

**Informed Trading in the Options Market around CEO Turnover Announcements for
Announcers and their Suppliers**

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Abstract

We find significantly positive (negative) abnormal returns around forced CEO turnover events with outside (inside) replacements for announcing firms, while, significantly negative abnormal returns for their suppliers for both outside and inside replacements. Pre-announcement options trading in both the announcing firms and the suppliers has a predictive power for abnormal returns around forced CEO turnovers, especially with outside replacements. Overall, our study suggests that forced CEO turnover events with outside successions have significant information along the supply chain and that informed traders exploit the options markets to trade in the announcing firms and their suppliers surrounding these events.

1. Introduction

The option market is an attractive venue for information-based trading because it offers higher leverage and lower trading costs (see, for example, Black, 1975; Back, 1993; Easley et al., 1998; Cao, 1999; Chakravarty, Gulen and Mayhew, 2004). While prior studies have documented informed option trading in announcing firms prior to their corporate events,¹ whether such trading also occurs in firms that have business relations with the announcing firms remains unanswered. Theoretical models such as Tookes (2008), suggest that information-based trades can also occur in related firms rather than the firm at which an information event occurs. Motivated from these theoretical predictions, we extend the current literature by providing evidence on informed options trading in both the announcing firms as well as their business partners.

The main empirical challenge for our analysis is the identification of a set of corporate events, which is important to announcing firms (hence are attractive for informed traders) and allows us to cleanly isolate their business partners which are also affected by these events. We focus on Chief Executive Officer (CEO) turnover events in our work. CEO turnover is the most critical corporate event that often re-shape the strategy and performance of the firm (see for examples, Farrell and Whidbee, 2003; Huson, Malatesla, and Parrino, 2004). In addition, the replacement of a firm's CEO also significantly disrupts its relationship with its dependent suppliers, resulting in negative stock market reactions and declines in financial performance for these suppliers following such an event (Intintoli, Serfling and Shaikh, 2017). We, therefore, examine whether option traders have private information about CEO turnover events and take advantage of this information to trade in both the announcing and their supplier firms prior to these events.

¹ See, for example, Roll et al. (2010); Jin et al. (2012); Cao et al. (2005); Chan et al. (2014); Hao (2016); Ghaghorri et al. (2017).

We use a hand-collected sample of 462 forced and 1,406 voluntary CEO turnover events of announcing firms during the period from 1997 to 2015. We also identify 483 (1,024) suppliers of announcing firms with forced (voluntary) CEO turnover announcements from Compustat's segment customer files. Similar to Intintoli et al. (2017), we define dependent suppliers as those that rely on a customer for a large portion of their revenues or report a customer as important to their business. We start our analysis by examining the market reactions to forced and voluntary CEO turnovers of announcing firms for both outside and inside replacements. For forced CEO turnovers, we find significantly positive abnormal returns for outside replacements while negative abnormal returns for insider replacements. For voluntary CEO turnovers, we find significantly positive abnormal returns for both outside and inside replacements. These findings suggest that the appointment of a CEO from outside the firm following a forced turnover is perceived by announcers' shareholders as more beneficial than an inside appointment, while inside or outside replacement does not matter for announcers' shareholders for voluntary CEO turnover events. Furthermore, we find that the supplier firms experience significantly negative abnormal returns around the announcers' forced CEO turnover events for both outside and inside replacements. However, there is no significant market reaction to the supplier firms around the announcers' voluntary CEO turnover events for both outside and inside replacements.

We then examine the patterns of options trading prior to the announcing firms' CEO turnovers events. Following the literature (see for examples, Roll et al. (2010), and Ordu and Schweizer (2015)), we use the abnormal option-to-stock ratio and the abnormal daily option trading volume as our measures of option trading. We find that the option-to-stock ratio and daily option trading volume of announcing firms become abnormally high prior to their forced CEO turnover events. Similarly, option trading of the announcing firms' suppliers becomes abnormally

high prior these events. These findings suggest that option traders have superior information about the forced CEO turnovers and take advantage of this information to trade prior to these events on both the announcing firms and their suppliers. We further show that both the abnormal option-to-stock ratio and the abnormal daily option trading volume are negatively related to the announcement period abnormal returns of the announcing firms. This relation is more pronounced for forced CEO turnovers with outside replacements. In addition, abnormal option trading measures of the suppliers are negatively related to the abnormal returns of both announcing firms and suppliers. These findings suggest private information of option traders about the announcing firms' forced CEO has contagious effects along the supply chain and is conveyed to the market through their trading activities.

We conduct two further analyses to ensure that our results do not capture any pattern that may prevail even without the occurrence of forced CEO turnover events. In the first analysis, we examine options trading prior to sudden CEO deaths. We expect that option traders should not have any informational advantage about the sudden death of a CEO because of the unexpected nature of such an event. We find that both the abnormal option-to-stock ratio and the abnormal daily option trading volume do not increase abnormally prior to sudden CEO deaths. In addition, these options trading measures are not significantly related to the abnormal returns surrounding the sudden CEO deaths. We also find similar results for the suppliers of firms experiencing sudden CEO death.

In the second analysis, we study the informativeness of options trading around pseudo-events for announcers and suppliers. We follow Jin et al. (2012) and randomly select a trading date in the [5, 45] window relative to each CEO turnover announcement date as the pseudo-event date. We find that both the abnormal option-to-stock ratio and the abnormal daily option trading volume

have much stronger predictability for the forced CEO turnover announcement-period returns compared with pseudo-event date returns. This set of analyses corroborate our evidence that option traders have private information about forced CEO turnovers and actively trade prior to such events in both announcing and supplying firms.

Having established that informed option trading occurs at both the announcing firms and their suppliers prior to the announcing firms' forced CEO turnovers, we next examine whether the liquidity of options affects the relation between the option trading measures and the abnormal returns. This analysis is motivated by Easley et al. (1998) who document that the extent of informed trading in the options market depends on the liquidity in the options market relative to the liquidity in the underlying stock market. We find that both the abnormal option-to-stock ratio and abnormal daily option trading volume contain more information about the announcers' and suppliers' announcement-period returns when there is an improvement in option liquidity during the pre-announcement periods. Abnormal trading activity in suppliers' options is also more informative about the announcers' and suppliers' announcement-period returns when the suppliers' options is more liquid than the announcers' options. These findings confirm that informed option trading in both the announcing firms and their suppliers is facilitated by the liquidity of their corresponding underlying options.

Our study makes two contribution to the literature. First, our paper contributes to the literature on informed trading among firms having business relationship along the supply chain. Intintoli, Serfling, and Shaikh (2017) study the information transfer along a supply chain when a firm experiences a CEO turnover and show that when firms announce forced CEO turnovers, their suppliers experience a significantly negative market reaction around these event dates. Hertznel, Li, Officer and Rodgers (2008) find that supplier abnormal returns around both the distress and

bankruptcy filing of a major customer are significantly negative on average, especially so when the filing firm's horizontal rivals appear to experience contagion. Alldredge and Cicero (2015) find that insiders of a supplier firm can earn profit by selling their own stock based on public information about the firm's principal customers. Extending this line of the literature, we show that informed trading in the options market occurs not only at the announcing firms but also at their suppliers. Our findings is consistent with Tookes's (2008) theoretical model. That is, information based trades can occur at the business-related firms other than the firm at which information event occurs.

Second, our study contributes to the literature on informed options trading around corporate events. Option traders possess private information and use their informational advantage to trade ahead of firm-specific events, such as earnings announcements (Jin et al., 2012; Roll et al., 2010), takeover announcements (Cao et al., 2005), financial analysts' consensus revisions (Hayunga and Lung, 2014), share repurchase announcements (Hao, 2016), stock split announcements (Gharghori et al., 2017). Despite the extensive evidence on the existence of information-based option trading, there is little insight into options trading prior to forced CEO turnover announcements. Our study documents that option traders are informed about forced CEO turnovers.

The rest of the paper is organized as follows. In section 2, we develop hypotheses. We describe the data and variable construction in Section 3. In Section 4, we present the empirical results and discussions. Section 5 and 6 discuss falsification tests and further analyses, respectively. We conclude in Section 7.

2. Hypotheses development

2.1. CEO turnovers and market reactions

A CEO turnover is defined as a replacement of a person who holds an office of the CEO of the firm (for example, Mikkelsen and Partch, 1997; Defond and Park, 1999; and Perry, 1999). A CEO turnover can be classified as a forced turnover or a voluntary turnover: a forced turnover occurs if the CEO is fired while a voluntary turnover is as if the CEO reaches the retirement age or accepts a new position either inside or outside the firm and leaves the position voluntarily, or the contract expires (Parrino, 1997; Huson, Parrino, and Starks, 2001). The most well-known reason given for forced CEO turnover is poor firm performance or substantial decline in stock prices (see for example, Coughlan and Schmidt, 1985; Warner, Watts and Wruck, 1988; Weisbach, 1988; Jenter and Lewellen, 2015).

Prior studies document mixed findings on how market reacts to CEO turnover announcements. According to Warner et al. (1988), investors perceive two competing information signals (i.e. good and bad news) surrounding CEO turnovers and the net effect of these signals can be positive or negative. When a CEO is replaced because of poor firm performance, it is regarded as bad news and the market reacts negatively. At the same time, if the replacement is in the best shareholders' interest, the market can react positively. Warner et al. (1988) find that market reacts insignificantly for forced CEO turnover announcements whereas Huson et al. (2001), Denis and Denis (1995), and Adams and Mansi (2009) find that market reacts positively to forced CEO turnover announcements. Further, Adams and Mansi (2009) find that market reacts more positively for forced turnover announcements than voluntary announcements. Dedman and Lin (2002) find that market reacts negatively to forced CEO turnover announcements and insignificantly for voluntary CEO turnover announcements in the UK.

In addition, market can react either positively or negatively to forced CEO turnovers because expectations of investors around announcements of forced CEO turnovers are influenced by the succession types (i.e. outside and inside succession). Parrino (1997) suggests that when choosing a new CEO, candidates who are better able to change the direction of a firm are more attractive when things are not going well, while, candidates whose abilities are especially well appropriate for a continuation of the firm's current policies are more preferable when a firm has been performing well than when it has been performing poorly. Inside candidates have spent much of their careers at the firm, are more specific to the firm's current policies than the abilities of outside candidates. On the other hand, outside candidates often have a broader exposure to, and experience with, alternative ways of running a firm. Therefore, outsiders are more likely to bring a new vision, new passion and new leadership to assist the firm in improving its performance and reaching a better position in the market. Recent studies document that market reacts positively when CEOs are replaced from outside the firms. For example, Huson et al. (2001) find that market reacts significantly and positively when forced CEOs were replaced by candidates outside the firm. Adam and Mansi (2009) find market reacts positively to outside replacement for both forced and voluntary CEO turnovers. Market reacts insignificantly to inside succession for both forced and voluntary turnovers (see Adam and Mansi (2009)). Collectively, the prior literature suggests that whether the market reacts positively or negatively to forced CEO turnovers is an empirical question.

