | | | | | | | | | | | |
| *2011 Insider Private Effort Regulation* | | | | | | | | | | | |
| Before | 0.215 | 0.256 | 0.267 | 0.223 | 0.277 | 0.283 | -0.009 | -0.004 | -0.002 | 0.186 | -0.050 |
| After | 0.069 | 0.136 | 0.164 | 0.071 | 0.143 | 0.173 | 0.008 | 0.007 | 0.003 | 0.216 | -0.054 |
| Difference | -0.146*** | -0.120*** | -0.103** | -0.152*** | -0.134*** | -0.110** | 0.017** | 0.011** | 0.005 | 0.030** | -0.004 |
| *t*-stat | -4.048 | -2.686 | -1.969 | -4.126 | -2.904 | -2.043 | 1.995 | 2.207 | 1.303 | 2.378 | -0.390 |
| *2013 Insider Trading Access Regulation* | | | | | | | | | | | |
| Before | 0.119 | 0.161 | 0.163 | 0.129 | 0.182 | 0.186 | 0.012 | 0.003 | 0.003 | 0.212 | -0.060 |
| After | 0.069 | 0.141 | 0.175 | 0.070 | 0.145 | 0.180 | 0.006 | 0.006 | 0.003 | 0.215 | -0.051 |
| Difference | -0.050** | -0.020 | 0.012 | -0.059** | -0.037 | -0.006 | -0.006 | 0.003 | 0.000 | 0.003 | 0.009 |
| *t*-stat | -2.098 | -0.706 | 0.364 | -2.438 | -1.202 | -0.164 | -1.127 | 0.867 | 0.037 | 0.477 | 1.416 |
| Insider Tradings - Medium | | | | | | | | | | | |
| 2011 Insider Private Effort Regulation | | | | | | | | | | | |
| Before | 0.062 | 0.102 | 0.124 | 0.065 | 0.119 | 0.147 | -0.003 | -0.007 | -0.002 | 0.212 | -0.040 |
| After | 0.048 | 0.097 | 0.119 | 0.052 | 0.107 | 0.134 | 0.007 | 0.003 | -0.001 | 0.213 | -0.039 |
| Difference | -0.014 | -0.005 | -0.005 | -0.013 | -0.012 | -0.013 | 0.010 | 0.010** | 0.001 | 0.001 | 0.001 |
| *t*-stat | -0.904 | -0.151 | -0.124 | -0.772 | -0.355 | -0.296 | 1.034 | 2.227 | 0.539 | 0.084 | 0.021 |
| *2013 Insider Trading Access Regulation* | | | | | | | | | | | |
| Before | 0.048 | 0.085 | 0.100 | 0.056 | 0.099 | 0.127 | -0.006 | -0.002 | -0.001 | 0.220 | -0.051 |
| After | 0.049 | 0.099 | 0.121 | 0.053 | 0.109 | 0.135 | 0.008 | 0.002 | -0.001 | 0.212 | -0.038 |
| Difference | 0.001 | 0.014 | 0.021 | -0.003 | 0.010 | 0.008 | 0.014** | 0.004 | 0.001 | -0.008 | 0.013* |
| *t*-stat | 0.036 | 0.561 | 0.611 | -0.220 | 0.377 | 0.228 | 2.016 | 1.295 | 0.346 | -0.822 | 1.743 |
| Insider Tradings - Low | | | | | | | | | | | |
| 2011 Insider Private Effort Regulation | | | | | | | | | | | |
| Before | 0.054 | 0.089 | 0.061 | 0.053 | 0.098 | 0.077 | -0.006 | -0.004 | -0.001 | 0.222 | -0.031 |
| After | 0.030 | 0.040 | 0.033 | 0.035 | 0.048 | 0.041 | -0.004 | -0.002 | -0.001 | 0.186 | -0.013 |
| Difference | -0.024 | -0.049 | -0.028 | -0.018 | -0.050 | -0.036 | 0.002 | 0.002 | -0.000 | -0.036** | 0.018 |
| *t*-stat | -1.216 | -1.170 | -0.521 | -0.868 | -1.177 | -0.677 | 0.125 | 0.583 | -0.130 | -2.367 | 1.346 |
| *2013 Insider Trading Access Regulation* | | | | | | | | | | | |
| Before | 0.049 | 0.081 | 0.053 | 0.050 | 0.091 | 0.069 | -0.007 | -0.006 | -0.002 | 0.220 | -0.034 |
| After | 0.030 | 0.040 | 0.034 | 0.035 | 0.048 | 0.041 | -0.004 | -0.001 | -0.001 | 0.186 | -0.013 |
| Difference | -0.019 | -0.041 | -0.019 | -0.015 | -0.043 | -0.028 | 0.003 | 0.005 | 0.001 | -0.034** | 0.021 |
| *t*-stat | -1.023 | -1.020 | -0.381 | -0.756 | -1.034 | -0.531 | 0.224 | 0.854 | 0.300 | -2.345 | 1.634 |

