Geography Spillover of CEO Forced Turnover

Yang Cao[1]

Grenoble Ecole de Management, France

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Abstract

This paper analyzes the reaction of peer firms to nearby CEO force turnover and shows that this nearby shock can increase peers' probability of resigning their CEOs. The negative peer reaction is consistent with excess monitoring, which may harm firm value. The reaction is stronger for small and well-performed peer firms. However, we find that independent directors with senior experience can weaken the negative reaction by reducing excess monitoring. Our results indicate that independent directors can be valuable monitors and resist the negative externality of this geography spillover.

Keywords: CEO Turnover; Geography Spillover; Excess Monitoring; Independent Directors

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[1] Corresponding E-mail address: yang.cao@grenoble-em.com

1. Introduction

One central topic in corporate governance is the punishment of CEO for their poor performance. The ultimate weapon of the board is the CEO forced resignation. For the CEO forced resignation or turnover, we can imagine that in the event firm, the announcement will affect the company in several ways and the news acts like an earthquake leading to mass disruption. However, if we look at the neighbors of the event firm, what shall the peers firm behave, facing the shock hitting "close to home"? Prior studies show shock hitting "close to home" has strong effects on belief information and leads to actions afterward (e.g. Malmendier and Nagel, 2011; Knupfer, Rantapuska, and Sarvimaki, 2016). One real example is PFIZER following IAC's step to resign CEO, two companies in New York, both resigned their CEO in December 2010. Although IAC resigned its CEO firstly and went up in stock price, PFIZER as the neighbor firm experienced a slump of its own stock when IAC announced the CEO forced turnover. Thus, it is plausible to believe that geographical peer firms may take some actions when facing the shock of nearby CEO forced turnover from event firm and the market may react to this scenario among peer firms and event firm.

The root of the nearby shock is that geographic locations matter in economic behaviors for a variety of reasons, related primarily to information frictions and/or peer effects. In the former reason, individuals considerable close to each other can enjoy efficiency information collection and transmission at low cost. In the latter one, according to Manski (1993), there are two different manifestations of peer effect. One is that group behavior affects individual behavior, whereas another represents group characteristics affect individual behavior.

In our case, firms within a geographic region may share similar corporate governance strategies, due to learning from each other or peer pressure of the management groups. More specifically, after one firm or even several firms have experienced CEO turnovers in a region, CEOs of other firms in the same area may feel the pressure that they may also be replaced. Such perception can induce them to work harder and/or change the operation policies, leading to improvements in firm performance. Thereby, under this situation, the geography spillover may deliver a positive effect on peer firms.

However, we cannot rule out another circumstance that this pressure comes from the event firm may intensify the peer firm management and reduce the firm value unfortunately. As the nearby shock may bring unnecessary anxiety, this might lead to excess monitoring of the peer firm's CEO with negative marginal value of monitoring. That means one-dollar input of this excess monitoring would not bring the equivalent one-dollar output in adding firm value. For example, CEO may not receive enough trust to conduct his plan or the board more engaged in firm operation may care more in short term return and neglect the long-term development. Therefore, from another side, the spillover from event firm may also result in negative externality of peer firms.

In this paper, we investigate the geography spillover of CEO forced turnover and its impact on peer firms. In doing so, we introduce the CEO forced turnover events of Jenter and Kanaan (2015) and locate each firm in the respective area to search for its peer firms in the same area. After controlling for the firm characteristics of event firm and peer firms, our cross-section results support the existence of geography spillover at area level and indicate the negative externality at peer firm level, as average negative peer reaction to CEO forced turnover at event firm, which is consistent with excess monitoring.

First, at the area level of 118 CBSA areas, using 830 events of CEO forced turnover occurred in 675 US firms from 1993 to 2011, we find the area wave of CEO forced turnover in last year can increase the probability of nearby peer firm taking the same firing CEO action in current year. The findings are robust to several different fixed effects and standard error clustering choices. This area wave indicates the geography spillover exists at the area level and in the long-term period.

Second, we also extend our analysis at peer firm level and examine the individual stock market reaction of peer firms to nearby CEO forced turnover shocks. Using cumulative abnormal returns, we point out the average negative reaction of peer firms under different model specifications. We also discover the peer firm's past stock market performance as a homogenous factor negatively determines its reaction. The inverse relationship of peer firm past performance and current reaction to shock is consistent with excess monitoring of harming the firm value (Adams & Ferreira, 2007; Faleye et al., 2011). As a robustness check, we alternatively focus on those areas with less frequently occurred CEO forced turnover and a long gap between each event. The results from the infrequent area sample still deliver similar results.

For the channel of excess monitoring, we identify the independent directors play the role of valuable monitors to reduce excess monitoring. To quantify the role of independent directors in reducing unnecessary monitoring, we measure its function by the fraction of independent directors in the board and its age to represent its senior experience (Bednar, 2012; Wang et al., 2015). The results reveal that boards with senior independent directors and a large fraction of independent directors can effectively reduce excess monitoring. The effect is stronger when we control for time-varying industry factors, i.e. industry business cycle, in which independent directors' industrial experience is more helpful. This finding is in line with prior studies for valuable monitoring of independent directors (Borokhovich et al., 1996; Weisbach, 1988). We also test other alternative explanations of negative reaction of peers, i.e. the area characteristics and institutional shareholders for this phenomenon. There is, however, no evidence supporting these alternative channels.

This paper contributes to several areas of the literature. First, it adds to the literature of spillover and governance of CEO. Prior studies point out the spillover at industry level with positive externality to peer firm on firm value, especially in M&A (Wilson, 2016). Our paper firstly looks at the geography spillover and finds the negative externality. The in average negative externality gives us a deeper thought about the effect of geographical spillover.

In particular, our study contributes to intense monitoring or excess monitoring (Adams & Ferreira, 2007; Faleye et al., 2011; Song & Thakor, 2006). We further confirm the negative effect of excess monitoring through a new source from a nearby shock. We also extend the source of intense monitoring from inside threat to outside shock.

More generally, our paper adds to the growing literature of geography and CEO governance (e.g., Bouwman, 2012; Parsons et al., 2018). Our results support the geographic closeness with lower information cost can facilitate the transfer of nearby shock. In the discussion of geographical externality, we indicate the negative one.

Our findings also contribute to the area of the role of independent directors. Prior studies discuss more about the independence of outside directors and its function to CEO (Boone & Mulherin, 2017; Kumar & Sivaramakrishnan, 2008). This paper suggests the new role of independent directors as the valuable monitors and can reduce the excess monitoring caused by nearby shock. We also show that the strength of independent directors in resisting excess monitoring increase when they have adequate industry knowledge (Wang et al., 2015).

The rest of the paper is organized as follows. Section 2 focuses on the related literature. In section 3, we build the hypothesis development. Section 4 explains the data collection and variable definition. Empirical results are shown in section 5. Section 6 further discusses other potential explanations. The final section concludes our findings.

