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Finance Working Paper N° 673/2020
April 2020

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ECGI Working Paper Series in Finance

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Keywords: Disruptive events, corporate governance, board of directors.

JEL Classifications: G32, G34

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1. Introduction

The job of the board of directors is to monitor management and provide high-level counsel (Jensen, 1993). While these two main roles occur simultaneously (Kim, Mauldin, and Patro, 2014), the advisory and monitoring functions compete for a director's time and focus (Armstrong, Core, and Weber, 2010; Faleye, Oitash, Oitash, 2011, 2013; Masulis, Wang, Xie, 2012). Since boards come under intense scrutiny by investors, the financial press, and politicians in times of crises,[1] understanding which role contributes the most to firm value in the wake of disruptive events is a question that has surprisingly received little attention in the academic literature.

Disruptive events are situations where firms experience an exogeneous and significant increase in the probability of incurring losses due to impairments in procurement, production or distribution activities.[2,3] As observed by Hermalin and Weisbach (1998), boards become more proactive and independent in a crisis due to the negative shock reducing CEOs' negotiation power. Thus, disruptive events represent an ideal setting to ascertain the relative importance of the board's advisory and monitoring functions. On the one side, directors can provide valuable advice to managers facing a disruptive event; on the other side, directors have the fiduciary obligation towards shareholders to oversee management in a situation that can seriously impact the firm's profitability or even survival. Failure to exercise these duties can have severe consequences for the directors.[4]

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[1] During congressional hearings related to the safety crisis at General Motors in 2014, Senator Richard Blumenthal criticize the board for abdicating to G.M. management too much responsibility for resolving the crisis. He also stated that: "The board's silence and apparent absence as a force is really regrettable,". (as reported in Vlasic, Bill, "GM's board is seen as slow in reacting to safety crisis", The New York Times, 7 Sept. 2014.)

[2] Executives generally deem disruptive events to be a top business peril (see e.g., Allianz, *Risk Barometer- Top Business Risks*, 2017). Accordingly, the consensus is that *firm resilience*, i.e. the ability to absorb, adapt and recover from disruptive events (Walker and Salt 2012), is a critical issue (e.g. The National Academies, *Disaster* Resilience, A National Imperative, 2012).

[3] For example, disruptive events may result in reduced revenues, property damage or fatalities, client dissatisfaction and related litigation, or even administrative fines and criminal penalties for lack of preparedness.

[4] For example, several lawsuits were filed by General Motors' shareholders against board members after the carmaker recalled more than 30 million vehicles for safety concerns in 2014. See Vlasic, Bill, "GM's board is seen as slow in reacting to safety crisis", The New York Times, 7 Sept. 2014.

Previous literature has examined how the allocation of board resources to the monitoring rather than the advisory function impacts firm value (Faleye, Oitash, Oitash, 2011; 2013). However, resources variables are not well suited to capture what determines the relative value of the two functions when boards face a disruption. We argue that the degree and effectiveness of the board's interventions depend on its structure, composition, and characteristics as well as the background and expertise of the directors (Baldenius, Melumad, Meng, 2014). Focusing on *board characteristics* rather than the overall board's monitoring and advising *intensity* at the time of the event allows us also to determine the channel through which the effect manifests itself.

At the time of the event, board characteristics can be assumed to be fixed, meaning that their impact on the stock price reaction can be interpreted as a market assessment of the expected contribution to the firm's ability to recover from the disruption (see also Hail, Muhn, and Oesch, 2019). Traits like board busyness, independence and size, as well as CEO duality are also associated to the ability of the board to perform its monitoring and advisory functions. Thus, their effects can provide insights about the relative value of the two functions in a time of crisis as well as the mechanism behind this effect.

Directors' busyness is generally deemed detrimental to firm value as it hampers monitoring (Hallock, 1997; Core, Holtausen, and Larcker, 1999; Fich and Shivdasani, 2006; Devos, Prevost, and Puthenpurackal, 2009; Falato, Kadyrzhanova, and Lel, 2014). Nevertheless, there is evidence that busy directors may be valuable if they make up for this negative effect with better advising (Field, Lowry, and Mkrtchyan, 2013). This may occur due to busy directors also being the more talented ones. Moreover, a crisis may lead busy directors to devote their talents to the company to avoid personal costs should the firm become financially distressed or go bankrupt (Fich and Shivdasani, 2007; Dou, 2017).

While there is evidence that *independent directors* are better monitors, an increase in monitoring activity often results in management providing less information to directors, which in turn leads to a decrease in advisory activity (Holmstrom, 2005; Song and Thakor, 2006; Adams and Ferreira, 2007). This is particularly relevant when access to information is costly and there are greater advising needs (Duchin, Matsusaka, Ozbas, 2010; Faleye, Oitash, Oitash, 2011) — prototypically in disruptive events situations.

Small boards are deemed more effective in monitoring management because of reduced coordination costs and less free riding (Yermack, 1996; Jenter, Schimd, and Urban, 2018). However, the optimal size of the board, and thus its advisory value, grow with the complexity of the firm (Coles, Daniel, and Naveen, 2008). If disruptive events increase, even temporarily, the complexity of the firm, then firms with larger boards should perform better due to their advisory advantage.

Finally, *CEO duality* is generally discouraged by regulations and corporate governance principles as it is deemed to reduce the ability of the board to monitor management (Fama and Jensen, 1983). However, separating the roles of CEO and chair may hurt the board's advising function, impairing decision-making and delaying prompt responses in times of crisis (Brickley, 1997). Similarly to board independence, we expect CEO duality to help firms to limit event disruption if the advisory function is more valuable in crisis situation.

We identify disruptive events by searching the 10-K form of US firms listed in the Compustat's Execucomp database from 2000 to 2016. After carefully screening a list of potential events generated by a keyword search based on a webscraping algorithm, we obtained a sample of 378 observations. Unsurprisingly, we find that these events destroy value on average, with a stock price loss of 0.83% in the event window (-2, +2) surrounding the announcement date. However, we are not interested in stock price reaction *per se* (as it can be

affected by the firm's efforts to minimize said reaction[5]), but in how it correlates with board attributes. We exploit these reactions to determine the value of the advisory function relative to the monitoring one in times of firm-specific crisis, focusing on the board characteristics mentioned before. To this end, we regress the cumulative abnormal returns (CARs) around the date of the disruptive event on the board-related variables and a series of firm-level controls.

Our results point towards advising-inclined boards being more valuable than the monitoring-inclined ones. While we do not find that the variables devoted to capture the effects of advisory and monitoring intensity affect the stock price reaction around the announcement of disruptive events, board characteristics do influence it—with implications in terms of the importance of the two functions. In fact, our tests document a *positive* impact of board busyness and size and a *negative* effect for board independence. These findings are consistent with firms benefitting more from boards that are less hands-on monitors and more hands-off advisors when there is a negative shock. In particular, the result for board busyness suggests that the quality more than the quantity of the advice matters. We thus complement the evidence provided by Field, Lowry, and Mkrtchyan (2013), showing that it is not merely less established firms which may benefit from a more advisory-oriented board. Our findings also support the view that the advising and monitoring functions impact firm value and firm resilience in a different way.

Building on these results, we examine how board experience, within and outside the firm, affects market reaction around disruptive events. Experience within the firm may allow directors to gain firm and management-specific knowledge, reducing the information gap with executives and increasing director ability to provide valuable advice (Kim, Mauldin, and Patro, 2014). Expertise gained in industry from either directorships or employment has also shown to

[5] Firms usually have insurance contracts to cover for the losses from the disruptive events. This can reduce the magnitude of the drop in the stock price around the disruptive event.

be valuable (Field, Lowry, and Mkrtchyan, 2013; Dass et al., 2014; von Meyerinck, Oesch, Schmid, 2016; Drobetz et al., 2018).

We find limited support for the view that expertise mitigates negative reactions around disruptive shocks. Indeed, industry experience has the opposite effect: more industry-experts on the board are associated with a more negative market reaction. This negative reaction is consistent with the view that the market has already incorporated the benefits of the directors' expertise at the time of their appointments (see for example Dass et al., 2014) and penalizes these firms when struck by a disruptive event. Collectively, we interpret these results as indicating that the relative advantage provided by a more advising-oriented board derives from neither its expertise nor its knowledge of the industry. By ruling out, or at the least not supporting, the industry-experience channel, these findings suggest that the advice is mostly disruption-specific.

We also test whether the effects we attribute to board characteristics are a byproduct of managerial incentives. Recent literature has documented the effect of CEO age on corporate policies and risk-taking (Yim, 2013; Serfling, 2014; Jenter and Lewellen, 2015), implying that age could shape CEO behavior at the time of the crisis. Similarly, CEO tenure has often been used as a proxy for CEO entrenchment, with CEO acquiring more power as tenure increases (Hermalin and Weisbach, 1998). Finally, a vast literature has examined the role of CEO compensation-based incentives to explain corporate risk-taking (Tufano, 1996; Knopf, Nam, and Thortnton, 2002; Rajgopal and Shevlin, 2002; Coles, Daniel, and Naveen, 2006; Hayes, Lemmon, and Qiu, 2012; Gormley, Matsa, Milbourn, 2014). Controlling for these factors do not alter our main results.

Our paper contributes to different strands of the literature. First, it provides a new take on the two key roles of the board. While there are several contributions that investigate the monitoring and advisory functions (see for example the reviews of Garner, Kim, and Kim, 2017

and Adams, 2017, as well as Faleye, Oitash, Oitash, 2011 and 2013), we are not aware of any study on the relative importance of the two roles at a time of crisis. We fill this void by providing new disruptive event evidence. Differently from Faleye, Oitash, Oitash (2011; 2013), we focus on board characteristics rather than on committees' assignment to investigate the relative value of the monitoring and advisory functions. Exploiting exogenous shocks, we show that boards with characteristics that facilitate their advisory contributions positively contribute to firm resilience, limiting the negative reaction associated with the event. Our results add to those of Field, Lowry, and Mkrtchyan (2013), which document that board busyness positively affects the value of firms that rely on directors for advising, i.e. IPO firms with minimal experience with public markets. We provide evidence of another, important, case where the advisory ability of busy directors outweighs the costs of their limited monitoring. Our findings also relate to a growing literature that investigates how directors focus on and allocate their time between the two functions (Armstrong, Core, and Weber, 2010; Faleye, Oitash, Oitash, 2011, 2013; Masulis, Wang, Xie, 2012; Kim, Mauldin, and Patro, 2014).

More generally, the paper contributes to the literature on the role of corporate governance, and in particular the board of directors, in crisis situations. While this literature mostly focuses on systemic crises (for example, the Asian and the great financial crises) and environmental disasters like the Fukushima nuclear incident (Bonetti, Cho, Michelon, 2018), this paper examines the role of various board characteristics in crises that are firm-specific.