Table 3: M&A Completion and Short-term Performance

The table presents the regression results of M&A completion and short-term performance, along with control variables for 2011 and 2013 regulations. All variable definitions are given in Appendix A. Deal success controls are a set of additional control variables for successful completion of an M&A deal, including type of payments, same industry acquisitions (0 for cross-industry deals, 1 otherwise), return on assets, etc. Model (1) - (3) present results of logit model with M&A completion and model (4) - (6) present results of short-term performance proxied by CAR(-1,1). Adjusted R-squared are reported for OLS regressions and Estrella R-squared are presented for logit models. *t*-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| Cons | -0.754 | -3.403* | -3.347** | 0.147** | 0.549** | 0.282*** |
| | (-0.491) | (-1.858) | (-1.989) | (2.551) | (2.502) | (3.319) |
| PIN | 0.727 | 6.457* | 5.752** | -0.122*** | -0.847 | -0.150 |
| | (0.654) | (1.953) | (2.124) | (-3.151) | (-1.486) | (-1.131) |
| PIN*Dummy 2011 | | -6.758* | | | 0.974* | |
| | | (-1.956) | | | (1.698) | |
| Dummy 2011 | | 2.047 | | | -0.401* | |
| | | (1.467) | | | (-1.913) | |
| PIN*Dummy 2013 | | | -6.215** | | | 0.276** |
| | | | (-2.149) | | | (2.024) |
| Dummy 2013 | | | 2.487** | | | -0.137** |
| | | | (2.060) | | | (-2.130) |
| Suspension Duration | -0.002* | -0.005*** | -0.005*** | -0.0001** | -0.0001* | -0.0001*** |
| | (-1.654) | (-3.583) | (-3.390) | (-2.542) | (-1.916) | (-2.739) |
| Mentioned | -0.358* | -0.538*** | -0.521*** | -0.020** | -0.020** | -0.020** |
| | (-1.713) | (-3.008) | (-2.919) | (-2.418) | (-2.437) | (-2.403) |
| Prior Performance | 1.051 | 0.407 | 0.431 | 0.030 | 0.030 | 0.029 |
| | (1.275) | (0.538) | (0.568) | (0.953) | (0.958) | (0.939) |
| Lending rate | 0.217* | 0.292*** | 0.258*** | -0.014*** | -0.015*** | -0.015*** |
| | (1.886) | (2.941) | (2.664) | (-3.214) | (-3.253) | (-3.283) |
| SOE | -0.166 | -0.074 | -0.054 | 0.011 | 0.011 | 0.010 |
| | (-0.662) | (-0.333) | (-0.242) | (1.234) | (1.260) | (1.150) |
| Related | 1.326*** | 1.318*** | 1.311*** | -0.006 | -0.006 | -0.005 |
| | (6.560) | (7.162) | (7.120) | (-0.809) | (-0.817) | (-0.730) |
| Transaction Pctg | -0.201 | -0.163 | -0.192 | 0.054*** | 0.053*** | 0.051*** |
| | (-0.805) | (-0.328) | (-0.388) | (3.089) | (2.995) | (3.018) |
| log(Total Asset) | 0.073 | 0.113 | 0.083 | -0.014*** | -0.014*** | -0.014*** |
| | (0.691) | (1.190) | (0.884) | (-3.400) | (-3.415) | (-3.356) |
| Leverage | -0.107 | -0.083 | -0.050 | 0.013 | 0.014 | 0.015 |
| | (-0.200) | (-0.224) | (-0.136) | (1.237) | (1.293) | (1.312) |
| B/M | -0.461 | -0.707 | -0.702 | 0.107*** | 0.109*** | 0.109*** |
| | (-0.915) | (-1.574) | (-1.548) | (4.853) | (4.900) | (4.899) |
| Performance | -1.159* | -0.635 | -0.639 | 0.063*** | 0.060*** | 0.061*** |
| | (-1.945) | (-1.200) | (-1.306) | (3.035) | (2.941) | (2.960) |
| State Ownership Pctg | 0.146 | -0.864 | -0.417 | -0.028 | -0.030 | -0.036 |
| | (0.109) | (-0.807) | (-0.387) | (-0.698) | (-0.735) | (-0.881) |
| HHI | 0.072 | 0.310 | 0.334 | 0.009 | 0.007 | 0.008 |
| | (0.162) | (0.755) | (0.810) | (0.476) | (0.340) | (0.436) |
| Suspension Period Mrk Return | 0.898*** | 0.771** | 0.815** | 0.112*** | 0.115*** | 0.114*** |
| | (2.666) | (2.221) | (2.365) | (8.138) | (8.219) | (8.178) |
| Deal Success Controls | Yes | Yes | Yes | No | No | No |
| Number of Obs | 601 | 601 | 601 | 620 | 620 | 620 |
| Estrella/Adjusted R2 | 0.114 | 0.132 | 0.132 | 0.169 | 0.179 | 0.177 |