2. Literature Review

Recent literature finds that geographic closeness may lead to similarity in corporate governance and other behaviors. Bouwman (2012) documents that CEO pay is strongly correlated with that of geographically-close CEOs. Parsons et al. (2018) shows that city-level culture is important in affecting firms' financial misconducts. Addoum et al. (2019) argues that the corporate bankruptcy events affect the investment and financial polices of geographically proximate firms. Pirinsky and Wang (2006) provides a survey on how geographic locations' economics in corporate finance. Jiraporn et al. (2013) discovers the geographical spillover of corporate social responsibility. Firm's investment is also correlated to investment of peer firms headquartered nearby, even though in very different industries (Dougal et al., 2015). Francis et al. (2016) indicates local network spillovers of CEO compensation in the case of firms in major metropolitan areas. Carosi (2016) investigates the geographical proximity in terms of profit and innovation. Engelberg et al. (2018) supports the view that geographical proximity encourages information spillover and reduce marginal cost. Regarding the geographical spillover of CEO behavior, those papers have argued the contagion of CEO behavior in the geographical closeness area. The closeness of geographic distance not only means firms can easily compare and affect each other with information transmitted at individual level easily and efficiently, but also each firm shares the local region culture and behaves similarly as in the same region. However, for which channel of this geographical spillover, a generally accepted one has not achieved yet. Along with that, whether the geographical externality yield positive effect is still uncertain.

In respect to CEO forced turnovers and peer effects, current studies focus on the industry level (Eisfeldt & Kuhnen, 2013; Jenter & Kanaan, 2015; Wilson, 2016). For the underlining mechanism of CEO turnover, the revisit of CEO ability and performance is commonly recognized. However, it is not clear about whether the revisit comes from the common industry factor (Eisfeldt & Kuhnen, 2013; Jenter & Kanaan, 2015), the information conveys from rival peers (Wilson, 2016) or both. Moreover, for the effect of CEO turnover spillover, the actions taken by the CEO who faces potential threat from this externality has proven to be beneficial for acquisition and shareholder wealth (Wilson, 2016). A similar positive externality conclusion is also reached in the spillover of hedge fund activism at industry level (Gantchev et al., 2019).

For the excess monitoring, a growing body of research focuses on the disadvantages of board monitoring after a certain threshold, e.g. CEO network, CEO compensation, and quality of management (Adams and Ferreira, 2007; Faleye et al., 2011; Garg, 2013; Hoskisson et al., 2009; McDonald and Westphal, 2010). In terms of firm performance, previous papers indicate that intense monitoring can limit board ability to create value and discourage valuable investments, e.g. M&A and innovation (Faleye et al., 2011; Guldiken and Darndeli, 2016). First, it will reduce the time for the advising function of the board (Adams & Ferreira, 2007) intensified by director litigation exposure. Second, the board will receive less information from the CEO as less trust between managers and directors exists (Holmlstrom, 2005). Besides, the board may perceive the primary function as monitoring and less focus on strategy advising (Adams, 2009). Therefore, excess monitoring would leave directors with less time, less information, and less focus on advising, and finally reduce firm value in combination with limiting board ability to create value. On the other hand, excess monitoring may bring management myopia by weakening manager perception of board support on investment on risky, but value-enhancing projects like innovation. Moreover, the excess monitoring and its disadvantages reinforce each other in a negative cycle such as monitoring leads to underinvestment, which in turn leads to increased monitoring due to complaints of underinvestment (Hoskisson et al., 2009).

In terms of the channel discussed in this paper: due to the reduced excess monitoring of CEO by independent directors, as argued in prior studies, independent director could be the value monitor (Borokhovich et al., 1996; Weisbach, 1988; Nguyen and Nielsen, 2010). First, independent directors are less tied with the firm interest and play the role of a “watchdog” without being too much engaged into specific business of the CEO (Bednar, 2012). Another feature of independent directors is that they serve in many firms and have limit time to do the excess monitoring (Ferris et al., 2003). In addition, the multiple board service of independent directors may help them easily distinguish the necessary monitoring and excess one (Masulis and Mobbs, 2014). The senior experience of independent directors also does a favor in justifying excess monitoring and reducing the unnecessary ones (Wang et al., 2015).

In summary, to the best of our knowledge, no study has investigated the relationship between CEO forced turnover and geographical spillover until now.

3. Hypothesis Development

The main hypothesis of this paper is to test the geographical spillover of CEO forced turnover, which is supported by the area wave or area cluster of CEO forced turnover event. As argued by Manski (1993), the peer effect facilitating by geography convenience of information transmission and shared social forms, we predict the area wave of CEO forced turnover as H1:

H1: The area wave of CEO forced turnover in the last year increases the probability of nearby peer firm taking the same firing CEO action in the current year.

On the other hand, at peer firm level, under nearby CEO forced turnover shock, we predict an in average negative reaction of peer firms, which is consistent with excess monitoring of harming the firm value (Adams & Ferreira, 2007; Song & Thakor, 2006). Facing the threat from the nearby event firm, the peer firm may enhance its own CEO monitoring. However, this temporary intense monitoring may violate the normal management behavior with less trust of CEO and more interpretation of CEO's operation. A board that is more engaged in firm operation may reduce firm value as well, in stark contrast to the original purpose (Faleye et al., 2011). Overall, these unusual interruptions brought by excess monitoring might harm firm value. Thus, we build the second hypothesis:

H2: The average peer reaction to a nearby shock of CEO forced turnover is negative.

Finally, in the discussion of channel behind the peer reaction, according to Borokhovich et al. (1996) and Weisbach (1988), we identify whether independent directors play the role of valuable monitors to reduce excess monitoring. A board with senior independent directors and large fraction of independent directors could effectively reduce the excess monitoring of H2 (Bednar, 2012; Ferris et al., 2003; Masulis and Mobbs, 2014; Wang et al., 2015). To quantify the role of independent directors in reducing unnecessary monitoring, we measure its role by the fraction of independent directors in the board and its age to represent its senior experience. Thus, we build the final hypothesis:

H3: More senior and larger fraction of independent directors in the board can better reduce excess monitoring of nearby CEO forced turnover shocks and weaken negative reaction of peers.

4. Data and Variables

We obtain the CEO forced turnover data in firm-year from Jenter and Kanaan (2015) with 895 records from 1993 to 2012. This sample covers 715 US firms in the S&P 500, S&P MidCap, and S&P SmallCap indexes. The definition of CEO forced turnover is from Parrino (1997). The main classification of CEO forced turnover is the dismissals of CEO which the press reports that CEO is fired, forced out, or retires or resigns due to policy differences or pressure are classified as forced. More detailed explanation of the classifying rules refers to Jenter and Kanaan (2015). This sample also excludes CEO turnovers caused by M&A and spin-off from our analysis.

