Informed Trading in Family Firms:

Evidence from Short Selling around Insider Sales

by

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Abstract

Using a novel dataset of insider trading and short selling from the Hong Kong Stock Exchange, we investigate potential information leakage from insiders to short sellers, particularly in family-controlled firms. We document a significant increase in short selling volume before information on insider sales is released to the public. The abnormal short sales are much stronger in family-controlled firms than state-owned companies and widely held companies. Furthermore, the concave relationship between the intensity of short selling and family control contributes to the debate on whether family presence facilitates or limits informed trading. We also find that, for family-controlled firms, trading by insiders who do not belong to the family attracts more attention by short sellers and comes with stronger stock return predictability.

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1. Introduction

Short sellers are often suspected of being informed traders as short interest negatively predicts stock returns (Boehmer *et al.*, 2008; Karpoff and Lou, 2010; Engelberg *et al.*, 2012). In addition, a large body of literature documents that short sellers have good timing skills, demonstrated by initiating short positions prior to unfavorable public announcements, such as negative earnings surprises, analyst downgrades, and financial misconduct (see, e.g., Christophe *et al.*, 2004, 2010). Two recent studies (i.e., Khan and Lu, 2013; Chakrabarty and Shkilko, 2013) explore the potential information interactions between short sellers and insiders, who are assumed to be the most informed group of a firm. While the above studies recognize short sellers' informed trading, the channel through which they obtain their information advantage is unclear. To shed light on this, we examine whether short sellers become informed around insider transactions across firms with different organization structures, particularly family-controlled firms.

Family firms dominate economic activities around the world, controlling about one-third of S&P 500 firms in the US and more than two-thirds of firms in East Asia and Europe (Shleifer and Vishny, 1986; Claessens *et al.*, 2000; Faccio and Lang, 2002; Anderson *et al.*, 2003, 2009, 2012). Family control and influence are enhanced beyond ownership stakes through pyramid structures, dual-class shares, disproportionate board representation, and historical ties to the firm (Zingales, 1995; Shleifer and Vishny, 1997; Anderson and Reeb, 2003; Villalonga and Amit, 2006). Prior literature (e.g., Ali *et al.*, 2007; Chen *et al.*, 2008; Anderson *et al.*, 2009) shows that family insiders are well informed as a result of dominant control over the firm. Their access to privileged information enables them to obtain private benefits through insider trading (Morck *et al.*, 2005). However, whether the family presence facilitates or limits informed trading remains an open question.

Insiders can be strongly motivated to engage in informed trading either by themselves or by tipping information to outside investors. Insiders can profit from the firm's negative news by either selling their own shares or engaging in short selling activity.[1] In the presence of strict insider trading regulations,[2] the availability of short sales provides family shareholders with another channel to trade on their non-public material information. Furthermore, if the insiders of a family firm are heavily monitored and scrutinized, they can still leak information to relatives or friends who receive less attention from the public.

The conflicts of interest between family directors and non-family directors in family firms can also trigger information leakage. According to cultural theories, the family may find it difficult to dissociate itself from the business (Bertrand and Schoar, 2006). The main goals of the family typically include "*preserving the family's legacy and reputation, implementing the family's values, mission and vision, and protecting the family name, maintaining family unity and harmony…*" (Villalonga *et al*., 2015, pp.645). Therefore, the family management is perhaps not value-maximizing, but rather utility-maximizing for the founding family. For example, family founders may derive utility from assigning family relatives to management positions rather than outsiders appointed via a competitive process. As a result, an organization featuring strong family ties gives rise to nepotism (Barnett, 1960; Bertrand and Schoar, 2006). Family directors may impose their self-serving desires onto key decisions of the firm not only because of the skills they have but also from a disproportionate amount of power due to their family status (Schulze *et al.,* 2016). Non-family directors and managers may resent the privileged positions family directors gain from their family status (Anderson *et al*., 2012; Schulze *et al.,* 2016). Non-family directors and managers, who may want to maximize their own wealth, are likely to share some objectives with the controlling family but not all. From this perspective,

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[1] The identification of whether insiders are short sellers goes beyond our data. The existing studies (i.e., Khan and Lu, 2013; Chakrabarty and Shkilko, 2013) and our study assume that they are different.

[2] Some firms have their own insider trading policy and codes going beyond regulation (see Jagolinzer *et al*., 2011).

insiders who are not related to the family can be a source of information leakage. Based on the above arguments, the presence of a controlling family may facilitate private information leakage to short sellers.

On the other hand, the controlling family also have incentives to limit informed trading. First, as long-term investors, they are less likely to trade for short-term benefits. For example, the founding family members in S&P 500 firms have held their positions for more than 78 years on average and typically have invested more than 69% of their personal wealth in the firm (Anderson and Reeb, 2003). The long investment horizon and their undiversified holdings compel them to focus on the firm's long-run growth and returns rather than short-term profits genereated via trading on private information (Villalonga and Amit, 2006; Hillier *et al.*, 2015). Second, strong family affiliation and ties of both the founder and the heirs to the firm motivate family members to be concerned about their reputation and commitment to the firm. They are less likely to engage in information-based transactions or information leakage to outside investors, which could harm their economic benefits and reputation. For instance, MicroStrategy, a family firm of business intelligence, asked its investors to help protect the firm from excessive short selling, as executives claimed that short sellers should be blamed for the stock's unfettered collapse in the past year in a letter to shareholders.[3]

Apart from their long investment horizon and reputational concerns, the desire of the controlling family to limit informed trading may also depend on their control over the firm. The stronger the family control, the more likely the family aim to protect the firm against informed trading. As Fan and Wong (2002, p. 406) argue, *"[o]nce the controlling owner obtains effective control of the firm, any increase in voting rights does not further entrench the controlling owner, but his/her higher cash flow rights in the firm mean that it will cost more to*

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[3] Larry Barrett, April 20, 2001, MicroStrategy trips over its own miscues. ZDNet News.

divert the firm's cash flows for private gain." In firms with strong family control, benefits extracted from informed trading are relatively small compared to the overall stock discount losses caused by negative signals to the market (Gomes, 2000). To a great extent, stronger control can align the interests of the controlling family with the firm's long-term growth and return. Thus, we argue that family shareholders in strongly controlled firms tend to limit informed trading in terms of insider trading and short sales.

This study makes three important contributions to the literature. First, our study is related to the strand of literature investigating the potential conflicts of interest between family directors and non-family directors, which are complicated by factors such as culture-based family ties, shared family wealth, and nepotism (e.g., Bertrand and Schoar, 2006; Villalonga *et al.*, 2015). Previous literature on informed trading in family firms (e.g., Chan *et al.*, 2010; Anderson *et al.*, 2012) tends to treat all insiders as one group, which ignores the potential conflicts of interest between them. Our data on insider transactions enable us to address the latter shortcoming by accounting for the identity of each insider and by distinguishing between family and non-family insiders. This helps us examine how their incentives may affect informed trading.

Second, the literature that has explored the effect of family control on family shareholders' incentives to engage in informed trading is very limited. A family firm is typically defined as a firm whose founder or a member of his or her family by either blood or marriage is an officer, director, or blockholder, either individually or as a group (Anderson and Reeb, 2003; Villalonga and Amit, 2006). Family ownership and control vary substantially across family firms in both the US and other markets. Although Anderson *et al.* (2012) investigate the relationship between family organizational structure and short sales around negative earnings surprises, they ignore the heterogeneity among family firms and treat all family firms as one group. The large variation in family power among family firms in Hong Kong which we research provides a valuable opportunity to examine the extent to which the family align their interests with the

firm's long-term growth and return. At the same time, the small size of Hong Kong gives a good pretext for a possible strong alignment as things probably get out faster as everyone knows everyone in the business community.