2.2. CEO turnovers and informed trading

Our analysis on option trading prior to CEO turnover announcements is built on the theoretical and empirical analyses of role of option markets as a venue for information-based trading. Black (1975) suggests that the higher leverage available in option markets might induce

informed traders to transact options rather than stocks. Easley et al. (1998) document that option markets are a venue for information-based trading because option volumes lead stock price changes. Recent studies provide evidence of informed trading in options market prior to pre-scheduled and unscheduled corporate events such as earnings announcements (Roll et al. (2010); Jin et al. (2012)); merger and acquisition (M&A) announcements (Cao et al. (2005); Chan, Ge and Lin (2014)); share repurchase announcements (Hao (2016)); or stock split announcements (Ghaghori et al. (2017)).

Previous studies document the predictive power of information-based measures derived from option trading based on the put-call ratio and put-call parity deviations (Pan and Poteshman (2006); Cremers and Weinbaum (2010)) or option trading volume (Easley, O'Hara and Srivinas, 1998; Pan et al., 2008; Ge et al., 2016). Roll, Schwartz and Subrahmanyam (2010) introduce the measure of option-to-stock (OS) ratio and find that OS increases significantly immediately prior to earnings announcements, suggesting that OS reflects private information regarding earnings news. Consistent with this interpretation, they document that OS positively predicts the absolute magnitude of earnings news and that the effect is more pronounced when the earnings news is negative. Johnson and So (2012) pursue this point and argue that informed traders more likely to use options for bad signals than for good ones, as a result, high OS indicates negative private information and low OS indicates positive private information. In addition, Pan and Poteshman (2006) present strong evidence that option trading volume contains information about future stock prices. Ordu and Schweizer (2015) find that option volume prior to stock merger announcements is approximately 300% higher than during the benchmark period. They also show evidence that the abnormal trading activity observed in options markets is related to informed trading activity prior to merger announcements.

Based on the above discussion, we argue that if option traders are informed about forced CEO turnovers, the average option-to-stock ratio and implied volatility skewness should be abnormally high immediately prior to forced CEO turnover announcements. Accordingly, we state Hypothesis 1 as follows:

H1: *Option-to-stock ratio and option trading volume of announcing firms become abnormally high immediately prior to their forced CEO turnover announcements.*

In addition, if option traders have private information about forthcoming CEO turnover events, their trading activity prior to the events should convey part of their information to the markets. Roll et al. (2010) report that OS in the days immediately prior to earnings announcements predicts the magnitude of announcement returns. Conditional on there being negative (positive) earnings news, they find that OS predicts lower (higher) announcement returns. Based on these findings, we argue that if option traders are informed about CEO turnover events, the preannouncement abnormal option-to-stock ratio and abnormal daily option trading volume are expected to be negatively related to the announcement returns. Thus, we propose the following hypothesis:

H2: *Abnormal option-to-stock ratio (abnormal option trading volume) of announcing firms is negatively related to their abnormal returns around their forced CEO turnovers.*

2.3. CEO turnovers and informed options trading along the supply chain

Prior studies suggest that there is an information transfer along the product markets. Tookes (2008) documents that net order flow and returns in the stocks of non-announcing competitors have information content for announcing firms' returns. Intintoli et al. (2017) show that when firms have forced CEO turnovers, suppliers of these firms experience significantly negative market

reaction around these event dates. They suggest that CEO turnover of a major customer is bad news for its suppliers because this customer can turn down its suppliers when having a new CEO. Alldredge and Cicero (2015) show that insiders of a supplier firm sell more of their own stock when public information about their customers' recent returns and earnings surprises suggests they will earn larger profits. Based on these studies, we argue when firms experience forced CEO turnovers, options traders may capitalize this opportunity by trading on their suppliers. As such, the average option-to-stock ratio and option trading volume in supplying firms should be abnormally high immediately prior to the CEO turnover announcements. Accordingly, we state Hypothesis 3 as follows:

H3: *Option-to-stock ratio and option trading volume of the suppliers of the announcing firms become abnormally high immediately prior to the forced CEO turnover events of announcing firms.*

Further, if informed traders use options markets to trade on their suppliers, their information should be conveyed to the market. We therefore expect that the preannouncement abnormal option-to-stock ratio and abnormal option trading volume in suppliers of our sample firms are negatively related to their own announcement returns (announcers' announcement returns). Thus, we propose the following hypothesis:

H4: *Abnormal option trading in supplying firms negatively related to their own abnormal returns (announcers' abnormal returns) around the forced CEO turnover events of announcing firms.*

3. Data and sample selection, and descriptive statistics

3.1. Data and sample selection

We use the ExecuComp database to identify all CEO turnovers during the 1997 - 2015 period. Since OptionMetrics data start only in 1996, we consider our CEO turnover announcements from 1997. Following Landier et al. (2012), we use variable “*annceo*” to identify the CEO of the firm. Whenever there is a change in the person classified as the CEO in ExecuComp, we mark the respective fiscal year as a turnover year. We use Factiva to identify the earliest CEO turnover announcement date and classify CEO turnovers into voluntary and forced following the criteria in Parrino (1997) as follows:

- (i) the Factiva media news reported that the CEO is replaced, ousted, departed or steps down, or resigns due to policy differences or pressure;
- (ii) if the press does not report any of these reasons and the CEO is at and/or above 60 years old, the turnover is classified as voluntary. We further review turnovers of CEOs under 60 years old. If the press reports death, poor health, or the acceptance of another position as the reason of the departure, the turnover is classified as voluntary;
- (iii) if the CEO is younger than 60 years old and the press reports none of the above reasons, the turnover is classified as forced. The departure is also classified as forced if the CEO age is below 60 but the retirement was not announced at least six months before the turnover;
- (iv) those circumstances, which are classified as forced turnovers in the previous steps, are further investigated by reading relevant business and trade press articles to reduce classification errors' incidence. These cases can be reclassified as voluntary supposing that the departures are persuasively explained, for example the executive is retiring for previously unrevealed

either business or personal reasons which are irrelevant to the firm's activities, or the incumbent takes an equivalent position elsewhere.

We then merge our sample of CEO turnover events with the with option data from OptionMetrics. We follow Ghaghorri et al. (2017)'s filters: (i) eliminating option that has zero open interest or a bid price of zero (ii) excluding options with an absolute value of delta less than 0.02 and more than 0.98, (iii) options must have maturities that range between 10 and 100 days, (iv) removing all options with bid-ask spread that is greater than the bid-ask midpoint, (v) a put (call) has to have a corresponding call (put) option with the same maturity and exercise price. Further, when performing option trading measures, we drop observations that do not have enough option trading data during the test benchmark windows. Specifically, if we observe no option trading volume during the test window (from day -7 to day -2) or benchmark window (from day -50 to day -11), we will drop these firm out of our sample.

To ensure that our results are not driven by confounding events, we eliminate the CEO turnover announcements that occur within 15 calendar days before or 15 calendar days after other corporate events: earnings announcements (8), dividend announcements (4), initial public offering (IPO) announcements (4), announcements about merger and acquisitions (M&A) (3), seasoned equity offerings (SEOs) (3), private investments in public equity (1), share repurchase (4), spinoffs (2), and stock splits (5). We also exclude the interim CEO appointments (95) which the firm promotes an individual to hold the temporary chief executive post until a permanent appointment. We also remove CEO turnovers due to deaths (163) and change in control such as M&A and spin-offs (11). We further remove observations that do not have accounting data (14), options trading data from OptionMetrics database (45), stock returns data from CRSP database (37), observations that do not have enough 251 days stock trading data from day -300 to day -50 (17) and 40 days

option trading data, from day -50 to day -11 (51) (see Jin et al. (2012)). After these sample selection steps, we have 462 forced CEO turnovers and 1406 voluntary CEO turnovers. Our analyses are based on the sample of 462 forced CEO turnover events (i.e., announcers or announcing firms).

To identify suppliers of the announcing firms, we use Compustat's segment customer files and consider the announcing firms as customers in these files. Similarly, we consider the announcing firms as suppliers and use Compustat's segment customer files to find out their customers. According to the U.S. Securities and Exchange Commission (SEC) Regulation S-K Item 101, suppliers are required to disclose their customers who account for 10% or more of their revenues. Following Intintoli et al. (2017), we also include suppliers who voluntarily report customers that account for less than 10% of sales.

As customers do not have a unique identifier linking them to Compustat, to link the customer abbreviations with full company data, we first match the customer names with our CEO turnover firms' names. We are able to match around 40.8%. We then manual check the unmatched data. After merging customer segment data with the announcing firms, CRSP, and OptionMetric database, we have 483 dependent suppliers.

3.2. Descriptive statistics

Table I presents the summary statistics of the CEO turnover sample. Panel A of Table 1 reports the yearly distribution of the sample. The total number of forced and voluntary CEO turnover events are 462 and 1,406, respectively. The year 2000 has the largest number of forced and voluntary CEO turnovers, 62 and 139 events, respectively. While, the year that has the lowest number of forced CEO turnovers is 2015 (27 events) and voluntary ones is 2002 (16 events). Panel B of Table 1 shows the sample distribution by industry. We find that the manufacturing industry

accounts for the largest number of CEO turnover announcements (43.07% for forced and 44.95% for voluntary), while the agriculture, forestry and fishing industry represent the lowest proportion of the samples (0.22% and 0.07% for forced and voluntary, respectively).

[INSERT TABLE 1 HERE]

Panels C and D of Table 1 display the summary statistics on control variables of forced and voluntary CEO turnovers, respectively. Appendix provides the detailed definitions of all variables. The firm in our forced CEO sample, on average, has the market value of \$15,234 million, with the log value of 7.66 while that in voluntary sample, is \$15,360 million, with the log value of 7.91. These values are similar to Hazarika et al. (2012). They also report that firms with forced turnovers are smaller than firms with voluntary ones. The average return on assets of forced CEO turnovers is significantly lower than that of voluntary CEO turnovers, 1.70% in comparison to 5.70%. Consistent to Hazarika et al. (2012), the firm in our forced sample has an average market to book ratio of 1.70, which is lower than that in our voluntary one (1.83). The average leverage in our forced sample is slightly higher than that in voluntary one, 22.70% as opposed to 22.50%. This finding is also similar to Hazarika et al. (2012). Furthermore, firm in our forced sample, on average, has 6.91 analysts following, whereas, that in our voluntary sample is 6.84.

4. Empirical results and discussions

4.1. Market reactions to CEO turnover announcements

Before addressing our main research questions, we re-examine the market reactions to CEO turnover announcements for announcers as well as for their suppliers through an event study. Following the literature (e.g. Huson et al., 2001), we calculate CAR using event window from one day before to one day after the announcement day and estimation window from day -300 to day -50 before the event date.

