**Information Leakage in Family Firms:**

**Evidence from Short Selling around Insider Sales**

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**Abstract**

Using a novel insider trading and short selling dataset from the Hong Kong Stock Exchange (HKEx), we investigate potential information leakage from corporate insiders to short sellers, particularly in family firms. Even without the presence of market makers in the HKEx, we document a significant increase in short selling volume before insider trades are released to the public. The non-monotonic relationship between the short selling intensity and family control contributes to the debate on whether family presence facilitates or limits information leakage. In addition, trading by non-family insiders is more likely to convey private information, as compared to family insiders.

**JEL codes:** G14; G18; G32; G38

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# Introduction

Information leakage, where material and non-public information is selectively revealed to a group of investors, is common in capital markets. This largely explains abnormal market reactions such as abnormal institutional trading, short selling and option trading ahead of earnings surprises, analyst recommendations, and other major corporate events (e.g., Christophe *et al*., 2004, 2010; Irvine *et al*., 2007; Hao, 2016). However, it is difficult to clearly identify the sources of information leakage in major capital markets such as the US, due to the involvement of both investors placing their trades and financial intermediaries executing the trades.

Brokerages, as financial intermediaries handling the trades, are in a privileged position to access non-public trading information given their ability to observe both the size and directions of order flow before trade execution.[[1]](#footnote-1) Following trade execution, a delay is allowed before reporting the trade to the public, offering them a further opportunity to tip information. For instance, the US Securities and Exchange Commission (SEC) charged Merrill Lynch a $7 million penalty for its inadequate policies and procedures for controlling the access to institutional customer order flow. The confidential information in "squawk boxes," which are internal intercom systems used by broker-dealers to broadcast institutional customer order information, was leaked to day traders in other firms who then traded ahead of the orders placed by Merrill Lynch’s customers (SEC, 2009).

Corporate insiders are another source of private information leakage given their in-depth knowledge of the firm. Market regulators are trying to limit insiders’ scope to leak non-public and material information. For example, the SEC has run a series of campaigns against the rise of so-called “expert networks”[[2]](#footnote-2), in which corporate insiders are hired as expert consultants from $300 to $1,000 an hour to speak confidentially to hedge fund managers. That expertise, however, can sometimes cross the line into material and non-public information (e.g., Zuckerman and Pulliam, 2010; Thompson, 2013).

Given the difficulties in isolating these two potential channels, and given that the literature mainly points to the leakage from financial intermediaries (e.g., Khan and Lu, 2013; Chakrabarty and Shkilko, 2013; McNally *et al*., 2017), it is worthwhile seeking an unique setting in which only one channel (corporate insiders) exists. This specific channel needs to be better understood. Thus, in this paper, we investigate whether information leakage still exists in a market without the presence of financial intermediaries to identify the leakage from corporate insiders, particularly insiders from family firms.[[3]](#footnote-3) Our study offers insight into the internal governance of corporate insiders, especially for family firms where external discipline is difficult to implement.

We base our study on the Hong Kong Stock Exchange (HKEx). Unlike the US stock market, which is facilitated by dealers/market makers, the HKEx is a pure order-driven system, standing out as an ideal representative for trading mechanisms without market makers. In addition, the HKEx is a global financial hub with sophisticated investors, such as short sellers. The presence and engagement of short sellers can facilitate our identification of abnormal market reactions as they are more likely to be better informed than average investors (e.g., Boehmer *et al*., 2008; Christophe *et al*., 2004, 2010; Karpoff and Lou, 2010; Engelberg *et al*., 2012). Furthermore, a significant number of Hong Kong firms are family owned and controlled (Claessens *et al.*, 2000; Jaggi *et al.*, 2009). The 10 most prominent families in Hong Kong control around 32.1% of all corporate assets (Tsui and Stott, 2004) and approximately half of Hong Kong’s firms are family controlled (Jaggi *et al*., 2009).

Specifically, we study potential information leakage from corporate insiders to short sellers by examining abnormal short sales around insider transactions. Our results suggest that short sellers initiate their short positions before insider sales are publicly reported (i.e., ahead of average investors), indicating the potential for information leakage. Interestingly, in family controlled firms, the intensity of short selling exhibits a non-monotonic function of family control rights: it increases with family control in general, but weakens for firms with higher levels of family control. After distinguishing insider sales placed by family members from those placed by non-family insiders, we find that transactions by non-family insiders trigger larger abnormal short sales than those by family insiders. Furthermore, following Cohen *et al*. (2012), we conduct a sub-sample analysis by distinguishing between routine and opportunistic insider trades, as opportunistic ones are more likely to result from private information. We find greater abnormal short selling volume for opportunistic trades for weakly controlled family firms and by non-family insiders.

Our study makes several contributions to the literature. First, we study information leakage under a trading system that is fundamentally different from that the ones prevailing in the US. Trading systems with financial intermediaries acting as market markers assure liquidity and facilitate price discovery, yet pay a price of lower transparency compared to a pure order-driven system (e.g., Madhavan, 1992; Pagano and Röell, 1996; Malinova and Park, 2013). Recent studies in the US (e.g., Khan and Lu, 2013; Chakrabarty and Shkilko, 2013; McNally *et al*., 2017) show that short sellers can obtain private price-relevant information from brokerages who execute insider sales. This indicates that the involvement of market makers could undermine market fairness through leaking private information, resulting in wealth transfers among investors.

Second, our study suggests that the insider channel for information leakage should not be neglected. Although Anderson *et al.* (2012) highlight that corporate insiders in family firms can be motivated to engage in informed trading, which helps explain the abnormal short sales around negative earnings surprises, they are not able to present direct evidence as their dataset does not flag insider trades. Our data allows us to identify each corporate insider through monitoring their trades. We, thus, provide direct evidence that private information leakage can originate from the investors making the trading (i.e., corporate insiders). Understanding this channel emphasizes the need to focus on the underlying governance of a firm, rather than simply building a Chinese Wall such as the Regulation Fair Disclosure when regulating insider trading.

Finally, prior literature on informed trading in family firms (e.g., Chan *et al.*, 2010; Anderson *et al*., 2012) focuses mainly on the contrast between family and non-family firms. It overlooks the sharp heterogeneity in that family ownership and control vary substantially across family firms. The significant variations in family control and involvement in Hong Kong provide us with a rare opportunity.[[4]](#footnote-4) Given these features, we explore whether the desire of a controlling family to limit information leakage can be moderated by its relative control over the firm and document a non-monotonic relationship between family control and the intensity of information leakage. Furthermore, the literature on potential conflicts between the controlling family and non-family employees (e.g., e.g., Perez-Gonzalez, 2006; Bennedsen *et al*., 2007; Bertrand *et al*., 2008) calls for compelling empirical evidence. Our data enables us to locate each insider’s identity. This helps us examine whether the affiliation to the family influences their likelihood of leaking information, thus explicitly manifesting the potential conflicts of interest.

The remainder of this paper is structured as follows. Section 2 presents literature and hypothesis development. Section 3 explains the institutional background. Section 4 describes the data sources and descriptive statistics. Section 5 presents the research methodology. Section 6 discusses the empirical results and robustness checks. Section 7 concludes the paper.

# Literature and Hypothesis Development

Prior studies generally argue that family insiders are better informed due to their long-standing knowledge and dominant control over the firm (e.g., Demsetz, 1986; Anderson and Reeb, 2003; Ali *et al*., 2007; Chen *et al*., 2008; Anderson *et al*., 2009; Chan *et al*., 2010). With easy access to privileged information, they can exploit this potential advantage for private benefits by engaging in informed trading either by themselves or by tipping information to outside investors. Even in the presence of strict insider trading regulations,[[5]](#footnote-5) heavily monitored and scrutinized family insiders can still leak information to their relatives or friends, who bear less attention from the public.

