

Benefits or costs? The effects of diversification with cross-industry knowledge on corporate value under crisis situation

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Abstract

Purpose – This paper aims to explore the explanations of “information effect” and “agency effect” of corporate diversification with cross-industry knowledge under a crisis situation.

Design/methodology/approach – Based on an event study of 203 public companies' crises in China between 2008 and 2018, the authors verify the information and agency effects of corporate diversification under a crisis situation by, respectively, examining the effects of interactions of corporate unrelated diversification with corporate transparency and knowledge deficiency attribution on the stock market's responses to the crises.

Findings – It is found that corporate unrelated diversification serves as a buffer in protecting firm value while attribution of knowledge deficiency can be a burden. The buffering effect is stronger when the corporate transparency is higher but weaker when the crisis is attributed to be caused by corporate tacit knowledge deficiency.

Practical implications – Unrelated diversified firms should strengthen information communication with stakeholders so as to break down the stakeholders' cross-industry knowledge barriers, and thus protect their own value at the crisis' onset. Also, they can further buffer the loss by reducing stakeholders' perceptions of the corporate tacit knowledge deficiency revealed in the crisis.

Originality/value – This study is the first to illustrate that the information and agency effects of corporate diversification strategy can be partially explained under a crisis situation, which provides meaningful insights about how firms can conduct knowledge management in their daily operations to deal better with corporate crises.

Keywords Crisis management, Corporate transparency, Cross-border knowledge, Knowledge deficiency attribution, Unrelated diversification

Paper type Research paper

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1. Introduction

A persistent concern within the strategy and knowledge management literature is the effect of corporate diversification on the firm value in corporate daily operations (Aggarwal and Samwick, 2003; Ataullah *et al.*, 2014; Berger and Ofek, 1995). Agency theory highlights the interest conflicts between managers and shareholders when it comes to strategic decisions, such as those related to corporate diversification (Ataullah *et al.*, 2014; Denis *et al.*, 1999). Top managers implement diversification strategies usually at the expense of the interests of the firm and its stakeholders to benefit themselves, which constitutes part of the firm's residual costs (Aggarwal and Samwick, 2003; Jensen and Meckling, 1979) [1]. Therefore, compared with focused firms, diversified firms are usually sold at a discount price (Berger and Ofek, 1995). This effect is called the “agency effect” of corporate

diversification (Ataullah *et al.*, 2014, p. 228). There is, however, other literature that presents an alternative view, arguing that there is not necessarily an interest conflict between managers and shareholders in diversification strategic decision making (Davis *et al.*, 1997). The purpose of diversification strategy implemented by managers may be to gain *diversification benefits*, including scope-economy (Berger and Ofek, 1995), risk decentralization (Chen and Keung, 2018), and thus increase the firm value (Ataullah *et al.*, 2014). However, due to the information asymmetry caused by diversification, external stakeholders tend to underestimate the firm value (Ataullah *et al.*, 2014; Davis *et al.*, 1997). This effect is called the “information effect” of diversification (Ataullah *et al.*, 2014, p. 228). Hence, the “agency effect” explains how the diversification strategy destroys the firm value from the perspective of residual costs (Ataullah *et al.*, 2014), while the “information effect” emphasizes the critical role of information in revealing the diversification benefits for the firm value (Hadlock *et al.*, 2001). In this study, we unbundle some of the benefits and costs associated with diversification under a crisis situation and further investigate how corporate diversification with cross-industry knowledge affects corporate market value at the crisis’ onset.