4.4.1. Market reactions to CEO turnover announcement for announcers

Table 2 reports the results for market reactions to CEO turnover announcement for announcers. Panel A of Table 2 shows that market reacts significantly and negatively to forced CEO turnovers. While, we find significantly positive market reactions to voluntary CEO turnovers. The average three-day abnormal returns are -0.42% for forced turnovers and 0.30% for voluntary ones. We further find negative market reactions to both forced and voluntary CEO turnovers for the preannouncement period [-50, -2]. However, it is only statically significant for forced ones. We also find significantly positive market reaction to forced CEO turnovers for the post-announcement period [+2, +50] but insignificantly negative to voluntary events.

[INSERT TABLE 2 HERE]

Prior studies document that market reacts positively to forced CEO turnovers with outside appointment as investors believe such resignations convey good news as the poorly performing CEO is replaced (see for examples, Huson et al. (2001), Adam and Mansi (2009)). Consistent with the previous literature, we find significantly positive market reactions to forced CEO turnover with outside replacement. Prior study shows that market reactions are positive to forced turnovers with inside replacement, but it is statistically insignificant (Adams and Mansi, 2009). We further find that market reacts negatively and significantly to forced CEO turnovers with inside successions. Regarding voluntary CEO turnovers, we find positive market reactions to both inside and outside replacement. This finding is consistent with Adam and Mansi (2009). In addition, we find market reacts negatively and significantly to both forced CEO turnovers with outside and inside successions for preannouncement period [-50, -2]. We also find significantly positive market reaction to forced CEO turnovers with outside replacement for the post-announcement period [+2, +50] but insignificantly positive to inside appointments. Regarding voluntary CEO turnovers,

market reacts insignificantly negative to inside replacements, but insignificantly positive to outside ones for preannouncement period [-50, -2] and post announcement periods [+2, +50].

Overall, our findings show that investors perceive a forced CEO turnover with outside replacement as good news, which is consistent with the prior literature (see for examples, Huson et al. (2001), and Adams and Mansi (2009)). The market, therefore, reacts positively to this type of events. While, a forced CEO turnover with inside replacement is perceived to be bad news, thus, the market reaction is negative.

4.4.2. Market reactions to CEO turnover announcement for suppliers

Intintoli et al (2017) document that if CEO replacements disrupt customer-supplier relationships, then supplier shareholders should react negatively to the announcement that a customer is replacing its CEO. Panel A of Table 3 shows suppliers experience negative and significant market reactions around the announcement window to forced and voluntary CEO turnovers. Furthermore, suppliers experience significantly negative market reactions to forced turnovers with outside and inside successions. Following a voluntary CEO turnover, suppliers market reactions are negative but insignificant for outside and inside replacements. Our result also shows that CAR (-1, +1) are statistically different between forced and voluntary with outside successions. We also find market reacts positively and significantly to both types of events for preannouncement and post announcement periods.

[INSERT TABLE 3 HERE]

Overall, this section shows that investors of suppliers perceive forced and voluntary CEO turnover announcements as bad news, on average, and thus, the market reacts negatively to this type of information. Our findings also indicate that forced CEO turnover events have significant information along the supply chain and convey critical information to the market.

4.2. Abnormal option trading activities around forced CEO turnover announcements

We investigate the trading patterns of investors in option markets around forced CEO turnover events in this section. Consistent with prior studies that employ abnormal trading measures prior to unscheduled events (see for example, Hayunga and Lung (2014), Hao (2016)), we use two measures of abnormal option trading activity, namely *AbOS* and *AbOV*. Given that the forced CEO turnover events are not publicly known beforehand, if option traders are informed about this type of event, the average option-to-stock ratio and the average option trading volume might be abnormally high immediately prior to the events.

Figure I (Figure II) shows the daily abnormal option-to-stock ratio (daily abnormal option trading volume) of the announcers as well as their suppliers for the period 20 days prior to 20 days after forced CEO turnover event dates. We observe a significant increase in both *AbOS* and *AbOV* from day -7 to day -2 for the announcers. We also find similar patterns for suppliers.

[INSERT FIGURES I & II HERE]

Overall, these findings suggest that informed traders use options markets to trade prior to forced CEO turnover events not only for announcing firms but also for their suppliers, supporting *H1* and *H3*

4.3. Option trading and market reactions

In this section we examine the impact of abnormal option trading on abnormal returns around forced CEO turnover event dates for announcers, and their suppliers using OLS regressions. The dependent variable is the three-day cumulative abnormal returns around the CEO turnover event dates (*CAR* (-1, +1)) for these firms. The key independent variables are

preannouncement period [-7, -2] *AbOS* and *AbOV*. Following Hazarika et al. (2012) and Guo and Masulis (2015), we control number of characteristics that affect announcement returns. These include firm market value (*SIZE*), return on assets (*ROA*), the market-to-book ratio (*MB*), firm leverage (*LEVERAGE*), and the number of analysts following (*ANALYSTS*).

4.3.1. Option trading and market reactions for announcers

Table 4 presents the results for announcers. The results in Columns (1) and (3) in Panel A of Table 4 show that preannouncement abnormal option trading is significantly and negatively related to abnormal returns around forced CEO turnover announcement dates for announcers. The significantly negative signs on the estimated coefficients of *AbOS* and *AbOV* indicate that the preannouncements *AbOS* and *AbOV* are informative about the abnormal returns around forced CEO turnover announcements.

As investors appear to favour forced CEO turnovers with outside replacement, we further generate a dummy variable *Outside* that takes value of one if new CEO comes from outside the firm, and zero otherwise. The results present in Columns (2) and (4). The negative coefficient estimate show that *AbOS* and *AbOV* become more informative for outside replacement. These findings, in general, suggest that a real shock to option traders of announcers is when the replacement is an outside CEO. This is where the uncertainty about CEO turnover is largest and hence providing the most benefit for informed traders to trade in the option market. However, we do not find any evidence of significant relation between preannouncement abnormal option trading and abnormal return around voluntary CEO turnover announcement dates (Panel B of Table 4).

[INSERT TABLE 4]

These findings support **H2 and H4** and suggest that private information of option traders about forced CEO turnovers are conveyed to the markets through their trading along the supply chain, especially when a new CEO is an external candidate.

4.3.2. Option trading and market reactions for suppliers

Given that option traders might consider trading in the announcing firms or supplying firms, we examine the impact of abnormal option trading of supplying firm on suppliers' market reaction or announcers' market reaction to CEO turnovers of announcing firms. We present the results in Table 5. Regarding forced CEO turnover announcements, Panel A1 shows suppliers' preannouncement abnormal option trading is significantly and negatively related to abnormal returns of suppliers. We also find significantly negative relation between suppliers' preannouncement abnormal option trading and announcers' abnormal returns in Panel A2. These results are more pronounced to forced CEO turnovers with outside successions. Nevertheless, again we do not find any evidence for voluntary CEO turnover announcements.

[INSERT TABLE 5]

These results indicate that if option traders have private information about forced CEO turnovers, they will also consider trading in the supplying firms. It is because trading in the announcing firm might be subject to insider trading law while trading in supplying firm is not. The market reaction (i.e. CAR (-1, +1)) for supplying firms are also larger than for announcing firms, indicating potentially higher profit in trading these firms. That is why we observe stronger results for supplying firms comparing to announcing firms.

5. Falsification tests

In this section, we perform two falsification tests to ensure that our results, presented in Section 4, reflect informed trading prior to forced CEO turnover events. In the first test, we examine the effect of options trading before the sudden death of CEOs. In the second test, we conduct pseudo-event analysis where we randomly select a non-event date as the actual turnover event and compare the pattern and informativeness of this pseudo-event sample with those of the real CEO turnover events sample.

5.1. Abnormal option trading activities around the announcement of the sudden CEO death

As the sudden deaths of CEOs are unanticipated events, there should be no private information about such events. Accordingly, we should not observe any significant changes in options trading prior to these events. We follow Nguyen and Nielsen (2010) for the selection of sudden deaths. We first search Factiva, using keyword search terms for executives (“CEO” or “Chief Executive Officer”) and for death (“passed away”, “die”, “death” or “deceased”), to identify deceased executives. The search terms do not include keywords “sudden” or “unexpected” because of large variation in the cited cause of death across media news. We then conduct a general search designed to identify all deceased executives and identify sudden death by classifying the causes of death. We apply the medical literature and define a sudden death as an unexpected and non-traumatic death that occurs instantaneously or within few hours of an abrupt change in the person’s previous clinical state. In addition to such deaths, we include accidental and traumatic deaths that are unanticipated by investors and unrelated to firm conditions. To ascertain that the deaths in our sample were indeed sudden and unexpected, we verify causation by searching news containing the name of the CEO in one-year period surrounding his/her death. We only include events that we find no conflicting evidence to indicate that the death is sudden and unexpected. For example,

death caused by heart attack will only be classified as sudden if we cannot find any evidence of previous history of heart problems or declining health prior to the death. Our final sample has 142 sudden death CEOs. We also identify 104 dependent suppliers of the sudden CEO death sample.

Panel A of Figures III and IV present the daily abnormal option-to-stock ratio and abnormal option trading volume for the sudden death CEOs from 20 days before to 20 days after the announcement date of sudden death. We also report the results for suppliers of our sudden death sample in Panel B of Figures III and IV. We do not observe any abnormal informed trading activities during the preannouncement period of sudden death CEOs for announcers as well as suppliers.

[INSERT FIGURE III & IV HERE]

We further run OLS regressions similar to our baseline model to test the influence of abnormal option trading measures on announcement period abnormal returns of the sudden death sample. Our results in Table VI show that preannouncement period *AbOS* and *AbOV* are not significantly related to the announcement period abnormal returns of announcers. We also do not find any evidence of significant relation between preannouncement abnormal option trading of suppliers and abnormal returns of suppliers or announcers. These findings suggest that *AbOS* and *AbOV* are not informative about the announcement returns of the sudden CEO death events.

[INSERT TABLE 6]

5.2. Placebo tests

A natural question is that whether the predictability of the abnormal options trading measures exists only before CEO turnover announcements or also in normal periods. To answer this question, we examine options trading around a randomly selected pseudo-event date for

announcers only. Following Jin et al. (2012), for each CEO turnover announcement, we randomly select a trading date in the [5, 45] window relative to the CEO turnover announcement date as the pseudo-event date. We construct the *CARs* for the period [-1, +1] and the abnormal option trading measures for this pseudo-event date in the same fashion as for the CEO turnover announcement date.