On the other hand, the controlling family also has incentives to limit informed trading. First, as long-term investors, they are less likely to trade for short-term benefits. Founding family often see themselves as stewards of the family business for future generations and their control often spans multiple decades, sometimes even centuries (Villalonga and Amit, 2006). For example, the founding family members in S&P 500 firms have on average held their positions for more than 78 years, and have typically invested more than 69% of their personal wealth in the firm (Anderson and Reeb, 2003). The long investment horizon and their undiversified holdings bind them to focus on the firm’s long-term growth rather than the short-term profits from trading on private information (Villalonga and Amit, 2006; Hillier *et al*., 2015). Second, family affiliation and the ties of both the founders and heirs motivate them to be especially concerned about the reputation and commitment to the firm. Therefore, they are less likely to engage in information-based transactions or information leakage to outside investors, which could harm their economic benefits and reputation.

In our study, we focus on family firms and explore whether family control and affiliation to the family can influence corporate insiders’ potential to engage in information leakage.

##  Family control and potential information leakage

The desire of a controlling family to limit information leakage can be moderated by its controlling power over the firm. 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 divert the firm’s cash flows for private gain.”* In firms with concentrated family dominance, benefits extracted from informed trading are relatively small, as compared to the overall stock discount losses caused by negative signals to the market. The concentrated family ownership and control provides a guarantee that they are willing to build a reputation for not expropriating outside investors (Gomes, 2000). Strong control also makes the controlling family more capable of limiting information leakage. The relatively small group of controlling family shareholders, resulting from concentrated family control, largely eliminates the opportunity for outside investors to engage in informed trading (Anderson *et al*., 2009). Thus, we hypothesize that the stronger the family control, the more likely the family will protect the firm against information leakage and informed trading.

##  Family affiliation and potential information leakage

The conflicts of interest between family insiders and non-family insiders in family firms can also trigger information leakage. The family’s objective function often includes a wide range of goals such as “*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). Hence, the family management is perhaps not value-maximizing, but rather utility-maximizing for the founding family (Bertrand and Schoar, 2006). For example, family founders may derive utility by hiring top management from their kinship network, rather than outsiders via a competitive process. Furthermore, hiring family members may also damage the relationships between family and non-family employees, leading to resentment from non-family employees (Schulze *et al.,* 2001; Bennedsen *et al*., 2007; Anderson *et al*., 2012). Apart from the resentment of the privileged positions held by the controlling family, to maximize their own wealth, non-family directors and managers are less likely to share all of the objectives with the controlling family. Thus, non-family insiders may impose their self-serving desires through information leakage. For the reasons discussed, we hypothesize that non-family insiders in family firms are more likely to leak private information compared to family insiders.

# 3. Institutional Background

## 3.1. The stock market mechanism in Hong Kong

Unlike the US stock market, the HKEx is a pure order-driven market without market markers. In the US stock market, the center of transaction execution is the market maker who quotes two-way prices (i.e., bid and ask). Customers, who may be investors or other intermediaries, place their orders with the market maker, who will adjust his/her prices depending on the state of his/her book. In contrast, the execution center in an order-driven market is the exchange in which intermediaries have no role in the transaction execution process. Investors’ orders are routed to a central order book and executed against one another. The electronic system in Hong Kong, known as the Automatic Order Matching and Execution System (AMS), matches appropriate bid and ask orders automatically.

An order-driven system is more transparent in terms of both trade matching and information disclosure. In the US, while trade execution is usually seamless, it could take time. Since the SEC does not require a trade to be executed within a set period of time, it provides financial intermediaries an opportunity to tip impending trading information to a third party prior to trade execution. After a trade is executed, in order to protect their positions, market makers are allowed a delay in reporting the executed trade to the public, which offers a further chance to tip trading information. In contrast, in the HKEx, the electronic screen in an AMS displays the order and trade information to the public in real time (e.g., the current best five bid and ask prices and the number of shares available). Trades executed in the HKEx are released to the market as soon as they are matched and are then available to all investors who subscribe to trading information simultaneously.

## 3.2. Insider trading and short selling in Hong Kong

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 filing Form 3A within three business days of any change in the nature of their interests, which is the original source for insiders’ trading information.

In January 1994, the HKEx launched a pilot scheme for regulated short selling under which 17 securities became eligible for short selling. Up to date, not all stocks on the HKEx can be short sold. Based mainly on liquidity and market value criteria, the HKEx updates the list of securities eligible for short selling on a quarterly basis. As of November 14, 2014, the end of our sample period, 755 stocks on the Main Board were eligible for short selling.

## 3.3. Family firms in Hong Kong

Whereas ownership of many public firms in Western countries such as the US and UK are widely diffused, the Hong Kong-listed firms feature a high concentration of family ownership and control. To safeguard family interests, they also routinely appoint family members to sit on the board (Jaggi *et al*., 2009; Leung *et al*., 2012). It is reported that families control approximately half of Hong Kong’s firms through pyramid structures, disproportionate board representation, and historical ties to the firm (Jaggi *et al*., 2009).

According to the Director’s Handbook issued by the HKEx in April 2017,[[6]](#footnote-6) a “controller” means any director, chief executive, or controlling shareholder who can exercise or control the exercise of 30% or more of the voting power at general meetings. Accordingly, we take a threshold of 30% or more of the voting rights across all family members to define family-controlled firms.[[7]](#footnote-7) Further, a “majority-controlled company” refers to a company held by any person who can exercise or control the exercise of more than 50% of the voting power at general meetings, or control the composition of a majority of the board of directors. We, thus, define a strongly controlled family firm if family voting rights exceed 50%, and otherwise as a weakly controlled family firm.

The HKEx also serves as the primary location for Chinese mainland firms seeking foreign financing. By the end of 2014, there were about 300 firms listed in Hong Kong that were controlled by the Chinese government, accounting for one fifth of all publicly listed firms on the Main Board[[8]](#footnote-8) of the HKEx. [[9]](#footnote-9) Thus, in addition to family firms and widely held firms, we also include H shares and red chips as state-controlled firms.

# 4. Data and Descriptive Statistics

## 4.1. Data sources and sample selection

We examine short selling around insider transactions on the HKEx from January 2009 to December 2014. The insider transactions for all open market sales are downloaded from Thomson One, which provides trading by the chairman, chief executives, other senior executives, executive directors, non-executive directors, and independent non-executive directors.[[10]](#footnote-10) Each transaction records the firm’s name, the firm’s stock code, the name of the insider who executed the trade, the insider’s position in the firm, the transaction date, the number of shares traded, the transaction price, the transaction value, and the insider’s shareholding after the transaction. The dataset selection procedure is summarized in Table 1.

The original sample contains 7,921 transactions covering 726 firms. Some insiders execute multiple transactions in a single day. These multiple transactions executed by the same person on the same day are consolidated and recorded as one transaction. To control for the compounding effects of earnings and dividend announcements, insider sales within 20 days of these events are eliminated (Chakrabarty and Shkilko, 2013). The data for earnings and dividend announcements are collected from the China Stock Market and Accounting Research Database (CSMAR). As each 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. Since not all Hong Kong stocks are eligible for short selling, it further reduces the number of observations to 1,341 transactions for 320 firms.[[11]](#footnote-11) Financial firms such as banks, insurance companies, investment funds, and real estate companies are also excluded.[[12]](#footnote-12) Finally, we obtain a dataset of 1,148 observations for 254 firms.