Finally, we examine the potential information leakage under a trading system which differs from that in the US. Usually, in the US, to protect their positions, market makers are allowed a delay before reporting an executed trade to the public, which offers them a chance to tip a select group of clients about the trade. Short sellers may obtain private price-relevant information from brokerages that execute insider sales (Khan and Lu, 2013; Chakrabarty and Shkilko, 2013). However, due to the multiple information sources, it is not clear whether the information leakage comes from insiders or brokerages. In contrast, the Hong Kong Stock Exchange (HKEx) is a pure order-driven system without market makers. This provides us with a unique opportunity to better identify potential sources for short sellers' information advantage. Also HKEx is a huge financial hub which makes it easier and more natural to have short selling as more sophisticated investors exist there than in some other countries with less developed financial markets.

To investigate short sellers' ability to predict and process insider transactions, we use the event study methodology by taking the date of insider' sales as the event and then measuring abnormal short sales over the 10 days around the event. All publicly traded firms on the Hong Kong Stock Exchange (HKEx) with insider transaction records from January 2009 to December 2014 are included in this study. To measure family firm characteristics, we manually gather directors' biographies and shareholding information from annual reports. Focusing on whether the presence of controlling family shareholders affects short sellers' trading activity, we examine the abnormal short sales around insider sales across different control structures. Our results suggest that short sellers initiate short positions before insider sales are publicly reported (i.e., ahead of average investors), indicating the potential for information leakage.

More importantly, the intensity of short selling around insider transactions is stronger in firms with controlling family shareholders than in widely held firms. Consistently, the profitability of insider trading in family firms is also higher. In contrast, we do not find stronger short selling activity in state-owned enterprises (SOEs), which also feature a high level of control. This can be explained by the incentives for directors in SOEs, who normally have few or no cash flow rights and many of them are government officials or politically connected (Allen *et al.*, 2005; Fan *et al.*, 2007). As government officials, they are less likely to trade on private information because political promotion could be their priority and involvement in informed trading could destroy their reputation (Hung *et al.*, 2012).

Our empirical findings also indicate that family control affects short sellers' positions in relation to insider sales. The intensity of short selling is a concave function of family control rights with its maximum at approximately 50%. Although the overall short selling activity is stronger in family firms than other firms, it is weaker in firms with extremely high levels of family control (more than 50% of voting rights, two board members, or 20% of board seats). The return predictability of insider sales in these highly controlled firms is also stronger than in weakly controlled firms. Our evidence suggests that the desire of the family to protect the firm against informed trading depends on their control.

To examine the potential conflicts among different insiders in family firms, we distinguish insider sales made by family members from those made by non-family insiders. The empirical results suggest that transactions by the non-family insiders trigger larger abnormal short sales than those made by family insiders, and their ability to predict future negative returns is also stronger. This supports the view that, although all directors in family firms have access to non-public material information, their incentives to engage in or limit informed trading may depend on whether they themselves are related to the family (Fan and Wong, 2002). Our results provide support for the cultural explanations for family firms. With a longer investment horizon than

non-family investors (Anderson and Reeb, 2003; Villalonga and Amit, 2006), family shareholders are less likely to trade on private information (Hillier *et al*., 2015). Meanwhile, dominant family control also indicates fewer opportunities for career development and less power for non-family employees (Barnett, 1960; Bertrand and Schoar, 2006). Thus, insiders who do not belong to the family may be motivated to leak non-public material information to outside investors as a result of resentment towards the controlling family.

To better identify whether insider transactions are driven by private information, we follow Cohen *et al*. (2012) to conduct a sub-sample analysis by distinguishing between routine insider trades and opportunistic insider trades. Opportunistic insider trades contain more private information than those of routine trades. We find greater and more significant abnormal short selling volume around opportunistic insider transactions in family-controlled firms. Also, the short selling intensity in weakly controlled family firms is much stronger than in strongly controlled family firms for the case of opportunistic transactions. Consistently, we document more active short selling activity around opportunistic transactions by non-family insiders than family insiders. In contrast, there is no significant information effect for routine insider sales, which are assumed to be carried out for liquidity reasons.

The remainder of this paper is structured as follows. Section 2 explains the institutional background. Section 3 describes the data sources and descriptive statistics. Section 4 presents the research methods. Section 5 discusses the empirical results and robustness checks. Section 6 concludes the paper.

2. Institutional Background

2.1. Insider trading and short selling in the HKEx

Part XV of the Securities and Futures Ordinance (SFO) launched by the Securities and Futures Commission (SFC) in Hong Kong refers to the disclosure of interests, requiring substantial

shareholders (5% or more of voting shares), directors, and chief executives of a listed firm to disclose all their interests in the listed corporation or any associated companies. Under the framework of the SFO, any substantial shareholder, director, chief executive, or employee of a listed company or its associated companies can be an insider of the listed firm. The board of directors and top management, regardless of their shareholding percentage, must notify the SFC by submitting Form 3A within three business days of any change in the nature of their interests. Thus, Form 3A is the original information source for Hong Kong insiders' trading. It contains the shareholding positions of the directors or top management before and after transactions.

Not all stocks on the HKEx can be short sold. In January 1994, the HKEx launched a pilot scheme for regulated short selling under which 17 securities first became eligible for short selling. Based mainly on liquidity and market value criteria, this list of securities eligible for short selling has been updated on a quarterly basis by the HKEx. As of November 14, 2014, 755 stocks on the Main Board were eligible for short selling.

2.2. The trading system in Hong Kong

Unlike the US stock market with its quote-driven system facilitated by market makers, the HKEx is a pure order-driven system without market makers. In an order-driven system, the center of transaction execution is the exchange. Like the market maker system, investors place orders, which are usually limit orders, with their respective brokers. The role of the broker is just to route these orders into the electronic central order book. The electronic system in Hong Kong, known as the Automatic Order Matching and Execution System (AMS), matches appropriate bid and ask orders automatically and executes the transactions. Compared to a quote-driven system, an order-driven system is more transparent in terms of disseminating market information. The electronic screen in an AMS displays the order and trade information

to the public on a real-time basis (e.g., the current best five bid and ask prices and the number of shares available). However, market makers in a quote-driven system are allowed a delay before reporting the executed trade to the public, which offers them a chance to tip trading information to a selected group of investors.

3. Data and Descriptive Statistics

3.1. Data sources and sample selection

We examine short sellers' trading activity in relation to insider transactions on the HKEx from January 2009 to December 2014. The insider transaction data for all open-market sales are downloaded from Thomson. The insiders include chairmen, chief executives, other senior executives, executive directors, non-executive directors, and independent non-executive directors. Each transaction records the firm's name, the firm's stock code, the name of the director who executed the trade, the director's position in the firm, the transaction date, the number of shares traded, the transaction price, the transaction value, and the director's shareholding after the transaction. The dataset selection procedure is summarized in Table 1. The original dataset contain 7,921 transaction records covering 726 firms. Some directors execute multiple transactions in a single day. These multiple transactions executed by the same person on one day are recorded as one transaction and the transaction size is consolidated. To remove the compounding effects of earnings and dividend announcements, insider sales within 20 days of these events are also eliminated (Chakrabarty and Shkilko, 2013). The dates for earnings and dividend announcements are collected from the China Stock Market and Accounting Research Database (CSMAR). As a unique insider can also have multiple transaction records on different dates over the study period, only the first transaction within any 30 consecutive days is taken as one event. Due to the regulation of short selling in Hong Kong, not all stocks are eligible for short selling. This further reduces the number of

observations to 1,341 transactions for 320 firms.[4] Financial firms such as banks, insurance companies, investment funds, and real estate companies are also excluded.[5] Ultimately, we obtain a dataset of 1,148 observations for 254 firms.