The geographical information of firms comes from COMPUSTAT. We obtain the zip code, city, and state of each firm's headquarter (HQ) from COMPUSTAT. We suppose the HQ as firm location, because HQ is close to company core activities like dismissal of top executives

(Loughran & Schultz, 2004; Pirinsky & Wang, 2006). One key problem of the COMPUSTAT address is that it only provides the current one and not in the respective year of the turnover. However, the relocation is very small, only 0.5% per year (Pirinsky & Wang, 2006) and is not necessary to consider (Devos & Rahman, 2014; Hilary & Hui, 2009; Parsons et al., 2018). To locate the firm in its MSA area, we obtain the county and state name of each firm from the zip-code database[1] (Devos & Rahman, 2014). Thus, we apply the rule that zip code, city, and state of each firm should simultaneously matched with COMPUSTAT and the zip-code database. Finally, we locate the firm's HQ in the respective CBSA area, either Metropolitan Statistical Area (MSA) or Micropolitan Statistical Area (µSA) defined by the office of management and Budget (OMB) as of 2003[2]. The matched-CBSA data contains 873 records of CEO forced turnover of 698 firms at 118 CBSA areas in firm-year from 1993 to 2012[3]. For other variables, all accounting information and stock performance information are collected from COMPUSTAT and CRSP. The characteristics of independent directors are obtained from BoardEx, while the institutional ownership is from Thomson Reuters. The definition of those variables can be found in Appendix A.1 and A.2.

5. Empirical results

5.1 Area wave

The first idea to find out the geography spillover is to see whether the herding effect of Manski (1993) exists. Consistent with other spillover studies (Gantchev et al., 2019), this part does analysis at aggregated area level with an intensity of events. In particular, it provides us

[1] http://www.unitedstateszipcodes.org/zip-code-database/
[2] CBSA (MSA or µSA) is redefined by every 10 years right after the US 10 yearly census, in spite of small changes in every year revision. The most recent redefinition version to our sample data is CBSA bulletin in 2003 according to US census in 2000. This rule of choosing CBSA version is also used in other studies (Devos & Rahman, 2014; Gao et al., 2011; John et al., 2011; Pirinsky & Wang, 2006).
[3] 2 records of firm's HQ are unmatched with any CBSA area, even tracking back to CBSA prior major version in 1993.

the macro view of how CEO forced turnover wave in the area and reshape the behavior of peer firm inside. Technically, we want to know whether the recent frequency of CEO forced turnover is associated with an higher probability of peer firms that would like to resign its CEO in the same area, after controlling for peer's fundamentals.

In the sample construction, we restrict the year interval from *t*-3 to *t*, where *t* represents the actual year of the CEO forced turnover of the respective firm. The dependent variable is defined as dummy variable that equals 1 if the firm resigns a CEO in one of the years in the time interval and 0 otherwise. For the independent variable, the lagged frequency of CEO forced turnover at area level, we define it as the total number of other firms' CEO forced turnover in other industry of last year (*t*-1) in the same CBSA area, excluding the firms own CEO forced turnover in the previous year. Next, for the control variables, we choose five typical accounting variables, suggested in prior literature on spillover waves (Gantchev et al., 2019). The detailed definitions of the control variables are provided in Appendix A.1. All control variables are winsorized at 1st and 99th percentiles to avoid outliers. The final data with control variables contains 3,320 (3,320=830*4) records of firm-years of 675 firms in 118 CBSA areas from 1993 to 2011.

We provide the descriptive statistics in Table 1. They are in the lines of existing literature (Gantchev et al., 2019). One variable of interest is the *Area Frequency t-1*, which is highly left skewed. That means most CEO forced turnover waves usually happen in certain areas, e.g. New York, Chicago, and Boston, etc. This is in the lines with common expectation of large firm agglomeration in these areas.

[Insert Table 1 here]

Next, we relate the possibility of CEO forced turnover with area wave. In Table 2, we present the logit regression of CEO forced turnover on recent area frequency of this type of event. Some models include year and/or area fixed effects. The standard error is clustering at area level. Our results hold if we alternatively cluster the standard error at SIC level and include more fixed effects like industry.

[Insert Table 2 here]

Comparing the first two columns, we observe that adding the firm-level controls largely increases the model fit. Consistent with prior studies (Weisbach, 1988), the poor performance of firm fundamentals strongly relates to CEO forced turnover's decision. In other words, CEOs in poorly performed firms are more likely to be resigned. Still, even controlling for firm fundamentals, the key variable: *Area Frequency t-1* keeps its significance both statistically and economically in the mean of probability. The economic significance indicates that one unit increase in *Area Frequency t-1* can bring up to 10% increase in the odds of a CEO forced turnover in peer firm. In column 3, we include the year fixed effect to control for the trend in area frequency in this period. This can ensure that our result is not driven by the general time trend of popularism in CEO forced turnover. The coefficient of the key variable increases a little bit and maintain significance. So far, we demonstrate that firms in an area with high intensity of CEO forced turnover are more likely to resign their own CEO. To further control for the unobservable area characteristics and make sure the robustness of results, in column 5, we add the area fixed effect to control for area characteristics like state law act. Our results remain similar and the key variable now has larger influence on the probability of CEO forced turnover as the coefficient increase to 10%.

Summarizing, the existence of area wave and effect on peer behavior support the herding effect (Manski, 1993) where a group affects individual behavior. In the next part, we focus on a more individualized angle that looks at each event, rather than the aggregate area level in this part.

5.2 Peer Reaction

In the previous section, we only focused on a small sample of firms that experienced at least one CEO forced turnover. We also solely considered the aggregated intensity at area level, rather than the individual event level. So, the subsequent question is how other peer firms in the same area react to a given CEO forced turnover event. Therefore, in this section, we analyze the peer firm reaction at event level, when a nearby CEO forced turnover is announced. We evaluate the reaction by computing the abnormal stock return in the event windows over 3 days [-1, 1], 7 days [-3, 3], 11 days [-5, 5] and 21 days [-10, 10] around the public date of each CEO forced turnover event individually.

To isolate the pure reaction to geography spillover, rather than industry spillover or customer-supplier interplay, we define peer firms as other firms in the same CBSA area, but in other SIC industry than the event firm. In addition, to eliminate the unrelated effect of customer and supplier interplay between each other, we also remove the peer firm if observing any customer-supplier bilateral relationship with event firm at the event year[1]. Applying these restrictions, we obtain 727 CEO forced turnover events occurred in 60 CBSA areas.

In terms of model, we use the market model to calculate abnormal returns (AR, %) as the difference of real returns and expected returns, where the market return is the CRSP value weighted return. Second, we also use the Fama-French three factors model which adds two factors SMB and HML. The estimation window is [-220, -21]. Then, we cumulate the abnormal return in those event windows to get the cumulative abnormal return (CAR, %). For the peer firm's CARs, assuming the true reaction caused by the event of interest is quite small, we

[1] The customer-supplier gvkey link is generously provided by Barrot and Sauvagnat (2016). We remove 149 qualified customer-supplier bilateral observation of 915, 118 records of peer_firm-event_firm.

deleted the extreme observations at 25% and the 75% percentile to avoid outliers[1]. Similarly, for the event firm CAR and other control variables, we winsorize at 1% and 99% percentile[2]. The main results hold under alternative winsorization percentile choices.

The control variables are obtained from the last recent fiscal year for peer firms and the event firm. For R&D and Sales, General and Administrative expense, we set them as 0 if missing. The annual adjusted return is the market-adjusted buy and hold abnormal return within the prior fiscal year, using monthly firm stock return minus CRSP value-weighted return, and then cumulating 12 months within the last recent fiscal year. We also put the condition that the peers and event firm stocks are traded normally in that period (CRSP's 'shrcd' symbol code equals 10, 11 or 12).