**<Insert Table 1 about here>**

The daily short selling volume is obtained from the HKEx. The stock market and accounting data are from Bloomberg. To measure the controlling power in listed firms, we manually collect insiders’ biographies and shareholding information from annual reports. This allows identification of family members on the board and their respective shareholding interests. In Hong Kong, directors’ interests are disclosed under 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. Corporate interests record those interests that 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 the total voting rights of the family.

## 4.2. Descriptive statistics

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

Panel B records summary statistics for the controlling power of large controlling shareholders measured at the end of 2012.[[13]](#footnote-13) For the 141 family-controlled firms (55.5% of all 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 of 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 control, on average, over 50% of the voting rights, with the highest approaching 80%. Even for non-controlled firms, the largest shareholder has a relatively high stake of 20% compared to the UK (5%) and US (10%) markets, respectively (Lakonishok and Lee, 2001; Fidrmuc *et al*., 2006). Finally, Panel C shows summary statistics of family control. It shows that family firms have 1.766 family members sitting on their board on average, accounting for 20% of the board.

**<Insert Table 2 about here>**

Table 3 presents the summary statistics for insider sale event and firm characteristics. In Panel A, the number of insider sales per firm has a mean of 4.52, which indicates that the sample firms have four insider sales on average over the study period. The short selling volume per day measures the 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 [-30, -11] window measures short selling activity from 30 to 11 days before the insider sale event. The event day short selling volume (0.024%) is larger than the average short selling volume (0.018%). This provides preliminary evidence that short sellers are more active on the day of insider sales.

Panel B of Table 3 reports summary statistics and correlation matrix for firm characteristics. *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. represents the cumulative daily short selling volume five days prior to the insider sale date as a percentage of firm’s shares outstanding. measures the cumulative daily abnormal size-adjusted returns during the five days prior to the insider sale date. is denoted as the size-adjusted abnormal returns on the insider sale date. For size-adjusted returns, we first sort all stocks into deciles based on daily market capitalization, and then calculate the equally weighted average returns for each portfolio on a daily basis as the benchmark returns. The size-adjusted abnormal return for event on day is its daily return on day minus the return on the portfolio to which it belongs.

According to the correlation matrix, larger firms show higher turnover and lower bid-ask spread, indicating better liquidity. However, the size of firm does not correlate with short selling volume and cumulative abnormal return before insider sales. In addition, the negative correlation between and presents consistent evidence that short interest negatively predicts stock returns (Boehmer *et al*., 2008; Karpoff and Lou, 2010; Engelberg *et al*., 2012).

**<Insert Table 3 about here>**

# 5. Methodology

## 5.1. Daily 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 date (day 0). We use an estimation window of [-30, -11], which runs from 30 to 11 days prior to the event, to estimate the expected daily short selling volume for each event.[[14]](#footnote-14) The short selling volume for firm and insider sale event on day is denoted by . The expected daily short selling volume is estimated as the mean of daily short selling volume from day -30 to day -11, which is

 (1)

The daily abnormal short selling volume within the event window is

 (2)

Denoting the number of shares outstanding by , the abnormal short selling volume for each day in the event window is

 (3)

## 5.2. Cumulative abnormal short sales

According to Hong Kong regulations, insiders are required to disclose their trades to the public within three business following the transaction by filing Form 3A. Based on this, we construct cumulative abnormal short sales across different windows within three business days including [0, 1], [0, 2], [0, 3], [1, 2], and [1, 3] to test whether short sellers are informed. Following previous literature (i.e., Khan and Lu, 2013; Chakrabarty and Shkilko, 2013), we expect that the filing date is when average investors first become aware of the insider trade. Despite short sellers’ ability to analyze visible order flow, the insider status and trading interest are not immediately observable until the transaction is disclosed. Thus, we argue that if short sellers continuously react to insiders’ transactions within three business days in addition to day zero, it indicates that their trading is informed.

## 5.3. 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 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 important to control for both lagged returns and current returns as determinants of short selling activity. To investigate the determinants of abnormal short sales, we run a multiple regression model as follows:

 (4)

In Equation (4), indicates firm ; indicates event , which is an executed insider transaction for firm ; and indicates day within a 21-day event window. The dependent variable is daily abnormal short sales. is an indicator variable which captures short sellers’ trading intensity within the three-day disclosure window. We use , , and for event day 0, event window [0, 1] and [0, 2], respectively. equals one when the day is day 0, and zero otherwise. equals one when the day is day 0 or day 1, and zero otherwise. equals one when the day is day 0, day 1, or day 2, and zero otherwise.

Following prior literature, we use a set of variables to control for other potential determinants of abnormal short sales, including *Firm size*, *Turnover*, *Bid-ask spread*, *book-to-market*, , , and . 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.

# 6. Empirical Results

## 6.1. Univariate analysis for abnormal short sales

Panel A of Table 4 reports the daily abnormal short sales in the [-10, +10] event window for all firms, family-controlled firms, non-controlled firms, and state-controlled firms.[[15]](#footnote-16) For all firms, the abnormal short selling volume accounts for 0.0041%, 0.0083%, and 0.0060% 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 prior to insiders’ sales, the front-running phenomenon of short sellers is not found in our study. Khan and Lu (2013) suspect that the leakage occurs when information about the upcoming trading is intercepted during the course of trade execution. In Hong Kong, without the presence of market makers, the front-running phenomenon no longer exists. The abnormal short sales on the event day can be attributed to short sellers’ ability to analyze visible order flow. Insider sales are often large, and thus create significant disturbances in the supply of shares. Such disturbances are detected by sophisticated tape monitors, who subsequently sell short (Chakrabarty and Shkilko, 2013). On the HKEx, the electronic screen displays order and trade information to the public on a real-time basis. Trades executed are released to the market as soon as they are matched. Thus, it is easier for short sellers to monitor the order flow compared to a quote-driven market.

Panel B reports the cumulative abnormal short sales. We document significantly positive abnormal short sales across [0, 1], [0, 2], and [0, 3] event windows (0.0110%, 0.0141%, and 0.0142% of shares outstanding, respectively) for family-controlled firms, but not for non-controlled and state-controlled firms. Even after excluding day 0, family-controlled firms still exhibit significantly cumulative abnormal short sales (0.0076%) in the [1, 2] event window.[[16]](#footnote-17) Our initial evidence on abnormal short sales shows potential information leakage as short position opened before the public announcement of an insider sale and closed upon market reaction to the announcement.

**<Insert Table 4 about here>**

## 6.2. Abnormal short sales and potential information leakage

Table 5 reports the regression results concerning abnormal short sales around insider transactions. Based on variable definition, , and record the intensity of abnormal short sales before average investors become aware of insider trading. If information leakage regarding insider sales exists, we expect to observe positive abnormal short sales within three business days. Model (1) shows that the event effect on short selling activity is significantly positive. For family-controlled firms, we find a statistically significant insider sale effect on short selling in Models (4), (5), and (6). While for non-controlled and state-controlled firms, we observe either a weak relationship or no relationship at all between the insider sale event and abnormal short selling.

For the control variables, our 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).

**<Insert Table 5 about here>**

## 6.3. Abnormal short sales and family control

In this sub-section, we explore how family control influences the potential information leakage from corporate insiders. Family voting rights and family board members are used to measure family control.[[17]](#footnote-18) Table 6 shows that short selling intensity has a non-monotonic relationship with family control. Based on the magnitude and significance of the coefficients on , and , the intensity of abnormal short sales is stronger in firms with weak family control (family voting rights <50% and family board seats <2[[18]](#footnote-19)), in Models (1), (2), (3) and (7), (8), (9) than in firms with strong family control in Models (4), (5), (6) and (10), (11), (12).