We pool the observation based on the pseudo-event date with our sample observations based on the forced CEO turnover announcement date and use an indicator variable of *EVENT* to indicate observations in the forced CEO turnover announcement sample. We regress *CAR* (-1, +1) against the abnormal option trading measures and the interaction of the *EVENT* variable with the abnormal option trading measures to capture the incremental predictive ability of the abnormal option trading measures before forced CEO turnover announcements relative to those before the pseudo-events. We repeat this process 1,000 times.

Panel A of Table VII shows the results for announcers. The results in Models (1) and (3) show that both *AbOS* and *AbOV* are not significant for pseudo-events sample. In addition, when we combine the pseudo-event sample with the forced CEO turnover announcement sample, the coefficients of interaction terms between the abnormal option trading measures and the *EVENT* is significantly negative. This finding supports the incremental predictability of the abnormal trading measures during the forced CEO turnover announcement periods over the pseudo-event case. We perform similar analysis for suppliers in Panel B of Table 7 and observe same results to announcers.

[INSERT TABLE 7]

Overall, the pseudo-event analysis provides further support for our earlier findings informed traders have private information regarding forced CEO turnover announcements and actively trade in the option market prior to the events in both announcing and supplying firms.

6. Further Analyses

6.1. Option liquidity, option trading and market reactions

Easley et al. (1998) suggest that the extent of informed trading in the options market depends on the liquidity of the options market relative to the liquidity of the underlying stock market. When the options market is more liquid than the stock market, informed traders are more likely to trade in the options market to take advantage of high leverage and low cost. As a natural extension of this argument, we examine whether the return predictabilities of abnormal option-to-stock ratio and abnormal implied volatility skewness are affected by the liquidity of options. We expect that their predictive power will be strengthened if liquidity of options is higher and vice versa.

We measure options liquidity by the options bid-ask spread (see for example, Chan et al. (2014)). We calculate the bid-ask spread for each option on each day as the difference between the best offer price and the best bid price and then divide it by the mid-point of the two. This measure serves as a proxy for the cost paid by options traders. That is, the higher the options bid-ask spread is, the less liquid the particular option is, *ceteris paribus*. We take the average bid-ask spread across all non-zero trading volume options for each firm on each day. We calculate the abnormal illiquidity (*AbOPBA*) as the natural logarithm of the ratio of average options bid-ask spreads during the preannouncement period [-5, -2] to those during the benchmark period [-50, -11]. The lower value of *AbOPBA* indicates an increase in the options liquidity in the pre-announcement period

compared to the benchmark period. We create a dummy variable *LABOPBA* which takes the value of one if *AbOPBA* is lower than the median and zero otherwise. This dummy variable indicates the subset of announcements where the options markets experience higher improvement in liquidity during the pre-announcement period. We then interact the *LABOPBA* with each of our informed options trading measures. These interaction terms capture the additional impact of option liquidity on the predictability of *AbOS* and *AbOV* on announcement returns.

Panel A of Table 8 shows that *AbOS* and *AbOV* still have significantly negative relations with announcement returns when controlling for the option bid-ask spread for forced CEO turnovers. Moreover, the negative relation between preannouncement abnormal option trading measures and announcement returns are stronger with *LABOPBA*. We also find similar results for suppliers. We perform similar analysis in Panel B and do not find any supportive evidence for voluntary CEO turnover announcements. These findings indicate that informed option trading in both announcing and supplying firms is more active for firms that have higher improvements in options liquidity during the pre-announcement period.

[INSERT TABLE 8]

We further consider whether the relative options liquidity of the announcers versus suppliers affect the information content of options trading in suppliers. According to Tookes (2008), informed traders prefer to trade more if competitors' stocks are more liquid than announcers' ones. We argue that if announcers' options are less liquid in relative to suppliers', option traders are more likely to trade in supplying firms. We calculate announcers' option illiquidity (*ILLIQ_Announcers*) as the natural logarithm of the average options bid-ask spreads during the preannouncement period [-7, -2] for announcers. We also compute the natural logarithm of the average options bid-ask spreads during the preannouncement period [-7, -2] for suppliers as

suppliers' option illiquidity (*ILLIQ_Suppliers*). We then create a dummy variable *RILLIQ* which takes the value of one if *ILLIQ_Announcers* is higher than *ILLIQ_Suppliers* and zero otherwise. We interact the *RILLIQ* with each of our informed options trading measures.

Table 9 reports the results. We observe in Panel A of Table 9 that the relation between suppliers' *AbOS* (*AbOV*) and suppliers market reactions to forced CEO turnovers are still significantly negative. This relation is more pronounced when suppliers' options are more liquid than announcers' options. We find similar results of the relation between suppliers' abnormal option trading measures and announcers' market reactions to forced CEO turnovers. We perform similar analysis for voluntary CEO turnovers in Panel B and do not find any significant results.

Overall, our results in this section indicate that option traders in announcing and supplying firms are more active prior to forced CEO turnovers for firms that have higher improvements in options liquidity during the preannouncement periods. Option traders also trade more prior to this type of events if announcers' options are less liquid compared to suppliers' option.

7. Conclusion

We examine market reactions and options trading around CEO turnover announcements. We find significantly positive (negative) abnormal returns for announcers around forced CEO turnover events with outside (inside) replacements, while, market reacts positively to voluntary CEO turnover events for both outside and inside replacements. We further find that for both outside and inside replacements, suppliers experience significantly negative abnormal returns around announcers' forced CEO turnover events while, insignificant abnormal returns around announcers' voluntary CEO turnover events. These findings indicate that forced CEO turnovers have significant information along the supply chain and convey more critical information to the market.

We examine informed trading in the equity options of announcing firms and their suppliers prior to CEO turnover event dates. We show that the *OS* and *OV* are abnormally high in announcers as well as their suppliers prior to announcers' forced CEO turnover events. Preannouncement *AbOS* and *AbOV* are negatively related to abnormal returns around forced CEO turnover event dates for announcers as well as their suppliers. This relation is more pronounced if a new CEO is an external candidate.

We further show that there are no abnormal increases in *AbOS* and *AbOV* prior to sudden death of CEOs and or randomly selected pseudo-event dates. In addition, we document that the influence of preannouncement *AbOS* and *AbOV* on abnormal returns of announcers and suppliers are more pronounced for forced CEO turnovers if there is an improvement in options liquidity during the pre-announcement period. Informed option traders are more favour to trade in the supplying firms prior to forced CEO turnovers if announcers' options are less liquid than suppliers' options. Overall, our findings suggest that option traders have information advantages over forced CEO turnovers and take advantages of this information by actively trading in the announcing firms as well as suppliers prior to these events.

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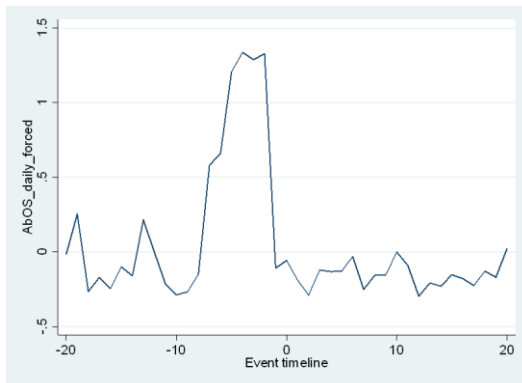
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Figure I: Daily abnormal option-to-stock ratio from day -20 to day +20

This figure shows daily abnormal option-to-stock ratio (*AbOS*) from twenty days before to twenty days after the announcement day (Day 0). Panel A presents the daily *AbOS* for announcers around forced CEO turnover announcements. Panel B displays the daily *AbOS* of suppliers around the announcement of forced CEO turnovers. The vertical axis is the *AbOS* which is measured as the daily OS minus the mean OS during the benchmark period [-50, -11]. The horizontal axis is the days around event days.

Panel A: Announcers



Panel B: Suppliers of our sample firms

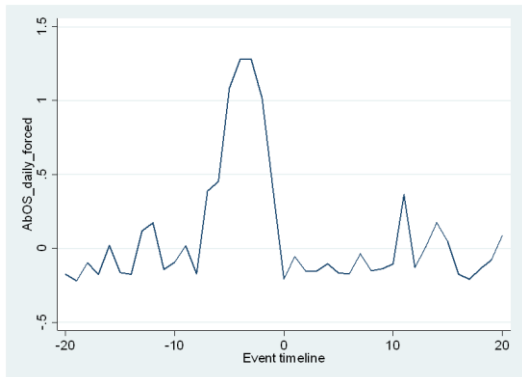
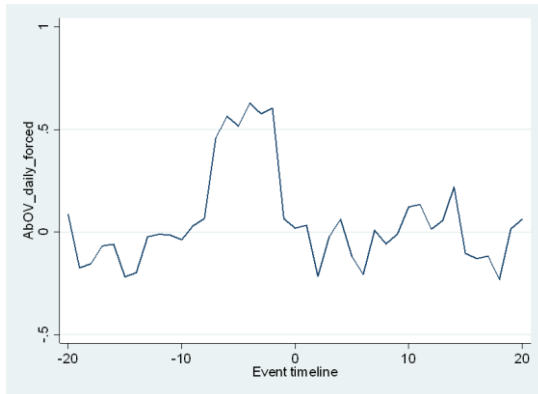


Figure II: Daily abnormal option trading volume from day -20 to day +20

This figure shows daily abnormal option trading volume (*AbOV*) from twenty days before to twenty days after the announcement day (Day 0). Panel A presents the daily *AbOV* for announcers around forced CEO turnover announcements. Panel B displays the daily *AbOV* of suppliers around the announcement of forced CEO turnovers. The vertical axis is the *AbOV* which is measured as the daily natural logarithm of the option trading volume minus the average daily natural logarithm of the option trading volume during the benchmark period [-50, -11]. The horizontal axis is the days around event days.

Panel A: Announcers



Panel B: Suppliers of our sample firms

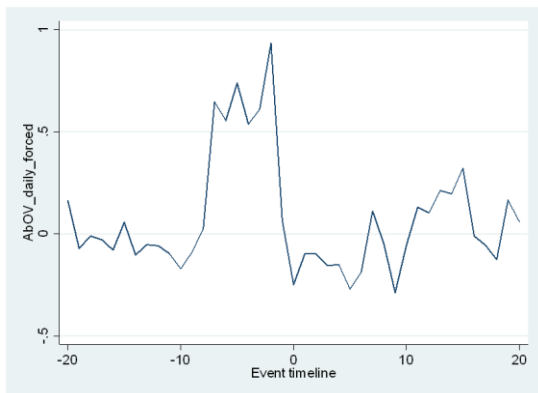
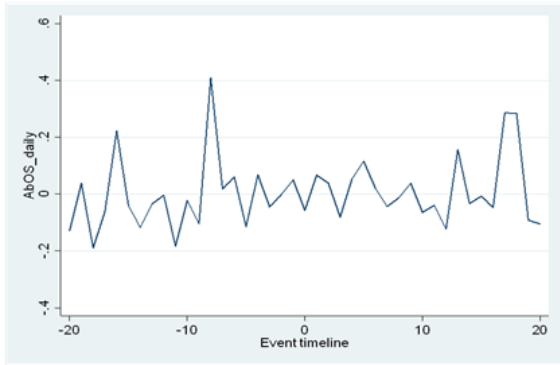


Figure III: Daily abnormal OS of sudden CEO deaths sample from day -20 to day +20

This figure shows daily abnormal option-to-stock ratio (*AbOS*) from twenty days before to twenty days after the announcement day (Day 0). Panel A presents the daily *AbOS* for sudden death sample. Panel B displays the daily *AbOS* for suppliers of the sudden death sample. The vertical axis is the *AbOS* which is measured as the daily OS minus the mean OS during the benchmark period [-50, -11]. The horizontal axis is the days around event days.