Finally, albeit investors are increasingly aware of ESG disruption risks (Jagannathani, Ravikumar, and Sammon, 2017; Kraik, 2019), there is almost no corporate governance literature dealing with firm resilience. To our knowledge, only three (recent) contributions have done so. Two of them focus on how disruptive events affect managerial decisions (see Dessaint and Matray, 2017; Bernile, Bhagwat, and Rau, 2017), rather than firm resilience *per se*. The

third one deals with organizational resilience (Krigman and Rivolta, 2016), whereas the disruptive event is a sudden CEO departure, not an external shock.

In the remainder of the paper, Section 2 presents the literature and develops the hypotheses. Section 3 describes the disruptive shocks and the sample construction. Sections 4 and 5 present the empirical analysis. Section 6 contains a brief conclusion.

2. Related literature and hypothesis development

Boards are complex entities (Adams, 2017), whose main roles are monitoring and advising executive managers. Previous literature has emphasized the existence of a trade-off between these two roles (Holmstrom, 2005; Song and Thakor, 2006; Adams and Ferreira, 2007; Faleye, Oitash, Oitash, 2011), which compete for directors' time and focus (Armstrong, Guay, and Weber, 2010). Because of their critical impact and the scrutiny boards receive in time of crisis, disruptive events provide an ideal testing ground to examine whether firms are better off with either a more monitoring- or more advisory-oriented board. Faleye, Oitash, Oitash (2011; 2013) propose board level variables that measure the intensity of advising and monitoring looking at committees' assignments. However, board characteristics may also provide important information about the relative role of the two functions, especially during a crisis period. Moreover, differently from board-level measures, board attributes allow us to determine through which channel the effect operates. To that end, we focus on a set of board characteristics that have been extensively examined in the literature: independence, size, busyness, and CEO duality. These variables, alone or in some combination, are often used to characterize boards whose directors are expected to better monitor or advise executive managers (for example Dahya, Dimitrov, McConnell, 2008; Pathan, 2009; Kolansiski and Li, 2013).

Board independence is generally associated with the monitoring role of the board. By having neither financial nor familial ties to the CEO or the firm, an independent director is in a

better position to monitor and challenge the firm's executives. There is evidence of board independence being positively related to firm performance (Shivdasani and Yermack, 1999; Coles, Daniel, and Naveen, 2008; Nguyen and Nielsen, 2010; Guo and Masulis, 2015). However, board independence seems to be value-enhancing only under certain conditions, for example when the cost of acquiring information about the firm is low (Duchin, Matsusaka, Ozbas, 2010). In addition, an overly independent board may receive little information from the CEO when the latter is afraid of increased oversight (Holmstrom, 2005; Song and Thakor, 2006; Adams and Ferreira, 2007). In line with this argument, Faleye, Oitash, Oitash (2011) find that board independence leads to a value reduction for firms with greater advising needs. Since disruptive events are likely to increase the advising needs of the firm, we can expect board independence to amplify the negative reaction to such events.

Monitoring-oriented boards are usually associated with having a limited number of members, i.e. a small board. Yermack (1996) finds an inverse relationship between firm value and board size, supporting the idea that more monitoring is beneficial to firm value. Jenter, Schimd, and Urban (2018) confirm this result for German firms. However, Coles, Daniel, and Naveen (2008) show that the relationship is U-shaped, with the optimal size depending on the advising requirement of the firm: more complex firms need larger boards. In view of disruptive events generally increasing complexity, larger boards are likely to be better placed to minimize the negative impact of disruptive events. Given that this increase in complexity is not permanent, we hypothesize that the benefit of having a large board will be concentrated at the time of the disruption.

To effectively monitor managers, directors must have enough time to perform their duties. External demands on directors' time are thus likely to reduce board monitoring quality and, consequently, decrease firm value. The literature generally supports this view (Hallock 1997; Core, Holtausen, and Larcker, 1999; Fich and Shivdasani 2006; Devos, Prevost, and

Puthenpurackal, 2009; Falato, Kadyrzhanova, and Lel, 2014), but the empirical evidence is mixed (Ferris, Jagannathan, and Pritchard, 2003; Field, Lowry, and Mkrtchyan, 2013). However, if being a busy director is a signal that the person is more talented, we can expect an improvement in the firm's post-disruptive event reaction. Talented but busy directors have incentives to devote their attention to the disrupted firm. Indeed, leaving a troubled firm shortly after a negative shock is a source of reputational penalties (Dou, 2017) whereas the firm's financial distress is likely to be a source of personal costs (Fich and Shivdasani, 2007).

Finally, board leadership matters because the chair sets the board's agenda and priorities. While regulations and corporate governance principles discourage firms to combine the roles of CEO and chair of the board, a significant fraction of S&P1500 companies still do that (Balsam, Puthenpurackal, and Upadhyay, 2016). If the CEO is also chair of the board, the ability of the board to monitor the management is compromised (Fama and Jensen, 1983). However, separating the roles of CEO and chair is not always positive: it may lead to leadership duplication, impair decision-making and delay a prompt response in times of crisis (Brickley, 1997). If splitting the CEO and chair roles leads to costly delays in responding to crises, then we expect firms whose CEO is also chair of the board to be more resilient than firms that separate the two roles.

On top of these four main attributes of the board of directors, we also control for gender diversity. Recently, several papers have investigated the introduction of mandatory gender quotas, with mixed results in Europe (Ahern and Dittmar, 2012; Matsa and Miller, 2013; Eckbo, Nygaard, and Thorburn, 2016) and negative ones in the US (Huang, Shivdasani, Simitzi, 2018; von Meyerinck et al., 2019). The idea behind this literature is that diverse directors bring assorted abilities and experiences to the table, which may prove beneficial to the firm (Garner, Kim, and Kim, 2017) in disruptive event situations.

Finally, we extend our investigation to examine the impact of directors' experience, both within and outside the firm. Within the firm, experience can be proxied by the average tenure of board members: over time, directors get to know the firm, which reduces the information gap with executives and increases the ability to provide valuable advice. However, this knowledge tends to be general rather than specific (Kim, Mauldin, and Patro, 2014). There are also benefits in directors having industry experience, especially when it comes to the advisory role of the board (Field, Lowry, and Mkrtchyan, 2013; Dass et al. 2014; von Meyerinck, Oesch, and Schmid, 2016; Drobetz et al. 2018). Similarly, expertise gained as CEO at another firm (Fahlenbrach, Low, Stulz, 2010), in government, or in the military is also likely to prove beneficial.

3. Disruptive Events, Sample, & Methodology

3.1 Identifying Disruptive Events

Businesses can be disrupted by a variety of hazards, some of which may significantly slow down their operations. In this paper, any hazard (natural or human-related) that interrupts or significantly interferes with a firm's operations or services is considered a disruptive event. More precisely, a *disruptive event* is defined as a natural or non-natural hazard that could shut down a firm's operations (or a part of them).

It follows that disruptive events create or increase the chance of losses due to property damage, environmental damage, fatalities, lawsuits or fines and penalties. In view of their potential effects, we allocate disruptive events to three macro-categories: business interruptions, damages, and supply chain interruptions. Business interruptions affect the company's ability to function or operate after a disaster. Damages are physical harm or asset value reduction caused by e.g. fire, flood, storm or accidents. Finally, supply chain interruptions affect third parties' ability to produce or distribute their products.

The disruptive events dataset has been hand collected using a four- phase process:

1) *Keyword identification*: We employ a sort of *snowball approach* to identify keywords. The snowball approach uses a small pool of initial data sources, which in turn nominate other potential data sources that can provide more information (Dudovskiy, 2018). We obtained the initial list of keywords for the natural hazard types from the US National Weather Service website.[6] For non-natural hazards, we used a combination of accident website databases, official reports and journal articles for sectors such as airlines or mining as primary data sources.[7] We identified many types of accidents (e.g., explosion, fire, cyberattack) to be used as keywords for our study. These primary data sources provided multiple referrals (i.e. other data sources) that helped us collect additional keywords to build up our list. We also searched for synonyms of the selected keywords (e.g., blast for explosion). This approach contributed effectively to establishing keyword lists consisting of expressions associated with hazards, enabling us to identify 355 relevant words (see Appendix A: Keywords).

2) *10-K search*: More specifically, we used a textual search *web-scraping algorithm* to extract data related to our 355 keywords. We run the algorithm on all 10-K forms filed with the SEC the 1999–2016 period. The web-scraping algorithm extracts snippets of text centered around the keywords from the 10-K form as well as the Central Index Key (*CIK*) number, the filing date, the fiscal year, and whether the form is an amendment. The CIK number is then used to link the 10-K forms to firms in the Compustat's Execucomp database for. The search resulted in 17,257 hits related to 1,486 firms.

[6] https://www.weather.gov/

[7] Examples of these sources for general disaster keywords are: a) the EM-DAT Glossary in EM-DAT, the International Disaster Database; b) The Peril Classification and Hazard Glossary from IRDR; c) Accident databases; and d) The United Nations Office for Disaster Risk Reduction. We also used the following industry-specific sources: 1) airline industry: Aviation Safety Network; Major Airline Disasters; 1001crash.com; National Transportation Safety Board; Airsafe.com; 2) energy industry: Paul Scherrer Institute, Project Gabe „Comprehensive Assessment of the Energy Sector"

3) *Data Cleaning*: Based on the textual search, we manually examined the data extracted by the algorithm as well as the corresponding 10-K forms to verify that the results are related to disruptive events. This is confirmed for 606 of the 17,257 hits.

4) *Event date*: 10-K forms usually do not report the exact dates of events. We run searches on Factiva to identify the dates of disruptive events not mentioned in 10-K forms, assuming that disruptive event dates coincide with the first press report. Natural hazards data is exclusively identified using publicly disclosed and officially confirmed information—essentially by the national weather authority. Given that our analysis is based on the quantification of market reaction at the time of the event, we drop all observations for which the event date is not available. After this screen, the sample comprises 497 events taking place from 1999 to 2016.

Appendix B documents a few examples of our analytical approach with excerpts from the corresponding 10-Ks and Factiva searches.

3.2 The Sample & Data

As described above, we collected information for 497 disruptive events occurring during the 1999-2016 period and covering all firms listed in the Compustat's Execucomp database. We apply additional screens to obtain our final sample. First, we require the firm to be active and listed in the year of the event, i.e. to be listed on Compustat and CRSP in the event year. This leads to the loss of 41 observations. We also require the firm to have enough daily stock returns to compute the cumulative abnormal returns around the disruptive events using a market model approach, based on at least 20 stock returns in the period (-241 to -41) days before the event. This results in the loss of an additional 13 observations. Finally, we exclude 66 firms from the financial sector with four-digit-SIC from 6000 to 6999 due to this sector having different firm structures and financial reporting practices. Finally, since a company can report disruptive events that took place far back in time, the sample only includes events reported up to 3 years

after they occur. For example, while examining a 10-K form for fiscal year 2010, we consider all events that took place over the 3-year period from 2008 to 2010. This eliminates two observations. The final sample thus consists of 375 observations. Table 1 provides descriptive statistics, with Panel B summarizing disruptive event impact for the 1999-2016 period.