The difference in short selling intensity due to relative controlling power supports that corporate insiders in strongly controlled family firms are less likely to leak private information compared to weakly controlled family firms. This is because, holding an undiversified portfolio, family shareholders with strong control may have a longer investment horizon and more reputational concerns for the firm. Also, given strong control, the controlling family are more capable of limiting information leakage.

**<Insert Table 6 about here>**

## 6.4. Abnormal short sales and non-family insiders

Among family-controlled firms, we further explore whether the likelihood of leaking information depend on 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. Models (1), (2), and (3) in Table 7 shows that abnormal short sales increase significantly for event day 0, event windows [0, 1], and [0, 2], following trades executed by non-family insiders, while no significant impact is observed for transactions executed by family insiders.

The results confirm the conjecture about potential conflicts of interest between family insiders and non-family insiders. Overall, insiders who are not related to the family can be a source of information leakage due to the desire to pursue personal interest. Thus, family affiliation can have a significant effect on corporate insiders’ potential to leak information.

**<Insert Table 7 about here>**

## 6.5. Insider sales and abnormal returns

To assess the stock return predictability of insider trading, we calculate abnormal stock returns following insider sales. Table 8 reports cumulative abnormal returns (CARs) for various event windows around insider sales.[[19]](#footnote-20) CARs are significantly positive at the 1% level in windows [-5, -1] and [-10, -1] for all firms. This suggests that insiders prefer to sell their shares after a short term of positive abnormal returns.

In Panel A, we do not document significantly negative cumulative abnormal returns for family-controlled firms in the [0, +10] event window. Among family firms, in Panel B, firms with weak 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 strong family control. This provides further evidence that short sellers initiate larger short positions around insider sales in firms with relatively weaker family control because it is more profitable. Similarly, in Panel C, we document larger significantly negative cumulative abnormal returns for transactions executed by insiders who are not affiliated to the family. This suggests that transactions by non-family directors and managers are more profitable. Overall, informed trading by short sellers is more active following insider transactions with higher abnormal returns.

**<Insert Table 8 about here>**

## 6.6. Robustness tests

### 6.6.1. Opportunistic and routine insider trades

Cohen *et al*. (2012) develop a new algorithm to decode the information content of insider trading. For each insider, they analyze his/her past trading history and search for consistent patterns through the timing of their trades. Based on their algorithm, insider trades can be classified as opportunistic and routine ones. They suggest that opportunistic insider transactions are more likely to be driven by private information, while routine transactions are more likely to be driven by diversification or liquidity reasons. 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 consecutive years, or the trading time interval between two consecutive trades is fixed as routine trades, and the rest as opportunistic trades.[[20]](#footnote-21) Because the information content of opportunistic insider trades is high, the potential of information leakage around those transactions is also expected to be high.

Table 9 shows the regression results for routine insider trades and opportunistic insider trades.[[21]](#footnote-22) \_r, \_r, and \_r capture the insider sale effect on short selling intensity for routine transactions, while \_o, \_o, and \_o capture the insider sale effect for opportunistic transactions.

Consistent with Cohen *et al*. (2012), for routine trades, we do not find any insider sale effect on abnormal short sales, indicating no information leakage from corporate insiders to short sellers regarding routine insider sales. While for opportunistic trades, we find that the intensity of short selling is positive and significant only in family-controlled firms. Further evidence suggests the opportunistic insider trades in weakly controlled family firms drive abnormal short sales. When comparing the opportunistic trading effect between family and non-family insiders, we find that non-family insiders are more likely to leak information to outside investors.

**<Insert Table 9 about here>**

### 6.6.2. Insiders’ 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 a firm, such as the chief executive officer (CEO) and the board of directors, are more successful predictors of future stock price movements. However, because they 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/executives. As the information hierarchy hypothesis suggests, the intensity in short selling decreases as the rank of insiders 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.[[22]](#footnote-23)

Table 10 reports the regression results for abnormal short sales depending on the insiders’ rank. In Panel A, we document significantly positive abnormal short sales for executive directors, but not for the chief executive and chairman. The results are, nonetheless, consistent with Jeng *et al*. (1999) and Fidrmuc *et al*. (2006). Fidrmuc *et al*. (2006) find that a CEO’s transactions exhibit the lowest information effects of all types of directors and Jeng *et al*. (1999) explain this phenomenon by arguing that CEOs are heavily scrutinized, leading them to trade cautiously.

**<Insert Table 10 about here>**

# 7. Conclusion

Using corporate insiders’ transaction records and daily short sales on the HKEx, we investigate the channel of information leakage from corporate insiders to short sellers. Our research design overcomes the identification challenge from distinguishing the information sources between corporate insiders and market makers, since the latter does not present in Hong Kong’s order-driven system. We find that even in the absence of market makers, short sellers initiate their short positions before insider sales are publicly reported. Among family firms, the intensity of short selling is a non-monotonic function of family control and trading by non-family insiders triggers stronger abnormal short sales, as compared to family insiders.

Our empirical evidence suggests that even without the involvement of financial intermediaries who are largely alleged to be the source of information leakage in the US, short sellers can still respond and move faster than average investors. This indicates that, corporate insiders can be another source of information leakage in the capital markets, which calls for more underlying governance of a firm. We also provide evidence on conflicts of interests in family firms from insiders’ likelihood of information leakage. Our study is related to the strand of literature investigating potential conflicts of interest among family firms, which are complicated by factors such as culture-based family ties, shared family wealth, and nepotism (e.g., Bertrand and Schoar, 2006; Perez-Gonzalez, 2006; Villalonga *et al.*, 2015). Overall, insiders in firms with strong family control are less likely to engage in opportunistic behavior. The conflict between family and non-family insiders as a result of resentment towards family dominance and self-serving desires motivates non-family insiders to engage in private information leakage.

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**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 companies, 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 |
| Excluding sales within 20 days of dividend and earnings announcements | 5,915 | 671 |
| Excluding multiple sales executed within 30 consecutive days for each insider | 2,546 | 667 |
| Excluding stocks that could not be short sold during the sample period | 1,341 | 320 |
| Excluding 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. Panel B records the summary statistics for the controlling power of large controlling shareholders. For family-controlled firms, this 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 the 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.

|  |
| --- |
| Panel A: Summary statistics for transaction size by category of director (%) |
|  | Obs. | Mean | Median | 1% | 99% | Std.Dev. |
| Chairman | 231 | 1.474 | 0.063 | 0.001 | 13.658 | 3.066 |
| 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 |
| 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**

Panel A 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 [-30, -11] window before the insider sale date as a percentage of the number of shares outstanding. Panel B reports the summary statistics and correlation matrix for firm characteristics. *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. is the cumulative daily short selling volume during the five days prior to the insider sale date as a percentage of firm’s shares outstanding. measures the cumulative daily abnormal size-adjusted returns during the five days prior to the insider sale date. is the size-adjusted abnormal returns on the insider sale date. \* The correlation coefficient is statistically significant at the 1 percent level.