Panel A: Sudden death sample



Panel B: Suppliers of sudden death sample

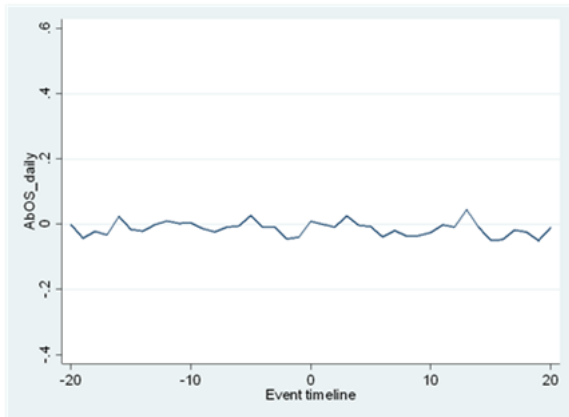
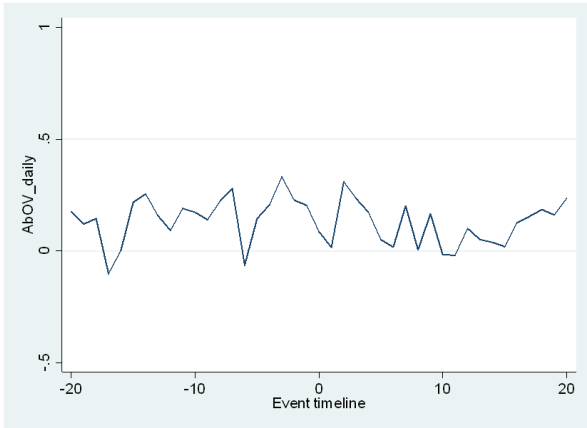


Figure IV: Daily abnormal option trading volume of sudden CEO deaths sample from day -20 to day +20

This figure shows daily abnormal option trading volume (*AbOV*) from twenty days before to twenty days after the announcement day (Day 0). Panel A presents the daily *AbOV* for sudden death sample. Panel B displays the daily *AbOV* of suppliers of sudden death sample. The vertical axis is the *AbOV* which is measured as the daily natural logarithm of the option trading volume minus the average daily natural logarithm of the option trading volume during the benchmark period [-50, -11]. The horizontal axis is the days around event days.

Panel A: Sudden death sample



Panel B: Suppliers of sudden death sample

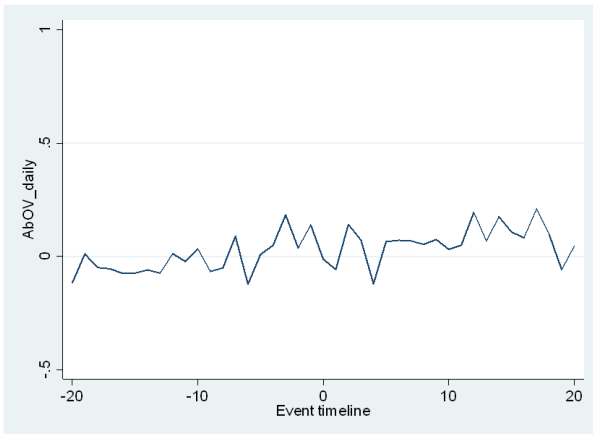


Table 1: Summary Statistic of the CEO Turnovers

This table reports the summary statistics of the CEO turnover sample. Panel A shows the frequency of CEO turnovers by year while Panel B displays the frequency by industry. Panels C, and D shows the statistics for forced CEO turnovers, and voluntary CEO turnovers, respectively. *MV* is market capitalization for the CEO turnover firms; *SIZE* is the natural logarithm of market value of the firm; *ROA* is the return on assets, which is calculated as the ratio of EBIT over total assets; *MB* is the firm's book value of equity at the end of the fiscal year preceding the calendar year of the announcement date divided by the firm's market capitalization; *LEVERAGE* is the book value of debt divided by the sum of the book value of debt and market value of equity; *ANALYSTS* is the yearly average of the number of analysts with valid estimates in the last year prior to the CEO turnover announcement

Panel A: CEO turnover announcements by year				
Year	Forced		Voluntary	
	Freq.	Percent (%)	Freq.	Percent (%)
1997	33	7.14	100	7.11
1998	34	7.36	116	8.25
1999	50	10.82	139	9.89
2000	62	13.42	139	9.89
2001	18	3.9	32	2.28
2002	10	2.16	16	1.14
2003	11	2.38	23	1.64
2004	20	4.33	26	1.85
2005	13	2.81	27	1.92
2006	22	4.76	84	5.97
2007	16	3.46	111	7.89
2008	20	4.33	73	5.19
2009	14	3.03	39	2.77
2010	14	3.03	61	4.34
2011	35	7.58	122	8.68
2012	33	7.14	122	8.68
2013	42	9.09	84	5.97
2014	13	2.81	58	4.13
2015	2	0.43	34	2.42
All years	462	100	1,406	100

Panel B: CEO turnover announcements by industry				
Industry	Forced		Voluntary	
	Freq.	Percent (%)	Freq.	Percent (%)
Agriculture, forestry, and fishing	1	0.22	1	0.07
Mining	28	6.06	65	4.62
Construction	5	1.08	17	1.21
Manufacturing	199	43.07	632	44.95
Transportation and public utilities	38	8.23	138	9.82
Wholesale trade	16	3.46	40	2.84
Retail trade	43	9.31	106	7.54
Finance, insurance, and real estate	38	8.23	191	13.58
Services	91	19.7	211	15.01
Non-classifiable establishments	3	0.65	5	0.36
All industries	462	100	1,406	100

Panel C: Summary statistics for forced CEO turnovers						
	N	Mean	STD	P25	Median	P75
<i>MV (in \$M)</i>	462	15,233.87	44,758.87	491.673	1,952.34	7,696.12
<i>SIZE</i>	462	7.655	2.037	6.198	7.577	8.948
<i>ROA</i>	462	0.017	0.154	0.010	0.039	0.088
<i>MB</i>	462	1.704	1.135	1.037	1.356	1.857
<i>LEVERAGE</i>	462	0.227	0.209	0.049	0.182	0.345
<i>ANALYSTS</i>	462	6.907	6.770	1.375	5.250	11.000

Panel D: Summary statistics for voluntary CEO turnovers						
	N	Mean	STD	P25	Median	P75
<i>MV (in \$M)</i>	1,406	16,360.09	44,415.09	757.616	2,504.11	9,697.80
<i>SIZE</i>	1,406	7.91	1.938	6.615	7.817	9.173
<i>ROA</i>	1,406	0.057	0.144	0.020	0.072	0.126
<i>MB</i>	1,406	1.833	1.362	1.096	1.387	2.022
<i>LEVERAGE</i>	1,406	0.225	0.193	0.052	0.203	0.346
<i>ANALYSTS</i>	1,406	6.843	6.505	1.583	4.909	10.667

Table 2: Market Reactions to CEO Turnover Announcements for Announcers

This table presents the mean and median of market reactions to CEO turnover announcements for announcers. Panel A presents the results for the cumulative abnormal return (CAR) for three-day announcement window (-1, +1). Panel B and C report the results for preannouncement window (-50, -2) and post announcement window (+2, +50), respectively. We estimate daily abnormal returns using the market model where the market beta is estimated based on returns from day -300 to day -50 prior to the announcement day. We provide Standardized residual test statistics in parentheses. We provide *t*-test for the difference in the mean abnormal returns between outside successions and inside successions in square brackets. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

Panel A: Announcement window (-1, +1)				
A1: Forced				
	Forced (1)	Forced-out (2)	Forced-ins (3)	t-test (2-3)
Mean (%)	-0.420	0.610	-1.048	[-2.13]**
Median (%)	-0.575	0.303	-0.652	
SRT	(-2.77)***	(2.58)***	(-3.50)***	
N	462	175	287	
A2: Voluntary				
	Vol	Vol-out	Vol-ins	t-test
Mean (%)	0.295	0.511	0.233	[-0.80]
Median (%)	0.221	0.346	0.202	
SRT	(2.61)***	(1.98)**	(1.90)*	
N	1,406	317	1,089	
t-test: Forced vs. Voluntary	[2.14]**	[-0.14]	[3.32]***	
Panel B: Preannouncement window (-50 -2)				
B1: Forced				
	Forced	Forced-out	Forced-ins	t-test
Mean (%)	-2.734	-2.117	-3.110	[-0.39]
Median (%)	-0.923	-1.767	-2.460	
SRT	(-3.20)***	(-1.74)*	(-2.70)***	
N	462	175	287	
B2: Voluntary				
	Vol	Vol-out	Vol-ins	t-test
Mean (%)	-0.723	0.200	-0.992	[-0.98]
Median (%)	-0.416	0.155	-0.682	
SRT	(-1.47)	(0.20)	(-1.56)	
N	1,406	317	1,089	
t-test: Forced vs. Voluntary	[1.79]*	[2.03]***	[-1.62]	
Panel C: Post-announcement window (+2, +50)				
C1: Forced				
	Forced	Forced-out	Forced-ins	t-test
Mean (%)	2.471	2.883	2.220	[-0.28]
Median (%)	1.430	2.287	1.024	
SRT	(2.78)***	(2.24)***	(1.50)	
N	462	175	287	
C2: Voluntary				
	Vol	Vol-out	Vol-ins	t-test
Mean (%)	-0.198	0.759	-0.478	[-1.00]
Median (%)	-0.337	0.588	-0.267	
SRT	(-0.22)	(0.54)	(-0.27)	
N	1,406	317	1,089	
t-test: Forced vs. Voluntary	[-2.39]**	[-1.97]*	[-2.04]***	

Table 3: Market Reactions to CEO Turnover Announcement for Suppliers

This table presents the mean and median of market reactions to CEO turnover announcements for suppliers of our sample. Panel A presents the results for the cumulative abnormal return (CAR) for three-day announcement window (-1, +1). Panel B and C report the results for preannouncement window (-50, -2) and post announcement window (+2, +50), respectively. We estimate daily abnormal returns using the market model where the market beta is estimated based on returns from day -300 to day -50 prior to the announcement day. We provide Standardized residual test statistics in parentheses. We provide Standardized residual test statistics in parentheses. We provide *t*-test for the difference in the mean abnormal returns between outside successions and inside successions in square brackets. *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