Being a negative event which shatters the overall favorable impression about a firm, a corporate crisis (e.g. a financial fraud event, product recall) is likely to trigger negative media reports (Zavyalova *et al.*, 2012), generate extensive negative perceptions (Coombs, 2007) and pose financial and non-financial threats to the firm and its stakeholders (Wei *et al.*, 2017). Although existing literature has carried out extensive discussions about the impacts of corporate diversification on the firm value in daily operations, only a few studies have explored its impacts under a crisis situation. We speculate that, under a crisis situation, the agency and information effects of diversification on the firm value may also be revealed. More specifically, based on the “information effect,” diversification, especially unrelated diversification, enables the firm to develop specialized cross-industry knowledge (Ataullah *et al.*, 2014), which may constitute a barrier for external stakeholders to understand the benefits of diversification strategy to the firm value (Aoki, 2010). Similarly, at the crisis’ onset, the uncertainty about the firm among its stakeholders is high (Wei *et al.*, 2017). The failure of stakeholders to understand the diversification strategy may affect their perceptions of its impacts on the firm value. Based on this, the crisis situation may bring to light the “information effect.”

On the other hand, the “agency effect” implies that shareholders usually hold the top managers often benefit themselves at the expense of the firm’s interests when they implement diversification strategies (Aggarwal and Samwick, 2003). Corporate crises are usually caused by top managers’ self-serving behaviors (Connelly *et al.*, 2016; Coombs, 2007), such as financial fraud events (Staubus, 2005). In this case, the crisis’ cause may also influence stakeholders’ perceptions of the diversification strategy’s impacts on the firm value at the crisis’ onset. The “agency effect” may be thus revealed in a crisis situation.

Based on empirical evidence about diversification of cross-industry knowledge, corporate transparency and attributions of knowledge deficiency, this study investigates the following three important questions to test above conjectures. First, will unrelated diversification affect the firm value at the crisis’ onset? Second, will corporate transparency affect stakeholders’ perception of the benefits of unrelated diversification to the firm value? Third, will the attribution of corporate knowledge deficiency affect the firm value and the stakeholders’ perception of the benefits of unrelated diversification to the firm value? Our findings show that the “information effect” and “agency effect” of unrelated diversification can be partly explained under a crisis situation.

Section 2 outlines the theoretical background for this study. This is followed by a presentation of the four hypotheses in Section 3 and introduction of the methods, data and empirical results in Sections 4–6. Section 7 discusses the findings and puts forward the implications, conclusions and limitations from this research.

2. Theory background

A corporate crisis represents a situation in which “stakeholders believe that the default social codes of the stricken organization are violated” (Yu *et al.*, 2008, p. 454). Therefore, stakeholders actively seek information about the affected firms to address the cognitive dissonance caused by the crisis, and may subsequently adjust their assessment of the firms (Wei *et al.*, 2017). Previous studies have shown that stakeholders rely on their social perceptions when interacting with an organization (Ataullah *et al.*, 2014; Bundy and Pfarrer, 2015). For example, external stakeholders respond to a firm’s insider-trading crisis according to their perceptions of corporate diversification (Ataullah *et al.*, 2014). We, thus, assume that corporate diversification, as a significant component of the stakeholders’ perceptions of an organization (Aoki, 2010), may play a key role in influencing stakeholders’ responses to a crisis.

2.1 Unrelated diversification

Corporate diversification has been widely investigated by strategic management researchers (Ataullah *et al.*, 2014; Denis *et al.*, 1999; Jacquemin and Berry, 1979). There are many methods to measure it, such as entropy measurement (Jacquemin and Berry, 1979), Blau coefficient (Blau, 2001) and specialization ratio (Grant and Jammine, 1988). The most popular method is entropy measurement introduced by Jacquemin and Berry in 1979, which divides corporate diversification into related and unrelated (Jacquemin and Berry, 1979). Related diversification refers to the concentration level of firms operating in related industries (e.g. refrigerator and air conditioner manufacturing industries), while unrelated diversification describes the corporate participation level in unrelated industries (e.g. food growing and transportation industries) (Chen and Keung, 2018).

Based on the core assumption of resource dependency theory (RDT), it is impossible for any organization to obtain all resources it needs internally from itself (Pfeffer, 1972). Organizations thus need to function and survive by resource interactions with factors (e.g. other organizations) in the environment on which they depend (Pfeffer, 1972; Pfeffer and Nowak, 1976). That is, organizations are “constrained and affected by their environment and act to attempt to manage these resource dependencies by setting up different forms of interorganizational arrangements” (Pfeffer and Salancik, 2003, p. xxxiii), including joint ventures (Inkpen and Currall, 2004), mergers and acquisitions (Pfeffer, 1972). As a result of cross-industry organizational arrangements (e.g. mergers and acquisitions) between the focal firm and its external organizations (Pfeffer and Nowak, 1976; Pfeffer and Salancik, 2003), corporate unrelated diversification level will, thus, produce an important impact on the focal firm’s survival.