[Insert Table 3 here]

In table 3, we report the results of the event study. We present the peer firm CAR at each individual peer firm level, where the unit of observation is each peer firm. Another way to evaluate peer firm CAR is to construct an equally weighted portfolio, containing all peer firms in one area, where the unit of observation is event firm. This portfolio-constructing method can effectively reduce correlation between peer firms (Giroud & Mueller, 2010). However, in the latter part, we want to explore the determinants of each peer's reaction and specifically the cross-section variation between peer firms[3]. Then, the technical point in testing the individual peer CAR is to avoid the correlation in standard error estimation. We then introduce the standard error clustering at event level that reaches the similar idea of portfolio peer CAR, yet in another way.

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[1] We also tried other triming percentiles, e.g. 30%-70% or 20%-80% for the peer CAR. The subsequent results still exhibit similar.

[2] For other variables, another 2%-98% winsorizing percentile also delivers the similar results.

[3] The subsequent results and summary statistics of equally weighted portfolio CAR at event level keep similar to individual peer level's results.

Consistent with existing literature, the average CAR of the event firm is comparable to Kang et al. (2018), around -0.2% to -0.5%. In terms of significance test, the mean of peer CAR is significantly negative across all event window specifications[1]. We also notice the peer CARs with relatively large standard deviation, around 1.5% of peer CARs in the mean of -0.2%. However, all medians of peer CARs show similar significance even under relatively large standard deviation, as well as the mean peer CARs.

In discussion of the peer CARs, the excess monitoring theory might explain the negative reaction. Facing the threat from nearby event firm, the peer firm may enhance its own monitoring of CEO. However, this temporary intense monitoring may break the normal schedule of board meeting, CEO talk and other systematic arrangements in the peer firm. This may violate the normal management behavior with less trust of CEO and more interpretation to CEO. In addition, board more engaged in firm operation may reduce firm value, contrast to the original purpose (Faleye et al., 2011). Generally, our empirical findings are consistent with prior studies about excess monitoring and its disadvantage to firm performance (Adams & Ferreira, 2007; Song & Thakor, 2006).

In the following reported results, we use the three-day CARs (-1, 1) estimated by Fama-French three factors model. This estimation exhibits a larger standard deviation than the market adjusted model. It meets our goal to explore the determinants of peer reaction and in particular the cross-sectional variation between peers for the same event. The magnitude of the CARs tends to be smaller for the three-day window around the event. Returns using narrow window seem to avoid the noise of other factors because our geography spillover is indirect and weak, easily covered and mistaken by other unrelated events. Therefore, we use the smaller three-day

[1] We also use other tests, i.e. Patell Z test (Patell, 1976), Standardized t-statistics (Boehmer et al., 1991) and Sign test (Cowan, 1992). The significance of mean peer CAR holds at similar significance level.

windows in the rest analysis. All subsequent results are relatively similar, and our main conclusions are robust if we choose any other measures presented in the table.

[Insert Table 4 here]

In table 4, we introduce the control variables of peer and event firm fundamentals (Intintoli et al., 2017; Kand & Shivdasani, 1996; Kang et al., 2018). The definition and source of these variables see Appendix A.2. The descriptive statistics of our control variables are in the line with prior literature (Derrien et al., 2019). The key variable is the last year excess return, adjusted for CRSP value-weighted market return. This stock market performance indicator is also applied to the event firm. For the event firm, it behaves worse in both mean and median of last year adjusted return, consistent with early findings in poor firm performance related to CEO forced turnover (Kang & Shivdasani, 1995; Warner et al., 1988). In comparison, peer firm's stock market performance is comparable to the market performance. In detail, the mean and median of peer stock performance are close to zero, indicating the indifference between individual return and market return. Besides that, the other two control variables as ROA[1] and leverage, also support the poor performance of event firm and normally operated peer firm. Next, for board characteristics, there is large deviation in average age of independent directors and its fraction in the board. One standard deviation of the mean in average age of independent directors corresponds to a six years gap, which matters in experiences and skills. The board also displays large variety at the fraction of independent directors with average two independent directors more or less, in the average nine board directors. That hints the potential substantial varying impact of independent directors on board operation. For the institutional ownership, in spite of pretty large institutional ownership, the concentration of ownership is quite small. Similar to independent directors, the institutional ownership behaves big variation as well, even

[1] Another common measure of ROA, different from this paper, is (income before extraordinary items/total assets) (Barrot & Sauvagnat, 2016; Bhojraj et al., 2009; Kahle & Stulz, 2017). We also try this measure and the following results remain similar.

at the relatively large average level. Finally, we also analyze the correlation between each variable. The correlation coefficients are all under 0.6. Thus, we can eliminate the concern of multicollinearity basically.

Next, we try to figure out the determinates of peer reaction to the event firm's shock. Thanks to the numerous peers firms surrounding the event firm, we can apply several fixed effects in our models. First, we use year fixed effect to control for the aggregate time trend. Then, we apply the year*area fixed effect. This interaction of fixed effect can absorb the time-varying characteristics of each area. Next, we employ the year*area*industry to consider the time-varying factor in industry and area both. With the help of these fixed effects, we can absorb many unobserved items, e.g. area GDP, culture, tax, industry shock and industry subsidy in one specific area, etc. In all reported results, the standard error is clustered at area level. We also try other standard error clustering settings, like at peer firm level, event or peer industry level. Those clustering options provide similar results.

[Insert Table 5 here]

Table 5 demonstrates the main regression results. In column 1, we only add the year fixed effect and concentrate on the within variation of peer reaction in a given year. In column 2, we further include the year*area fixed effect and investigate the variation within peers in a given year and given area. In column 3, we extend and apply the year*area*industry fixed effect. Using this model, we can focus on peer variation within year, area and industry at triple level. In column 4, we choose the event fixed effect to absorb any event-related characteristics. In column 5, we repeat the fixed effect setting of column 3 but add control variables of the event firm. This inclusion may reduce 4000 observations but can better account for the effect of event firm characteristics on peer CAR.

Despite different variation settings, the variable of interest: last year peer firm's stock return is quite homogenous. It supports the significant and negative relationship with peer CAR under all five model specifications. This key variable also shows economically significance, e.g. in column 5, one standard deviation rise can decrease 6% in the mean of peer CAR. The negative coefficient indicates that if peer firm experienced increase in its stock return last year, however, the investors may be depressed at the nearby shock for interrupting peer normal operations and then sell more stocks, which leads to a decrease of peer CAR. This empirical finding is plausible with the excess monitoring theory. The unnecessary monitoring, brought by redundant panic from nearby event firm shock, can harm firm value by interrupting normal management and declining down the firm stock price afterward. This harm is more severe in the well-performed peer firm, proxied by positive market-adjusted stock return last year. However, even though our findings are consistent with the assumption of excess monitoring theory, it only promises a high correlation and is not sure for the causality. Thus, in 5.4 section, we turn to analyze the channel of excess monitoring that indeed reveals the causality behind this phenomenon.