|  |
| --- |
| Panel A: Summary statistics for event characteristics |
|  |  |  |  |  |  | Family-controlled | Non-controlled | State-controlled |
|  |  |  |  |  |  | (No. of firms=141) | (No. of firms=72) | ( No. of firms=41) |
|  | 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 [-30,-11] (%) | 0.018 | 0.009 | 0.000 | 0.118 | 0.027 | 0.016 | 0.019 | 0.021 |
| Panel B: Summary statistics and correlation matrix for firm characteristics |
|  | Mean | Median | 1% | 99% | Std.Dev. | Firm size | Turnover | Bid-ask spread | Book-to-market |  |  |
| Firm size | 22.488 | 22.488 | 18.300 | 26.774 | 1.684 |  |  |  |  |  |  |
| Turnover | 14.880 | 15.047 | 9.852 | 18.584 | 1.770 | 0.126\* |  |  |  |  |  |
| Bid-ask spread | 0.006 | 0.003 | 0.000 | 0.047 | 0.011 | -0.333\* | -0.156\* |  |  |  |  |
| Book-to-market | 0.907 | 0.679 | 0.008 | 4.376 | 0.876 | 0.003 | 0.169\* | 0.001 |  |  |  |
|  | 0.157 | 0.069 | 0.000 | 1.350 | 0.339 | -0.011 | 0.209\* | -0.090\* | -0.002 |  |  |
|  | 0.013 | 0.001 | -0.214 | 0.426 | 0.107 | -0.009 | 0.150\* | 0.008 | 0.096\* | 0.039\* |  |
|  | 0.096 | -0.121 | -5.932 | 8.767 | 2.800 | 0.005 | 0.096\* | 0.006 | 0.032\* | -0.036\* | -0.006 |

**Table 4**

**Abnormal Short Sales Volume around Insider Sales**

Panel A 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 [-30, -11] estimation window as a percentage of the number of shares outstanding. Panel B reports the cumulative daily abnormal short sales for all firms, family-controlled firms, non-controlled firms, and state-controlled firms in the [0,1], [0,2], [0,3], [1,2], and [1,3] event windows. The t-test tests whether daily abnormal short sales and cumulative ones are different from zero. \*\*\*, \*\* and \* indicate significance at the 1%, 5% and 10% levels, respectively.

|  |
| --- |
| Panel A: Daily abnormal short sales volume around insider sales |
|  | All firms | Family-controlled | Non-controlled | State-controlled |
|  | No. of events=946 | No. of events=494 | No. of events=300 | No. of events=152 |
| Day | Mean | t-stat | Mean | t-stat | Mean | t-stat | Mean | t-stat |
| -10 | -0.0007 | -0.69 | 0.0016 | 1.23 | -0.0047\*\*\* | -2.77 | -0.0001 | -0.05 |
| -9 | -0.0000 | -0.02 | 0.0014 | 0.78 | -0.0022 | -1.01 | -0.0002 | -0.09 |
| -8 | -0.0009 | -0.71 | -0.0004 | -0.23 | -0.0032\* | -1.68 | 0.0019 | 0.45 |
| -7 | -0.0028\*\*\* | -2.99 | -0.0024\* | -1.69 | -0.0043\*\*\* | -2.82 | -0.0014 | -0.65 |
| -6 | -0.0008 | -0.73 | -0.0007 | -0.49 | -0.0019 | -1.07 | 0.0008 | 0.20 |
| -5 | -0.0014 | -1.09 | -0.0020 | -1.21 | -0.0023 | -1.07 | 0.0020 | 0.45 |
| -4 | -0.0002 | -0.14 | 0.0007 | 0.34 | -0.0001 | -0.06 | -0.0030 | -1.43 |
| -3 | -0.0016 | -1.47 | -0.0014 | -1.01 | -0.0013 | -0.59 | -0.0029 | -1.11 |
| -2 | 0.0015 | 1.08 | 0.0020 | 1.08 | 0.0025 | 0.86 | -0.0021 | -0.96 |
| -1 | 0.0041\*\* | 1.99 | 0.0024 | 1.54 | 0.0078 | 1.36 | 0.0020 | 0.82 |
| 0 | 0.0083\*\*\* | 4.07 | 0.0065\*\*\* | 3.10 | 0.0086\*\* | 2.16 | 0.0135\* | 1.86 |
| 1 | 0.0060\*\* | 2.23 | 0.0045\*\* | 2.11 | 0.0021 | 0.99 | 0.0183 | 1.25 |
| 2 | 0.0017 | 1.10 | 0.0030 | 1.27 | -0.0002 | -0.11 | 0.0010 | 0.33 |
| 3 | 0.0019 | 0.96 | 0.0001 | 0.07 | 0.0036 | 0.67 | 0.0043 | 1.28 |
| 4 | 0.0030 | 1.63 | 0.0046\* | 1.78 | 0.0013 | 0.40 | 0.0013 | 0.28 |
| 5 | 0.0023 | 1.64 | 0.0028 | 1.45 | 0.0006 | 0.22 | 0.0040 | 1.19 |
| 6 | 0.0029\* | 1.81 | 0.0027 | 1.48 | 0.0009 | 0.28 | 0.0072 | 1.55 |
| 7 | 0.0034 | 1.62 | 0.0022 | 1.18 | 0.0062 | 1.12 | 0.0013 | 0.48 |
| 8 | 0.0031\* | 1.91 | 0.0056\*\* | 2.52 | -0.0004 | -0.12 | 0.0019 | 0.58 |
| 9 | 0.0033\*\* | 2.07 | 0.0046\*\* | 2.21 | 0.0022 | 0.67 | 0.0013 | 0.40 |
| 10 | 0.0020 | 1.20 | 0.0029\* | 1.71 | 0.0030 | 0.72 | -0.0032 | -1.55 |
| Panel B: Cumulative daily abnormal short sales volume within three business days |
|  | All firms | Family-controlled | Non-controlled | State-controlled |
| Day | Mean | t-stat | Mean | t-stat | Mean | t-stat | Mean | t-stat |
| [ 0, 1 ] | 0.0143\*\*\* | 3.50 | 0.0110\*\*\* | 2.95 | 0.0107\* | 1.92 | 0.0318 | 1.61 |
| [ 0, 2 ] | 0.0159\*\*\* | 3.20 | 0.0141\*\*\* | 2.64 | 0.0105 | 1.46 | 0.0327 | 1.52 |
| [ 0, 3 ] | 0.0178\*\*\* | 2.89 | 0.0142\*\* | 2.20 | 0.0141 | 1.30 | 0.0370 | 1.54 |
| [ 1, 2 ] | 0.0077\*\* | 2.12 | 0.0076\* | 1.94 | 0.0019 | 0.48 | 0.0192 | 1.14 |
| [ 1, 3 ] | 0.0096\*\* | 2.01 | 0.0077 | 1.53 | 0.0055 | 0.71 | 0.0236 | 1.21 |