<Insert Table 1 about here>

The daily short sales data are obtained from the HKEx. The stock market and accounting data are from Bloomberg. To measure the controlling power in listed firms, we manually collect directors' biographies and shareholding information from annual reports. This allows identification of the number of family members sitting on the board and their respective shareholdings. Generally, directors' interests in a listed company are disclosed in four categories: personal interests, family interests, corporate interests, and other interests. Personal interests document beneficial interests directly registered in the name of the director. Family interests identify shares held by a director's spouse or children under the age of 18 years. Corporate interests record those interests a director is deemed to have with respect to any corporation in which he or she is entitled to either exercise or control the exercising of one-third or more of the voting power in general meetings or where the corporation or its directors are accustomed to acting in accordance with his or her directions or instructions. Other interests normally refer to interests in the form of options, beneficiaries, or trustees. These four categories are aggregated across all members of the controlling family to form total voting rights of the family. Given that many Hong Kong listed firms adopt pyramid structures or cross-holdings, it is difficult to trace the gap between voting rights and cash flow rights at the

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[4] A dynamic short selling list is manually identified using the short selling announcement on the HKEx website. The HKEx website only posts the latest list of securities that are eligible for short selling but announcements for every previous change to the short selling list could be found. Thus, the short selling list posted on March 24, 2015, is taken as the benchmark short selling list and every dynamic short selling list between two adjustments is back deducted.
[5] A sample with all the firms, including financial firms, is analyzed as a robustness check and the results remain qualitatively the same.

corporate interest and other interest levels.[6] Thus, in Hong Kong, voting rights is a better proxy to use to measure corporate control (Claessens *et al.*, 2000).

3.2. Control definition and descriptive statistics

A person or corporation that controls approximately one-third or more of the voting rights of a listed firm is required by the SFO to disclose any family and corporate interests in the annual report. Therefore, a threshold of 30% voting rights across all family members is used to define a family-controlled firm.[7] The identification of state-controlled firms is made using the CSMAR database. Firms with a relatively more diversified control structure are defined as non-controlled firms.

Table 2 reports summary statistics for directors' trades, large controlling shareholders, and family control characteristics. Panel A of Table 2 reports the summary statistics for transaction size by category of director. Other senior executives include chief financial officers, chief operating officers, chief investment officers, and managers. Chairman denotes the chairman of the board. The overall transaction size for Hong Kong directors, 0.509% as the number of shares outstanding, is comparable to Lakonishok and Lee's (2001) finding of 0.58% for US directors, but smaller than the 1.38% for UK directors (Fidrmuc *et al.*, 2006). Unlike the US market where management accounts for most of directors' sales, chief executives in the Hong Kong market have a smaller trading volume (0.98%) than the chairmen (1.47%).

Panel B of Table 2 records summary statistics for the controlling power of large controlling shareholders measured at the end of 2012.[8] For the 141 family-controlled firms (55.5% of all

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[6] For some firms, it is difficult to trace the cash flow rights held by the controlling family. For corporate interests, it is only required that they disclose whether they control one-third or more of the voting rights in the listed firm's controlling corporation. The same problem applies for the other interests in relation to a family trustee. There is no significant difference between the voting and cash flow rights at the personal and family levels.

[7] We conduct robustness checks for different thresholds of family voting rights from 20% to 35%. The results are largely consistent and available upon request.

[8] Generally, the control structure, especially for the block shareholder, does not change substantially across several years. Therefore, we take the control structure at the end of 2012 for our sample of 2009 to 2014.

firms), controlling power refers to the voting rights of all family members; for the 41 state-controlled firms (16.1% of all firms), the controlling power of large controlling shareholders refers to the voting rights by the state; for the 72 non-controlled firms (28.3% of all firms), it refers to the voting rights of the largest substantial shareholder. According to Panel B, both the family and the state have an average of more than 50% control over the firm, with the highest approaching 80%. Even for the non-controlled firms in Hong Kong, the largest shareholder has a relatively high stake of 20% compared to the UK and US markets where the corresponding figures are 5% and 10% (Lakonishok and Lee, 2001; Fidrmuc *et al*., 2006). Indeed, previous studies show a relatively high concentration of control in most markets outside the US and UK.

Panel C shows summary statistics of family control characteristics in family firms. The family can exert control via their board seats. The statistics show that family firms have 1.766 family members sitting on their board on average, accounting for 20% of all board directors. This is consistent with Anderson *et al*. (2012), who document an average of 1.73 board seats held by the families that own US family firms. However, Hong Kong family firms have a maximum of seven family board seats compared to only four in the US markets. This indicates that in Hong Kong, family controlling power varies substantially across family firms.

<Insert Table 2 about here>

Panel A of Table 3 provides descriptive statistics on insider sale event characteristics. The number of insider sales per firm has a mean of 4.52. This indicates that the sample firms have four insider sales on average over the study period. The short selling volume per day measures the routine daily short selling activity for each firm. The daily short selling volume accounts for an average of 0.022% of total shares outstanding. The average daily short selling volume in the [-60, -11] window is a specific measure of short selling activity from 60 to 11 days before the insider sale event. In line with intuition, the event day short selling volume (0.024%) is

larger than the average short selling volume (0.022%). The size of insider trading in family-controlled (0.561%) and non-controlled firms (0.579%) is larger than in state-controlled firms (0.184%), as directors in state-controlled firms have very small shareholding. Family-controlled firms have the smallest short selling volume on the event day with 0.020%, in contrast to 0.035% and 0.026% for state-controlled and non-controlled firms, respectively. Panel B of Table 3 shows summary statistics of firm characteristics. Average firm size for family firms (22.703), measured by the natural logarithm of daily market capitalization, is similar to that of non-controlled firms (22.703), while state-controlled firms tend to have a larger firm size (23.957). Also, state-controlled firms have larger turnover, measured by the natural logarithm of the daily number of shares traded.

<Insert Table 3 about here>

4. Methodology

4.1. Abnormal short sales

To investigate the intensity of short sales around insider transactions, we employ an event-study approach to measure the abnormal short selling volume around each insider sale. The date of the insider sale is taken as the event day. The event window [-10, +10] is the period from 10 trading days before to 10 days after the event day. We use an estimation window of [-60, -11], which runs from 60 to 11 days prior to the event, to estimate the daily normal short selling volume for each event. The short selling volume for firm i and event j on day t is denoted by ss_{ijt}. If day 0 is the event day on which an insider in firm i executes a sale transaction j, the daily expected normal short selling volume $\overline{ss}_{ij}$ is estimated by the mean daily short selling volume from day -60 to day -11, which is

$$\overline{ss}_{ij} = \frac{1}{50}\sum_{t=-60}^{t=-11} ss_{ijt} \qquad (1)$$

14

The daily abnormal short selling volume within the event window is

$$\widetilde{ss}_{ijt} = ss_{ijt} - \bar{\bar{ss}}_{ij} \,, \quad t \,\epsilon\,[-10, +10] \,. \tag{2}$$

Denoting the number of shares outstanding by $nosh_{it}$, the abnormal short selling volume for each day in the event window is

$$ass_{ijt} = 100 \times \frac{\widetilde{ss}_{ijt}}{nosh_{ijt}}, \quad t \,\epsilon\,[-10, +10]. \tag{3}$$

Table 4 reports the daily abnormal short sales in the [-10, +10] event window for insider trades for all firms, family-controlled firms, non-controlled firms, and state-controlled firms.[9] For all firms, the abnormal short selling volume accounts for 0.0045%, 0.0088%, and 0.0065% of shares outstanding on day -1, day 0, and day 1, respectively. Unlike Khan and Lu (2013), who find that short sellers can initiate their short positions as many as seven days before directors sell shares, the front-running phenomenon of short sellers is not found in our study. The results are, however, consistent with Chakrabarty and Shkilko (2013), who also document significant abnormal short sales on days 0 and 1. According to the Hong Kong insider trading regulation, insider transactions are reported to the public within three business days of the transaction date. Therefore, short sellers react to insiders' transactions before the news officially becomes public, indicating that their trading is informed. For the non-controlled and state-controlled firms, significantly positive abnormal short sales (0.0094% and 0.0144%) are observed on day 0 only. However, for family-controlled firms, the insider sale event triggers strong abnormal short sales from the event day onward to 10 days after the event. The results show that the intensity of informed trading varies across different organization structures.