For the other control variables, their coefficients are also sensible under the explanation of excess monitoring theory. For example, if the peer firm is rather small, high leveraged, and has large indirect expenses, then it is easier to be affected and produce excess monitoring under the nearby event firm shock. This leads to a decrease in its CAR as well. After analyzing the peer firm, we then focus on the event firm and find if the event firm is young and with large stock return last year, the shock of CEO forced turnover is more threatened to peer firm because in common sense, young and well-performed event firm should not fire CEO. However, it really happens beyond peers' expectation. Thus, peer firms are more shocked by reinforcing the monitoring that leads to more excess one, which indeed harms peer firm value unfortunately. Notably, however, adding the event firm characteristics does not change the sign or the significance of the key variable. Regarding the model fit, because of the weak geography spillover and multiple fixed effects, the adjusted R square that only focuses on within-group variation is quite small but still comparable to another study of spillover in corporate governance (Derrien et al., 2019).

Some studies argue that CEO turnover can be anticipated in the two-year period prior to the event (Martin & Mcconnell, 1991). Thus, we also replace the key variable with the last two-year peer firm market-adjusted stock return. The replacement yet provides similar results.

5.3 Robustness check

One big concern of the study is the contamination of events. In simple words, several events overlap and lead to the overestimation of expected returns in the estimation window. The ideal solution is to find those areas with less frequently occurred events. Thus, to eliminate this concern, we delete the observations in the often-occurred area, i.e. New York, Chicago, Boston, Los Angeles, and San Joes. Using the cleaned sample, only 30% sample remains, and we run the regressions again.

[Insert Table 6 here]

The results are shown in table 6. The key variable still maintains its sign and significance, even we use the same specification of table 5. This indicates the consistency and stability of our estimation. In addition, the variable of peer size also presents similar results like table 5. So far, we can make sure that the concern of contamination events would not affect our estimation. The estimation is quite robust.

Comparing table 5 and table 6, the difference in the magnitude of variable of interest might suggest that in larger and more frequently occurred areas, e.g. New York, Boston etc., peer firms suffer more shocks and are surrounded by a more threating environment. That leads to more excess monitoring and subsequently to a decrease in firm value. Importantly, however, no matter infrequent or rare areas, peer firms face the nearby shock and take destructive actions, consistent with the excess monitoring theory.

5.4 Possible Channel

Until now, we have found the empirical results consistent with the assumption of the excess monitoring theory. Then, the natural question comes by, what is the channel of excess monitoring and how can it determine the peer reaction through what mechanism? In this part, we try to answer this question.

As argued in prior studies, independent director could be the valuable monitor (Borokhovich et al., 1996; Weisbach, 1988). First, independent directors are less tied with the firm interest and play the role of a “watchdog” without being too much engaged into specific business of CEO. Another feature of independent directors is that they serve in many firms at the same time and have limited time to do excess monitoring. In addition, the multiple board service of independent director may help them easily distinguish between the necessary monitoring and excess ones. The senior experience of independent directors also does a favor in justifying excess monitoring and reducing this unnecessary one. Therefore, we assume that with a larger fraction of independent directors and more senior independent directors in the board, the excess monitoring would be effectively controlled and then subsequently reduce negative reactions. The independent directors can play their role, with intended purpose or not, to reduce the excess monitoring and benefit the firm value.

[Insert Table 7 here]

As presented in table 7, we add three related variables into the models and repeat all estimations in table 5. After the inclusion of independent directors, the key variable, last year peer firm stock return is no longer significant under all models. Despite the insignificance, we find the independent directors' characteristics are significant under all specifications, even after controlling the board size. The explaining power of the last year return is indeed replaced by independent director's characteristic. Now, the coefficients of mean age of independent directors and fraction in board both reconcile with our assumption of independent directors' role in excess monitoring. Those two variables also show economic significance, e.g. in column 5, one standard deviation increase in independent director's average age can lead to 0.5 increase in peer CAR, while for independent directors' fraction, it is 0.03. In general, it is the independent directors who determine the reaction to nearby shock, rather than the firm's prior performance. Besides, the coefficient of independent directors' characteristics is even larger under the year*area*industry fixed effect. One possible explanation is that independent directors can provide better value monitoring at industry level with adequate industry knowledge and experience.

For the control variables, older peer firms behave calmer to the nearby shock and their peer reactions are smaller. Comparing the model fit in table 7 and table 5, there is an obvious improvement in the adjusted R square, even after the reduction of observations.

We also test whether the use of the median age of independent directors change the results. We find that this replacement would not change the results in table 7. It still presents the similar results as well as table 7 does.

In conclusion, we verify the role of independent directors in reducing excess monitoring. In spite of this discovered channel, there shall be some other possible explanations. We check the other explanations one by one in the next part.

6. Alternative Explanations

One possible alternative explanation is that local area features in attracting similar firms with a high rate of CEO forced turnover. Some firms with high CEO turnover rates may prefer clustering in certain areas. For example, Silicon Valley attracts many IT firms who frequently dismiss CEOs forcibly. Thus, we cannot attribute this to the source of spillover effect because of the coincidence of similar observations in same area. However, after controlling for the area fixed effect and the area* year fixed effect, we can exclude this as our results are stable and consistent in any given area and in a given year.

Another potential explanation is that institutional shareholders conduct excess monitoring. Facing the nearby shock, the institutional shareholders may feel pressure as they may hold portfolios across local firms. Thus, institutional shareholders may ask for more unnecessary monitoring at peer firm to avoid CEO failure in peers again. Prior studies have proven the monitoring role of institutional shareholders (Hartzell & Starks, 2003; Parrino et al., 2003). Thus, we assume more excess monitoring accompanying with more institutional ownership of firm outstanding shares. Based on this assumption, we include institutional ownership from BoardEx database into our models. The Herfindahl index is also added to control for the ownership concentration (Demsetz & Lehn, 1985). We repeat all estimations in table 7. However, the inclusion does not change the results of existing variables in table 7. Furthermore, two new added variables in table 8 are insignificant under all specifications.

[Insert Table 8 here]

Prior studies also argue that only the large institutional shareholders who can effectively affect the firm (Maug, 1998; Shleifer & Vishny, 1986). Then, we replace the whole institutional ownership with the ownership of only big institutions, whose assets are above the median of the industry. The results are similar to those in table 8 using the overall institutional ownership. Therefore, we can broadly refuse the channel of institutional shareholders.

Overall, we test area factors and institutional shareholder for possible explanations. However, there is no evidence supporting those alternative arguments. Thus, we further convince the channel of independent directors.

7. Conclusion

Spillover of corporate governance reshapes peer firms. This paper focuses on the geography spillover of CEO forced turnover. As the disrupted event with extreme shock to event firm in the local area, how would the nearby peer firm react to this CEO forced turnover? We answer this question at two levels. First, at area level, we find the area wave of CEO forced turnover can increase the probability of firing CEO in nearby peer firm as well. Second, at the peer individual level or event level, peers respond to this nearby shock with negative reaction. This phenomenon is consistent with the excess monitoring theory that may harm firm value. However, more senior independent directors in the board can reduce the excess monitoring. We further confirm the important role of independent directors as valuable monitors who can reduce excess monitoring. This finding may give a new idea on how to play the role of independent director and how to effectively conduct valuable monitoring. In future research, the long-term performance change of peer firm, facing the temporary nearby shock, will be another fruitful area.