[Please insert Table 1 about here]

Disruptive events are spread over the entire sample period, with a noticeable spike in 2005. Business interruptions are their most common consequence, followed by damages and a limited number of supply chain interruptions.[8] Our sample is mostly composed of events associated with natural hazards, which represent almost three-quarters of the observations. Finally, Table 1 shows that a majority of events (59%) is new, with *New Events* being those not preceded by any disruption over a three-year period.

We also collect stock prices, financial, market and board data as well as data on institutional investors' ownership. Stock price data are from the CRSP. Financial and market data are obtained from Compustat, whereas Boardex is used for information on boards, directors' expertise and directors' knowledge.[9] Finally, data on CEOs are from the Compustat Execucomp database.

3.3 Methodology

Our goal is to quantify the impact of board attributes on the change in value generated by the disruptive event. A measure of the costs incurred by the firm is the abnormal change in the

[8] The three categories are not mutually exclusive since a supply chain interruption can also result in a business interruption.

[9] Boardex provides the employment history of the directors. However, it does not provide the industry classification (SIC code) of these firms. A fuzzy matching is required to associate Boardex firms to CRSP/Compustat codes. Felix von Meyerinck kindly shared his data on this matching. See Drobetz et al. (2018) for a detailed description of the procedure.

market value of the company at the time of the disruptive event. C*eteris paribus*, more resilient firms should be less penalized by the market around the day of the event: they should have the capacity to recover more rapidly than other firms. It is important to note that we are not interested in the magnitude of firm loss *per se*. Indeed, this loss, and therefore the abnormal returns around the disruption day, can be influenced also by factors like the existence of insurance contracts for damaged properties. In other words, it is likely that the stock market reaction we observe underestimates actual firm losses. By contrast, our interest lies in how stock market reactions and firm performance correlate with the structure and composition of the board at the time of the events.

Consequently, our models include board-related variables associated to board independence, size, busyness, and CEO duality. In additional models, we include several proxies for expertise and board diversity. The observed stock price reaction, of course, depends also on firm characteristics, which can affect its exposure to the shock. We control for firm-level characteristics like size, book-to-market, leverage, capital expenditures, operating performance, cash flow volatility, and past stock price performance. Moreover, we take into account that institutional investors play a fundamental role in monitoring and advising executives, both through public and behind-the-scene interventions (e.g., Carleton, Nelson, and Weisbach, 1998, McCahery, Sautner, and Starks, 2016). Hence, we control for the percentage of shares held by institutional investors.

We also introduce industry and calendar year fixed effects in the models. While imperfect, industry fixed effects allow us to remove the average shock for a firm in that industry, so that our variables of interest are left to explain the deviation from the average industry reaction. In some models, we add a binary variable for natural hazards as well as another variable to account for the type of disruption (business interruptions), which capture the average reaction observed for categories of hazard over time for all event firms.

$$CAR_i = \alpha + \beta * Board_i + \gamma * Event_i + \theta * X_i + \varphi_t + \vartheta_i + \varepsilon_i \qquad [1]$$

where CAR_i is the abnormal return in an event window centered around the day of the disruptive shock; $Event_i$ is the vector of event-level variables; and X_i is a vector of firm characteristics. φ_t and ϑ_i are year and industry fixed effects, respectively. The sample used to test this model includes all event firms. The main variables of interest are included in the vector $Board_i$, whose coefficients capture the impact of a certain board attribute on the CAR around the event.

3.4 Variables and Summary Statistics

Table 2 presents summary statistics for the abnormal stock price reaction around the disruptive events in the event windows (-2, 2), (-2, 5), and (-5, 5). These variables, as well as all variables used in the analysis, are winsorized at 1% on both tails. The average CAR in the event window (-2, 2) is -0.86%, statistically significant at the 1% level. This confirms that the events investigated negatively affect the value of the firm. While the economic magnitude of this reaction may seem relatively modest, it is worth remembering that acquisitions of publicly listed firms have a similar magnitude (see Eckbo 2009). Moreover, the magnitude of the market reaction can be mitigated by insurance contracts entered into by the firm.

Regarding the different categories of events, new and non-new events generate similar reactions. On the other hand, non-natural hazards have a market reaction that is about twice as large as the one for natural hazards (-1.35% vs. -0.68%), signaling that the market penalizes more disruptions in which humans play a role. Finally, regarding the type of disruptive events, supply chain and business disruptions cause negative and significant reactions. This is not true for the category damages, for which we estimate a negative but insignificant reaction.

Table 2 also presents CARs for the event windows (-2, 5) and (-5, 5), which we use as robustness checks in the regression analysis. As the panel shows, the results are rather similar to the event window (-2, 2), with a larger economic effect. There are a few differences though.

Business interruptions have the largest negative reactions among the three types of events when the event window increases, and the reactions for natural and non-natural hazards are no longer significant in the event window (-5, 5).

[Please insert Table 2 about here]

Summary statistics for the board and control variables are presented in Table 3. Concerning board variables, about 39% of independent directors are busy, i.e. they hold at least 3 directorships in listed companies. This is consistent with previous literature that emphasize that board members are selected among a relatively small pool of candidates (Nguyen, 2012; Cai, Nguyen, and Walkling, 2017). The average and median board is composed of 9 directors, which mirrors values found in the literature (Yermack, 1996). Independent directors are the majority in the typical board, with about three quarters of directors being independent. This high percentage of independent directors is expected given the regulatory changes after the scandals taking place in the early 2000s that pushed towards board independence. However, despite this trend, more than half of the firms have a CEO that is also chair of the board, a slightly lower percentage than for the population of S&P 1500 firms studied by Balsam, Puthenpurackal, and Upadhyay (2016). Independent directors are often involved in at least two of the key monitoring committees, that is audit, compensation, and nominating/corporate governance committees (Faleye, Oitash, and Oitash, 2011). The fraction of independent directors that are advisory intensive is significantly lower (Faleye, Oitash, and Oitash, 2013). Following the literature, we define an independent director as an advisory director if he/she has been a director for at least one year and does not serve on any monitoring committee but serves on at least one advisory committee if the company has any.[10] This suggests that there are few

[10] If the company has no standing advisory committees, we classify independent directors as advisory directors if they do not serve on any monitoring committee. We classify the audit, compensation, and nominating/governance committees as monitoring committees and the finance, investment, strategy, acquisitions, science and technology, and executive committees as advisory.

directors with a very long tenure. Finally, consistently with Adams and Ferreira (2009), the percentage of female directors is very low in the sample of disrupted firms. In fact, female directors represent on average 10% of the board seats.

Regarding experience variables, we first note that the average director has spent about 4 years in the company, but the median is only 2.2 years. About 22% of the independent directors have previous experience in the industry in which the company operates, which is again similar to the percentage of expert directors found by Drobetz, Schmid, and von Meyerick (2018). The percentage is lower for the entire board (11.5%), because insiders often do not have previous directorships in other companies. Table 3 presents also statistics for employee and director experience separately, as well as experience as CEO and in a government (or government agency). Collectively, these variables indicate that independent directors are more likely to be expert, but the number of expert directors remain somehow limited even among independent ones.

The next block of variables presented in Table 3 refers to firm level control variables. Firms are large, which is not surprising given that the sample includes S&P 1500 companies. Firms hit by disruptive events have more than 80% of their equity in the hands of institutional investors. Book-to-market ratio, operating performance (ROA) as well as stock performance are on average good leading to the year of the shock. The leverage ratio is around 25%, which is consistent with previous literature (Brav, 2009). These firms have significant investment in CAPEX representing more than 10% of the total assets and steady cash flows. Finally, we present descriptive stats for CEO-level variables. Delta, vega, CEO age (around 56 years) and tenure (8 years) are in line with the literature (see for example Armstrong and Vashishta, 2012).

4. Do Board Attributes affect Stock Market Reaction at the Time of the Disruptive Event?

4.1 Baseline Models

We exploit disruptive events to understand the relationship between board attributes and firm performance. As shown in Table 4 (where the dependent variable is the CAR in the event window -2, 2), three board attributes stand out: busyness, board size and independence.

[Please insert Table 4 about here]

Board busyness positively affects the reaction to disruptive events. Consistent with Field, Lowry, and Mkrtchyan (2013), this finding supports the view that busy directors are more talented and, thus, more capable of helping the firm in a disruptive event situation. Board size positively impacts CARs around the disruption. This is in line with Coles, Daniel, and Naveen (2008) findings that large boards positively affect complex firm value. Finally, board independence appears with a negative and significant coefficient. More independent board are generally associated with stronger, more conflictual oversight of managers. It follows that when boards limit themselves to advising managers in disruptive events situation, they perform better than monitoring boards. Other board attributes neither attenuate nor amplify the reaction to disruptive events. Having a CEO holding the title of chair of the board does not impact stock price at the time of the announcement of the disruption. Board diversity does not affect CARs either. All these results are confirmed when we control for the type of the events (business disruptions and natural hazard).

In Columns II and V, we include binary variables to capture advisory intensive and monitoring intensive boards (Faleye, Oitash, and Oitash, 2011 and 2013). The coefficients of these two variables are not statistically significant, suggesting that having a more advisory or more monitoring-oriented board per se does not affect the stock price reaction at the time of the disruption. Similarly, we do not find any effect when we measure the advisory (monitoring) intensity as the percentage of independent directors that are advisory (monitoring) intensive in Columns (III) and (VI). This suggests that single board characteristics are better suitable than

board-level measures of intensity to capture the relative importance of advising and monitoring during crisis times.

Regarding control variables, highly levered firms get more negative reactions, suggesting that disruptive events increase the likelihood of financial distress. Similarly, less valuable firms (i.e. firms with a higher book-to-market ratio) and firms with better stock price performance in the year prior to the event are more negatively affected. Finally, firm size negatively affects CARs around disruptive events, indicating that large firms face higher disruption costs than smaller ones.

4.2 Disruptive Events and Directors' Experience

Recent evidence has shown the importance of directors' expertise (Field, Lowry, and Mkrtchyan, 2013; Dass et al., 2014; von Meyerinck, Oesch, and Schmid, 2016; Drobetz et al., 2018). We examine the importance of both internal and external expertise in Table 5. Using different proxies, we re-estimate the model of Table 4 to include directors' experience. The average time on board captures the knowledge of the director about the firm and measures the internal experience. We consider a variety of external experience. Following Drobetz et al. (2018), we look at the overall industry experience as well as experience gained as employee and director. We also examine experience as CEO (Fahlenbrach, Low, and Stulz, 2010) and in the government (Goldman, Rocholl, So, 2009; Kang and Zhang, 2018). Results are presented in Table 5.