Especially under a crisis situation, unrelated diversification level reveals the outcome of the firm’s internalization of various external resources from different industries (Pfeffer, 1972; Pfeffer and Salancik, 2003). This determines the corporate dependence level on external resources and its autonomy level in regard to the available resources (Oliver, 1991; Pfeffer and Salancik, 2003). The crisis’ outbreak often requires the firm to timely organize its resources to deal with it for reducing the losses of the firm itself and its stakeholders (Bundy and Pfarrer, 2015). Under such situation, unrelated diversification level, as a manifestation of the corporate resource dependence and autonomy level, affects the corporate ability to deal with emergencies, thus affecting its survival (Oliver, 1991; Pfeffer, 1972).

The “onset of a crisis is characterized by high levels of uncertainty about a firm among its stakeholders” (Bundy and Pfarrer, 2015; Wei *et al.*, 2017, p. 2106). Under this uncertainty condition, stakeholders tend to assess the crisis’ impacts on the firm by relying on their perceptions of the corporate abilities to solve the crisis (Oliver, 1991). Their responses to the crisis, thus, should be affected by the corporate unrelated diversification level.

2.2 Attribution of knowledge deficiency in crisis

The concept of knowledge, defined as “the awareness of what one knows through study, reasoning, experience or association or through various other types of learning”, has received considerable attention in the literature (Del Giudice and Della Peruta, 2016; McInerney, 2002, p. 1009; Santoro *et al.*, 2020; Schoenherr *et al.*, 2014). Corporate knowledge in particular can be seen from different perspectives (Polanyi, 1966; Quinn, 1999). For instance, Quinn (1999) equates corporate knowledge with professional intelligence within an organization, and divided it into four categories, namely, “cognitive knowledge,” “advanced skills,” “systems understanding” and “self-motivated creativity.” Polanyi (1966) divided corporate knowledge more concisely into two types, namely, “explicit knowledge” and “tacit knowledge.” The former refers to knowledge that can be systematized, standardized and recorded (McInerney, 2002) such as production technology knowledge. While the latter is indescribable knowledge residing in the human mind such as values and implicit ways of doing things (Polanyi, 1966).

Corporate knowledge has been widely regarded in the past literature as a significant factor in enhancing the firm value in a dynamic business environment (Del Giudice and Maggioni, 2014; Nyuur *et al.*, 2019; Scuotto *et al.*, 2017). From the perspective of explicit knowledge, advanced explicit knowledge (e.g. manufacturing technique) can help firms gain competitive advantages over rivals and thus improve their own value (Schoenherr *et al.*, 2014). Meanwhile, from the perspective of tacit knowledge, excellent tacit knowledge can help firms obtain the wider favor and reward from stakeholders, which has important impacts on the promotion of corporate value (Chin *et al.*, 2019; Nyuur *et al.*, 2019). For instance, corporate social responsibility (CSR) behavior, as the concrete embodiment of firm’s good tacit knowledge, can enable firms to obtain the trust from multiple stakeholders such as employees, customers and suppliers (Nyuur *et al.*, 2019). In turn, these stakeholders will reward firms through increased productivity, consumer loyalty and other outcomes that maximize the corporate reputation and competitiveness, and thus enhance corporate value (Nyuur *et al.*, 2019).

Although past literature has focused extensively on the positive role of corporate knowledge in influencing the firm value, with less attention paid to the harm of corporate knowledge deficiency on it. In reality, a higher value obtained by firms based on their superior corporate knowledge may quickly dissipate due to the crises caused by knowledge deficiencies. For instance, in 2016, South Korea’s Samsung was abandoned by the Chinese market because of its senior executives’ reluctance to recall the faulty phones sold in mainland China at the mobile phone explosion event’s onset. Before that, it previously held nearly a third of the market shares in China [2]. Exploring the impact of the corporate knowledge deficiency on firm value under a crisis situation is thus great significant.