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Appendix

Table A.1: Definitions of control variables in Table 1

Source from COMPUSTAT

Variable	Obs.	Definition
ln(Market Value)	firm-year	Natural log of firm's market value at the end of each fiscal year.
ln(Sales)	firm-year	Natural log of firm's total sales for each fiscal year.
Market-to-Book ratio	firm-year	Ratio of firm's market value to book value of common equity for each fiscal year.
EBITDA/Assets	firm-year	Earnings before interest, taxes, depreciation and amortization divided by book value of assets for each fiscal year.
Net PPE/Assets	firm-year	Book value (net depreciation) of property, plant and equipment divided by book value of assets. End value of fiscal year.

Table A.2: Sources and definitions of control variables in Table 4

Variable	Obs.	Source	Item calculation
Annual adjusted return	Firm-year	CRSP	12 months buying and holding return, adjusted for CRSP value-weighted market return
Size	Firm-year	COMPUSTAT	log(at)
ROA	Firm-year	COMPUSTAT	oibdp/at
Leverage	Firm-year	COMPUSTAT	(dltt+dlc)/at
Tobin Q	Firm-year	COMPUSTAT	(at-ceq+csho*prcc_f)/at
SG&A	Firm-year	COMPUSTAT	sga
R&D	Firm-year	COMPUSTAT	rd
Age	Firm-year	CRSP	ln(age+1)
Average age of independent directors	Firm-year	BoardEx	ln(mean_age_indep_directors+1)
Board size	Firm-year	BoardEx	
Fraction of independent directors	Firm-year	BoardEx	
Peer institutional ownership	Firm-year	Thomson Reuters	
Peer Herfindahl index	Firm-year	Thomson Reuters	

Table 1: Descriptive statistics of variables in area wave

The definitions of variables see Table2 and Table A.1

Variable	Obs.	Mean	Std.	Min	Median	Max	P10	P90
CEO forced turnover dummy	3320	0.2530	0.4348	0	0	1	0	1
Area frequency t-1	3320	1.5373	2.2307	0	1	13	0	4
ln(Market Value)	3320	6.9650	1.8511	2.5349	6.8164	11.6283	4.7817	9.5655
Market-to-Book ratio	3320	2.8038	3.3551	0	1.9631	22.5357	0.6486	5.8586
EBITDA/Assets	3320	0.0547	0.1198	-0.4804	0.0650	0.3069	-0.0597	0.1806
Net PPE/Assets	3320	0.2549	0.2153	0.0001	0.1942	0.8615	0.0256	0.5844

Table 2: Probability of CEO forced turnover of peer on recent area wave

Under the logit regression, we restrict the year interval from t-3 to t, where t represents the actual year of CEO forced turnover of one firm. The dependent variable is the dummy that equals 1 if the firm resign CEO at one year in the time interval and 0 otherwise. For independent variable, the lagged frequency of CEO forced turnover in area level, we define it as the total number of other firms' CEO forced turnover in other industry of last year (t-1) in the same CBSA area, excluding firm itself CEO forced turnover in previous year. All control variables are winsorized at 1st and 99th percentiles to avoid outliers. The final data with control variables contains 3320 (3320=830*4) records of firm-year of 675 firms in 118 CBSA areas from 1993 to 2011. Some models include control variables, year and/or area fixed effects. The standard error is clustering at area level. The t statistics show in the parenthesis, with ***, **, and * denoting 1%, 5% and 10% significance level respectively.

Dependent variable	CEO forced turnover dummy			
	(1)	(2)	(3)	(4)
Area frequency t-1	0.0375***	0.0416***	0.0477***	0.0942***
	(6.19)	(6.27)	(5.79)	(4.67)
ln(Market Value)		-0.0480***	-0.0449***	-0.0456**
		(-3.22)	(-2.74)	(-2.00)
Market-to-Book ratio		-0.0769***	-0.0831***	-0.0899***
		(-5.53)	(-5.67)	(-5.85)
EBITDA/Assets		-2.3029***	-2.4131***	-2.7256***
		(-7.91)	(-8.05)	(-8.15)
Net PPE/Assets		0.0657	0.0206	-0.1833
		(0.72)	(0.22)	(-1.44)
Constant	-1.1419	-0.5374***	-0.3149***	-0.0479
	(-47.09)	(-4.89)	(-2.65)	(-0.25)
Year FE	No	No	Yes	Yes
Area FE	No	No	No	Yes
Pseudo R^2	0.0012	0.0317	0.0334	0.0383
N	3320	3320	3320	3320

Table 3: Peer reaction as Cumulative Abnormal Return (CAR)

We remove peers if in same SIC industry as the event firm and/or observing any customer-supplier bilateral relationship with event firm at the event year. Then, we obtain 727 CEO forced turnover events in 60 CBSA areas. In estimation model, ‘FF’ is the Fama-French three factors model with two factors SMB and HML, while ‘M’ is the market adjusted model, where the market return is CRSP value weighted return. The estimation window is [-220, -21]. For peer firm CARs, we delete the extreme observations at 25% and the 75% percentile to avoid outliers. For the event firm CAR and other control variables, we winsorize at 1% and 99% percentile. Other trimming or winsorizing percentiles delivers similar results. The mean of CAR (%) is the estimate of the constant from a regression with no explanatory variables, and significance is calculated with clustering standard error at event level. The significance of median is obtained from sign rank test. ***, ** and * denote 1%, 5% and 10% significance level respectively.

Model	Event window		N	Mean	Median	Std.	p10	p90
FF	(-1,1)	Peer firm	49158	-0.2222***	-0.2169***	1.1391	-1.8105	1.3574
		event firm	725	-1.8447***	-0.4687***	12.6731	-13.6416	9.1025
M	(-1,1)	Peer firm	49158	-0.2495***	-0.2433***	1.1302	-1.8278	1.3274
		event firm	723	-1.8061***	-0.6214***	12.6977	-13.9050	9.0888
FF	(-3,3)	Peer firm	49079	-0.4033***	-0.4038***	1.7874	-2.8966	2.0831
		event firm	726	-2.0887***	-0.7881***	15.4505	-17.7694	12.6384
M	(-3,3)	Peer firm	49152	-0.4144***	-0.4169***	1.7698	-2.8700	2.0648
		event firm	726	-2.0099***	-0.8759***	15.7229	-17.9886	12.8217
FF	(-5,5)	Peer firm	49117	-0.5201***	-0.5290***	2.3188	-3.7452	2.7131
		event firm	726	-2.9336***	-1.3371***	19.1807	-21.9988	14.3977
M	(-5,5)	Peer firm	49213	-0.5245***	-0.5359***	2.3002	-3.7116	2.7040
		event firm	726	-2.7589***	-1.2344***	19.4405	-20.4188	14.8807
FF	(-10,10)	Peer firm	48770	-0.6924***	-0.6672***	3.3963	-5.4263	4.0267
		event firm	727	-3.4169***	-2.2600***	23.1990	-28.9405	18.8905
M	(-10,10)	Peer firm	48699	-0.6660***	-0.6796***	3.3674	-5.3438	4.0465
		event firm	725	-3.1227***	-2.0377***	24.0788	-29.8604	19.8523

Table 4: Descriptive statistics of variables of peer reaction

We use the three-day CARs (-1, 1) estimated by Fama-French three factors model. The item 'indep. directors' represents 'independent directors'. We list the variable definition, source and possible calculation formula in Appendix A.2.