**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. equals one when the day is day 0, and zero otherwise. equals one when the day is day 0 or day 1, and zero otherwise. equals one when the day is day 0, day 1, or day 2, and zero otherwise. *Firm size* is the natural logarithm of the daily market value. *Turnover* is the natural logarithm of the daily number of shares traded. *Bid-ask spread* is measured as the bid price minus the ask price, divided by the average of the daily bid and ask prices. *Book-to-market* is the quarter-end book value of equity divided by the daily market value of equity*.* represents the cumulative short selling volume during the five days prior to day t as a percentage of number of shares outstanding. is the size-adjusted abnormal returns on day t. 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.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | All firms | Family-controlled | Non-controlled | State-controlled |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|  | 0.006\*\*\* |  |  | 0.005\*\* |  |  | 0.004\* |  |  | 0.008 |  |  |
|  | (3.461) |  |  | (2.401) |  |  | (1.708) |  |  | (1.246) |  |  |
|  |  | 0.005\*\*\* |  |  | 0.004\*\* |  |  | 0.001 |  |  | 0.013 |  |
|  |  | (2.793) |  |  | (2.210) |  |  | (0.521) |  |  | (1.575) |  |
|  |  |  | 0.003\*\* |  |  | 0.003\* |  |  | -0.001 |  |  | 0.008 |
|  |  |  | (2.140) |  |  | (1.864) |  |  | (-0.726) |  |  | (1.463) |
| Firm size | -0.001 | -0.001 | -0.001 | -0.004\*\*\* | -0.004\*\*\* | -0.004\*\*\* | 0.003\* | 0.003\* | 0.003\* | -0.001 | -0.001 | -0.001 |
|  | (-0.809) | (-0.806) | (-0.809) | (-3.461) | (-3.466) | (-3.464) | (1.885) | (1.887) | (1.887) | (-0.417) | (-0.412) | (-0.403) |
| Turnover | 0.003\*\*\* | 0.003\*\*\* | 0.003\*\*\* | 0.003\*\*\* | 0.003\*\*\* | 0.003\*\*\* | 0.004\*\*\* | 0.004\*\*\* | 0.004\*\*\* | 0.014\*\*\* | 0.014\*\*\* | 0.014\*\*\* |
|  | (4.963) | (4.974) | (4.991) | (4.401) | (4.397) | (4.422) | (3.040) | (3.043) | (3.058) | (2.917) | (2.969) | (2.954) |
| Bid-ask spread | 0.296 | 0.295 | 0.294 | 0.004 | -0.001 | 0.004 | 0.834 | 0.830 | 0.825 | -1.203 | -1.194 | -1.181 |
|  | (0.756) | (0.752) | (0.748) | (0.019) | (-0.002) | (0.017) | (1.154) | (1.146) | (1.139) | (-1.212) | (-1.203) | (-1.185) |
| Book-to-market | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.000 | -0.001\*\* | -0.001\*\* | -0.001\*\* | -0.004\*\* | -0.004\*\* | -0.004\*\* |
|  | (-1.407) | (-1.405) | (-1.412) | (-0.918) | (-0.914) | (-0.922) | (-2.456) | (-2.460) | (-2.462) | (-2.410) | (-2.419) | (-2.427) |
|  | 0.046\*\*\* | 0.046\*\*\* | 0.046\*\*\* | 0.036\*\*\* | 0.036\*\*\* | 0.036\*\*\* | 0.056\*\*\* | 0.056\*\*\* | 0.057\*\*\* | 0.037\*\* | 0.037\* | 0.037\* |
|  | (8.487) | (8.489) | (8.477) | (5.312) | (5.313) | (5.314) | (11.945) | (11.929) | (11.908) | (1.987) | (1.973) | (1.976) |
|  | 0.029\*\*\* | 0.029\*\*\* | 0.029\*\*\* | 0.015\* | 0.015\* | 0.015\* | 0.066\*\*\* | 0.066\*\*\* | 0.066\*\*\* | 0.037 | 0.036 | 0.036 |
|  | (3.959) | (3.961) | (3.969) | (1.794) | (1.790) | (1.793) | (5.887) | (5.882) | (5.876) | (1.216) | (1.215) | (1.214) |
|  | 0.001\*\* | 0.001\*\* | 0.001\*\* | -0.000 | -0.000 | -0.000 | 0.001\* | 0.001\* | 0.001\* | 0.002 | 0.002\* | 0.002\* |
|  | (2.173) | (2.209) | (2.224) | (-0.060) | (-0.044) | (-0.032) | (1.816) | (1.834) | (1.826) | (1.649) | (1.681) | (1.672) |
| Intercept | -0.030 | -0.030 | -0.030 | 0.040 | 0.040 | 0.039 | -0.103\*\*\* | -0.104\*\*\* | -0.104\*\*\* | -0.193\*\* | -0.191\*\* | -0.193\*\* |
|  | (-1.147) | (-1.151) | (-1.156) | (1.552) | (1.554) | (1.543) | (-2.762) | (-2.769) | (-2.772) | (-2.049) | (-2.066) | (-2.062) |
| Industry | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 16,310 | 16,310 | 16,310 | 8,299 | 8,299 | 8,299 | 5,048 | 5,048 | 5,048 | 2,963 | 2,963 | 2,963 |
| Adjusted  | 0.126 | 0.126 | 0.126 | 0.089 | 0.089 | 0.089 | 0.227 | 0.227 | 0.227 | 0.111 | 0.115 | 0.113 |

**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 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. The dependent variable is daily abnormal short sales. equals one when the day is day 0, and zero otherwise. equals one when the day is day 0 or day 1, and zero otherwise. equals one when the day is day 0, day 1, or day 2, and zero otherwise. *Firm size* is the natural logarithm of the daily market value. *Turnover* is the natural logarithm of the daily number of shares traded. *Bid-ask spread* is measured as the bid price minus the ask price, divided by the average of the daily bid and ask prices. *Book-to-market* is the quarter-end book value of equity divided by the daily market value of equity*.* represents the cumulative short selling volume during the five days prior to day t as a percentage of number of shares outstanding. is the size-adjusted abnormal returns on day t. 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.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Family voting rights<50% | Family voting rights>=50% | Family board seats<2 | Family board seats>=2 |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
|  | 0.007\*\* |  |  | 0.001 |  |  | 0.008\*\* |  |  | -0.000 |  |  |
|  | (2.151) |  |  | (0.524) |  |  | (2.405) |  |  | (-0.162) |  |  |
|  |  | 0.006\*\* |  |  | 0.000 |  |  | 0.007\*\* |  |  | -0.000 |  |
|  |  | (2.060) |  |  | (0.181) |  |  | (2.301) |  |  | (-0.263) |  |
|  |  |  | 0.004\* |  |  | 0.000 |  |  | 0.005\*\* |  |  | -0.001 |
|  |  |  | (1.689) |  |  | (0.277) |  |  | (2.100) |  |  | (-0.489) |
| Firm size | -0.009\*\*\* | -0.009\*\*\* | -0.009\*\*\* | -0.000 | -0.000 | -0.000 | -0.006\*\*\* | -0.006\*\*\* | -0.006\*\*\* | -0.003\*\* | -0.003\*\* | -0.003\*\* |
|  | (-4.132) | (-4.131) | (-4.129) | (-0.329) | (-0.331) | (-0.330) | (-3.305) | (-3.305) | (-3.302) | (-2.385) | (-2.386) | (-2.386) |
| Turnover | 0.005\*\*\* | 0.005\*\*\* | 0.005\*\*\* | 0.003\*\*\* | 0.003\*\*\* | 0.003\*\*\* | 0.004\*\*\* | 0.004\*\*\* | 0.004\*\*\* | 0.005\*\*\* | 0.005\*\*\* | 0.005\*\*\* |
|  | (4.299) | (4.289) | (4.319) | (3.650) | (3.656) | (3.654) | (3.449) | (3.439) | (3.461) | (4.512) | (4.508) | (4.513) |
| Bid-ask spread | -0.377 | -0.375 | -0.370 | 0.058 | 0.057 | 0.057 | -0.087 | -0.086 | -0.077 | 0.094 | 0.095 | 0.094 |
|  | (-0.935) | (-0.933) | (-0.922) | (0.274) | (0.267) | (0.269) | (-0.204) | (-0.200) | (-0.181) | (0.326) | (0.329) | (0.329) |
| Book-to-market | 0.000 | 0.000 | 0.000 | -0.001\*\*\* | -0.001\*\*\* | -0.001\*\*\* | 0.000 | 0.000 | 0.000 | -0.001\*\*\* | -0.001\*\*\* | -0.001\*\*\* |
|  | (0.917) | (0.919) | (0.916) | (-4.820) | (-4.831) | (-4.828) | (1.200) | (1.204) | (1.200) | (-4.031) | (-4.031) | (-4.031) |
|  | 0.038\*\*\* | 0.038\*\*\* | 0.038\*\*\* | 0.033\*\*\* | 0.033\*\*\* | 0.033\*\*\* | 0.040\*\*\* | 0.040\*\*\* | 0.039\*\*\* | 0.003 | 0.003 | 0.003 |
|  | (5.105) | (5.107) | (5.109) | (3.351) | (3.345) | (3.349) | (5.382) | (5.385) | (5.389) | (0.290) | (0.290) | (0.291) |
|  | 0.026\* | 0.025\* | 0.025\* | 0.017\*\*\* | 0.017\*\*\* | 0.017\*\*\* | 0.018 | 0.018 | 0.018 | 0.035\*\*\* | 0.035\*\*\* | 0.035\*\*\* |
|  | (1.951) | (1.934) | (1.941) | (3.868) | (3.872) | (3.876) | (1.221) | (1.208) | (1.218) | (4.053) | (4.051) | (4.051) |
|  | -0.000 | -0.000 | -0.000 | 0.000\*\* | 0.000\*\* | 0.000\*\* | -0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
|  | (-0.411) | (-0.386) | (-0.371) | (2.022) | (2.029) | (2.026) | (-0.004) | (0.032) | (0.043) | (0.509) | (0.511) | (0.510) |
| Intercept | 0.103\*\* | 0.103\*\* | 0.103\*\* | -0.037 | -0.037 | -0.037 | 0.079\*\* | 0.079\*\* | 0.078\*\* | 0.011 | 0.011 | 0.011 |
|  | (2.219) | (2.216) | (2.206) | (-1.262) | (-1.262) | (-1.264) | (2.025) | (2.022) | (2.010) | (0.334) | (0.333) | (0.335) |
| Industry | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 5,359 | 5,359 | 5,359 | 2,940 | 2,940 | 2,940 | 4,905 | 4,905 | 4,905 | 3,394 | 3,394 | 3,394 |
| Adjusted  | 0.106 | 0.106 | 0.106 | 0.111 | 0.111 | 0.111 | 0.105 | 0.106 | 0.106 | 0.091 | 0.091 | 0.091 |