Past studies have shown that situational factors play a key role in influencing how stakeholders interpret corporate crises (Bundy and Pfarrer, 2015; Wei *et al.*, 2017). Attribution theory argues that humans are intuitive psychologists who try to comprehend their environment and seek causal explanations, especially when the events are negative and unexpected (Weiner, 2006). At the crisis’ onset, stakeholders usually tend to identify its causes based on characteristics such as their perceived intention, controllability and severity (Coombs, 2007). In turn, these causal attributions will affect the stakeholders’ perceptions of, and attitudes toward, a firm (Wei *et al.*, 2017). Corporate knowledge deficiency, as an important perceived cause, usually represents a vital identification target when stakeholders try to comprehend the crisis (Coombs, 2004; Laufer and Coombs, 2006). We, thus, speculate that the attribution of knowledge deficiency perceived by stakeholders will affect their responses to the crisis, and thus influence the firm value.

3. Hypothesis development

3.1 Effect of unrelated diversification

Based on the view of RDT, unrelated diversification implies an organizational structure that is constructed by a special interaction between the firm and its external partners that are not in the same industry (Pfeffer and Nowak, 1976; Pfeffer and Salancik, 2003). At the crisis' onset, this structure affects the firm's survival by determining its dependence and autonomy level on resources (Drees and Heugens, 2013; Oliver, 1991). Accordingly, unrelated diversification can influence corporate stakeholders' perceptions and decision-making following a crisis event (Ataullah *et al.*, 2014).

In responding to a corporate crisis, stakeholders rely on information other than the event itself, including the corporate unrelated diversification level, to form their evaluation basis (Ataullah *et al.*, 2014; Godfrey *et al.*, 2009). At the crisis' onset, a firm with higher unrelated diversification level usually possesses a lower dependence level on external resources (Drees and Heugens, 2013), and a higher autonomy level in its internal resources (Oliver, 1991). This condition allows the firm to timely rely on its internal resources to disperse and defuse the crisis' risks, so as to reduce the losses for itself and its stakeholders (Coombs, 2007). Based on this, higher unrelated diversification level may positively affect the stakeholders' assessments of the crisis' impacts on the firm, and thus protect the firm value at the crisis' onset. We thus postulate:

- H1.* Unrelated diversification has a positive effect on the firm's market value at the crisis' onset.

3.2 Moderating effect of corporate transparency

As a special organizational structure, unrelated diversification reveals firms usually possess a variety of cross-industry knowledge (Hadlock *et al.*, 2001). Although the firm's internal staff may be able to access the classified knowledge about various parts of the diversified firm, outside investors may not have access to the relevant cross-industry knowledge (Thomas, 2002). Additionally, "the interactions among different segments, which are likely to possess distinctive cognitive assets, make diversified firms more complex and harder for outsiders to understand" (Aoki, 2010; Ataullah *et al.*, 2014, p. 230). In this case, the value of unrelated diversification may be underestimated by external stakeholders (Ataullah *et al.*, 2014).

"Transparency the perceived quality of intentionally shared information from a sender" (Schnackenberg and Tomlinson, 2016, p. 1788). About the firm and its stakeholders, "transparency is seen as a critical element of knowledge sharing such that increased transparency brings increased awareness, coherence, and comprehensibility to information exchanged between two parties" (Schnackenberg and Tomlinson, 2016, p. 1788). Accordingly, higher corporate transparency level reduces the information asymmetry between the firm and its stakeholders and breaks the cross-industry knowledge barrier for the stakeholders (Aoki, 2010). This condition helps external stakeholders to perceive the benefits of unrelated diversification to the firm value, especially at the crisis' onset. On the contrary, lower corporate transparency level strengthens the cross-industry knowledge barrier for stakeholders (Aoki, 2010), which makes them unable to comprehensively understand the value of unrelated diversification to the firm (Ataullah *et al.*, 2014). At the crisis' onset, therefore, the stakeholders' response is likely unaffected by the unrelated diversification level. We thus predict:

- H2.* There is a positive interaction between unrelated diversification and corporate transparency on the firm's market value such that the positive effect of unrelated diversification is stronger when corporate transparency is high (vs low).