Table 4: M&A Completion and Short-term Performance with Different Financial Constraints

The table presents the regression results of M&A completion and short-term performance after controlling for proxies of financial constraints. Deal success controls are a set of additional control variables for successful completion of an M&A deal, including type of payments, same industry acquisitions (0 for cross-industry deals, 1 otherwise), return on assets, etc. Model (1) - (2) present results of logit model with M&A completion and Model (3) - (4) present results of short-term performance proxied by CAR(-1,1). Adjusted and Estrella R-squared are reported for OLS and logit models, respectively. $t$-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Cons | -3.555** | 3.188 | 0.179*** | 0.210** |
| | (-2.075) | (1.090) | (3.850) | (2.357) |
| PIN | 5.269* | 5.428** | -0.091*** | -0.088*** |
| | (1.957) | (2.002) | (-2.973) | (-2.794) |
| Suspension Duration | -0.004*** | -0.005*** | -0.0001* | -0.0001** |
| | (-3.172) | (-3.274) | (-1.787) | (-2.320) |
| Mentioned | -0.532*** | -0.522*** | -0.010 | -0.012* |
| | (-2.795) | (-2.912) | (-1.409) | (-1.705) |
| Return before suspension | 0.193 | 0.379 | 0.011 | 0.030 |
| | (0.244) | (0.493) | (0.400) | (1.124) |
| SOE | -0.085 | 0.048 | -0.002 | 0.001 |
| | (-0.374) | (-0.212) | (-0.212) | (-0.130) |
| Related | 1.303*** | 1.340*** | -0.008 | -0.007 |
| | (6.817) | (7.227) | (-1.405) | (-1.278) |
| Transaction Pctg | 0.161 | -0.267 | 0.001** | 0.001** |
| | (0.315) | (-0.536) | (2.101) | (2.150) |
| log(Total Asset) | 0.090 | -0.322* | -0.014*** | -0.016*** |
| | (0.942) | (-1.828) | (-4.403) | (-2.760) |
| Leverage | 0.004 | -0.040 | 0.016 | 0.018 |
| | (0.011) | (-0.108) | (1.392) | (1.534) |
| B/M | -0.663 | -0.793* | 0.101*** | 0.105*** |
| | (-1.460) | (-1.685) | (5.592) | (5.770) |
| Performance | -0.593 | -0.621 | 0.065*** | 0.066*** |
| | (-1.145) | (-1.266) | (4.061) | (4.210) |
| WW Index | 0.031 | | -0.0004 | |
| | (1.332) | | (-0.485) | |
| HP Index | | 0.844*** | | 0.003 |
| | | (2.693) | | (0.352) |
| State Ownership Pctg | -0.381 | -0.462 | 0.011 | 0.002 |
| | (-0.349) | (-0.430) | (0.372) | (0.078) |
| HHI | 0.271 | 0.415 | 0.000 | 0.005 |
| | (0.642) | (0.998) | (0.023) | (0.326) |
| Lending rate | 0.242** | 0.243** | -0.012*** | -0.014*** |
| | (2.368) | (2.480) | (-3.800) | (-3.891) |
| Suspension Period Mrk Return | 0.754** | 0.788** | 0.117*** | 0.123*** |
| | (2.216) | (2.275) | (8.735) | (9.100) |
| Deal Success Controls | Yes | Yes | No | No |
| Number of Obs | 792 | 871 | 787 | 868 |
| Estrella/Adjusted R2 | 0.141 | 0.140 | 0.163 | 0.170 |