[Please insert Table 5 about here]

The average time directors have sat on the board is never statistically significant, suggesting that being more engaged in the firm's business is not valuable in these situations. Overall, the results show no support for the view that directors' industry expertise mitigates the decline in stock price around disruptive events. The only significant coefficient is in Column I, showing that having directors with more industry expertise negatively affect the CARs. This

negative reaction is consistent with the view that the stock price has already incorporated the benefits of directors' expertise at the time of their appointments (see for example Dass et al. 2014) and penalizes these firms for the failure of preventing the disruptive event. This negative reaction could be also due to the market believing there is less room for improvement if the company already has experts on the board. However, even this coefficient turns not significant when we consider independent directors experience. Finally, results are no longer significant for industry experience as an employee.

We also consider different forms of expertise. Directors with CEO expertise are particularly sought after by firms and valued by the market (Fahlenbrach, Low, and Stulz, 2010). Kang and Zhang (2018) document a negative effect of government experience on firm value and performance due to their impaired advisory capacity. To be sure, having worked either in the government or in a governmental agency may generate political connections that could be valuable in times of crisis. However, we find no significant effects associated with these types of expertise (see Columns VII to X of Table 5).

Board independence and busyness maintain the same sign and significance as in Table 4. Board size remains significant in most specifications. CEO duality, board diversity, and advisory and monitoring intensive board dummies are still not significant. In other words, the inclusion of variables related to director expertise does not alter the picture provided by Table 4, indicating the shock mitigation advantage of a board more inclined to provide quality advice. These findings suggest that the directors' most valuable talents in these events are *situation-specific* rather than industry-specific. In other words, knowledge and experience acquired in other firms within the same industry do not necessarily translate into better advice.

4.3 The Role of CEO Characteristics

So far, we focused on the characteristics of the board. However, market reactions could be influenced by the CEO and his/her attributes. To control that previous results are not driven by

some omitted variables related to the CEO, Table 6 deals with variables that should capture the CEO effect. Our four CEO-related variables are: age; tenure; delta; and vega. Recent literature has documented the effect of CEO age on corporate policies and risk-taking (Yim, 2013; Serfling, 2014; Jenter and Lewellen, 2015) as well as on career risk (Scharfstein and Stein, 1990; Hirschleifer and Thakor, 1992; Holmstrom, 1999). This suggest that age could shape CEO behavior at crisis time. CEO tenure is often used as a proxy for CEO entrenchment, with CEOs acquiring more power as tenure increases (Hermalin and Weisbach, 1998). Finally, a vast literature has examined the role of CEO compensation-based incentives to explain corporate risk-taking (Tufano, 1996; Knopf, Nam, and Thortnton, 2002; Rajgopal and Shevlin, 2002; Coles, Daniel, and Naveen, 2006; Hayes, Lemmon, and Qiu, 2012; Gormley, Matsa, Milbourn, 2013). Thus, we control for the alignment of shareholder and manager incentives (delta) and CEO risk-taking incentives (vega). Table 6 provides the results.

[Please insert Table 6 about here]

Table 6 shows that controlling for CEO-related variables does not alter our main results. Board independence, size, and busyness continue to affect market reaction. Regarding CEO variables, we find evidence that neither CEO's incentives nor his age and tenure affect stock price reactions. In an unreported analysis, we also include CEO gender as control variable. This variable is not statistically significant either (only 1.3% of the CEOs in our disrupted firms are women).

4.4 Additional Analyses and Robustness Tests

We complete our investigation of stock price reaction around disruptive events with an examination of the impact of a) board attributes on new events (i.e. events not preceded by other disruptive events in a 3-year period) b) alternative event windows and c) time clustering.

Panel A of Table 7 presents the results for new events. The model is the same as the one used in previous tables, but we add interactions between board variables and new events.

Overall, the picture is like the one provided by Table 4. While the baseline effect for board size is not significant, the interaction between new events and board size is positive and significant in models I and III. This suggests that the benefits of having a larger board at the time of disruptive events are mostly for first-time events. Board busyness and independence still affect the reaction in a positive and negative way, respectively. Their interactions with new events are never significant. In models I and III, the New Event dummy becomes negative and significant, suggesting that once we remove the effects associated with board variables, first-time events destroy more value. In model II, the coefficient of the monitoring intensive board dummy is positive and significant, while its interaction with new event dummy has a negative coefficient of a similar magnitude. This indicates that while, overall, the effect for new event is negligible, monitoring intensive boards could positively impact the reaction in case of follow-up events. The board gender variable and its interaction with new events are also significant, with offsetting coefficients.

[Please insert Table 7 about here]

Panel B of Table 7 shows the results for the cumulative abnormal reaction in the event window (-5, 5). When we use this longer event window, results are remarkably similar to those for the event window (-2, 2). The major difference is the lack of statistical significance for board size, which is now significant only in Column I at the 10% percent level. In unreported tables, we re-estimate the models for the event windows (-2, 5), obtaining similar results.[11]

We also replicate the models of Table 4 clustering the standard errors at both firm and year levels. This allows us to account also for the fact that some sample years have more observations than others (e.g. 2005 and 2008). Results are presented in Table 8. They are similar to those of Table 4, confirming once again our main findings.

[11] The table is available from the authors upon request.

[Please insert Table 8 about here]

5. Conclusions

In this paper, we investigate the contribution of boards of directors to firm resilience around disruptive events by assessing the relative importance of their advisory and monitoring roles. Using both a webscraping algorithm and manual searches, we identify 378 disruptive events affecting US firms listed in Compustat's Execucomp between 1999 and 2016. On average, the stock market reacts negatively to these disruptive events.

Based on these manually collected US data, we document that three board-related attributes affect market reactions at the time of the shock. Board independence exacerbates the negative share price effect of disruptive events, whereas the reverse is true for director busyness and board size. These reactions imply that, in times of crisis, advice-oriented boards fare better than monitoring-oriented boards. More specifically, information flows less easily within independent boards. Conversely, busy directors and large boards are more talented, respectively more effective in complex situations.

We also examine if these findings are related to director expertise. The value of advisory boards does not depend on industry-specific, CEO or government experience. In fact, we find no support that industry-specific experience is valuable; on the contrary, a board full of industry experts worsens market reaction. Our results are robust to the inclusion of CEO characteristics.

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Appendix A. Keywords

Hazard Type	Description
Natural Hazards	Adverse weather – Blizzards - Bird Strike - Birds Attack - Cold Weather - Cyclone – Electrical Storm – Extreme weather - Flood - Fog – Harsh Weather Conditions – Haze – Heat Waves - Heavy Rain - Heavy Snow - Hurricane - Lightning storms – Nesting Birds - Poor Weather – Raptors - Roosting Birds - Snow – Snowfall - Snow Storm – Severe Weather – Storm – Typhoon – Weather Disruption - Windstorm - Winter Weather - Woodpeckers - Drought – Earthquake - Eruption – Levee - Tsunami - Volcanic ash - Volcanic ash cloud - Disease - Food poisoning – Illnesses – Epidemic - Food Safety Risk - Food Safety
Non-Natural Hazards	Accidents Cargo Ship – Accidents in Shipyards – Air Travel Disruption – Assaults - Bridge Collapse – Boiler Explosion - Brake Failure - Break Off Rolling Stock - Broken Out – Burst Pipe Leak - Burst Pipe Leak Sparks Falling – Buffer Stop – Buffer Stop Collision - Burst Water Mains – Capsizing – Capsizing of a Ship – Cargo Door Failure – Caterpillar Accidents – Cockpit Windscreen Failure – Collide – Collision – Collision with Fuselage – Contaminate Insulators – Container Ship Collide – Corrosion – Collapse of Courier – Collapse of Roof – Crane Mishaps – Crop failure – Crop Failures – Damage - Dams Transfer Water - Derailment – Destroy – Dielectric Strength - Driver's Errors - Dotcom Collapse – Ecological Damage – Electric Shock – Electrical Short Circuit - Engine Failure – Engineering Failure – Equipment Shortage – Evacuation - Excavator Failure - Excavator Wrecks - Explosion – Exposure – Failure Burst Water Pipe - Failed Electrical Circuits – Fall – Falls - Falls from Trains – Fallout - Faulty Electrical - Fatal Accident – Faulty Equipment – Frozen Pipe – Fuel Shortages – Gas Bubbles Accidents - Gas Tanker Accidents – Glitch – Grounding - Grounding of Ships – Guids wire - Hauling - Haulage Accidents - Head on Collision – Heavy Equipment Accidents – High Voltage Electrical – Human Error – Junction Layout – Leak Pipeline - Leak Pipeline Segment – Leaking Water Meter – Level Crossing Misuse – Level Crossing Misuse Accidents – Loading Caterpillar Tractor Failure - Manufacturing Problems – Marine Crane Operation – Maritime Accident – Materials Damage – Material Shortage – Mechanical Failure – Mechanical Failure of Rolling Stock – Mechanical Fault – Medical Error – Metal Fatigue – Mid-Air Collision – Mishandling Engine Accident – Misuse Equipment – Obstructions - Obstructions on the Line – Offshore Exploration – Offshore Rig Accidents – Operator Error – Oil Rig Blowout Accidents – Oil Rig Explosion – Overflow of Hot Liquid Hydrocarbon – Overload Electricity – Overhead Power Cables Failure – Overhead Power Lines – Overload Transformer Failure – Padeye Failure – Panipat Explosion – Pier Collapse – Pilot Error –Pipe Leakage – Pirate Attacks – Power Cables Failure – Power System Failure – Pressurization System Failure of Operator – Problems of the Barge- Process Plant Failures – Propeller Failure – Poor Track – Poor Track or Junction Layout – Potential Pump Failure – Pumping Station - Pumping Station Failure – Railway Accidents – Rail Crash - Raw Materials Interruption - Rockfall – Runway Incursion - Runway Collision – Safety Issues – Sank – Sink – Sinking – Signalmen's Errors – Ship Collide – Ship Collision – Shifting of Cargo - Ship Grounding – Shipyards – Shortage of Equipment – Short Circuits Fault – Shortage of Material – Shot Down — Slump – Structural Failure of Rear Pressure Bulkhead –Sump Pump Failure –Surface Mines – Tailing Dam Collapse - Technical Failures - Transformer Windings Failure – Transmission Towers Collapse – Transmission Towers Fall – Transportation Accidents – Transfer Water - Treeing – Trip – Tire Blowout – Thorpe Rail Accident – Track Fault – Towing Equipment – Tugboat Accident – Tunnel Collapse – Uncontained Engine Failure – Underground Cable Fault - Vandalism – Vapour Explosion in Fuel Tank – Vehicular Accidents - Walls in Underground –Wastewater Plants Explosion - Water Bombers Failed –Water Bombers Failed - Welding –Well Blowouts - Attack – Bomb Explosion - Chaos -Conflict – Curfew - Cyber-Attack – Cyberattack - Cybercrime - Disaster – Fraud – Hacking – Hijack - Incursion War – Malicious – Malicious Attack - Malware – Nuclear – Seizure – Strike – Protest – Riot – Terror Attack - Terrorism - Terrorist – Software Bugs –Stolen - Unrest – Vandalism - Mine vow - Violent Protests – Vow - Attack Outbreak – Broadband Failure – Broadband Failures - Broadband Outage - Broadband Outage Fixed - Cable Break - Cable Cut - Cable Damage - Cable Disruption - Capacity Problem – Cylinder of Aragonite Explosion – Data Center Disasters - Data Center Offline – Data Center Outage – DDoS Attack – Downtime – Downturn –Email Disruption - Failure – Failure in Communication – Fallout –Faulty Transmitter – Fire Storage – Generator Failure – Hard Drive Failure - Hardware Failure – Internet Disruption - Internet Outages - IP Failure - IT Equipment Failure - IT Failure - Network Down - Network Downed – Server Crash - Shutdown - Shut Down - Shuts Down Dial-up Network - Software Failure - System Down - Time Down – Tripped Circuit – Ups System Failure - Civil Engineering Failure - Fuel Shortages - Power Cut – Power Failure – Power Outage - Power Surges - Breakdown - Blast – Bushfires - Explosions – Fire - Fires in Underground Coal Mines – Flames - Infrastructure Damage - Mass Poisoning - Sever Fire - Blowouts - Blast - Broken Out - Burst Pipe Leak - Chemical Process Problems -Chemical Tank Guides Wire Failure - Chemical Tanker Failure - Collisions Vessels -Collisions Oil Vessels – Diesel Spillage - Drowing -Dripping – Inadequate Material Evaluation - Infiltration - Explosions - Fall - Flames – Frozen Pipe – Gas Bubbles Accidents - Gas Tanker Accidents – Hazardous Chemical Fire – Hazardous Chemical Site - Hazardous Chemical Storage Fire - Hazardous Chemical Storage Exploration - Hazardous Materials Hydrocarbon Fire - Hydrocarbon Explosion - Hydrocarbon Toxic - Leakage – Leak Pipeline - Leak Pipeline Segment - Nuclear Accident – Mudslides – Offshore Rig Accidents - Oil Spill – Oil Rig Blowout Accidents – Overflow of Hot Liquid Hydrocarbon - Sabotage – Seepage - Slag – Spill – Spillage - Tanker Accidents - Tanker Spill – Technological System Failure - Transportation Accident - Trip - Toxic Gases – Toxic Wastes - Pier Collapse - Pipe Leakage - Pipeline Exploration - Pipeline Fire - Pollution - Pump Failure - Refinery Accidents - Refinery Explosion - Refinery Fire - Rock Fall – Wastewater Plants Explosion - Wastewater Treatment Plants - Wells drilled - Supply Chain Risk - Raw Materials Interruption - Collapse of Courier (Supply Chains)