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[9] Two or more directors with different titles in the same firm can execute their trades on the same day. We take this day only once as an insider event when implementing the event study. This further reduces the insider sales observations to 946.

4.2. Determinants of abnormal short sales

Prior research shows that both insider trading and short selling intensity can be affected by a series of return-related and liquidity-related variables. Diether *et al*. (2009) show that short sellers often begin to increase their positions once lasting positive returns are obtained. Similarly, insiders are also likely to trade following positive returns (Lakonishok and Lee, 2001; Khan and Lu, 2013). Thus, it is essential to control for both lagged returns and current returns as determinants of short selling activity to separate out the mixed influence of return factors. To investigate the determinants of abnormal short sales, a multiple regression model is applied, as follows:

$$ass_{ijt} = \alpha + \beta_1 Insider_{ij} + X_{ijt}^T\beta + \varepsilon_{ijt}, \qquad t \in [-10, +10]. \qquad (4)$$

In Equation (4), i indicates firm i; j indicates event j, which is an executed insider transaction for firm i; and t indicates day t within a 21-day event window. The dependent variable ass_{ijt} is daily abnormal short sales calculated using Equation (3) for firm i and event j on day t. $Insider_{ij}$ is the main indicator variable that equals one when the day is the event day and zero otherwise. This variable is constructed based on the preliminary results in Table 4 to detect the event effect of insider sales on the intensity of short sales after controlling for other determinants.

A set of variables is included to control for other potential determinants of abnormal short sales. *Firm size* is the natural logarithm of the daily market value. *Bid-ask spread* is measured as the bid price minus the ask price, divided by the average of the daily bid and ask prices. *Turnover* is the natural logarithm of daily number of shares traded. Market-to-book is the daily market capitalization divided by the previous quarter-end book value of equity. $Short_{(t-5;t-1)}$

represents the cumulative daily short selling volume during the five days prior to day t as a percentage of firm's shares outstanding. AR_t is the size-adjusted abnormal returns on day t. $CAR_{(t-5;t-1)}$ measures the cumulative daily abnormal size-adjusted returns (Fidrmuc *et al.*, 2006; Khan and Lu, 2013) during the five days prior to day t. For the size-adjusted returns, we first sort 10 size portfolios for all stocks listed on the Main Board based on daily market capitalization, and then calculate the equally weighted average return for each size portfolio on a daily basis. The size-adjusted abnormal return for event i on day t is its daily return on day t minus the return on the portfolio to which it belongs.

The heteroskedasticity-consistent standard errors are used to estimate the coefficients. The standard errors are clustered at the event level. Industry and year effects are also controlled for multiple regressions.

5. Empirical Results

This section starts by discussing the impact of insider sale events on abnormal short sales across different organization structures. For family firms, the influence of family control on short selling is further investigated.

5.1. Abnormal short sales due to directors' trades across organization structures

Table 5 reports the regression results concerning abnormal short sales around insider transactions to all firms, family-controlled firms, non-controlled firms, and state-controlled firms. Based on Equation (4), *Insider* records the intensity of abnormal short sales on the event day. If informed trading exists, we expect to observe positive abnormal short sales on the event day. Model (1) shows that the event effect on short selling activity is significantly positive, with a coefficient of 0.006. This indicates that abnormal short sales increase by, on average, 0.006% of shares outstanding on the event day compared to other days within the event window.

For family-controlled firms, a statistically significant insider sale effect on short selling is documented in Model (2), on average 0.005% of the number of shares outstanding on the event day (both statistically and economically stronger than non-controlled firms in Model (3)). For state-controlled firms only, there is no statistically significant relationship between insider sale events and abnormal short selling in Model (4). Based on the above results, we conclude that informed trading in the form of short selling around insider sales is more active in family firms.

For the control variables, the results suggest that short selling activity is more intense in firms with higher turnover and a heavier historical short position. Also, short sellers favor initiating short selling after positive cumulative abnormal returns, which is consistent with Khan and Lu (2013) and Chakrabarty and Shkilko (2013).

<center>**<Insert Table 5 about here>**</center>

5.2. Abnormal short sales and family control

The results in Table 5 suggest that short selling activity around insider sales is particularly strong in family firms. Here, we explore how family control influences the potential informed trading between short sellers and insiders. Family voting rights, family board members, and family board presence are used to measure family control.

Table 6 shows that short selling intensity has a concave relationship with family controlling power. On average, based on the magnitude and significance of the coefficient on *Insider*, the intensity of short selling activity is stronger in firms with less family control (family voting rights <50%, family board seats <2, and family board presence <20%), in Models (1), (3), and (5) than in firms with stronger family control in Models (2), (4), and (6). We document significant positive abnormal short sales on the event day for weakly controlled family firms (0.007%, 0.008%, and 0.008%, respectively) compared to strongly controlled ones (0.001%,

<center>18</center>

0.000%, and -0.000%). The results support a concave relationship between the intensity of short selling and controlling power in family firms. This can be explained because, holding an undiversified portfolio, family shareholders have a longer investment horizon and more reputational concerns for the firm. Their trading is mostly motivated by liquidity reasons rather than material information. When family control dominates, family shareholders align their interests more with the firm and are less likely to engage in informed trading themselves or leak information to outside investors.

<center>**<Insert Table 6 about here>**</center>

5.3. Abnormal short sales and family directors

Within family-controlled firms, we further investigate whether the incentives to engage in informed trading depend on the insider's affiliation with the family. Insider sales are classified into two groups. One group includes trades executed by family insiders, while the other refers to trades executed by insiders who do not belong to the family. In unreported univariate tests, significant (at the 1% level) large abnormal short sales (0.0075% on day 0) around insider sales executed by the non-family group exist, but there are no positive abnormal short sales for the family group.

<center>**<Insert Table 7 about here>**</center>

Model (1) in Table 7 shows that abnormal short sales increase by 0.006% on the event day following trades executed by non-family insiders, while no significant impact is seen for abnormal short sales from transactions executed by family insiders. This result confirms the conjecture about the potential conflicts of interest between family insiders and non-family insiders regarding trading incentives. Insiders who are not related to the family can be a source

of information leakage due to the pursuit of their own personal returns or resentment to the family dominance based on culture theory (Bertrand and Schoar, 2006).

5.4. The return predictability of insider sales

To assess the stock return predictability of insider trading, we calculate abnormal stock returns following insider sales. Abnormal returns are measured as size-adjusted returns.[10] Table 8 reports cumulative abnormal returns (CARs) in the [-5, -1], [-10, -1], [0, +3], [0, +5], and [0, +10] event windows around insider sales. CARs are significantly positive at the 1% level in windows [-5, -1] and [-10, -1] for all firms. This suggests that (1) directors prefer to sell their shares after a short term of positive abnormal returns and (2) short selling around insider sales does not appear to respond to other negative public information about the firm because there are no negative abnormal returns before the transaction.