Table 5: Prior Trading Suspension and Post Trading Resumption PIN

This table reports the differences in average values of PIN before and after regulatory shocks, over the period before trading suspension and after trading resumption, respectively. For PIN values around each regulatory shock during each period, we first sort deals into terciles by deal quality, proxied by deal synergies measured as the total 5-day abnormal returns post trading resumption. Then, we compute and compare the average PIN before and after regulatory shock within each quality group. Difference in PIN is the difference between average PIN before an event minus the average PIN after the event. Significance levels for equality of means $t$-tests are reported. Price Limit Hits is the average proportion for transactions that traded at daily price limit. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

| | Prior Trading Suspension [-10 days, 0] | | | | Post Trading Resumption [0, 5 days] | | | |
|---|---|---|---|---|---|---|---|---|
| 2011 Regulation | Before Event | After Event | Difference | $p$-value | Before Event | After Event | Difference | $p$-value |
| Low | 0.386 | 0.353 | 0.033** | 0.047 | 0.432 | 0.453 | -0.021 | 0.622 |
| Medium | 0.376 | 0.388 | -0.011 | 0.465 | 0.418 | 0.425 | -0.006 | 0.847 |
| High | 0.482 | 0.402 | 0.080*** | 0.000 | 0.745 | 0.889 | -0.144*** | 0.000 |
| 2013 Regulation | Before Event | After Event | Difference | $p$-value | Before Event | After Event | Difference | $p$-value |
| Low | 0.416 | 0.348 | 0.068*** | 0.000 | 0.460 | 0.452 | 0.008 | 0.804 |
| Medium | 0.431 | 0.379 | 0.052*** | 0.000 | 0.432 | 0.421 | 0.012 | 0.637 |
| High | 0.481 | 0.396 | 0.085*** | 0.000 | 0.745 | 0.901 | -0.156*** | 0.000 |
| Price Limit Hits | 2.40% | | | | 37.15% | | | |

Table 6: Market Efficiency and Long-term Performance

The table presents the regression results of market efficiency and long-term performance. All variable definitions are given in Appendix A. The dependant variables for model (1) and (2) are variance ratio and autocorrelation, respectively. Model (3) - (5) are for one, two, and three-year monthly excess returns based on Fama-French three-factor model. Adjusted R-squared are reported for OLS regressions. *t*-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| Cons | 0.076** | 0.019 | 0.011 | 0.039** | 0.040*** |
| | (2.224) | (0.893) | (0.243) | (2.297) | (3.179) |
| PIN | 0.088*** | 0.069*** | 0.074 | 0.010 | 0.004 |
| | (2.598) | (3.749) | (1.434) | (0.786) | (0.432) |
| Mentioned | 0.007 | -0.001 | 0.001 | -0.001 | -0.001 |
| | (1.145) | (-0.162) | (0.266) | (-0.603) | (-0.605) |
| Prior Performance | -0.008 | 0.020* | 0.004 | -0.005 | -0.003 |
| | (-0.954) | (1.714) | (0.118) | (-0.710) | (-0.631) |
| Lending rate | 0.008*** | 0.004** | -0.002 | 0.001 | 0.001 |
| | (2.639) | (2.507) | (-0.637) | (0.056) | (0.115) |
| SOE | 0.015** | -0.003 | 0.007 | 0.001 | 0.002 |
| | (2.024) | (-0.962) | (1.034) | (0.303) | (1.105) |
| Related | -0.012** | 0.006** | 0.000 | -0.001 | 0.000 |
| | (-2.077) | (2.362) | (0.035) | (-0.552) | (0.175) |
| Transaction Pctg | 0.0012 | -0.319 | -0.000 | 0.001 | 0.001 |
| | (1.305) | (-0.427) | (-0.247) | (1.100) | (0.882) |
| log(Total Asset) | 0.003 | -0.0001 | -0.004 | -0.005*** | -0.004*** |
| | (1.316) | (-0.076) | (-1.209) | (-3.897) | (-4.743) |
| Leverage | 0.023 | 0.010 | -0.007 | -0.000 | 0.001 |
| | (1.335) | (1.200) | (-0.440) | (-0.002) | (0.484) |
| B/M | 0.028** | -0.003 | 0.043*** | 0.026*** | 0.015*** |
| | (2.221) | (-0.475) | (2.835) | (6.880) | (5.075) |
| Performance | 0.013 | -0.008 | 0.007 | 0.002 | 0.004 |
| | (0.836) | (-1.094) | (0.389) | (0.350) | (0.927) |
| SOE Pctg | -0.061* | 0.012 | -0.036* | -0.018* | -0.012 |
| | (-1.883) | (0.760) | (-1.862) | (-1.829) | (-1.500) |
| HHI | -0.002 | -0.003 | 0.032** | 0.012** | 0.007** |
| | (-0.153) | (-0.563) | (1.969) | (2.448) | (2.147) |
| Mrk.Ret. Susp | 0.025 | -0.012 | 0.012 | 0.011** | 0.009*** |
| | (1.423) | (-1.600) | (0.799) | (2.471) | (3.089) |
| Number of Obs | 871 | 874 | 872 | 872 | 872 |
| Estrella/Adj.R2 | 0.065 | 0.036 | -0.002 | 0.042 | 0.043 |