Panel A: Announcement window (-1, +1)				
A1: Forced				
	Forced (1)	Forced-out (2)	Forced-ins (3)	t-test (2-3)
Mean (%)	-3.467	-3.850	-3.288	[-0.94]
Median (%)	-2.035	-3.001	-2.427	
SRT	(-3.54)***	(-3.10)***	(-2.12)**	
N	483	154	329	
A2: Voluntary				
	Vol	Vol-out	Vol-ins	t-test
Mean (%)	-2.442	-0.221	-2.862	[-3.53]***
Median (%)	-1.258	-0.106	-0.662	
SRT	(-2.17)**	(-1.43)	(-1.19)	
N	1,024	163	861	
t-test: Forced vs. Voluntary	[0.20]	[3.04]***	[1.12]	
Panel B: Preannouncement window (-50 -2)				
B1: Forced				
	Forced	Forced-out	Forced-ins	t-test
Mean (%)	3.222	2.680	3.476	[0.19]
Median (%)	2.424	2.025	2.374	
SRT	(3.04)***	(2.07)**	(2.99)***	
N	483	154	329	
B2: Voluntary				
	Vol	Vol-out	Vol-ins	t-test
Mean (%)	3.244	2.908	3.308	[0.66]
Median (%)	1.819	1.501	1.865	
SRT	(3.11)***	(1.19)	(1.47)	
N	1,024	163	861	
t-test: Forced vs. Voluntary	[0.10]	[0.67]	[-0.63]	
Panel C: Post-announcement window (+2, +50)				
C1: Forced				
	Forced	Forced-out	Forced-ins	t-test
Mean (%)	3.342	3.479	3.279	[-0.73]
Median (%)	2.938	3.658	2.542	
SRT	(3.19)***	(2.35)**	(3.30)***	
N	483	154	329	
C2: Voluntary				
	Vol	Vol-out	Vol-ins	t-test
Mean (%)	3.199	2.707	3.292	[0.79]
Median (%)	2.268	1.534	2.314	
SRT	(2.89)***	(1.14)	(1.57)	
N	1,024	163	861	
t-test: Forced vs. Voluntary	[-0.74]	[-1.34]	[0.50]	

Table 4: Option Trading and Market Reaction to CEO Turnover Announcements for Announcers

This table presents the regression results for the relation between abnormal options trading activities and the market reactions to forced CEO turnover announcements for announcers. Panel A and B report the results of forced and voluntary, respectively. The dependent variable is the *CAR* (-1, +1). *AbOS* is the difference in the daily average OS between the preannouncement periods [-7, -2] and the benchmark period [-50, -11]. *AbOV* is the difference between the average daily natural logarithm of the option trading volume between the preannouncement period [-7, -2] and the benchmark period [-50, -11]. *Outside*, a dummy variable that takes the value of one if the new CEO is appointed from outside the firm, and zero otherwise. The regressions include year and industry fixed effects. All the models are estimated using *OLS* regression with White heteroskedasticity-consistent standard errors. *N* is the number of observations and *t*-statistics are given in parentheses. We control for year fix effect and industry fix effect. The superscripts *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

Panel A: Forced				
	(1)	(2)	(3)	(4)
<i>AbOS_n7n2</i>	-0.0032 (-2.37)**	-0.0072 (-4.27)***		
<i>AbOS_n7n2*Outside</i>		-0.0088 (-4.62)***		
<i>AbOV_n7n2</i>			-0.0042 (-2.38)**	-0.0051 (-2.41)**
<i>AbOV_n7n2*Outside</i>				-0.0092 (-3.47)***
<i>Outside</i>		0.0162 (2.03)**		0.0160 (2.00)**
<i>SIZE</i>	0.0067 (2.54)**	0.0066 (2.50)**	0.0075 (2.91)***	0.0073 (2.82)***
<i>ROA</i>	-0.0002 (-0.27)	-0.0003 (-0.43)	-0.0004 (-0.49)	-0.0005 (-0.61)
<i>MB</i>	0.0100 (0.49)	0.0083 (0.40)	0.0090 (0.45)	0.0044 (0.22)
<i>LEVERAGE</i>	-0.0825 (-2.07)**	-0.0780 (-2.01)**	-0.0814 (-2.03)**	-0.0810 (-2.10)**
<i>ANALYSTS</i>	-0.0009 (-0.20)	-0.0011 (-0.23)	-0.0015 (-0.33)	-0.0011 (-0.24)
<i>CONSTANT</i>	-0.0551 (-2.06)**	-0.0523 (-1.75)*	-0.0736 (-2.72)***	-0.0617 (-2.15)**
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
R2	0.0623	0.0744	0.0705	0.0845
N	462	462	462	462

Panel B: Voluntary				
	(1)	(2)	(3)	(4)
<i>AbOS_n7n2</i>	-0.0004 (-0.65)	0.0018 (1.06)		
<i>AbOS_n7n2*Outside</i>		-0.0032 (-1.37)		
<i>AbOV_n7n2</i>			-0.0011 (-1.52)	-0.0035 (-1.47)
<i>AbOV_n7n2*Outside</i>				0.0029 (1.39)
<i>Outside</i>		-0.0010 (-0.26)		0.0003 (0.09)
<i>SIZE</i>	0.0008 (0.76)	0.0008 (0.77)	0.0009 (0.81)	0.0009 (0.81)
<i>ROA</i>	0.0003 (0.64)	0.0003 (0.67)	0.0002 (0.59)	0.0002 (0.59)
<i>MB</i>	0.0046 (0.47)	0.0047 (0.48)	0.0040 (0.41)	0.0039 (0.40)
<i>LEVERAGE</i>	-0.0389 (-2.13)**	-0.0398 (-2.19)**	-0.0376 (-2.06)**	-0.0371 (-2.03)**
<i>ANALYSTS</i>	-0.0014 (-0.68)	-0.0013 (-0.61)	-0.0016 (-0.74)	-0.0016 (-0.74)
<i>CONSTANT</i>	-0.0329 (-2.44)**	-0.0386 (-1.61)	-0.0353 (-2.46)**	-0.0445 (-1.74)*
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
R2	0.0286	0.0297	0.0302	0.0322
N	1,406	1406	1,406	1406

Table 5: Option Trading and Market Reaction to CEO Turnover Announcements for Suppliers

This table presents the regression results for the relation between abnormal options trading activities and the market reactions to forced CEO turnover announcements for suppliers. Panel A and B report the results of forced and voluntary, respectively. The dependent variable is the *CAR* (-1, +1). *AbOS* is the difference in the daily average OS between the preannouncement periods [-7, -2] and the benchmark period [-50, -11]. *AbOV* is the difference between the average daily natural logarithm of the option trading volume between the preannouncement period [-7, -2] and the benchmark period [-50, -11]. *Outside*, a dummy variable that takes the value of one if the new CEO is appointed from outside the firm, and zero otherwise. The regressions include year and industry fixed effects. All the models are estimated using *OLS* regression with White heteroskedasticity-consistent standard errors. *N* is the number of observations and *t*-statistics are given in parentheses. We control for year fix effect and industry fix effect. The superscripts *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

Panel A: Forced								
	A1: Suppliers' options trading on suppliers' CAR				A2: Suppliers' options trading on suppliers' CAR			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<i>AbOS_n7n2</i>	-0.0016 (-4.91)***	-0.0018 (-5.66)***			-0.0014 (-5.84)***	-0.0013 (-5.82)***		
<i>AbOS_n7n2*Outside</i>		-0.0023 (-5.85)***				-0.0024 (-5.93)***		
<i>AbOV_n7n2</i>			-0.0033 (-2.07)**	-0.0035 (-2.10)**			-0.0058 (-3.44)***	-0.0055 (-3.40)***
<i>AbOV_n7n2*Outside</i>				-0.0049 (-2.55)***				-0.0067 (-3.88)***
<i>Outside</i>		-0.0164 (-3.79)***		-0.0165 (-3.82)***		0.0265 (3.65)***		0.0293 (4.21)***
<i>SIZE</i>	0.0083 (3.72)***	0.0082 (3.59)***	0.0082 (3.57)***	0.0088 (3.67)***	0.0047 (2.33)**	0.0072 (3.38)***	0.0042 (2.00)**	0.0072 (3.34)***
<i>ROA</i>	0.0022 (0.76)	0.0020 (0.62)	0.0010 (0.36)	0.0013 (0.41)	-0.0007 (-0.27)	0.0026 (0.98)	-0.0015 (-0.62)	0.0023 (0.90)
<i>MB</i>	-0.1069 (-6.56)***	-0.1051 (-6.30)***	-0.1121 (-7.08)***	-0.1128 (-6.94)***	-0.0847 (-4.48)***	-0.0779 (-4.13)***	-0.0899 (-4.89)***	-0.0861 (-4.56)***
<i>LEVERAGE</i>	-0.1809 (-3.04)***	-0.1802 (-2.96)***	-0.1520 (-2.50)**	-0.1651 (-2.65)***	-0.1832 (-3.86)***	-0.2269 (-4.67)***	-0.1445 (-3.04)***	-0.2074 (-4.21)***
<i>ANALYSTS</i>	0.0079 (1.71)*	0.0079 (1.61)	0.0099 (2.13)**	0.0089 (1.81)*	0.0048 (0.95)	-0.0015 (-0.30)	0.0070 (1.40)	-0.0002 (-0.04)
<i>CONSTANT</i>	-0.0424 (-2.39)**	-0.0410 (-2.22)**	-0.0436 (-2.44)**	-0.0474 (-2.49)**	-0.0334 (-2.06)**	-0.0553 (-3.29)***	-0.0325 (-2.00)**	-0.0573 (-3.48)***
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.1572	0.1584	0.1416	0.1394	0.1397	0.1925	0.1438	0.1836
N	483	483	483	483	483	483	483	483