Appendix B. Examples of disruptive events

Example 1

Company Name: TREEHOUSE FOODS INC
Filing date for 10K: 26-2-2008
Page: 70
Section: INSURANCE CLAIM — NEW HAMPTON
Keyword: Fire
In-text citation:

In February 2008, the Company's non-dairy powdered creamer plant in New Hampton, Iowa was damaged by a fire, which left the facility unusable. The Company repaired the facility and it became operational in the first quarter of 2009. The Company filed a claim with our insurance provider and received approximately $47.2 million in reimbursements for property damage and incremental expenses incurred to service our customers throughout this period. The claim was finalized in September 2009, and the Company received a final payment of approximately $10.6 million to close the claim in October 2009. For the year ended December 31, 2009 the Company recognized income of approximately $15.4 million, of which $14.5 million is classified in Other operating (income) expense and $0.9 million is classified in Cost of sales. Of the $14.5 million, $13.6 was related to a gain on the fixed assets destroyed in the incident.

From Factiva – PR Newswire 3-3-2008

DOW JONES

PR Newswire
a CISION company

Bay Valley Foods Reports on Recovery Operations From New Hampton, Iowa Plant Fire

585 words
3 March 2008
09:18
PR Newswire (U.S.)
PRN
English

NEW HAMPTON, Iowa, March 2 /PRNewswire/ -- Bay Valley Foods, a division of TreeHouse Foods, Inc. (NYSE: THS), reported today that the Company plans to repair and reopen its New Hampton, Iowa plant that was damaged by an early morning fire Friday, February 29. No one was injured in the fire and related damage that occurred at approximately 4:00 a.m. Friday. The cause of the fire, which resulted in structural damage to the plant's second story, is still being investigated.

The New Hampton facility employs 61 people and is one of three Bay Valley Foods plants that processes non-dairy powdered creamers and other dry powdered products.

George Jurkovich, Senior Vice President - Operations, said, "We are proud of the effective response of the New Hampton plant management and employee team. As a result of their efforts and training, the plant was safely evacuated and no one was injured. Within hours of the fire, a team of Company engineers and plant operations personnel joined plant management on the scene to assess the damage to plant and equipment. The plant's management will meet with all employees on Monday and begin the recovery process."

Bay Valley Foods' customers served by the New Hampton plant will in the interim be supplied by the Company's Wayland, Michigan and Pecatonica, Illinois plants. "Our primary goal is to do everything possible to meet all of our customers' product requirements," Jurkovich said. The New Hampton plant only supplies industrial customers. The Company is the largest manufacturer of powdered creamer in the United States based on sales volume.

Example 2

Company Name: TIME WARNER CABLE INC
Filing date for 10K: 15-2-2013
Page: 47
Section: It has been mentioned once in MANAGEMENT'S DISCUSSION AND ANALYSIS OF RESULTS OF OPERATIONS AND FINANCIAL CONDITION
Keyword: Storm
In-text citation:

OIBDA. OIBDA increased principally as a result of revenue growth and the wireless-related asset impairment recorded in the fourth quarter of 2011 (as discussed above), partially offset by higher cost of revenue, selling, general and administrative expenses and merger-related and restructuring costs. As discussed above, OIBDA growth benefited from the impact of acquisitions.

The Company incurred net expenses of approximately $110 million in 2012 related to new initiatives, including home automation and monitoring services, the deployment of WiFi access points and the LA RSNs, which launched on October 1, 2012. The results for 2011 included net expenses from new initiatives of approximately $70 million primarily related to the Company's mobile high-speed data service and home automation and monitoring services.

In late October 2012, Superstorm Sandy caused damage and business interruption to the Company's cable systems from the Carolinas to Maine and into Ohio, with the most significant impact in the New York metropolitan area. For the year ended December 31, 2012, the Company estimates that both OIBDA and Operating Income were negatively impacted by approximately $6 million (which is net of recognized benefits from insurance proceeds of approximately $9 million) as a result of service outages caused by the storm. Additionally, the Company estimates that capital expenditures to replace property, plant and equipment damaged by the storm totaled approximately $19 million during the fourth quarter of 2012. The Company expects to receive additional insurance proceeds during 2013.

Factiva Theflyonthewall - 8-11-2012

DOW JONES

theflyonthewall

Time Warner Cable to credit NYC area customers impacted by hurricane

81 words
8 November 2012
Theflyonthewall.com
FLYWAL
English

Time Warner Cable announced that it will automatically credit many New York City area residential and business customers whose services were interrupted by Hurricane Sandy. As service is restored, Time Warner Cable will automatically apply credits for residential customers' TV, Internet and Home phone services, including applicable equipment, and for business customers' Business Class services in areas where the vast majority of customers experienced an extended outage, the company said.

Document FLYWAL0020121108e8b8007n2

Example 3

Company Name: EBAY INC
Filing date for 10K: 6-2-2015
Page: 49
Sections: ITEM 7: MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS - overview
Keyword: cyberattack
In-text citation:

Our Marketplaces segment total net revenues increased $533 million, or 6%, in 2014 compared to 2013. The increase in total net revenues was driven primarily by an increase in gross merchandise volume (GMV) (as defined below) of 9%, which was due to continued growth internationally and in the U.S. and a favorable impact from foreign currency movements relative to the U.S. dollar. We believe that during 2014, GMV was negatively impacted by declines in volume caused by lower organic traffic and our second quarter cyberattack described below. Our Marketplaces segment operating margin decreased 2.7 percentage points in 2014 compared to 2013 due primarily to continued investments in our marketing programs, site operations and business initiatives.

As previously disclosed, during the second quarter of 2014, our Marketplaces segment experienced a cyberattack that compromised an authentication database containing user names, encrypted passwords and other non-financial data of our customers. The attack resulted from a small number of employee log-in credentials that were compromised. The database included eBay Marketplaces customers' name, encrypted password, e-mail address, physical address, phone number and date of birth. The database did not contain any financial information or other confidential personal information. As a result of this attack we generally required Marketplaces users to reset their passwords in order to access their accounts on our core Marketplaces platform and its localized counterparts. This attack was isolated to our eBay platform and we have seen no evidence of unauthorized access or compromises to personal or financial information of our PayPal users, as that data is stored separately on a secure network.

During 2014, we recorded cyberattack-related expenses and customer credits of approximately $46 million, of which approximately $41 million have been reported within our Marketplaces segment. Expenses include costs to investigate and remediate the attack, provide additional customer support and temporarily enhance customer protection as well as additional marketing program costs. Customer credits were voluntarily offered as refunds to sellers during the password reset period and were recorded as a reduction of revenue. Many of these measures were undertaken to preserve our customers' trust in our Marketplaces businesses.

Factiva - Pittsburgh Business Times Online -21-5-2014

DOW JONES

PITTSBURGH BUSINESS TIMES

Intrusion leads eBay to ask users to change passwords

Paul J. Gough
269 words
21 May 2014
Pittsburgh Business Times Online
PITBJO
English

Online retailer eBay Inc. is urging users to change their passwords following a cyberattack that targeted a database although no financial information was apparently stolen.

The database that was compromised was stored on eBay's corporate network and included customer names, email addreses, date of birth, phone number, home address and encrypted password, eBay (Nasdaq: EBAY) said in a news release Wednesday. It found out about the intrusion, which occurred in late February or early March, two weeks ago.

"After conducting extensive tests on its networks, the company said it has no evidence of the compromise resulting in unauthorized activity for eBay users, and no evidence of any unauthorized access to financial or credit card information, which is stored separately in encrypted formats. However, changing passwords is a best practice and will help enhance security for eBay users," eBay said in a prepared statement.