Variable	Obs.	Mean	Std.	Median	p10	p90
Peer CAR (%)	49158	-0.2223	1.1391	-0.2169	-1.8105	1.3574
Peer annual adjusted return	49158	0.0380	0.5121	-0.0326	-0.4793	0.5711
Peer size	49158	6.2230	2.2621	6.1159	3.3558	9.3540
Peer ROA	49158	0.0656	0.1945	0.0928	-0.0610	0.2215
Peer leverage	49158	0.1998	0.2015	0.1557	0.0000	0.4730
Peer Tobin Q	49158	1.9573	1.6917	1.3856	0.9664	3.5568
Peer SG&A	49158	0.2344	0.2606	0.1718	0.0000	0.5678
Peer R&D	49158	0.0423	0.1074	0.0000	0.0000	0.1258
Peer age	49158	2.5022	0.9389	2.5348	1.1815	3.6617
Peer average age of indep. directors	31268	4.1070	0.1093	4.1132	4.0099	4.2010
Peer board size	31321	9.5758	2.8683	9	6	13
Peer fraction of indep. directors	31325	0.6766	0.1783	0.7143	0.4286	0.8889
Peer institutional ownership	30463	0.7045	0.2278	0.7184	0.4158	0.9529
Peer Herfindahl index	30463	0.0341	0.5551	0.0078	0.0229	0.0472
Event firm CAR (%)	725	-1.8447	12.6731	-0.4687	-13.6416	9.1025
Event firm size	725	7.3422	2.0042	7.0858	4.9380	10.0551
Event firm ROA	725	0.0635	0.1452	0.0828	-0.0565	0.1990
Event firm leverage	725	0.2530	0.2271	0.2243	0.0000	0.5406
Event firm age	725	2.7889	0.8332	2.8124	1.7070	3.8413
Event firm annual adjusted return	725	-0.2947	0.9121	-0.4507	-1.1359	0.6300

Table 5: peer fundamentals, event firm fundamentals and peer reaction

We also replace the key variable with last two-year peer firm market-adjusted stock return. The replacement provides similar results. In fixed effects, Y: year, A: CBSA area; I: industry; E: event. The standard error is clustered at area level. We also try other standard error clustering settings, like at peer firm level, event or peer industry level. Those clustering options deliver the similar results. The t statistics show in the parenthesis, with ***, ** and * denoting 1%, 5% and 10% significance level respectively.

Dependent variable	CAR (-1,1) FF				
	(1)	(2)	(3)	(4)	(5)
Peer annual adjusted return	-0.0507***	-0.0500***	-0.0485***	-0.0520***	-0.0510***
	(-4.08)	(-3.89)	(-4.17)	(-3.99)	(-4.36)
Peer size	0.0111***	0.0100***	0.0083***	0.0106***	0.0084***
	(4.49)	(4.49)	(3.35)	(4.56)	(3.44)
Peer ROA	0.0241	0.0208	0.0197	0.0168	0.0100
	(0.75)	(0.65)	(0.51)	(0.55)	(0.22)
Peer leverage	-0.0469**	-0.0412*	-0.0357**	-0.0449**	-0.0298
	(-2.12)	(-1.81)	(-2.16)	(-2.12)	(-1.38)
Peer Tobin Q	0.0012	0.0008	0.0000	0.0016	0.0002
	(0.42)	(0.29)	(0.00)	(0.61)	(0.07)
Peer SG&A	-0.0382**	-0.0394**	-0.0326*	-0.0378**	-0.0248
	(-2.21)	(-2.26)	(-1.79)	(-2.15)	(-1.02)
Peer R&D	0.0646	0.0463	0.0818	0.0448	0.0885
	(1.16)	(0.76)	(1.07)	(0.79)	(1.03)
Peer age	-0.0026	-0.0022	-0.0054	-0.0031	-0.0038
	(-0.81)	(-0.68)	(-1.05)	(-0.95)	(-0.63)
Event firm CAR					-0.0005
					(-1.29)
Event firm size					-0.0033
					(-1.15)
Event firm ROA					0.0028
					(0.09)
Event firm leverage					0.0036
					(0.17)
Event firm age					0.0167**
					(2.30)
Event firm annual adjusted return					-0.0093**
					(-2.44)
Constant	-0.2696***	-0.2631***	-0.2468***	-0.2652***	-0.2836***
	(-14.80)	(-14.81)	(-15.86)	(-14.71)	(-8.10)
Fixed effects	Y	Y*A	Y*A*I	E	Y*A*I
Adj. R^2	0.0017	0.0016	0.0012	0.0064	0.0014
N	54131	54120	54114	54106	50928

Table 6: subsample of infrequent areas

We remove the CBSA areas where CEO forced turnover events frequently occur, e.g. New York, Chicago, Boston, Los Angeles and San Joes, California. In fixed effects, Y: year, A: CBSA area; I: industry; E: event. The standard error is clustered at area level. The t statistics show in the parenthesis, with ***, ** and * denoting 1%, 5% and 10% significance level respectively.

Dependent variable	CAR (-1,1) FF				
	(1)	(2)	(3)	(4)	(5)
Peer annual adjusted return	-0.0443***	-0.0423***	-0.0443***	-0.0410***	-0.0466**
	(-3.17)	(-3.05)	(-2.96)	(-2.97)	(-2.58)
Peer size	0.0279***	0.0260***	0.0166***	0.0264***	0.0170***
	(6.60)	(6.21)	(3.10)	(6.26)	(3.01)
Peer ROA	-0.0601	-0.0634	0.0016	-0.0760	0.0153
	(-0.99)	(-0.99)	(0.03)	(-1.11)	(0.26)
Peer leverage	-0.0844**	-0.0660	-0.0113	-0.0638	0.0132
	(-2.04)	(-1.52)	(-0.27)	(-1.38)	(0.23)
Peer Tobin Q	0.0041	0.0040	0.0066	0.0047	0.0068
	(0.57)	(0.57)	(0.84)	(0.66)	(0.72)
Peer SG&A	-0.0032	-0.0095	0.0096	-0.0066	0.0540
	(-0.08)	(-0.21)	(0.17)	(-0.14)	(1.22)
Peer R&D	0.0422	0.0019	0.0364	-0.0017	0.0857
	(0.38)	(0.02)	(0.23)	(-0.01)	(0.52)
Peer age	-0.0018	-0.0013	-0.0129	-0.0002	-0.0118
	(-0.19)	(-0.13)	(-1.03)	(-0.02)	(-0.97)
Event firm CAR					0.0007
					(1.00)
Event firm size					-0.0031
					(-0.63)
Event firm ROA					-0.0546
					(-0.72)
Event firm leverage					0.0273
					(0.58)
Event firm age					-0.0084
					(-0.39)
Event firm annual adjusted return					-0.0146
					(-1.43)
Constant	-0.4400***	-0.4299***	-0.3719***	-0.4363***	-0.3569***
	(-15.11)	(-17.55)	(-10.70)	(-17.50)	(-4.72)
Fixed effects	Y	Y*A	Y*A*I	E	Y*A*I
Adj. R^2	0.0023	0.0019	0.0012	0.0058	0.0017
N	19533	19525	19512	19513	18303

Table 7: Peer reaction and independent directors

We add the characteristics of independent director (indep. directors) of peer firm. We also test whether using the median age of independent directors change the results. This replacement would not change the results in table 7. In fixed effects, Y: year, A: CBSA area; I: industry; E: event. The standard error is clustered at area level. The t statistics show in the parenthesis, with ***, ** and * denoting 1%, 5% and 10% significance level respectively.