3.3 Main and moderating effects of knowledge deficiency attribution

Several attributions of corporate crises exist in the literature (Connelly *et al.*, 2016; Coombs, 2004). For example, Coombs (2004) divides corporate crises into three clusters, i.e. victim, accident and intention, according to the crisis responsibility attributions. Connelly *et al.* (2016) argue that crises are caused by two types of corporate failures, which they label as competency failure and integrity failure. In this study, based on attribution theory (Weiner, 2006), and the classification of corporate knowledge, i.e. explicit and tacit knowledge (Chin *et al.*, 2018; McInerney, 2002), we hold that, with the exception of the crises in which the firms are perceived as victims, firms' crises are caused by their explicit and tacit knowledge deficiencies (Laufer and Coombs, 2006; Papa *et al.*, 2018; Wang Chun-hsien *et al.*, 2020). We, thus, divide the crises into three clusters, namely, victim, explicit knowledge and tacit knowledge.

The victim cluster includes crises that are perceived as having no knowledge deficiency, with the firm perceived as a crisis' victim (Coombs, 2007). Examples of this kind of crises include product tampering and rumors (Coombs, 2004). The explicit knowledge cluster includes crises caused by corporate explicit knowledge deficiency such as technical failure incidents (Laufer and Coombs, 2006). As explicit knowledge has attributes that can be documented and modified (Santoro *et al.*, 2019), this deficiency is perceived as having lower difficulty level of repair, with the crisis seen as unintentional and solvable (McInerney, 2002). Finally, tacit knowledge cluster includes crises caused by corporate tacit knowledge deficiency such as financial fraud events (Staubus, 2005). Due to the incalculable and unpredictable characteristics of tacit knowledge (Chin *et al.*, 2019; McInerney, 2002), this deficiency is perceived as having higher difficulty level of repair (Connelly *et al.*, 2016), with the crisis seen as intentional and unmanageable (Santoro *et al.*, 2019).

Stakeholders often attribute the crisis' cause to corporate knowledge deficiency (Coombs, 2007; Ferreira *et al.*, 2018) and their attributions may influence their attitudes toward the firm (Wei *et al.*, 2017). The corporate knowledge deficiency perceived by stakeholders as more difficult to be repaired, the less trust they have in the firm because the deficiency is more likely to pose a long-term threat to the interests of the firm and its stakeholders (Bundy and Pfarrer, 2015; Connelly *et al.*, 2016). In consequence, they may punish the firm depending partly on their knowledge deficiency attributions. We thus hold that the shareholders' responses to the crisis may become more severe as perceived difficulty level of repairing the knowledge deficiency increases, as the crisis cluster changes from victim, to explicit knowledge and to tacit knowledge. We thus predict:

- H3.* The negative effect of corporate crises on the firm's market value is stronger as the knowledge deficiency attribution increases.

As we argued earlier, the buffering effect of unrelated diversification should alleviate the damage of a crisis to the firm value – as a result of the stakeholders' tendency to evaluate the crisis' impacts on the firm by their perceptions of the corporate ability to solve emergencies. This is especially likely to happen when there is no or limited difficulty level of repairing the knowledge deficiency (i.e. victim or explicit knowledge deficiency cluster), which would make stakeholders trust that the firm can rely on its own resources to solve the crisis autonomously. This effect should be weakened, however, when the knowledge deficiency is attributed to the tacit knowledge deficiency. Under this condition, stakeholders find it hard to believe that firms can repair knowledge deficiency through its own efforts. Just as the devil effect's viewpoint (Bradburn *et al.*, 2004), "a single dishonest behavior is sufficient to produce a confident attribution that the actor is dishonest" (Reeder and Brewer, 1979, p. 68). In consequence, the firm value should be significantly and consistently depressed when the crisis' cause is attributed to the tacit knowledge deficiency, regardless of what the corporate unrelated diversification level is. We thus predict:

- H4. There is a negative interaction between unrelated diversification and knowledge deficiency attribution on the firm's market value such that the positive effect of unrelated diversification is stronger when the perceived difficulty level of repairing knowledge deficiency is low (vs high).