There has been no unauthorized activity for eBay or PayPal users, eBay said. PayPal is owned by eBay.

"Beginning later today, eBay users will be notified via email, site communications and other marketing channels to change their password. In addition to asking users to change their eBay password, the company said it also is encouraging any eBay user who utilized the same password on other sites to change those passwords, too," said eBay. "The same password should never be used across multiple sites or accounts."

Appendix C. Variable Definitions

Variable	Definition
Event-level variables	
New Event	Binary variable taking value 1 if the firm affected by the disruption has not been hit by disruptive event for at least 3 years, 0 otherwise.
Natural Hazard	Binary variable taking value 1 if the disruptive event affecting the business activity of the firm is caused by a natural hazard, 0 otherwise. See Appendix Y for the list of disruptive events.
Business Interruption	Binary variable taking value 1 if the disruptive event leads to an interruption of the firm's own operations, 0 otherwise.
CAR (x, y)	Cumulative average abnormal return in the event window from day x to day y. Abnormal returns are computed using a market model approach, where the coefficients are estimated over a 200-day window (min. 20 obs). The market returns are the CRSP-value weighted portfolio returns.
Firm-level Variables	
Size	Log of the total assets of the firm (Source: Compustat (at))
Leverage	The ratio between total debt and total assets (Source: Compustat (dlc+dltt)/at)
CAPEX	The capital expenditures of the firm scaled by total assets (Source: Compustat capx/at)
BTM	The book-to-market ratio of the firm (Source: Compustat ceq/(abs(prc)*csho))
ROA	Operating income before depreciation divided total assets (Source: Compustat oibdp/at)
Log(Age)	Log of one plus the difference between the year of the event and the first year the firm has valid data on CRSP (Source: CRSP)
Institutional Ownership	Percentage of shares held by institutional investors (Source: ThomsonReuters' 13Fs)
Sales Volatility	Volatility of sales over the last 5 years, scaled by total assets (Source: Compustat sale, at)
Stock Return	Stock price performance in the calendar year before the event (Source: CRSP (abs(prc/cfacpr)-abs(l1.prc/l1.cfacpr))/abs(l1.prc/l1.cfacpr))
Board-level Variables	
Advisory Intensive Board	Percentage of independent directors that are advisory intensive. We define an independent director as an advisory director if he/she has been a director for at least one year and does not serve on any monitoring committee but serves on at least one advisory committee if the company has any. If the company has no standing advisory committees, we classify independent directors as advisory directors if they do not serve on any monitoring committee. We classify the audit, compensation, and nominating/governance committees as monitoring committees and the finance, investment, strategy, acquisitions, science and technology, and executive committees as advisory (Source: Boardex).
Advisory Intensive Board Dummy	Indicator variable that equals one if a company has at least one advisory intensive director, zero otherwise. We define an independent director as an advisory director if he/she has been a director for at least one year and does not serve on any monitoring committee but serves on at least one advisory committee if the company has any. If the company has no standing advisory committees, we classify independent directors as advisory directors if they do not serve on any monitoring committee. We classify the audit, compensation, and nominating/governance committees as monitoring committees and the finance, investment, strategy, acquisitions, science and technology, and executive committees as advisory (Source: Boardex).
Average Time on Board	Average time on board of the directors (Source: Boardex).
Busy Ind. Directors	Percentage of independent directors with at least three directorships in listed companies (Source: Boardex)
Board Size	Size of the board of directors (Source: Boardex)

Independent Directors	Percentage of independent directors in the board of directors (Source: Boardex)
Board Gender Diversity	Percentage of female directors in the board of directors (Source: Boardex)
CEO experience All Board	Percentage of directors with CEO experience in the industry (Source: Boardex)
CEO experience Ind. Dir	Percentage of independent directors with CEO experience in the industry (Source: Boardex)
Government experience All Board	Percentage of directors with government experience (Source: Boardex)
Government experience Indep. Dir	Percentage of independent directors with government experience (Source: Boardex)
Indep Dir. Experience all Board	Percentage of directors with experience as independent director in the industry (Source: Boardex)
Indep Dir. Experience Indep. Dir	Percentage of independent directors with experience as independent director in the industry (Source: Boardex)
Industry experience Indep. Dir.	Percentage of independent directors with industry experience (Source: Boardex)
Industry experience All Board	Percentage of directors with industry experience (Source: Boardex)
Monitoring Intensive Board	Percentage of independent directors that are monitoring intensive. We define an independent director as a monitoring director if he/she serves in at least two of the audit, compensation, and nominating/governance committees (Source: Boardex).
Monitoring Intensive Board Dummy	Binary variable taking value 1 if monitoring intensive independent directors are the majority of independent directors. We define an independent director as a monitoring director if he/she serves in at least two of the audit, compensation, and nominating/governance committees (Source: Boardex).
Work Experience All Board	Percentage of directors with work experience in the industry (Source: Boardex)
Work Experience Ind. Dir	Percentage of independent directors with work experience in the industry (Source: Boardex)
CEO-level Variables	
Ln (Delta)	Log of one plus delta. The change in the dollar value of the CEO wealth for a one percentage point change in stock price at the end of the fiscal year. (Source: Execucomp plus others)
Ln (Vega)	Log of one plus vega. Vega is the change in the dollar value of the CEO wealth for a one percentage change in the annualized standard deviation of stock returns at the end of the fiscal year. (Source: Execucomp plus others)
CEO Age	CEO age (Source: Execucomp)
CEO Tenure	CEO tenure (Source: Execucomp)

Table 1. Disruptive events by year and type

This table presents the sample of disruptive events affecting the companies listed in the Compustat Execucomp database from 1999 to 2016.

Year	All	Type of Disruptive Event			Natural Hazard		New Events	
		Business Interruption	Supply Chain Int.	Damage	Yes	No	Yes	No
1999	2	2	0	0	0	2	2	0
2000	2	0	0	2	1	1	2	0
2001	5	1	0	4	2	3	5	0
2002	6	3	0	3	3	3	6	0
2003	9	4	1	5	0	9	7	2
2004	20	12	0	8	16	4	13	7
2005	124	87	3	37	115	9	61	63
2006	7	5	0	2	3	4	3	4
2007	7	5	0	2	1	6	3	4
2008	65	42	1	23	63	2	26	39
2009	9	4	1	5	3	6	8	1
2010	16	10	1	5	5	11	13	3
2011	39	21	8	8	32	7	29	10
2012	25	17	0	8	22	3	16	9
2013	8	4	0	4	4	4	4	4
2014	16	9	0	7	2	14	12	4
2015	11	7	0	4	6	5	8	3
2016	4	3	0	1	0	4	2	2
Total	375	236	15	128	278	97	220	155

Table 2. Stock price reaction around disruptive events

This table reports the average stock price reaction around the day of the disruptive event (day 0) for the final sample of disruptive events, and by new events, natural hazard, and by type of disruptive event. CARs are measured in the event windows (-2, 2), (-2, 5), (-5, 5) centered on the event day using a market model approach. Continuous variables are winsorized at 1% on both tails. Standard errors are reported between parentheses. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% level.

	All	New Events		Natural Hazard		Type of Disruptive Event		
		Yes	No	Yes	No	Business Interruption	Supply Chain Int.	Damage
				CAR (-2, 2)				
CAR	-0.0086***	-0.0085*	-0.0086*	-0.0068*	-0.0135**	-0.0098**	-0.0170*	-0.0065
Std. err.	(0.0033)	(0.0044)	(0.0049)	(0.0037)	(0.0066)	(0.0041)	(0.0095)	(0.0057)
N.	375	220	155	278	97	236	15	128
				CAR (-2, 5)				
CAR	-0.0114***	-0.0141***	-0.0076	-0.0105**	-0.0140*	-0.0184***	-0.0155	0.0009
Std. err.	(0.0044)	(0.0054)	(0.0072)	(0.0052)	(0.0078)	(0.0057)	(0.0128)	(0.0070)
N.	375	220	155	278	97	236	15	128
				CAR (-5, 5)				
CAR	-0.0086*	-0.0077	-0.0099	-0.0090*	-0.0076	-0.0169***	-0.0205	0.0064
Std. err.	(0.0046)	(0.0059)	(0.0073)	(0.0054)	(0.0087)	(0.0060)	(0.0130)	(0.0075)
N.	375	220	155	278	97	236	15	128

Table 3. Summary statistics for firms at the time of the disruptive events

This table reports the summary statistics (mean, median, and standard deviation) for the variables used in the empirical analysis at the end of the year before the disruptive events. We present the variables in three groups: board variables; firm-level variables; and CEO-level variables. Continuous variables are winsorized at 1% on both tails. Variables are defined in Appendix C.

Variable	Mean	Median	Std. Dev	N.
Board-level Variables				
Busy Ind. Directors	38.64%	37.50%	22.88%	349
Board Size	8.56447	9.0000	1.9117	349
Independent Directors	74.77%	77.78%	13.50%	349
Advisory Int. Board Dummy	33.81%	0.00%	47.37%	349
Monitoring Int. Board Dummy	79.08%	100.00%	40.73%	349
Advisory Int. Board	17.41%	0.00%	28.42%	349
Monitoring Int. Board	69.50%	76.92%	30.02%	349
CEO Duality	53.58%	100.00%	49.94%	349
Time on Board	3.9189	2.2000	4.6424	349
Board Gender Diversity	9.73%	10.00%	9.86%	349
Industry Exp. All Board	11.45%	8.33%	12.66%	349
Industry Exp. Indep. Dir.	21.77%	6.37%	26.88%	349
Work Exp. All Board	4.22%	0.00%	6.68%	349
Work Exp. Ind. Dir.	7.62%	0.00%	15.50%	349
Indep Dir. Exp. All Board	2.17%	0.00%	5.27%	349
Indep Dir. Exp. Indep. Dir.	5.16%	0.00%	14.12%	349
CEO Exp. All Board	1.25%	0.00%	3.34%	349
CEO Exp. Ind. Dir.	2.20%	0.00%	7.86%	349
Gov. Exp. All Board	6.90%	2.96%	8.84%	349
Gov. Exp. Indep. Dir.	14.10%	0.00%	20.44%	349
Firm-level Variable				
Institutional Ownership	81.97%	85.73%	18.20%	318
BTM	0.5040	0.4426	0.3438	375
Leverage	25.41%	23.93%	18.68%	375
CAPEX	11.64%	7.06%	13.67%	360
ROA	15.41%	13.63%	8.04%	375
Log(Size)	7.2750	7.1052	1.1648	375
Cash flow volatility	4.30%	3.37%	3.52%	350
Stock Return	29.08%	23.86%	49.18%	364
CEO-level Variables				
Delta	609.6762	200.8617	1128.8280	334
Vega	88.9646	38.2614	148.0617	339
CEO age	56.3495	56.0000	7.1876	329
CEO Tenure	7.0095	5.0000	5.9478	317