Panel B: Voluntary								
	B1: Suppliers' options trading on suppliers' CAR				B2: Suppliers' options trading on suppliers' CAR			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<i>AbOS_n7n2</i>	-0.0004 (-1.04)	-0.0000 (-0.00)			-0.0003 (-0.77)	-0.0000 (-0.00)		
<i>AbOS_n7n2*Outside</i>		-0.0007 (-0.21)				-0.0004 (-0.10)		
<i>AbOV_n7n2</i>			-0.0007 (-0.80)	0.0024 (0.94)			-0.0010 (-1.37)	0.0058 (2.41)**
<i>AbOV_n7n2*Outside</i>				-0.0031 (-1.13)				0.0072 (2.85)***
<i>Outside</i>		-0.0015 (-0.22)		0.0027 (0.42)		-0.0066 (-1.66)*		-0.0067 (-1.70)*
<i>SIZE</i>	0.0077 (5.90)***	0.0066 (5.08)***	0.0076 (5.89)***	0.0065 (4.99)***	0.0033 (3.05)***	0.0029 (2.86)***	0.0032 (2.99)***	0.0027 (2.62)***
<i>ROA</i>	0.0102 (8.12)***	0.0103 (8.24)***	0.0103 (8.20)***	0.0104 (8.33)***	0.0071 (8.25)***	0.0071 (8.35)***	0.0072 (8.32)***	0.0072 (8.42)***
<i>MB</i>	-0.0417 (-3.78)***	-0.0403 (-3.68)***	-0.0413 (-3.77)***	-0.0398 (-3.59)***	0.0053 (0.48)	0.0058 (0.52)	0.0060 (0.53)	0.0064 (0.57)
<i>LEVERAGE</i>	-0.0224 (-0.62)	-0.0260 (-0.72)	-0.0209 (-0.58)	-0.0243 (-0.67)	-0.0995 (-3.26)***	-0.1010 (-3.37)***	-0.0980 (-3.23)***	-0.0995 (-3.27)***
<i>ANALYSTS</i>	-0.0146 (-4.37)***	-0.0138 (-4.11)***	-0.0143 (-4.32)***	-0.0137 (-4.07)***	-0.0073 (-2.64)***	-0.0069 (-2.53)**	-0.0069 (-2.54)**	-0.0066 (-2.46)**
<i>CONSTANT</i>	-0.0267 (-2.89)***	-0.0153 (-1.62)	-0.0270 (-2.92)***	-0.0150 (-1.58)	-0.0186 (-2.04)**	-0.0140 (-1.58)	-0.0188 (-2.06)**	-0.0128 (-1.44)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.2078	0.2181	0.2077	0.2184	0.0887	0.0918	0.0899	0.0994
N	1024	1024	1024	1024	1024	1024	1024	1024

Table 6: Abnormal options trading and market reaction to sudden CEO deaths

This table presents the regression results for the relation between preannouncement abnormal option trading measure and market reactions to sudden death CEO turnover announcements. The dependent variable is the *CAR* (-1, +1). *AbOS* is the difference in the daily average OS between the preannouncement periods [-7, -2] and the benchmark period [-50, -11]. *AbOV* is the difference between the average daily natural logarithm of the option trading volume between the preannouncement period [-7, -2] and the benchmark period [-50, -11]. The regressions include year and industry fixed effects. All the models are estimated using *OLS* regression with White heteroskedasticity-consistent standard errors. *N* is the number of observations and *t*-statistics are given in parentheses. We control for year fix effect and industry fix effect. The superscripts *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

	Sudden death sample		Suppliers of sudden death			
	(1)	(2)	Suppliers' options trading on suppliers' CAR		Suppliers' option trading on announcers' CAR	
			(3)	(4)	(5)	(6)
<i>AbOS_n7n2</i>	-0.0007 (-0.46)		0.0053 (1.07)		0.0109 (1.28)	
<i>AbOV_n7n2</i>		-0.0049 (-1.41)		0.0008 (0.28)		0.0018 (1.13)
<i>SIZE</i>	0.0097 (1.73)*	0.0117 (2.15)**	0.0113 (1.34)	0.0105 (1.19)	0.0086 (3.60)***	0.0083 (3.23)***
<i>ROA</i>	0.0003 (0.24)	0.0000 (0.02)	0.0040 (1.12)	0.0038 (1.02)	0.0306 (3.46)***	0.0294 (3.34)***
<i>MB</i>	0.1070 (2.47)**	0.1041 (2.47)**	-0.0098 (-0.17)	-0.0070 (-0.11)	0.0786 (2.15)**	0.0799 (2.14)**
<i>LEVERAGE</i>	-0.0103 (-0.14)	-0.0251 (-0.33)	-0.0626 (-0.46)	-0.0354 (-0.25)	-0.2910 (-1.99)**	-0.2733 (-1.84)*
<i>ANALYSTS</i>	-0.0043 (-0.41)	-0.0059 (-0.59)	-0.0072 (-0.46)	-0.0073 (-0.46)	-0.0233 (-1.94)*	-0.0234 (-1.94)*
<i>CONSTANT</i>	-0.0912 (-2.42)**	-0.0995 (-2.69)***	-0.0370 (-0.79)	-0.0375 (-0.78)	-0.0679 (-1.80)*	-0.0657 (-1.70)*
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.0902	0.1022	0.0217	0.0112	0.3482	0.3392
N	142	142	104	104	104	104

Table 7: Pre-announcement Abnormal Option Trading and Market Reaction to Forced CEO Turnover Announcements, Pseudo-Event Analysis

This table presents the regression results for the relation between preannouncement abnormal option trading measure and market reactions to forced CEO turnover announcements. The dependent variable is the *CAR* (-1, +1). *AbOS* is the difference in the daily average OS between the preannouncement periods [-7, -2] and the benchmark period [-50, -11]. *AbOV* is the difference between the average daily natural logarithm of the option trading volume between the preannouncement period [-7, -2] and the benchmark period [-50, -11]. *Event*, a dummy variable indicating observations in the CEO turnover announcement sample. The regressions include year and industry fixed effects. All the models are estimated using *OLS* regression with White heteroskedasticity-consistent standard errors. The first (second) number in the parentheses indicate the number of times the coefficient is negative (positive) and significant at 10% level.

Panel A: Announcers				
	(1)	(2)	(3)	(4)
<i>AbOS_n7n2</i>	0.0010 (97,141)	0.0012 (101,155)		
<i>AbOS_n7n2*Event</i>		-0.0030 (860,55)		
<i>AbOV_n7n2</i>			0.0009 (97,220)	0.0010 (85,246)
<i>AbOV_n7n2*Event</i>				-0.0039 (795,66)
<i>Event</i>		-0.0090 (824,0)		-0.0087 (866,0)
<i>SIZE</i>	-0.0022 (116,16)	0.0062 (0,69)	-0.0021 (112,19)	0.0068 (0,96)
<i>ROA</i>	0.0011 (77,104)	-0.0001 (11,10)	0.0010 (77,105)	-0.002 (13,9)
<i>MB</i>	0.0020 (22,88)	0.0098 (3,30)	0.0019 (35,93)	0.0090 (4,41)
<i>LEVERAGE</i>	0.0074 (35,120)	0.0108 (0,65)	0.0071 (31,124)	0.0110 (0,75)
<i>ANALYSTS</i>	0.0033 (18,101)	-0.0036 (34,0)	0.0034 (19,102)	-0.0040 (38,0)
<i>CONSTANT</i>	0.0141 (30,55)	0.0191 (0,18)	0.0116 (30,50)	0.0202 (0,15)
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
R2	0.287	0.124	0.291	0.130

Panel B: Suppliers of our sample								
B1: Suppliers' option trading on suppliers' CAR					B2: Suppliers' option trading on announcers' CAR			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<i>AbOS_n7n2</i>	0.0006 (34,110)	0.0010 (101,155)			0.0009 (88,167)	0.0011 (109,121)		
<i>AbOS_n7n2*Event</i>		-0.0018 (891,4)				-0.0015 (860,55)		
<i>AbOV_n7n2</i>			0.0005 (56,134)	0.0021 (85,246)			0.0007 (82,248)	0.0025 (81,306)
<i>AbOV_n7n2*Event</i>				-0.0039 (795,66)				-0.0060 (795,66)
<i>Event</i>		-0.0100 (780,0)		-0.0099 (776,0)		-0.0045 (824,0)		-0.0087 (866,0)
<i>SIZE</i>	0.0019 (11,90)	0.0080 (3,302)	0.0015 (14,87)	0.0079 (4,330)	-0.0018 (134,21)	0.0045 (0,69)	-0.0024 (148,21)	0.0040 (0,96)
<i>ROA</i>	0.0009 (65,126)	0.0014 (11,90)	0.0010 (62,130)	0.0016 (13,97)	0.0015 (45,301)	-0.0006 (21,9)	0.0012 (74,298)	-0.0018 (13,9)
<i>MB</i>	0.0001 (18,66)	-0.1060 (140,11)	0.0003 (20,60)	-0.1119 (147,10)	0.0022 (32,100)	-0.0839 (430,7)	0.0024 (35,110)	-0.0900 (8,432)
<i>LEVERAGE</i>	0.0045 (45,143)	-0.1800 (387,0)	0.0041 (40,139)	-0.1518 (344,0)	0.0069 (23,137)	-0.1830 (0,236)	0.0072 (31,145)	-0.1440 (0,215)
<i>ANALYSTS</i>	0.0006 (27,111)	0.0070 (0, 63)	0.0007 (19,115)	0.0079 (0,68)	0.0028 (34,178)	0.0040 (38,0)	0.0030 (32,193)	0.0065 (45,0)
<i>CONSTANT</i>	0.0199 (23,67)	0.0291 (0,18)	0.0196 (30,70)	0.0272 (0,15)	0.0112 (24,61)	-0.0329 (0,42)	0.0117 (20,74)	-0.0312 (0,36)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.109	0.144	0.111	0.155	0.129	0.136	0.131	0.141

Table 8: Option Liquidity, Informed Trading and Market Reaction to CEO Turnovers

This table presents the results of how liquidity in option market influences the relation between preannouncement abnormal option trading measures and market reactions to forced CEO turnover announcements. The dependent variable is the *CAR* (-1, +1). *AbOS* is the difference in the daily average OS between the preannouncement periods [-7, -2] and the benchmark period [-50, -11]. *AbOV* is the difference between the average daily natural logarithm of the option trading volume between the preannouncement period [-7, -2] and the benchmark period [-50, -11]. *AbOPBA*, the difference in the natural logarithm of the average daily option bid-ask spread between the preannouncement period [-7, -2] and the benchmark period [-50, -11]; *LabOPBA* is a dummy variable that takes the value of one if *AbOPBA* is lower than median and zero otherwise. The regressions include year and industry fixed effects. All the models are estimated using *OLS* regression with White heteroskedasticity-consistent standard errors. *N* is the number of observations and *t*-statistics are given in parentheses. We control for year fix effect and industry fix effect. The superscripts *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