4. Methods

4.1 Sample and data sources

We use a sample of crises events related to Chinese listed companies to test our hypotheses. The reason why we examine listed companies is because they are subjected to strict requirements of China's economic regulations for information disclosure such as corporate announcements. Furthermore, their financial statements are widely available (Zavyalova *et al.*, 2012). Following the procedures outlined by Wei *et al.* (2017), we investigate crisis events by reviewing news reports in China Business News and the China Securities Journal published between 2008 and 2018. China Business News is a major newspaper for business and economic news whose reports are timely and accurate, while the China Securities Journal is a significant international newspaper, which provides information about Chinese listed firms. There were 233 crises during the study period. We removed 30 observations, which were confounded by releases of information about significant events, for example, announcement of major sales or mergers within seven days of a crisis (Godfrey *et al.*, 2009). The final sample consists of 203 crisis events. Detailed information about the crises and firms is shown in Appendix Tables A1 and A2.

4.2 Dependent variable: cumulative abnormal returns

The dependent variable in the regression models used to investigate the potential influence of a crisis event on corporate market value is cumulative abnormal adjusted returns (CAR). A firm's CAR connected with a crisis event is calculated over a three-day (−1, 1) time window. This is in line with previous studies arguing that this method can timely “capture possible information leakage prior to a crisis while minimizing confounds of post-crisis events” (Wei *et al.*, 2017, p. 2109). The calculation method of CAR is as follows.

Abnormal returns refer to the unexpected percentage-gaps between the expected normal return and the real return. Following prior research (Godfrey *et al.*, 2009; Wei *et al.*, 2017), the market model is applied to obtain the expected normal return, abnormal return and cumulative abnormal returns, namely:

$$R_{it} = A_i + B_i R_{mt} + E_{it},$$

where R_{it} represents the normal return of security i on day t , A_i captures the intercept and B_i is the systematic risk associated with security i ; R_{mt} is the return on the market portfolio of stocks on day t and E_{it} is the error term of security i on day t . Subsequently, the abnormal return is estimated as:

$$AR_{it} = R_{it} - (A_i + B_i R_{mt}).$$

In this model, AR_{it} represents the abnormal return of security i on day t and A_i and B_i are the ordinary least squares parameter estimates of security i . Thus, the three-day cumulative abnormal return (CAR_{3-day}) over the 3-day ($n: -1, 0, +1$) event window for each security i is calculated as follows:

$$CAR_{3-day} = \sum_{t=n}^{n=(-1,0,+1)} AR_{it}$$

The expected returns are calculated for the period of 128 to 8 trading days before the critical incident (i.e. a total of 120 trading days) (Wei *et al.*, 2017). Furthermore, the daily

market return volatility is calculated using the equal weight average of the Shanghai stock exchange composite index and the Shenzhen stock exchange component index. All return and market data were obtained from the Accounting Research Database (CSMAR, www.gtarsc.com/Home).

4.3 Independent variables

4.3.1 Unrelated diversification. We analysis the corporate unrelated diversification level because it exposes firms to more situations where the information and agency effects can be manifested. On the one hand, unrelated diversification level reveals the knowledge convergence of different industries present in each firm, which may trigger the “information effect.” On the other hand, the “agency effect” of unrelated diversification may be of more concern to stakeholders because cross-industry operations provide managers with greater opportunities to reduce the risk of their own interests being damaged (Ataullah *et al.*, 2014).