## Table 7: Robustness Tests

The table presents the regression results of robustness tests. Model (1) and (6) present results of logit model with deal's completion as dependent variable. Model (2) and (7) use CAR(-1,+1) in excess of Fama-French three-factor model as the dependent variable. Model (1) and (2) are results on full sample, including firms with suspension duration in the bottom quartile. In Model (6) and (7), PIN is replaced by the dummy variable of insider trading identified by CSRC. Model (3), (4) and (5) report CAR(-2,+2), CAR(-5,+5), and CAR(-1,+1) in excess of market return, respectively. In Model (8), operation performance is proxied by operating income. Deal completion controls are a set of additional control variables for successful completion of an M&A deal, including type of payments, same industry acquisitions, and return on assets, etc. Adjusted and Estrella R-squared are reported for OLS and logit models, respectively. $t$-statistics are in parentheses. ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| Cons | -3.362** | 0.184*** | 0.359*** | 0.706*** | 0.140*** | -0.573 | 0.228*** | -0.024 |
| | (-2.001) | (4.150) | (4.994) | (6.558) | (3.271) | (-0.480) | (5.780) | (-0.125) |
| PIN/Insider trading | 5.652** | 0.087*** | 0.163*** | 0.123* | 0.086*** | -1.111*** | 0.017* | -0.003 |
| | (2.074) | (2.778) | (3.395) | (1.797) | (2.733) | (-3.370) | (1.867) | (-0.079) |
| Suspension duration | -0.005*** | -0.0001** | -0.0002*** | -0.0004*** | -0.0001*** | -0.005*** | -0.0001** | 0.047** |
| | (-3.398) | (-2.364) | (-3.167) | (-2.819) | (-2.876) | (-3.430) | (-2.299) | (2.481) |
| Mentioned | -0.529*** | -0.012* | -0.028*** | -0.046*** | -0.010 | -0.493*** | -0.010 | -0.072 |
| | (-2.909) | (-1.713) | (-2.765) | (-2.859) | (-1.480) | (-2.840) | (-1.457) | (-0.538) |
| Prior performance | 0.429 | 0.031 | -0.074* | -0.119 | 0.155*** | 0.682 | 0.026 | 0.021 |
| | (0.566) | (1.131) | (-1.751) | (-1.615) | (5.895) | -0.935 | (0.966) | (1.231) |
| Lending rate | 0.262*** | -0.014*** | -0.023*** | -0.033*** | -0.012*** | 0.264*** | -0.012*** | 0.080*** |
| | (2.684) | (-3.868) | (-4.243) | (-3.537) | (-3.522) | -2.892 | (-3.686) | (3.236) |
| SOE | -0.060 | 0.001 | -0.005 | -0.022 | 0.001 | -0.025 | 0.002 | -0.049 |
| | (-0.270) | (0.068) | (-0.474) | (-1.275) | (0.174) | (-0.117) | (0.245) | (-1.568) |
| Related | 1.312*** | -0.007 | -0.009 | -0.001 | -0.004 | 1.231*** | -0.007 | -0.001*** |
| | (7.123) | (-1.296) | (-0.955) | (-0.053) | (-0.678) | -6.834 | (-1.269) | (-2.866) |
| Transaction pctg | -0.200 | 0.035** | 0.083*** | 0.121*** | 0.040*** | -0.006 | 0.034** | 0.003 |
| | (-0.382) | (2.177) | (3.559) | (3.628) | (2.640) | (-1.292) | (2.182) | (0.167) |
| log(Total Asset) | 0.088 | -0.015*** | -0.031*** | -0.059*** | -0.012*** | 0.125 | -0.016*** | 0.034 |
| | (0.947) | (-4.592) | (-6.022) | (-7.635) | (-4.088) | -1.427 | (-5.242) | (1.212) |
| Leverage | -0.085 | 0.018 | 0.028 | 0.056** | 0.020* | -0.013 | 0.021* | 0.018 |
| | (-0.240) | (1.549) | (1.377) | (2.109) | (1.765) | (-0.039) | (1.696) | (0.389) |
| B/M | -0.727 | 0.106*** | 0.181*** | 0.355*** | 0.103*** | -0.744 | 0.111*** | 0.086 |
| | (-1.590) | (5.947) | (6.076) | (6.772) | (5.895) | (-1.642) | (6.282) | (1.228) |
| Performance | -0.652 | 0.066*** | 0.083*** | 0.172*** | 0.039** | -0.662 | 0.064*** | -0.086 |
| | (-1.332) | (4.215) | (3.524) | (4.140) | (2.430) | (-1.375) | (4.077) | (-0.912) |
| SOE Pctg | -0.420 | 0.003 | 0.008 | -0.104 | 0.005 | -0.784 | 0.006 | -0.023 |
| | (-0.390) | (0.091) | (0.180) | (-1.355) | (0.183) | (-0.767) | (0.197) | (-0.369) |
| HHI | 0.327 | 0.005 | 0.021 | 0.060* | 0.012 | 0.162 | 0.005 | -0.006 |
| | (0.796) | (0.308) | (0.907) | (1.733) | (0.818) | -0.412 | (0.345) | (-0.149) |
| Mrk.Ret. Susp | 0.792** | 0.122*** | 0.235*** | 0.563*** | 0.126*** | 1.070*** | 0.126*** | 0.114 |
| | (2.201) | (9.127) | (10.070) | (14.312) | (9.427) | -3.194 | (9.246) | (0.514) |
| Comp. Controls | Yes | No | No | No | No | Yes | No | No |
| Number of Obs | 871 | 868 | 867 | 868 | 867 | 871 | 868 | 885 |
| Estrella/Adj.R2 | 0.132 | 0.172 | 0.232 | 0.339 | 0.203 | 0.095 | 0.169 | 0.004 |