**Table 7**

**Insider Event, Family Affiliation, and Abnormal Short Sales**

This table reports OLS regression results for abnormal short sales around insider transactions, split by whether or not the insider is affiliated with 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 who do not belong to the family. equals one when the day is day 0, and zero otherwise. equals one when the day is day 0 or day 1, and zero otherwise. equals one when the day is day 0, day 1 or day 2, and zero otherwise. *Firm size* is the natural logarithm of the daily market value. *Turnover* is the natural logarithm of the daily number of shares traded. *Bid-ask spread* is measured as the bid price minus the ask price, divided by the average of the daily bid and ask prices. *Book-to-market* is the quarter-end book value of equity divided by the daily market value of equity*.* represents the cumulative short selling volume during the five days prior to day t as a percentage of number of shares outstanding. is the size-adjusted abnormal returns on day t. 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.

|  |  |  |
| --- | --- | --- |
|  | Non-family group | Family group |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
|  | 0.006\*\* |  |  | 0.000 |  |  |
|  | (2.402) |  |  | (0.073) |  |  |
|  |  | 0.005\*\* |  |  | -0.001 |  |
|  |  | (2.344) |  |  | (-0.572) |  |
|  |  |  | 0.004\*\* |  |  | -0.002 |
|  |  |  | (2.190) |  |  | (-1.099) |
| Firm size | -0.006\*\*\* | -0.006\*\*\* | -0.006\*\*\* | 0.000 | 0.000 | 0.000 |
|  | (-4.375) | (-4.384) | (-4.379) | (0.041) | (0.039) | (0.039) |
| Turnover | 0.004\*\*\* | 0.004\*\*\* | 0.004\*\*\* | 0.006\*\*\* | 0.006\*\*\* | 0.006\*\*\* |
|  | (4.176) | (4.178) | (4.196) | (3.025) | (3.012) | (3.027) |
| Bid-ask spread | 0.144 | 0.133 | 0.142 | -0.616 | -0.617 | -0.618 |
|  | (0.504) | (0.464) | (0.499) | (-1.478) | (-1.475) | (-1.473) |
| Book-to-market | 0.000 | 0.000 | 0.000 | -0.001\*\* | -0.001\*\* | -0.001\*\* |
|  | (0.392) | (0.395) | (0.388) | (-2.447) | (-2.449) | (-2.458) |
|  | 0.037\*\*\* | 0.037\*\*\* | 0.037\*\*\* | 0.021\*\* | 0.021\*\* | 0.021\*\* |
|  | (5.136) | (5.138) | (5.140) | (2.002) | (1.999) | (2.002) |
|  | 0.016 | 0.016 | 0.016 | 0.020\*\* | 0.020\*\* | 0.020\*\* |
|  | (1.405) | (1.396) | (1.398) | (2.081) | (2.079) | (2.077) |
|  | 0.000 | 0.000 | 0.000 | -0.000 | -0.000 | -0.000 |
|  | (0.334) | (0.333) | (0.359) | (-0.603) | (-0.611) | (-0.615) |
| Intercept | 0.071\*\* | 0.071\*\* | 0.070\*\* | -0.061 | -0.061 | -0.061 |
|  | (2.530) | (2.534) | (2.516) | (-1.074) | (-1.077) | (-1.081) |
| Industry | Yes | Yes | Yes | Yes | Yes | Yes |
| Year | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 6,492 | 6,492 | 6,492 | 1,807 | 1,807 | 1,807 |
| Adjusted  | 0.094 | 0.095 | 0.095 | 0.119 | 0.119 | 0.119 |

**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 who 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. Panel A displays the regression results across different groups when the main regressor is . Panel B shows the regression results across different groups when the main regressor is . Panel C shows the regression results across different groups when the main regressor is . \_r refers to routine insider trades, and \_o refers to opportunistic insider trades. Weak family control group refers to firms with family voting rights less than 50%, and strong family control group refers to firms with family voting rights more than 50%. All models include year and industry dummies. The other control variables are all included in the regressions, but are 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.

|  |
| --- |
| Panel A: Regressions across different groups on day 0 |
|  | Family-controlled | Non-controlled | State-controlled | Weak family control | Strong family control  | Non-family group | Family group |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| r | -0.002 |  | 0.008 |  | 0.000 |  | -0.002 |  | -0.002 |  | -0.001 |  | -0.004 |  |
|   | (-0.703) |  | (1.394) |  | (0.057) |  | (-0.509) |  | (-0.273) |  | (-0.261) |  | (-0.396) |  |
| o |  | 0.006\*\* |  | 0.003 |  | 0.008 |  | 0.008\*\* |  | 0.001 |  | 0.007\*\* |  | 0.001 |
|  |  | (2.495) |  | (1.095) |  | (1.169) |  | (2.266) |  | (0.546) |  | (2.430) |  | (0.408) |
| Panel B: Regressions across different groups in event window [0,1] |
|  | Family-controlled | Non-controlled | State-controlled | Weak family control | Strong family control  | Non-family group | Family group |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| r | 0.005 |  | 0.006 |  | 0.003 |  | 0.007 |  | -0.001 |  | 0.011 |  |  |  |
|   | (0.588) |  | (1.531) |  | (0.499) |  | (0.645) |  | (-0.271) |  | (0.874) |  |  |  |
| o |  | 0.004\*\* |  | -0.001 |  | 0.014 |  | 0.006\*\* |  | 0.000 |  | 0.005\*\* | -0.007 | -0.000 |
|  |  | (2.155) |  | (-0.270) |  | (1.546) |  | (2.005) |  | (0.201) |  | (2.178) | (-0.775) | (-0.023) |
| Panel C: Regressions across different groups in event window [0,2] |
|  | Family-controlled | Non-controlled | State-controlled | Weak family control | Strong family control  | Non-family group | Family group |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) | (14) |
| r | 0.003 |  | 0.005 |  | 0.000 |  | 0.003 |  | 0.000 |  | 0.007 |  | -0.007 |  |
|   | (0.432) |  | (1.560) |  | (0.048) |  | (0.414) |  | (0.068) |  | (0.781) |  | (-0.848) |  |
| o |  | 0.003\* |  | -0.003 |  | 0.009 |  | 0.004\* |  | 0.000 |  | 0.004\*\* |  | -0.001 |
|  |  | (1.851) |  | (-1.410) |  | (1.464) |  | (1.695) |  | (0.262) |  | (2.030) |  | (-0.557) |