Table 4. Stock price reaction and board characteristics

This table reports the coefficient estimates for OLS regression models of cumulative abnormal returns around the disruption announcement on board variables, and a set of control variables. CARs are measured in the event window (-2, 2) centered on the event day using a market model approach. Variables are defined in Appendix C. Continuous variables are winsorized at 1% on both tails. Industry and year fixed effects are included in all models. Industry fixed effects are based on the 49-industry Fama-French classification. Year fixed effects are calendar year dummies. Standard errors are reported in parentheses and clustered at firm level. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% level.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Busy Ind. Directors	0.0646***	0.0640***	0.0633***	0.0655***	0.0649***	0.0640***
	(0.0226)	(0.0223)	(0.0226)	(0.0231)	(0.0228)	(0.0232)
Board Size	0.0049**	0.0051**	0.0052*	0.0049*	0.0052**	0.0052*
	(0.0025)	(0.0026)	(0.0026)	(0.0025)	(0.0026)	(0.0027)
Independent Directors	-0.1341***	-0.1344***	-0.1299***	-0.1334***	-0.1335***	-0.1291***
	(0.0328)	(0.0342)	(0.0338)	(0.0314)	(0.0330)	(0.0327)
CEO Duality	-0.0059	-0.0055	-0.0056	-0.0058	-0.0053	-0.0054
	(0.0085)	(0.0086)	(0.0087)	(0.0087)	(0.0088)	(0.0089)
Board Gender Diversity	0.0113	0.0199	0.0144	0.0102	0.0186	0.0129
	(0.0532)	(0.0526)	(0.0531)	(0.0540)	(0.0528)	(0.0537)
Advisory Int. Board Dummy		0.0027			0.0026	
		(0.0103)			(0.0105)	
Monitoring Int. Board Dummy		0.0080			0.0085	
		(0.0090)			(0.0093)	
Advisory Int. Board			-0.0002			-0.0004
			(0.0142)			(0.0142)
Monitoring Int. Board			0.0075			0.0080
			(0.0125)			(0.0130)
New Event	0.0006	0.0001	0.0004	0.0009	0.0004	0.0007
	(0.0087)	(0.0089)	(0.0088)	(0.0088)	(0.0090)	(0.0090)
Natural Hazard				0.0032	0.0041	0.0036
				(0.0110)	(0.0114)	(0.0111)
Business Interruption				0.0000	0.0004	0.0006
				(0.0097)	(0.0097)	(0.0099)
Institutional Ownership	0.0353	0.0354	0.0352	0.0360	0.0363	0.0360
	(0.0251)	(0.0257)	(0.0257)	(0.0254)	(0.0261)	(0.0260)
BTM	-0.0428***	-0.0443***	-0.0444**	-0.0431***	-0.0448***	-0.0448**
	(0.0161)	(0.0167)	(0.0171)	(0.0162)	(0.0168)	(0.0173)
Leverage	-0.0619**	-0.0635**	-0.0623**	-0.0608**	-0.0621**	-0.0611**
	(0.0247)	(0.0250)	(0.0248)	(0.0256)	(0.0260)	(0.0258)
Capex	-0.0497	-0.0461	-0.0502	-0.0504	-0.0472	-0.0513
	(0.0430)	(0.0454)	(0.0453)	(0.0434)	(0.0459)	(0.0459)
ROA	-0.1086*	-0.1204*	-0.1158*	-0.1085*	-0.1212*	-0.1165*
	(0.0609)	(0.0620)	(0.0626)	(0.0632)	(0.0648)	(0.0657)
Size	-0.0128**	-0.0128**	-0.0126**	-0.0128**	-0.0128**	-0.0126**
	(0.0057)	(0.0058)	(0.0057)	(0.0057)	(0.0058)	(0.0058)
Cash flow Volatility	-0.2379	-0.2284	-0.2298	-0.2324	-0.2203	-0.2227
	(0.1720)	(0.1688)	(0.1710)	(0.1751)	(0.1720)	(0.1732)
Stock Return	-0.0160*	-0.0154*	-0.0156*	-0.0161*	-0.0156*	-0.0158*
	(0.0082)	(0.0082)	(0.0081)	(0.0083)	(0.0083)	(0.0082)
Year FE	yes	yes	yes	yes	yes	yes
Industry FE	yes	yes	yes	yes	yes	yes
Number of observations	274	274	274	274	274	274
Adjusted R2	0.111	0.105	0.104	0.103	0.097	0.095

Table 5. Is Experience valued by the market at the time of the disruptive event?

This table reports the coefficient estimates for OLS regression models of cumulative abnormal returns around the disruption announcement on board variables, experience, and a set of control variables. CARs are measured in the event window (-2, 2) centered on the event day using a market model approach. The experience variable is computed for all directors (Columns All) and for the independent directors (Columns Ind. Dir). Variables are defined in Appendix C. Continuous variables are winsorized at 1% on both tails. Industry and year fixed effects are included in all models. Industry fixed effects are based on the 49-industry Fama-French classification. Year fixed effects are calendar year dummies. Standard errors are reported in parentheses and clustered at firm level. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% level.

Type of Experience	Industry		Work		Ind. Dir		CEO		Government	
	All	Ind. Dir.	All	Ind. Dir.	All	Ind. Dir.	All	Ind. Dir.	All	Ind. Dir.
	(I)	(II)	(III)	(IV)	(V)	(VI)	(VII)	(VIII)	(IX)	(X)
Busy Ind. Directors	0.0826***	0.0764***	0.0664***	0.0676***	0.0691***	0.0674***	0.0673***	0.0650***	0.0633***	0.0647***
	(0.0225)	(0.0220)	(0.0224)	(0.0224)	(0.0219)	(0.0219)	(0.0233)	(0.0233)	(0.0228)	(0.0228)
Board Size	0.0037	0.0042	0.0050*	0.0048*	0.0050*	0.0051**	0.0048*	0.0051*	0.0051**	0.0052**
	(0.0026)	(0.0027)	(0.0026)	(0.0025)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)
Indep. Directors	-0.1484***	-0.1455***	-0.1358***	-0.1359***	-0.1374***	-0.1365***	-0.1358***	-0.1350***	-0.1288***	-0.1283***
	(0.0331)	(0.0349)	(0.0337)	(0.0329)	(0.0335)	(0.0335)	(0.0335)	(0.0339)	(0.0347)	(0.0350)
CEO Duality	-0.0034	-0.0036	-0.0043	-0.0040	-0.0046	-0.0046	-0.0046	-0.0047	-0.0047	-0.0052
	(0.0084)	(0.0085)	(0.0087)	(0.0086)	(0.0084)	(0.0085)	(0.0086)	(0.0085)	(0.0084)	(0.0084)
Board Gender Diversity	0.0214	0.0275	0.0275	0.0280	0.0288	0.0297	0.0304	0.0286	0.0240	0.0254
	(0.0531)	(0.0545)	(0.0546)	(0.0546)	(0.0546)	(0.0554)	(0.0560)	(0.0572)	(0.0548)	(0.0552)
Advisory Int. Board Dummy	0.0012	-0.0002	0.0010	-0.0002	0.0003	0.0007	0.0017	0.0011	0.0028	0.0022
	(0.0101)	(0.0104)	(0.0107)	(0.0108)	(0.0106)	(0.0107)	(0.0108)	(0.0109)	(0.0110)	(0.0108)
Monitoring Int. Board Dummy	0.0057	0.0059	0.0075	0.0083	0.0067	0.0069	0.0062	0.0067	0.0078	0.0088
	(0.0088)	(0.0090)	(0.0092)	(0.0091)	(0.0091)	(0.0093)	(0.0092)	(0.0093)	(0.0092)	(0.0096)
Averaged Time on Board	0.0011	0.0011	0.0011	0.0011	0.0012	0.0011	0.0010	0.0010	0.0011	0.0010
	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)	(0.0009)
Experience Variable	-0.0861**	-0.0298	-0.0413	-0.0371	-0.0779	-0.0181	-0.0417	0.0025	0.0616	0.0204
	(0.0431)	(0.0190)	(0.0670)	(0.0354)	(0.0995)	(0.0393)	(0.1067)	(0.0424)	(0.0533)	(0.0256)
Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Industry FE	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	274	274	274	274	274	274	274	274	274	274
Adjusted R2	0.121	0.113	0.104	0.109	0.106	0.104	0.103	0.102	0.107	0.105

Table 6. Stock price reaction, board, and CEO characteristics

This table reports the coefficient estimates for OLS regression models of cumulative abnormal returns around the disruption announcement on board variables, and a set of control variables. CARs are measured in the event window (-2, 2) centered on the event day using a market model approach. Variables are defined in Appendix C. Continuous variables are winsorized at 1% on both tails. Industry and year fixed effects are included in all models. Industry fixed effects are based on the 49-industry Fama-French classification. Year fixed effects are calendar year dummies. Standard errors are reported in parentheses and clustered at firm level. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% level.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Busy Ind. Directors	0.0657***	0.0610***	0.0601***	0.0619***	0.0586**	0.0575**
	(0.0223)	(0.0228)	(0.0224)	(0.0232)	(0.0237)	(0.0235)
Board Size	0.0055**	0.0061**	0.0062**	0.0053**	0.0058**	0.0060**
	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0026)	(0.0027)
Independent Directors	-0.1163***	-0.0959**	-0.0989***	-0.1109***	-0.0909**	-0.0960**
	(0.0375)	(0.0387)	(0.0377)	(0.0368)	(0.0391)	(0.0373)
CEO Duality	-0.0024	-0.0014	-0.0012	-0.0018	-0.0010	-0.0010
	(0.0091)	(0.0093)	(0.0094)	(0.0089)	(0.0092)	(0.0093)
Board Gender Diversity	-0.0629	-0.0607	-0.0570	-0.0525	-0.0534	-0.0488
	(0.0550)	(0.0565)	(0.0549)	(0.0574)	(0.0585)	(0.0574)
Advisory Int. Board Dummy		-0.0119			-0.0121	
		(0.0101)			(0.0100)	
Monitoring Int. Board Dummy		0.0121			0.0100	
		(0.0097)			(0.0099)	
Advisory Int. Board			-0.0111			-0.0110
			(0.0153)			(0.0152)
Monitoring Int. Board			0.0220*			0.0185
			(0.0131)			(0.0131)
New Event	-0.0051	-0.0059	-0.0058	-0.0067	-0.0071	-0.0071
	(0.0092)	(0.0093)	(0.0093)	(0.0091)	(0.0092)	(0.0092)
Natural Hazard				-0.0140	-0.0111	-0.0123
				(0.0114)	(0.0118)	(0.0115)
Business Interruption				-0.0087	-0.0092	-0.0080
				(0.0112)	(0.0112)	(0.0112)
Ln(Delta)	-0.0027	-0.0041	-0.0047	-0.0035	-0.0048	-0.0051
	(0.0049)	(0.0054)	(0.0056)	(0.0053)	(0.0057)	(0.0058)
Ln(Vega)	-0.0046	-0.0045	-0.0042	-0.0045	-0.0044	-0.0042
	(0.0032)	(0.0033)	(0.0033)	(0.0031)	(0.0032)	(0.0031)
CEO Age	-0.0007	-0.0007	-0.0008	-0.0008	-0.0008	-0.0008
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
CEO Tenure	-0.0010	-0.0011	-0.0010	-0.0011	-0.0012	-0.0012
	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)	(0.0010)
Firm Controls	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Industry FE	yes	yes	yes	yes	yes	yes
Number of observations	234	234	234	234	234	234
Adjusted R2	0.139	0.139	0.137	0.138	0.136	0.134

Table 7. Additional analyses for short-term reactions.