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Appendix A: Variable Definitions

| **Variables** | **Definition** |
|---|---|
| Deal completion | Equal to 1 if the deal is completed, 0 otherwise. |
| Efficiency: Variance Ratio | Variance ratio as defined in Lo & MacKinlay (1989) with $iid = 1$. |
| Efficiency: Autocorrelation | Autocorrelation of high frequency returns at lag 2. |
| HHI | Herfindahl-Hirschman Index of the listed company's industry |
| Insider trading | Equal to 1 if the deal involves confirmed case of insider trading by CSRC, 0 otherwise. |
| Lending rate | Yield to maturity on 1-year, AAA rated corporate bond in China in year t. |
| Leverage | Leverage of the listed company, defined as total debt scaled by total assets at the end of quarter $t-1$. |
| Log (Total Asset) | Nature log of total assets of the listed company at the end of quarter $t-1$. |
| Long-term performance | One, two, and three-year monthly excess returns based on Fama-French three-factor model. |
| Suspension Period Market Return | Market return during the suspension of the listed company. |
| Mentioned | Equal to 1 if the deal is announced as M&A at trading suspension, 0 otherwise. |
| B/M | Ratio between book value and market value of the company at the end of quarter $t-1$. |
| PIN | Probability of informed trading around trade suspension (-10, +5) following the methodology in Easley et al. (1996). |
| $\text{PIN}_{ex\text{-}ante}$ | 10-day average PIN before suspension |
| $\text{PIN}_{ex\text{-}post}$ | 5-day average PIN measure after resumption |
| Prior performance | 30-day CAR based on Fama-French 3 factor before suspension. |
| Related transaction | Equal to 1 if the acquirer and target companies are related, 0 otherwise. |
| Return before suspension | 5-day return before trading suspension. |
| ROA | Return on assets of the listed company at the end of quarter $t-1$, defined as net income / total assets |
| Short-term performance | Three-day cumulative abnormal return (-1,+1) around trading suspension and resumption in excess of Fama-French 3-factor model. |
| SOE | Equal to 1 if the company is a state-owned-enterprise, 0 otherwise. |
| State ownership pctg | Percentage of the state-owned shares of the listed company before the deal. |
| Suspension duration | Number of trading days suspended for the company |
| Transaction pctg | Percentage of target company's ownership acquired during the transaction. |