**Table 10**

**Insiders’ Rank and Abnormal Short Sales**

This table reports OLS regression results for abnormal short sales around insider sales by insiders’ 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. Panel A displays the regression results across different ranks when the main regressor is . Panel B shows the regression results across different ranks when the main regressor is . Panel C shows the regression results across different ranks when the main regressor is . All models include year and industry dummies. The other control variables are all included in the regressions, but are 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.

|  |
| --- |
|  Panel A: Regressions across different ranks on day 0 |
|  | Chief executive | Chairman | Other senior executives | Executive directors | Non-executive directors | Independentdirectors |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
|  | 0.004 | 0.003 | 0.000 | 0.009\*\* | 0.004 | 0.008\* |
|  | (0.893) | (0.871) | (0.161) | (2.348) | (1.159) | (1.656) |
|  Panel B: Regressions across different ranks in event window [0, 1] |
|  | Chief executive | Chairman | Other senior executives | Executive directors | Non-executive directors | Independentdirectors |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
|  | -0.001 | 0.004 | -0.002 | 0.011\*\* | -0.000 | 0.006 |
|  | (-0.210) | (1.275) | (-0.832) | (2.426) | (-0.123) | (1.529) |
| Panel C: Regressions across different ranks in event window [0, 2] |
|  | Chief executive | Chairman | Other senior executives | Executive directors | Non-executive directors | Independentdirectors |
|  | (1) | (2) | (3) | (4) | (5) | (6) |
|  | -0.003 | 0.003 | -0.003\* | 0.007\*\* | 0.002 | 0.004 |
|  | (-1.324) | (1.168) | (-1.792) | (2.182) | (0.527) | (1.330) |

1. According to the SEC, trade execution is not instantaneous. SEC regulations do not require a trade to be executed within a set period of time. But if firms advertise their speed of execution, they must not exaggerate or fail to tell investors about the possibility of significant delays. https://www.sec.gov/reportspubs/investor-publications/investorpubstradexechtm.html. [↑](#footnote-ref-1)
2. The experts can be company executives, directors and professionals (e.g., doctors, engineers and technology experts). [↑](#footnote-ref-2)
3. Family firms dominate economic activities around the world, controlling about one-third of the S&P 500 firms in the US and over two-thirds of the firms in East Asia and Europe ([Shleifer and Vishny, 1986](http://www.sciencedirect.com/science/article/pii/S0304405X09000063#bib40); Claessens *et al.*, 2000; Faccio and Lang, 2002; [Anderson *et al*., 2003](http://www.sciencedirect.com/science/article/pii/S0304405X09000063#bib2), 2009, 2012). Also, prior literature illustrates that family insiders are well informed, as a result of their dominant control over the firm (e.g., Ali *et al*., 2007; Chen *et al*., 2008; Anderson *et al*., 2009). [↑](#footnote-ref-3)
4. According to summary statistics, family voting rights vary from 30% to 80%, and family board seats vary from 0 to 7 among family firms. [↑](#footnote-ref-4)
5. Some firms have their own insider trading policy and code of practice going beyond regulations (Jagolinzer *et al*., 2011). [↑](#footnote-ref-5)
6. See Director’s Handbook, “http://www.hkexgroup.com/-/media/HKEX-Group-Site/ssd/Corporate-Governance/Documents/Handbook\_website.pdf” [↑](#footnote-ref-6)
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. [↑](#footnote-ref-7)
8. The Main Board and the Growth Enterprise Market (GEM) comprise the HKEx securities market. They provide a marketplace for capital formation by different types of companies. Main Board companies are generally larger and have a longer history and profit record. Those without a profit record must satisfy alternative financial tests. See https://www.hkex.com.hk/eng/global/faq/hkex%20markets.htm [↑](#footnote-ref-8)
9. The number of H shares and red chips is sourced from the China Stock Market and Accounting Research Database (CSMAR). [↑](#footnote-ref-9)
10. When analyzing insider trading, we define both directors and top management as insiders in our main analysis. In a further robustness check, we exclude managers who are not on the board, and the results remain unchanged. [↑](#footnote-ref-10)
11. A dynamic short selling list is manually identified using the short selling announcements on the HKEx website. The HKEx website posts only the latest list of securities that are eligible for short selling, but announcements for every previous change to the short selling list can 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. [↑](#footnote-ref-11)
12. A sample with all firms, including financial firms, is analyzed as a robustness check, and the results remain qualitatively similar. [↑](#footnote-ref-12)
13. Generally, block shareholders do not change substantially across several years. Therefore, we take the control structure at the end of 2012 for our sample of 2009 to 2014. [↑](#footnote-ref-13)
14. According to Chakrabarty and Shkilko (2013), estimation window [-60, -11] may allow the inclusion of compounding events in addition to insider sales. Thus, we report the results when the estimation window is set as [-30,-11] in the paper. However, in unreported results, we also conduct analysis based on an estimation window of [-60, -11] and the results are qualitatively similar. [↑](#footnote-ref-14)
15. 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 compared to the 1,148 in Table 1. In Table 10, for robustness check, we also have a full 1,148 observations when running regressions depending on directors’ rank. [↑](#footnote-ref-16)
16. As all transactions should be released to the public by day 3, we do not find the cumulative abnormal short sales significant in the [1, 3] event window. [↑](#footnote-ref-17)
17. In unreported results, we also take family board presence as a proxy for family control, and the results are qualitatively the same. Family board presence is the number of family members sitting on the board as a percentage of the total number of board members. The threshold of family board presence to define a family firm as a strongly family-controlled firm is 20%. [↑](#footnote-ref-18)
18. According to the summary statistics in Table 2, average family voting rights is 51.186% and average family board seats is 1.766. Thus, we take a threshold of 50% for family voting rights and 2 for family board seats. Our criteria are also consistent with the definition for a majority-controlled company by the Director’s Handbook issued by the HKEx. [↑](#footnote-ref-19)
19. The abnormal returns defined by the market model are also tested. The results remain qualitatively the same. [↑](#footnote-ref-20)
20. 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. [↑](#footnote-ref-21)
21. For family control, we only report the results measured by family voting rights here. The results measured by family board seats and family board presence are qualitatively the same. [↑](#footnote-ref-22)
22. According to Chapter 3 of the Listing Rules and Guidance (Authorised Representatives, Directors, Board Committees and Company Secretary) disclosed by the HKEx, 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. [↑](#footnote-ref-23)