Panel A: Forced						
	A1: Announcers		A2: Suppliers of our sample			
			Suppliers' option trading on suppliers' CAR		Suppliers' option trading on announcers' CAR	
	(1)	(2)	(3)	(4)	(5)	(6)
<i>AbOS_n7n2</i>	-0.0025 (-2.34)**		-0.0023 (-2.19)**		-0.0018 (-4.62)***	
<i>AbOS_LabOPBA</i>	-0.0280 (-3.19)***		-0.0068 (-3.49)***		-0.0040 (-6.03)***	
<i>AbOV_n7n2</i>		-0.0399 (-2.01)**		-0.0017 (-2.60)***		-0.0060 (-3.13)***
<i>AbOV_LabOPBA</i>		-0.0690 (-2.84)***		-0.0040 (-3.08)***		-0.0090 (-4.25)***
<i>LabOPBA</i>	0.0006 (0.07)	0.0024 (0.31)	-0.0107 (-2.01)**	-0.0078 (-1.46)	0.0122 (2.57)***	0.0179 (3.79)***
<i>SIZE</i>	0.0052 (2.31)**	0.0058 (2.60)***	0.0085 (3.78)***	0.0089 (3.77)***	0.0045 (2.23)**	0.0038 (1.83)*
<i>ROA</i>	-0.0002 (-0.20)	-0.0003 (-0.43)	0.0025 (0.83)	0.0009 (0.32)	-0.0009 (-0.34)	-0.0017 (-0.71)
<i>MB</i>	0.0174 (0.85)	0.0152 (0.75)	-0.1036 (-6.35)***	-0.1092 (-6.84)***	-0.0883 (-4.63)***	-0.0952 (-5.00)***
<i>LEVERAGE</i>	-0.0748 (-2.01)**	-0.0735 (-2.01)**	-0.1882 (-3.14)***	-0.1685 (-2.78)***	-0.1759 (-3.78)***	-0.1424 (-3.07)***
<i>ANALYSTS</i>	-0.0007 (-0.14)	-0.0010 (-0.21)	0.0079 (1.67)*	0.0090 (1.92)*	0.0049 (1.00)	0.0066 (1.36)
<i>CONSTANT</i>	-0.0456 (-2.91)***	-0.0487 (-3.15)***	-0.0399 (-2.23)**	-0.0430 (-2.36)**	-0.0372 (-2.33)**	-0.0344 (-2.17)**
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.0311	0.0488	0.1657	0.1421	0.1520	0.1560
N	462	462	483	483	483	483

Panel B: Voluntary						
	B1: Announcers		B2: Suppliers of our sample			
	(1)	(2)	Suppliers' option trading on suppliers' CAR		Suppliers' option trading on announcers' CAR	
			(3)	(4)	(5)	(6)
<i>AbOS_n7n2</i>	-0.0003 (-0.39)		-0.0003 (-0.89)		-0.0002 (-0.44)	
<i>AbOS_LAbOPBA</i>	-0.0003 (-0.08)		0.0002 (0.70)		-0.0001 (-0.14)	
<i>AbOV_n7n2</i>		0.0037 (0.29)		-0.0009 (-0.70)		-0.0002 (-0.18)
<i>AbOV_LAbOPBA</i>		-0.0017 (-1.60)		0.0022 (0.95)		0.0000 (0.03)
<i>LAbOPBA</i>	0.0009 (0.30)	0.0001 (0.03)	-0.0017 (-0.51)	-0.0024 (-0.62)	-0.0025 (-0.99)	-0.0023 (-0.81)
<i>SIZE</i>	-0.0004 (-0.37)	-0.0002 (-0.18)	0.0076 (5.83)***	0.0078 (5.88)***	0.0033 (3.04)***	0.0033 (3.01)***
<i>ROA</i>	0.0005 (1.20)	0.0005 (1.22)	0.0103 (8.13)***	0.0103 (8.16)***	0.0071 (8.10)***	0.0071 (8.07)***
<i>MB</i>	0.0055 (0.59)	0.0042 (0.45)	-0.0422 (-3.82)***	-0.0421 (-3.81)***	0.0052 (0.47)	0.0052 (0.46)
<i>LEVERAGE</i>	-0.0310 (-1.77)*	-0.0309 (-1.78)*	-0.0232 (-0.64)	-0.0215 (-0.60)	-0.0988 (-3.21)***	-0.0982 (-3.22)***
<i>ANALYSTS</i>	-0.0004 (-0.19)	-0.0006 (-0.29)	-0.0141 (-4.08)***	-0.0146 (-4.20)***	-0.0070 (-2.53)**	-0.0070 (-2.52)**
<i>CONSTANT</i>	0.0053 (0.76)	0.0046 (0.65)	-0.0265 (-2.86)***	-0.0272 (-2.91)***	-0.0179 (-1.97)**	-0.0182 (-1.97)**
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.0089	0.0108	0.2101	0.2083	0.0896	0.0892
N	1406	1406	1024	1024	1024	1024

Table 9: Liquidity Ratio, Informed Trading and Market Reaction to CEO Turnovers

This table presents the results of how liquidity in option market influences the relation between preannouncement abnormal option trading measures and market reactions to forced CEO turnover announcements. The dependent variable is the *CAR* (-1, +1). *AbOS* is the difference in the daily average OS between the preannouncement periods [-7, -2] and the benchmark period [-50, -11]. *AbOV* is the difference between the average daily natural logarithm of the option trading volume between the preannouncement period [-7, -2] and the benchmark period [-50, -11]. *ILLIQ_Announcers*, the natural logarithm of the average daily option bid-ask spread during the preannouncement period [-7, -2] of announcers; *ILLIQ_Suppliers*, the natural logarithm of the average daily option bid-ask spread during the preannouncement period [-7, -2] of suppliers; *RILLIQ* is a dummy variable that takes the value of one if *ILLIQ_Announcers* is higher than *ILLIQ_Suppliers* and zero otherwise. The regressions include year and industry fixed effects. All the models are estimated using *OLS* regression with White heteroskedasticity-consistent standard errors. *N* is the number of observations and *t*-statistics are given in parentheses. The superscripts *, **, *** indicate significance at the 10%, 5% and 1% levels, respectively.

	Panel A: Forced				Panel B: Voluntary			
	Suppliers' option trading on suppliers' CAR		Suppliers' option trading on announcers' CAR		Suppliers' option trading on suppliers' CAR		Suppliers' option trading on announcers' CAR	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
<i>AbOS_n7n2</i>	-0.0015 (-4.66)***		-0.0018 (-5.47)***		-0.0004 (-0.91)		-0.0002 (-0.69)	
<i>AbOS_RILLIQ</i>	-0.0073 (-5.48)***		-0.0077 (-6.30)***		-0.0461 (-0.27)		-0.0278 (-0.30)	
<i>AbOV_n7n2</i>		-0.0047 (-2.39)**		-0.0073 (-3.13)***		0.0017 (1.76)*		0.0016 (1.95)*
<i>AbOV_RILLIQ</i>		-0.0064 (-4.73)***		-0.0095 (-4.89)***		0.0051 (2.11)**		0.0029 (1.66)*
<i>RILLIQ</i>	-0.0101 (-1.68)*	-0.0116 (-1.86)*	-0.0061 (-1.73)*	-0.0066 (-1.80)*	-0.0080 (-2.35)**	-0.0092 (-2.69)***	-0.0028 (-0.95)	-0.0032 (-1.04)
<i>SIZE</i>	0.0081 (3.65)***	0.0078 (3.41)***	0.0046 (2.26)**	0.0039 (1.83)*	0.0075 (5.84)***	0.0074 (5.74)***	0.0033 (3.01)***	0.0031 (2.88)***
<i>ROA</i>	0.0023 (0.79)	0.0012 (0.40)	-0.0007 (-0.26)	-0.0014 (-0.59)	0.0100 (7.91)***	0.0101 (8.02)***	0.0070 (8.15)***	0.0071 (8.27)***
<i>MB</i>	-0.1060 (-6.54)***	-0.1111 (-7.05)***	-0.0845 (-4.47)***	-0.0894 (-4.84)***	-0.0403 (-3.69)***	-0.0393 (-3.64)***	0.0058 (0.51)	0.0068 (0.60)
<i>LEVERAGE</i>	-0.1780 (-3.00)***	-0.1434 (-2.38)**	-0.1789 (-3.77)***	-0.1376 (-2.88)***	-0.0189 (-0.53)	-0.0188 (-0.53)	-0.0983 (-3.21)***	-0.0977 (-3.21)***
<i>ANALYSTS</i>	0.0083 (1.80)*	0.0102 (2.20)**	0.0050 (1.00)	0.0072 (1.45)	-0.0142 (-4.29)***	-0.0137 (-4.21)***	-0.0071 (-2.59)***	-0.0067 (-2.44)**
<i>CONSTANT</i>	-0.0399 (-2.25)**	-0.0394 (-2.19)**	-0.0320 (-1.96)*	-0.0297 (-1.82)*	-0.0248 (-2.67)***	-0.0247 (-2.66)***	-0.0179 (-1.97)**	-0.0179 (-1.97)**
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.1619	0.1503	0.1427	0.1493	0.2114	0.2148	0.0895	0.0927
N	483	483	483	483	1024	1024	1024	1024

Appendix - Variable definitions and data sources

Variables	Definitions	Data Sources
$CAR(t_1, t_2)$	Cumulative abnormal returns from day t_1 to day t_2 around CEO turnover events where the CEO turnover announcement is day 0, and the market model with the estimation window from day -300 to day -50 before CEO turnover announcements is employed.	CRSP
OS	Option trading volume across all the options contracts time 100 divided by number of share volume	OptionMetrics
$AbOS_{n7n2}$	The difference between the daily average OS between the preannouncement period [-7, -2] and the benchmark period (days [-50, -11])	OptionMetrics
$AbOV_{n7n2}$	The difference between the average daily natural logarithm of the option trading volume between the preannouncement period [-7,-2] and the benchmark period (days [-50,-11])	OptionMetrics
MV	The market capitalization for the CEO turnover announcement firms	
$SIZE$	The natural logarithm of the market value of the firm.	Compustat
ROA	The operating income before depreciation divided by total assets.	Compustat
MB	The market value of equity divided by the book value of equity at the end of the fiscal year.	Compustat
$LEVERAGE$	The book value of debt divided by the sum of the book value of debt and market value of equity.	Compustat
$ANALYSTS$	The yearly average of the number of analysts with valid estimates in the last year prior to the CEO turnover announcement.	I/B/E/S Analyst Forecast
$Outside$	A dummy variable that takes the value of one if the new CEO is appointed from outside the firm, and zero otherwise	
$Event$	A dummy variable indicating the CEO turnover announcement sample	
$AbOPBA$	The difference in the natural logarithm of the average daily option bid-ask spread between the preannouncement period [-7, -2] and the benchmark period [-50, -11]	
$LABOPBA$	A dummy variable that takes the value of one if $AbOPBA$ is lower than median and zero otherwise	
$ILLIQ_Announcers$	The natural logarithm of the average daily option bid-ask spread during the preannouncement period [-7, -2] of announcers	
$ILLIQ_Suppliers$	The natural logarithm of the average daily option bid-ask spread during the preannouncement period [-7, -2] of suppliers	

RILLIQ A dummy variable that takes the value of one if *ILLIQ_Announcers* is higher than *ILLIQ_Suppliers* and zero otherwise