From Panel A, we document negative cumulative abnormal returns for family-controlled firms in the [0, +10] event window, which can help to explain the stronger intensity of short selling activity around insider sales in family-controlled firms. In Panel B, firms with lower family control (family voting rights <50%, family board seats <2, and family board presence <20%) display significantly negative cumulative abnormal returns in the [0, +10] event window compared to firms with higher family control (family voting rights >=50%, family board seats >=2, and family board presence >=20%). Consistently, short sellers initiate larger short positions around insider sales in firms with lower family control. Similarly, in Panel C, we document larger significantly negative cumulative abnormal returns for transactions executed by insiders who do not belong to the family. This suggests that transactions by non-family directors and mangers are more profitable, which also triggers stronger abnormal short sales.

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[10] The abnormal returns defined by the market model are also tested. The results remain qualitatively the same.

Overall, informed trading by short sellers is more active around insider transactions with stronger negative return predictability.

\<Insert Table 8 about here\>

5.5. Sub-group analysis and robustness tests

5.5.1. Opportunistic or routine insider trades

Cohen *et al*. (2012) develop a new algorithm to decode the information content of insider trading. For each insider, they analyze past trading history and look for consistent patterns in the timing of their trades. Under the algorithm, insider trades can be grouped into opportunistic ones and routine ones. Their empirical results suggest that opportunistic insider transactions contain more private information than those of routine transactions. Following Cohen *et al*. (2012), we identify the transactions made by an insider who places a trade in the same calendar month for at least two years, or the trading time interval between two consecutive trades is fixed as routine trades and others else as opportunistic trades.[11] Because the information content of opportunistic insider trades is higher, the informed trading intensity around the transactions is expected to be higher.

Table 9 shows the regression results for routine insider trades and opportunistic insider trades separately across different organization structures, family control, and family membership in Panels A, B, and C, respectively. Models (1) and (2) in Panel A for all firms show only significant abnormal short sales for opportunistic transactions. This suggests that short sellers respond more actively to opportunistic insider sales. We find that the intensity of short selling is significant for opportunistic insider sales only in family-controlled firms in Model (4). No

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[11] We expand the range of routine trades based on the data structure. Following Cohen *et al*. (2012), if the trade pattern of an insider is March 1, 2012, June 1, 2012, Sept. 1, 2012, and Dec. 1, 2012, his/her transactions are classified as routine trades. Besides, we also identify the trades made by an insider whose trading time interval is fixed as routine trades.

abnormal short selling activity is seen in state-controlled firms and non-controlled firms regardless of opportunistic insider or routine insider sales. The results for Panels B and C suggest that opportunistic insider transactions in weakly controlled family firms and transactions by non-family owners trigger stronger abnormal short selling.

<div align="center"><Insert Table 9 about here></div>

5.5.2. Directors' rank and abnormal short sales

According to the information hierarchy hypothesis proposed by Seyhun (1986), insiders who are more knowledgeable about the overall operational activities of the firm, such as the chief executive officer (CEO) and the board of directors, are more successful predictors of future stock price movements. However, because such parties are more rigorously scrutinized, they may choose not to use their information advantage for trading (Jeng et al., 1999). We test whether short selling activity around insider trading depends on the rank of directors. As the information hierarchy hypothesis suggests, the intensity in short selling decreases as the rank of directors making the sale moves through the following categories: chief executive, chairman, other senior executives (chief financial officer/chief operating officer/chief investment officer/managers), executive directors, non-executive directors, and independent non-executive directors.[12]

Table 10 reports the regression results for abnormal short sales on the insider sale event by directors' rank. We document significant insider sale events for executive directors and independent directors, but not for the chief executive and chairman. The results are consistent with Jeng et al. (1999) and Fidrmuc et al. (2006). Fidrmuc et al. (2006) find that a CEO's

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[12] According to Chapter 3 of the Listing Rules and Guidance (Authorised Representatives, Directors, Board Committees and Company Secretary) disclosed by the Hong Kong Stock Exchange, every board must include at least three independent non-executive directors and at least one of the independent non-executive directors must have appropriate professional qualifications or accounting or related financial management expertise. A candidate holding more than 1% of the number of shares is more likely to be questioned about his/her independence.

transactions exhibit the lowest information effects of all types of directors and do not document statistically significant cumulative abnormal returns for a chairman's trades. Jeng *et al.* (1999) explain this phenomenon by arguing that CEOs are heavily scrutinized, leading them to trade cautiously.

<center>**<Insert Table 10 about here>**</center>

5.5.3. Other robustness checks

Our main tests based on Equation (4) capture abnormal short sales only on the event day of insider sales. To test the robustness of our results, we examine abnormal short sales on the event day and the day after and continue to find strong event effects, indicating that short sellers react to transactions in family-controlled firms more aggressively.

When analyzing insider trading, we define both directors and top management as insiders in our main results. We also exclude managers who are not on the board as insiders in a further check and the results remain robust.

6. Conclusion

Using directors' transaction records and daily short sale data, we investigate whether family presence facilitates or limits informed trading by examining abnormal short sales around insider transactions. We find that short sellers initiate their short positions before insider sales are publicly reported. The short selling intensity is significantly stronger in family-controlled firms than in non-controlled firms. Further results indicate that short sellers' activity in response to directors' trades is also affected by the family's controlling power. The intensity of short selling is a concave function of family controlling power, with its maximum at approximately 50%. Although short selling activity around insider sales is more active in family firms overall than in other firms, it is weaker in firms with extremely strong family control. In family-

controlled firms, transactions by insiders who do not belong to the family group trigger larger abnormal short sales than do those by family insiders.

Our study provides a major contribution to the existing literature on the potential conflicts of interest between family and non-family insiders. In particular, our evidence on a concave relation between the intensity of short selling and controlling power in family firms sheds new light on the opposing incentives for the controlling family to engage in informed trading.

The main argument in favor of informed trading by insiders and short sellers is that it conveys private information to the capital market, thus allowing better price discovery and improving market efficiency (Jaffe, 1974; Seyhun, 1986; Leland, 1992; Chang *et al*., 2007; Boehmer and Wu, 2012). However, the superior return predictability of informed trading can undermine the confidence of average investors and further limit capital market development. Our empirical evidence suggests that even without the involvement of the market makers who are largely alleged to be the source of information leakage in the US, short sellers can still respond and move faster than other market participants. Our research also provides additional evidence related to information leakage in explaining short sellers' superior profitability.

Table 1
Dataset Selection Procedure

This table reports the dataset selection procedure. The original dataset contains 7,921 transaction records covering 726 firms from January 2009 to December 2014. Multiple transactions executed by the same person on one day are recorded as one transaction and the transaction size is consolidated. Insider sales within 20 days of earnings and dividend announcements are eliminated. When multiple transactions are made by one insider within 30 consecutive days, only the first transaction is retained. Stocks that are ineligible for short selling are excluded. Financial firms such as banks, insurance, investment funds and real estates are also excluded. A sample of 1,148 observations for 254 firms is finally obtained.

Sample selection procedure	Obs.	Firms
Open market sale transactions for all insiders	7,921	726
Consolidated transactions for each insider on the same day	7,736	726
Exclude sales within 20 days of dividend and earnings announcements	5,915	671
Exclude multiple sales executed within 30 consecutive days for each insider	2,546	667
Exclude stocks that could not be short sold during the sample period	1,341	320
Exclude financial firms (banks, insurance, investment funds and real estates)	1,148	254

Table 2
Summary Statistics for Directors' Trades, Large Controlling Shareholders and Family Control

Panel A reports the summary statistics for transaction size by category of director from January 2009 to December 2014. The transaction size is measured by the number of shares traded as a percentage of the number of shares outstanding. Other senior executives include the chief financial officer, chief operating officer, chief investment officer, and managers, while the chairman is the chairman of the board. Panel B records the summary statistics for the controlling power of large controlling shareholders. For family-controlled firms, it is measured as the voting rights by all family shareholders; for state-controlled firms, it is measured as the voting rights by the state; for non-controlled firms, it is measured as the voting rights held by the largest substantial shareholder. Panel C shows summary statistics for family control in family firms. *Family board seats* is the number of family members sitting on the board. *Family board presence (%)* is the number of family members sitting on the board as a percentage of the total number of board members.