Panel A of this table reports the coefficient estimates for OLS regression models of cumulative abnormal returns around the disruption announcement on board variables and their interactions with New Event, and a set of control variables. CARs are measured in the event window (-2, 2) centered on the event day using a market model approach. Panel B presents the estimates for OLS regression models of cumulative abnormal returns around the disruption announcement on board variables and a set of control variables using CARs in the event window (-5, 5) as dependent variable. Variables are defined in Appendix C. Continuous variables are winsorized at 1% on both tails. Industry and year fixed effects are included in all models. Industry fixed effects are based on the 49-industry Fama-French classification. Year fixed effects are calendar year dummies. Standard errors are reported in parentheses and clustered at firm level. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% level.

Panel A: Is the reaction to new events different?

	(I)	(II)	(III)
Busy Ind. Directors	0.0777**	0.0720**	0.0754**
	(0.0337)	(0.0336)	(0.0342)
Board Size	-0.0003	0.0002	0.0002
	(0.0036)	(0.0033)	(0.0036)
Independent Directors	-0.1875***	-0.1753***	-0.1806***
	(0.0510)	(0.0509)	(0.0495)
CEO Duality	-0.0099	-0.0098	-0.0093
	(0.0113)	(0.0118)	(0.0121)
Board Gender Diversity	0.0991	0.1326*	0.1055
	(0.0788)	(0.0750)	(0.0799)
Advisory Int. Board Dummy		0.0072	
		(0.0121)	
Monitoring Int. Board Dummy		0.0328**	
		(0.0132)	
Advisory Int. Board			0.0048
			(0.0181)
Monitoring Int. Board			0.0152
			(0.0170)
Busy Ind. Directors * New Event	-0.0132	-0.0068	-0.0102
	(0.0344)	(0.0369)	(0.0351)
Board Size * New Event	0.0081*	0.0075	0.0083*
	(0.0046)	(0.0047)	(0.0048)
Independent Directors * New Event	0.0753	0.0627	0.0767
	(0.0689)	(0.0643)	(0.0640)
CEO Duality * New event	0.0079	0.0075	0.0072
	(0.0156)	(0.0162)	(0.0164)
Board Gender Diversity * New Event	-0.1380	-0.1783*	-0.1493
	(0.0932)	(0.0944)	(0.0937)
Advisory Int. Board Dummy * New Event		-0.0137	
		(0.0165)	
Monitoring Int. Board Dummy * New Event		-0.0367*	
		(0.0189)	
Advisory Int. Board * New Event			-0.0158
			(0.0261)
Monitoring Int. Board * New Event			-0.0062
			(0.0245)
New Event	-0.1106*	-0.0613	-0.1060*
	(0.0605)	(0.0624)	(0.0606)
Natural Hazard	0.0044	0.0084	0.0060
	(0.0109)	(0.0115)	(0.0110)
Business Interruption	0.0010	0.0021	0.0018
	(0.0101)	(0.0103)	(0.0103)
Firm Controls	yes	yes	yes
Year FE	yes	yes	yes
Industry FE	yes	yes	yes
Number of observations	274	274	274
Adjusted R2	0.100	0.102	0.086

Panel B: CAR (-5, 5)

	(I)	(II)	(III)	(IV)	(V)	(VI)
Busy Ind. Directors	0.0737***	0.0751***	0.0793***	0.0774***	0.0786***	0.0835***
	(0.0277)	(0.0275)	(0.0272)	(0.0281)	(0.0279)	(0.0275)
Board Size	0.0061*	0.0060	0.0050	0.0060	0.0058	0.0047
	(0.0036)	(0.0037)	(0.0039)	(0.0037)	(0.0037)	(0.0039)
Independent Directors	-0.2173***	-0.2229***	-0.2341***	-0.2088***	-0.2142***	-0.2270***
	(0.0511)	(0.0518)	(0.0501)	(0.0519)	(0.0528)	(0.0512)
CEO Duality	0.0083	0.0086	0.0081	0.0077	0.0079	0.0072
	(0.0124)	(0.0123)	(0.0124)	(0.0125)	(0.0124)	(0.0125)
Board Gender Diversity	-0.0869	-0.0833	-0.0963	-0.0798	-0.0769	-0.0887
	(0.0724)	(0.0744)	(0.0734)	(0.0730)	(0.0741)	(0.0740)
Advisory Int. Board Dummy		0.0068			0.0062	
		(0.0135)			(0.0134)	
Monitoring Int. Board Dummy		0.0023			0.0018	
		(0.0142)			(0.0151)	
Advisory Int. Board			0.0111			0.0115
			(0.0196)			(0.0196)
Monitoring Int. Board			-0.0234			-0.0269
			(0.0175)			(0.0184)
New Event	-0.0056	-0.0056	-0.0049	-0.0061	-0.0062	-0.0057
	(0.0104)	(0.0108)	(0.0105)	(0.0104)	(0.0107)	(0.0104)
Natural Hazard				0.0073	0.0071	0.0058
				(0.0170)	(0.0175)	(0.0169)
Business Interruption				-0.0131	-0.0129	-0.0150
				(0.0116)	(0.0118)	(0.0118)
Institutional Ownership	0.0393	0.0390	0.0385	0.0397	0.0393	0.0383
	(0.0317)	(0.0322)	(0.0311)	(0.0322)	(0.0327)	(0.0314)
BTM	-0.0049	-0.0047	0.0001	-0.0041	-0.0039	0.0019
	(0.0246)	(0.0249)	(0.0249)	(0.0246)	(0.0249)	(0.0249)
Leverage	-0.0822**	-0.0850**	-0.0839**	-0.0774**	-0.0800**	-0.0792**
	(0.0342)	(0.0347)	(0.0348)	(0.0354)	(0.0359)	(0.0358)
Capex	-0.0629	-0.0553	-0.0555	-0.0606	-0.0537	-0.0519
	(0.0558)	(0.0570)	(0.0588)	(0.0553)	(0.0566)	(0.0587)
ROA	-0.0508	-0.0582	-0.0332	-0.0385	-0.0451	-0.0161
	(0.0962)	(0.0988)	(0.1004)	(0.0962)	(0.0996)	(0.1019)
Size	-0.0243***	-0.0245***	-0.0252***	-0.0239***	-0.0241***	-0.0247***
	(0.0070)	(0.0071)	(0.0068)	(0.0072)	(0.0072)	(0.0069)
Cash flow Volatility	-0.3585*	-0.3586*	-0.3878**	-0.3561*	-0.3569*	-0.3933**
	(0.1830)	(0.1856)	(0.1890)	(0.1890)	(0.1927)	(0.1966)
Stock Return	-0.0143	-0.0138	-0.0154	-0.0128	-0.0124	-0.0137
	(0.0150)	(0.0153)	(0.0148)	(0.0147)	(0.0149)	(0.0144)
Year FE	yes	yes	yes	yes	yes	yes
Industry FE	yes	yes	yes	yes	yes	yes
Number of observations	274	274	274	274	274	274
Adjusted R2	0.108	0.101	0.105	0.105	0.097	0.102

Table 8. Stock price reaction and time clustering

This table reports the coefficient estimates for OLS regression models of cumulative abnormal returns around the disruption announcement on board variables, and a set of control variables. CARs are measured in the event window (-2, 2) centered on the event day using a market model approach. Variables are defined in Appendix C. Continuous variables are winsorized at 1% on both tails. Industry and year fixed effects are included in all models. Industry fixed effects are based on the 49-industry Fama-French classification. Year fixed effects are calendar year dummies. Standard errors are reported in parentheses and clustered at both firm and year level. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% level.

	(I)	(II)	(III)	(IV)	(V)	(VI)
Busy Ind. Directors	0.0646***	0.0640***	0.0633***	0.0655***	0.0649***	0.0640***
	(0.0211)	(0.0213)	(0.0203)	(0.0199)	(0.0204)	(0.0194)
Board Size	0.0049	0.0051*	0.0052*	0.0049	0.0052*	0.0052*
	(0.0029)	(0.0029)	(0.0028)	(0.0029)	(0.0029)	(0.0028)
Independent Directors	-0.1341***	-0.1344***	-0.1299***	-0.1334***	-0.1335***	-0.1291***
	(0.0286)	(0.0261)	(0.0306)	(0.0288)	(0.0269)	(0.0314)
CEO Duality	-0.0059	-0.0055	-0.0056	-0.0058	-0.0053	-0.0054
	(0.0059)	(0.0060)	(0.0058)	(0.0060)	(0.0061)	(0.0059)
Board Gender Diversity	0.0113	0.0199	0.0144	0.0102	0.0186	0.0129
	(0.0673)	(0.0617)	(0.0659)	(0.0662)	(0.0613)	(0.0653)
Advisory Int. Board Dummy		0.0027			0.0026	
		(0.0098)			(0.0101)	
Monitoring Int. Board Dummy		0.0080			0.0085	
		(0.0133)			(0.0131)	
Advisory Int. Board			-0.0002			-0.0004
			(0.0145)			(0.0146)
Monitoring Int. Board			0.0075			0.0080
			(0.0117)			(0.0118)
New Event	0.0006	0.0001	0.0004	0.0009	0.0004	0.0007
	(0.0074)	(0.0080)	(0.0075)	(0.0077)	(0.0084)	(0.0079)
Natural Hazard				0.0032	0.0041	0.0036
				(0.0110)	(0.0110)	(0.0111)
Business Interruption				0.0000	0.0004	0.0006
				(0.0055)	(0.0056)	(0.0055)
Firm Controls	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Industry FE	yes	yes	yes	yes	yes	yes
Number of observations	269	269	269	269	269	269
Adjusted R2	0.105	0.099	0.097	0.097	0.090	0.089

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