Dependent variable	CAR (-1,1) FF				
	(1)	(2)	(3)	(4)	(5)
Peer annual adjusted return	-0.0207	-0.0225	-0.0234	-0.0104	-0.0198
	(-1.01)	(-1.08)	(-1.00)	(-0.42)	(-0.81)
Peer size	0.0151	0.0145	0.0093	0.0170*	0.0098
	(1.59)	(1.59)	(0.82)	(1.70)	(0.94)
Peer ROA	0.2308**	0.2145**	0.2709*	0.2060**	0.2374
	(2.31)	(2.14)	(1.92)	(2.17)	(1.47)
Peer leverage	-0.1042**	-0.0961**	-0.0443	-0.0965**	-0.0348
	(-2.36)	(-2.13)	(-1.01)	(-2.11)	(-0.74)
Peer Tobin Q	0.0017	0.0029	-0.0002	0.0057	0.0029
	(0.24)	(0.42)	(-0.03)	(0.76)	(0.49)
Peer SG&A	-0.0582	-0.0628	-0.0640	-0.0570	-0.0294
	(-0.91)	(-1.06)	(-0.71)	(-0.91)	(-0.30)
Peer R&D	-0.0320	-0.0224	0.1731	-0.0526	0.1626
	(-0.21)	(-0.13)	(0.70)	(-0.32)	(0.60)
Peer age	-0.0228**	-0.0201*	-0.0377***	-0.0207*	-0.0373**
	(-2.09)	(-1.93)	(-3.06)	(-1.76)	(-2.56)
Peer average age of indep. directors	0.1001**	0.0888**	0.3293***	0.0906**	0.3266***
	(2.11)	(2.19)	(3.79)	(2.21)	(3.57)
Peer board size	-0.0011	-0.0003	-0.0012	-0.0004	-0.0027
	(-0.30)	(-0.10)	(-0.28)	(-0.13)	(-0.88)
Peer fraction of indep. directors	0.1261***	0.1090***	0.1469**	0.0994**	0.1328**
	(2.74)	(2.71)	(2.58)	(2.35)	(2.53)
Event firm CAR					0.0000
					(0.04)
Event firm size					0.0032
					(0.59)
Event firm ROA					0.0143
					(0.17)
Event firm leverage					0.0355
					(0.59)
Event firm age					0.0083
					(0.74)
Event firm annual adjusted return					-0.0142
					(-1.12)
Constant	-0.7326***	-0.6864***	-1.6141***	-0.7094***	-1.6590***
	(-3.19)	(-3.42)	(-4.32)	(-3.29)	(-4.23)
Fixed effects	Y	Y*A	Y*A*I	E	Y*A*I
Adj. R^2	0.0014	0.0019	0.0044	0.0175	0.0053
N	16479	16467	16441	16434	15199

Table 8: Peer reaction and Institutional ownership

We add the characteristics of institutional ownership of peer firm. We also replace the whole institutional ownership with the ownership of only big institutions, whose assets are above the median of industry. The results are similar to table 8. In fixed effects, Y: year, A: CBSA area; I: industry; E: event. The standard error is clustered at area level. The t statistics show in the parenthesis, with ***, ** and * denoting 1%, 5% and 10% significance level respectively.

Dependent variable	CAR (-1,1) FF				
	(1)	(2)	(3)	(4)	(5)
Peer annual adjusted return	-0.0183	-0.0195	-0.0244	-0.0078	-0.0207
	(-0.89)	(-0.94)	(-1.04)	(-0.31)	(-0.84)
Peer size	0.0159*	0.0151*	0.0078	0.0177*	0.0077
	(1.70)	(1.68)	(0.66)	(1.80)	(0.70)
Peer ROA	0.1907*	0.1744*	0.2333	0.1634*	0.1923
	(1.87)	(1.69)	(1.61)	(1.68)	(1.17)
Peer leverage	-0.1001**	-0.0947**	-0.0675	-0.0933**	-0.0583
	(-2.46)	(-2.36)	(-1.65)	(-2.31)	(-1.37)
Peer Tobin Q	0.0019	0.0031	0.0003	0.0057	0.0034
	(0.29)	(0.48)	(0.05)	(0.80)	(0.58)
Peer SG&A	-0.0597	-0.0651	-0.0707	-0.0608	-0.0348
	(-0.90)	(-1.06)	(-0.75)	(-0.95)	(-0.33)
Peer R&D	-0.0582	-0.0354	0.1631	-0.0648	0.1551
	(-0.40)	(-0.21)	(0.65)	(-0.40)	(0.55)
Peer age	-0.0207*	-0.0183*	-0.0344***	-0.0185	-0.0335**
	(-1.84)	(-1.69)	(-2.74)	(-1.53)	(-2.26)
Peer average age of indep. directors	0.1098**	0.0974**	0.3232***	0.0966**	0.3174***
	(2.04)	(2.13)	(3.73)	(2.12)	(3.49)
Peer board size	-0.0004	0.0003	-0.0007	0.0002	-0.0022
	(-0.12)	(0.09)	(-0.17)	(0.05)	(-0.72)
Peer fraction of indep. directors	0.1282**	0.1123**	0.1372**	0.1011**	0.1254**
	(2.61)	(2.53)	(2.41)	(2.25)	(2.40)
Peer institutional ownership	0.0138	0.0144	0.0630	0.0173	0.0875
	(0.36)	(0.39)	(1.17)	(0.43)	(1.41)
Peer Herfindahl index	0.0072	0.0073	0.0051	0.0063	0.0015
	(1.36)	(1.44)	(0.66)	(1.13)	(0.18)
Event firm CAR					0.0001
					(0.08)
Event firm size					0.0033
					(0.62)
Event firm ROA					0.0051
					(0.06)
Event firm leverage					0.0440
					(0.74)
Event firm age					0.0107
					(0.98)
Event firm annual adjusted return					-0.0141
					(-1.03)
Constant	-0.7956***	-0.7430***	-1.6171***	-0.7579***	-1.6731***
	(-2.91)	(-3.11)	(-4.22)	(-2.94)	(-4.19)
Fixed effects	Y	Y*A	Y*A*I	E	Y*A*I
Adj. R^2	0.0012	0.0019	0.0043	0.0171	0.0053
N	16040	16028	16004	165997	14787