	Obs.	Mean	Median	1%	99%	Std.Dev.
Panel A: Summary statistics for transaction size by category of director (%)						
Chief executives	115	0.980	0.044	0.000	19.500	3.203
Other senior executives	92	0.057	0.023	0.000	0.621	0.102
Chairman	231	1.474	0.063	0.001	13.658	3.066
Executive directors	414	0.327	0.021	0.000	6.944	1.757
Non-executive directors	118	0.383	0.030	0.000	6.307	1.227
Independent directors	178	0.018	0.006	0.000	0.197	0.045
All insiders	1,148	0.509	0.022	0.000	11.326	2.023
Panel B: Summary statistics for the controlling power of large controlling shareholders (%)						
	Obs.	Mean	Median	1%	99%	Std.Dev.
Family-controlled firms	141	51.186	50.320	30.690	79.140	13.494
Non-controlled firms	72	20.785	21.580	1.477	29.880	6.447
State-controlled firms	41	51.549	51.990	21.000	77.900	14.855
Panel C: Summary statistics for family control in family firms						
	Obs.	Mean	Median	1%	99%	Std.Dev.
Family board seats	141	1.766	1.000	0.000	6.000	1.340
Family board presence (%)	141	19.904	14.286	0.000	60.000	14.431

Table 3
Summary Statistics for Event and Firm Characteristics

This table reports descriptive statistics from January 2009 to December 2014 for all firms, then family-controlled firms, non-controlled firms and state-controlled firms. *Insider sale events per firm* stands for the number of insider sales per firm over the sample period. *Insider transaction size (%)* is measured by the number of shares traded as a percentage of the number of shares outstanding. *Short selling volume per day (%)* refers to the daily short selling volume per firm as a percentage of the number of shares outstanding across the sample period. *Event day short selling volume (%)* is the daily short selling on the insider sale date as a percentage of the number of shares outstanding. *Average short selling volume (%)* is the average daily short selling volume in the [-60, -11] window before the insider sale date as a percentage of the number of shares outstanding. *Firm size* is the natural logarithm of the daily market value. *Book to market* is the quarter-end book value of equity divided by the daily market value of equity. *Turnover* is the natural logarithm of the daily number of shares traded. *Bid-ask spread* is measured as the daily bid price minus the daily ask price, divided by the average of the daily bid and ask prices.

Panel A: Summary statistics for event characteristics								
						Family-controlled (N=610)	Non-controlled (N=363)	State-controlled (N=175)
	Mean	Median	1%	99%	Std.Dev.			
Insider sale events per firm	4.520	2.000	1.000	25.000	5.032	4.326	5.042	4.269
Insider transaction size (%)	0.509	0.022	0.000	11.326	2.023	0.561	0.579	0.184
Short selling volume per day (%)	0.022	0.009	0.000	0.202	0.046	0.023	0.024	0.021
Short selling volume on the event day (%)	0.024	0.006	0.000	0.262	0.060	0.020	0.026	0.035
Average short selling volume [-60,-11] (%)	0.018	0.009	0.000	0.107	0.024	0.015	0.019	0.023
Panel B: Summary statistics for firm characteristics								
						Family-controlled (N=141)	Non-controlled (N=72)	State-controlled (N=41)
	Mean	Median	1%	99%	Std.Dev.			
Firm size	22.488	22.488	18.300	26.774	1.684	22.703	22.522	23.957
Book to market	0.907	0.679	0.008	4.376	0.876	0.771	0.935	0.710
Turnover	14.880	15.047	9.852	18.584	1.770	14.960	15.434	15.623
Bid-ask spread	0.006	0.003	0.000	0.047	0.011	0.006	0.007	0.004

Table 4
Abnormal Short Sales Volume around Insider Sales

This table reports the daily abnormal short sales in the [-10, +10] event window for insider trades for all firms, family-controlled firms, non-controlled firms, and state-controlled firms. The insider sale day is defined as day 0. Abnormal short sales (%) is measured by daily short sales minus average short sales in the [-60, -11] estimation window as a percentage of the number of shares outstanding. The t-test tests whether abnormal short sales are different from zero. ***, ** and * indicate significance at the 1% ,5% and 10% levels, respectively.

Day	All firms (N=946)		Family-controlled (N=494)		Non-controlled (N=300)		State-controlled (N=152)	
	Mean	t-stat	Mean	t-stat	Mean	t-stat	Mean	t-stat
-10	-0.0000	-0.19	0.0018	1.21	-0.0039**	-2.27	0.0008	0.35
-9	0.0005	0.40	0.0015	0.90	-0.0014	-0.65	0.0007	0.37
-8	-0.0005	-0.37	-0.0003	-0.16	-0.0024	-1.34	0.0027	0.70
-7	-0.0022***	-2.70	-0.0023*	-1.74	-0.0035**	-2.45	-0.0005	-0.24
-6	-0.0004	-0.32	-0.0005	-0.40	-0.0011	-0.66	0.0017	0.43
-5	-0.0010	-0.75	-0.0018	-1.17	-0.0014	-0.71	0.0029	0.64
-4	0.0003	0.24	0.0008	0.44	0.0007	0.29	-0.0021	-1.06
-3	-0.0011	-1.05	-0.0012	-0.96	-0.0005	-0.21	-0.0020	-0.80
-2	0.0020	1.52	0.0021	1.25	0.0033	1.19	-0.0012	-0.58
-1	0.0045**	2.28	0.0025*	1.75	0.0086	1.52	0.0029	1.23
0	0.0088***	4.41	0.0066***	3.35	0.0094**	2.41	0.0144**	1.99
1	0.0065***	2.45	0.0047***	2.26	0.0030	1.48	0.0192	1.33
2	0.0024	1.24	0.0032	1.37	0.0006	0.27	0.0019	0.70
3	0.0026	1.48	0.0003	0.18	0.0044	0.83	0.0052	1.61
4	0.0035	1.96	0.0047*	1.93	0.0021	0.66	0.0022	0.49
5	0.0028	2.09	0.0030	1.64	0.0014	0.57	0.0049	1.49
6	0.0033**	2.22	0.0029*	1.75	0.0017	0.54	0.0081*	1.76
7	0.0038	1.93	0.0024	1.44	0.0070	1.29	0.0022	0.82
8	0.0036**	2.28	0.0057***	2.65	0.0004	0.14	0.0028	0.85
9	0.0038**	2.51	0.0047**	2.47	0.0030	0.95	0.0022	0.71
10	0.0024	1.54	0.0030**	1.98	0.0038	0.92	-0.0023	-1.17

Table 5
Insider Event, Large Controlling Shareholders and Abnormal Short Sales

This table reports OLS regression results for abnormal short sales around insider transactions for all firms, family controlled firms, non-controlled firms and state-controlled firms. The dependent variable is daily abnormal short sales. *Insider* is an indicator variable that equals one when the day is the event day and zero otherwise. *Firm size* is the natural logarithm of the daily market value. *Bid-ask spread* is measured as the bid price minus the ask price, divided by the average of the daily bid and ask prices. *Turnover* is the natural logarithm of the daily number of shares traded. *Market-to-book* is the daily market capitalization divided by the previous quarter-end book value of equity. $Short_{(t-5;t-1)}$ represents the cumulative short selling volume during the five days prior to day t as a percentage of number of shares outstanding. AR_t is the size-adjusted abnormal returns on day t. $CAR_{(t-5;t-1)}$ measures the cumulative abnormal size-adjusted returns during the five days prior to day t. All models include year and industry dummies. All standard errors are clustered by event. Robust t-statistics are reported in parentheses. ***, ** and * indicate significance at the 1% ,5% and 10% levels, respectively.

	(1) All firms	(2) Family-controlled	(3) Non-controlled	(4) State-controlled
Insider	0.006***	0.005**	0.004*	0.008
	(3.451)	(2.404)	(1.678)	(1.264)
Firm size	-0.001	-0.005***	0.001	-0.001
	(-1.480)	(-4.469)	(1.137)	(-0.704)
Turnover	0.004***	0.004***	0.004***	0.014***
	(5.836)	(5.132)	(3.417)	(2.917)
Bid-ask spread	0.203	-0.092	0.760	-1.132
	(0.597)	(-0.451)	(1.183)	(-1.289)
Market-to-book	-0.000	-0.000	-0.001	-0.004**
	(-1.291)	(-1.063)	(-1.473)	(-2.298)
$Short_{(t-5;t-1)}$	0.046***	0.034***	0.057***	0.040**
	(9.330)	(6.650)	(14.502)	(2.526)
$CAR_{(t-5;t-1)}$	0.025***	0.009	0.065***	0.033
	(3.499)	(1.224)	(5.913)	(1.090)
AR_t	0.000*	-0.000	0.001*	0.002
	(1.952)	(-0.355)	(1.887)	(1.620)
Intercept	-0.016	0.063***	-0.070**	-0.175*
	(-0.702)	(2.827)	(-2.165)	(-1.922)
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Observations	16,310	8,299	5,048	2,963
Adjusted R^2	0.133	0.091	0.239	0.107

Table 6
Insider Event, Family Control and Abnormal Short Sales

This table reports OLS regression results for abnormal short sales around insider transactions, across different family control, in family-controlled firms. *Family voting rights* refers to the voting rights held by all family members. *Family board seats* is the number of family members sitting on the board. *Family board presence* is the family members sitting on the board as a percentage of the total number of board members. The dependent variable is daily abnormal short sales. *Insider* is an indicator variable that equals one when the day is the event day and zero otherwise. *Firm size* is the natural logarithm of the daily market value. *Bid-ask spread* is measured as the bid price minus the ask price, divided by the average of the daily bid and ask prices. *Turnover* is the natural logarithm of the daily number of shares traded. *Market-to-book* is the daily market capitalization divided by the previous quarter-end book value of equity. $Short_{(t-5;t-1)}$ represents the cumulative short selling volume during the five days prior to day t as a percentage of the number of shares outstanding. AR_t is the size-adjusted abnormal return on day t. $CAR_{(t-5;t-1)}$ measures the cumulative abnormal size-adjusted return during the five days prior to day t. All models include year and industry dummies. All standard errors are clustered by event. Robust t-statistics are reported in parentheses. ***, ** and * indicate significance at the 1% ,5% and 10% levels, respectively.

	(1) Family voting rights<50%	(2) Family voting rights>=50%	(3) Family board seats<2	(4) Family board seats>=2	(5) Family board presence<20%	(6) Family board presence>=20%
Insider	0.007**	0.001	0.008**	0.000	0.008**	-0.000
	(2.159)	(0.641)	(2.369)	(0.027)	(2.430)	(-0.094)
Firm size	-0.009***	-0.001*	-0.007***	-0.004***	-0.007***	-0.004***
	(-4.188)	(-1.839)	(-3.635)	(-4.108)	(-3.555)	(-4.019)
Turnover	0.005***	0.003***	0.004***	0.005***	0.005***	0.003***
	(4.794)	(3.354)	(4.289)	(4.735)	(4.553)	(3.833)
Bid-ask spread	-0.405	-0.147	-0.065	-0.068	-0.148	-0.097
	(-1.162)	(-0.926)	(-0.185)	(-0.277)	(-0.423)	(-0.454)
Market-to-book	0.000	-0.001***	0.000	-0.001***	0.000	-0.000***
	(0.780)	(-4.354)	(1.145)	(-4.037)	(1.026)	(-2.666)
$Short_{(t-5;t-1)}$	0.035***	0.027***	0.037***	0.008	0.035***	0.022***
	(6.334)	(3.155)	(6.562)	(1.037)	(6.466)	(3.025)
$CAR_{(t-5;t-1)}$	0.017	0.013***	0.011	0.029***	0.016	0.016***
	(1.516)	(3.478)	(0.864)	(3.807)	(1.345)	(3.070)
AR_t	-0.000	0.000*	-0.000	0.000	-0.000	0.000
	(-0.637)	(1.655)	(-0.163)	(0.151)	(-0.730)	(1.374)
Intercept	0.117***	-0.006	0.089**	0.041	0.085**	0.054**
	(2.806)	(-0.282)	(2.469)	(1.631)	(2.272)	(2.163)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,359	2,940	4,905	3,394	5,385	2,914
Adjusted R^2	0.106	0.087	0.108	0.089	0.100	0.086

Table 7
Insider Event, Family Membership and Abnormal Short Sales

This table reports OLS regression results for abnormal short sales around insider transactions, split by whether or not the insider belongs to the family, in the family-controlled firms. The *family group* includes those trades executed by family insiders, and the *non-family group* refers to those trades executed by insiders that do not belong to the family. *Insider* is an indicator variable that equals one when the day is the event day and zero otherwise. *Firm size* is the natural logarithm of the daily market value. *Bid-ask spread* is measured as the daily bid price minus the daily ask price, divided by the average of the daily bid and ask prices. *Turnover* is the natural logarithm of the daily number of shares traded. *Market-to-book* is the daily market capitalization divided by the previous quarter-end book value of equity. $Short_{(t-5;t-1)}$ represents the cumulative short selling volume during the five days prior to day t as a percentage of the number of shares outstanding. AR_t is the size-adjusted abnormal return on day t. $CAR_{(t-5;t-1)}$ measures the cumulative abnormal size-adjusted return during the five days prior to day t. All models include year and industry dummies. All standard errors are clustered by event. Robust t-statistics are reported in parentheses. ***, ** and * indicate significance at the 1% ,5% and 10% levels, respectively.

	(1) Non-family group	(2) Family group
Insider	0.006**	0.000
	(2.406)	(0.057)
Firm size	-0.006***	-0.002
	(-5.399)	(-0.543)
Turnover	0.004***	0.005***
	(5.018)	(2.845)
Bid-ask spread	0.042	-0.506
	(0.170)	(-1.275)
Market-to-book	0.000	-0.001**
	(0.273)	(-2.561)
$Short_{(t-5;t-1)}$	0.036***	0.016**
	(6.595)	(2.233)
$CAR_{(t-5;t-1)}$	0.011	0.019**
	(1.103)	(2.302)
AR_t	0.000	-0.000
	(0.132)	(-0.673)
Intercept	0.089***	-0.035
	(3.677)	(-0.709)
Industry	Yes	Yes
Year	Yes	Yes
Observations	6,492	1,807
Adjusted R^2	0.102	0.081

Table 8
Abnormal Stock Returns around Insider Sales

This table reports cumulative abnormal returns (CARs) in the [-5, -1], [-10, -1], [0, +3], [0, +5], and [0, +10] event windows around insider sales. Abnormal returns are measured as size-adjusted returns. Panel A describes CARs around insider sales for all firms, family-controlled firms, non-controlled firms, and state-controlled firms. Panel B records CARs around insider sales for different level of family control in family-controlled firms. *Family voting rights* refers to the voting rights held by all family members. *Family board seats* is the number of family members sitting on the board. *Family board presence* is the family members sitting on the board as a percentage of the total number of board members. Panel C reports CARs around insider sales split by whether or not the insider belongs to the family, in the family-controlled firms. The *family group* includes those trades executed in family-controlled firms by family insiders, and *non-family group* refers to those trades executed by insiders that do not belong to the family. ***, ** and * indicate significance at the 1% ,5% and 10% levels respectively.

Panel A: Abnormal stock returns and large controlling shareholders							
	All firms		Family-controlled firms		Non-controlled firms		State-controlled firms	
Day	Mean	t-stat	Mean	t-stat	Mean	t-stat	Mean	t-stat
[-5, -1]	0.0161***	7.96	0.0146***	5.37	0.0226***	5.64	0.0101***	2.90
[-10, -1]	0.0266***	8.90	0.0229***	5.98	0.0368***	5.92	0.0207***	3.86
[0, +3]	0.0028	1.51	0.0018	0.70	0.0045	1.32	0.0023	0.54
[0, +5]	0.0006	0.28	0.0010	0.33	0.0005	0.12	0.0006	0.14
[0, +10]	-0.0033	-1.12	-0.0056	-1.37	-0.0018	-0.32	0.0019	0.34

Panel B: Abnormal stock returns and family control											
	Family voting rights <50%		Family voting rights >=50%		Family board seats<2		Family board seats>=2		Family board presence<2		Family board presence>=2
Day	Mean	t-stat	Mean	t-stat	Mean	t-stat	Mean	t-stat	Mean	t-stat	Mean	t-stat
[-5, -1]	0.0119***	3.66	0.0189***	3.95	0.0147***	3.86	0.0145***	3.96	0.0136***	3.55	0.0162***	3.95
[-10, -1]	0.0185***	4.12	0.0301***	4.35	0.0233***	4.67	0.0224***	3.75	0.0211***	4.41	0.0259***	4.03
[0, +3]	-0.0022	-0.73	0.0080*	1.84	-0.0014	-0.42	0.0059	1.64	-0.0003	-0.10	0.0050	1.32
[0, +5]	-0.0054	-1.52	0.0112**	2.04	-0.0049	-1.28	0.0086*	1.74	-0.0033	-0.91	0.0078	1.48
[0, +10]	-0.0131***	-2.76	0.0062	0.85	-0.0154***	-3.00	0.0072	1.10	-0.0115**	-2.32	0.0037	0.53

Panel C: Abnormal stock returns and insider's membership (or not) of family				
	Non-family group		Family group	
Day	Mean	t-stat	Mean	t-stat
[-5, -1]	0.0169***	5.31	0.0072	1.41
[-10, -1]	0.0259***	5.69	0.0137*	1.97
[0, +3]	0.0028	1.04	-0.0015	-0.24
[0, +5]	0.0002	0.05	0.0037	0.48
[0, +10]	-0.0077*	-1.84	0.0011	0.10

Table 9
Routine Insider Trades, Opportunistic Insider Trades and Abnormal Short Sales

This table reports OLS regression results for abnormal short sales around routine and opportunistic insider trades separately. The dependent variable is daily abnormal short sales. *Insider*_routine includes routine insider trades and *Insider*_opportunistic includes opportunistic insider trades. Panel A shows the regression results across different organization structure. Panel B shows the regression results across different level of family control measured as voting power, board seats and board presence. Panel C shows the regression results according to whether the insider belongs to the family in the family-controlled firms. All models include year and industry dummies. The other control variables are all included in the regressions but not reported in this table. All standard errors are clustered by event. Robust t-statistics are reported in parentheses. ***, ** and * indicate significance at the 1% ,5% and 10% levels, respectively.

	All firms		Family-controlled		Non-controlled		State-controlled	
Panel A: Routine insider trades, opportunistic insider trades and large controlling shareholders								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
*Insider*_routine	0.003		-0.002		0.008		0.000	
	(1.029)		(-0.693)		(1.359)		(0.070)	
*Insider*_opportunistic		0.006***		0.006**		0.003		0.009
		(3.267)		(2.497)		(1.098)		(1.199)

Panel B: Routine insider trades, opportunistic insider trades and family control

	Family voting rights<50%		Family voting rights>=50%		Family board seats<2		Family board seats>=2		Family board presence<20%		Family board presence>=20%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
*Insider*_routine	-0.002		-0.002		-0.002		0.000		-0.004		0.002	
	(-0.527)		(-0.275)		(-0.445)		(-0.008)		(-0.831)		(0.381)	
*Insider*_opportunistic		0.008**		0.001		0.009**		0.000		0.009**		0.000
		(2.272)		(0.643)		(2.416)		(0.165)		(2.551)		(-0.193)

Panel C: Routine insider trades, opportunistic insider trades and family membership

	Non-family group		Family group	
	(1)	(2)	(3)	(4)
*Insider*_routine	-0.001		-0.003	
	(-0.260)		(-0.320)	
*Insider*_opportunistic		0.007**		0.001
		(2.439)		(0.332)

Table 10
Directors' Rank and Abnormal Short Sales

This table reports OLS regression results for abnormal short sales around insider sales by director's rank. Other senior executives include the chief financial officer, chief operating officer, chief investment officer and managers, while the chairman is the chairman of the board. The dependent variable is daily abnormal short sales. *Insider* is an indicator variable that equals one when the day is the event day and zero otherwise. *Firm size* is the natural logarithm of the daily market value. *Bid-ask spread* is measured as the daily bid price minus the daily ask price, divided by the average of the daily bid and ask prices. *Turnover* is the natural logarithm of the daily number of shares traded. *Market-to-book* is the daily market capitalization divided by the previous quarter-end book value of equity. $Short_{(t-5;t-1)}$ represents the cumulative short selling volume during the five days prior to day t as a percentage of the number of shares outstanding. AR_t is the size-adjusted abnormal return on day t. $CAR_{(t-5;t-1)}$ measures the cumulative abnormal size-adjusted return during the five days prior to day t. All models include year and industry dummies. All standard errors are clustered by event. Robust t-statistics are reported in parentheses. ***,** and * indicate significance at the 1% ,5% and 10% levels, respectively.

	(1) Chief executive	(2) Chairman	(3) Other senior executives	(4) Executive directors	(5) Non-executive directors	(6) Independent directors
Insider	0.005	0.003	-0.000	0.009**	0.004	0.009*
	(1.065)	(0.970)	(-0.144)	(2.376)	(1.168)	(1.703)
Firm size	-0.001	0.000	0.001	-0.002	-0.002	-0.003**
	(-0.543)	(0.103)	(0.347)	(-1.348)	(-0.853)	(-2.317)
Turnover	0.005***	0.003**	0.002	0.005***	0.005**	0.004**
	(3.419)	(2.398)	(1.522)	(3.836)	(2.016)	(2.495)
Bid-ask spread	-1.965**	-0.492	0.488	0.873	-0.247	-0.516
	(-2.508)	(-0.790)	(0.673)	(1.369)	(-0.353)	(-1.001)
Market-to-book	-0.001*	0.000	0.000	-0.001**	0.001	0.000
	(-1.870)	(0.573)	(0.520)	(-2.462)	(0.952)	(0.072)
$Short_{(t-5;t-1)}$	0.009	0.001	0.055***	0.040***	0.048***	0.046***
	(1.256)	(0.071)	(6.186)	(4.761)	(10.064)	(5.888)
$CAR_{(t-5;t-1)}$	0.034***	0.034**	0.024	0.033**	0.016	0.035*
	(2.697)	(2.165)	(1.100)	(2.430)	(0.874)	(1.758)
AR_t	0.000	0.001**	-0.000	0.001**	0.001**	-0.000
	(1.251)	(2.121)	(-0.551)	(2.055)	(2.274)	(-0.621)
Intercept	-0.038	-0.045	-0.055	-0.023	0.001	0.007
	(-0.812)	(-0.671)	(-1.209)	(-0.510)	(0.012)	(0.250)
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,948	4,473	1,864	8,845	2,678	3,245
Adjusted R^2	0.097	0.106	0.106	0.107	0.198	0.155

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