Each firm's unrelated diversification level is measured by the method of entropy. According to this method, the unrelated diversification level reveals the amount of company sales derived from different two-digit Standard Industrial Classification (SIC) industry groups [3]. All data are available from the CSMAR. The unrelated diversification (UD) is calculated as:

$$UD = \sum_{j=1}^n P_j \log(1/P_j)$$

where P_j is the proportion of the j -th industry group sales in the corporate total sales. Larger values for the entropy measure reveal less concentration of sales within industry groups and represent higher unrelated diversification level.

4.3.2 Attribution of knowledge deficiency. To measure the attribution of knowledge deficiency, we reviewed news coverage of each crisis at its onset. Two of the authors used the coding scheme of Schoenherr *et al.* (2014), Wei *et al.* (2017) and Connelly *et al.* (2016) to separately code each crisis based on its descriptions, and categorized all crises into different types, including “product harms, product defects, product tampering, malicious rumors, technical accidents, organizational misdeed, environment spill, stealth pollution and financial fraud” (Wei *et al.*, 2017, p. 2111) (Appendix Table A1). All codes were 95% consistent between the two coders, manifesting high reliability (Weber, 1990). The remaining 5% difference was resolved through discussions to reach consensus. Finally, to test the coding's veracity, we also invited a visiting scholar to code 50 randomly selected critical events and the results were still reliable with a compliance rate of 89%. The different types of crises were then classified into three clusters, including “victim” (coded as 1), “explicit knowledge” (coded as 2) and “tacit knowledge” (coded as 3). For instance, if at the crisis' onset, the news coverage describes no quality problem at the firm itself but at other pharmaceutical firms, the event can be regarded as the type of product harms, and the firm can be classified as the victim (Wei *et al.*, 2017). If the news coverage describes a factory explosion caused by employees' technical problem, the event can be regarded as the technical accidents type that belongs to the explicit knowledge deficiency (Schoenherr *et al.*, 2014). Finally, if the news coverage describes a financial fraud incident caused by a joint fraud of the company's general manager and chief financial officer, the event can be regarded as the financial fraud type that belongs to the tacit knowledge deficiency (Schoenherr *et al.*, 2014; Connelly *et al.*, 2016). The higher the score, the higher the perceived difficulty level of repairing the knowledge deficiency.

4.4 Moderating variable: corporate transparency

Following Xu *et al.* (2019), we define corporate transparency as the number of announcements a firm makes in the year prior to a crisis. The data about the number of

announcements come from the well-known financial terminal Choice (<http://choice.eastmoney.com/>), which is an Internet Big Data Financial Hyper Terminal for different users such as financial investment institutions, research and academic organizations (Xu *et al.*, 2019). Most importantly, this database can timely update corporate announcements, financial and operational data and research reports.

4.5 Control variables

We controlled for the following factors to ensure the results are robust. For corporate characteristics, to explain the possibility that large firms may attract more attention from stakeholders (Zavyalova *et al.*, 2012), the log-transformed values of annual sales before the crisis were used to measure the *firm size*. We also controlled for *Tobin's Q*, *profitability* and *leverage* in the year before the crisis, which are known to correlate with the firm's market value (Wei *et al.*, 2017). *Profitability* was measured by the ratio of the net profit margin on sales and *leverage* was measured by the asset-liability ratio. These data were obtained from the CSMAR.

For event attributes, considering the influence of the *type of crisis* on the attribution, we also created and controlled three dummies for the crisis types that occurred most frequently in our data, including technical accidents (19%), organizational misdeed (19%) and product harms (11%). The *number of fatalities* in a crisis always determines its social influence level, we thus controlled for this variable (Lo *et al.*, 2018). Considering the potential effects of industry attributes, we further controlled for *return on assets* of corporate main business industry in the year before the crisis (Chang and Thomas, 1989) and measured it by the ratio of industry net profit to total industry assets. Finally, to exclude the potential effects of corporate market competitive advantage on stakeholders' responses to the firm, we also controlled for the *market share* in the corporate main business industry, which was measured by the proportion of corporate main business revenue and industry revenue in the year before the crisis (Chang and Singh, 2000). These data were obtained from CSMAR and the Choice database.

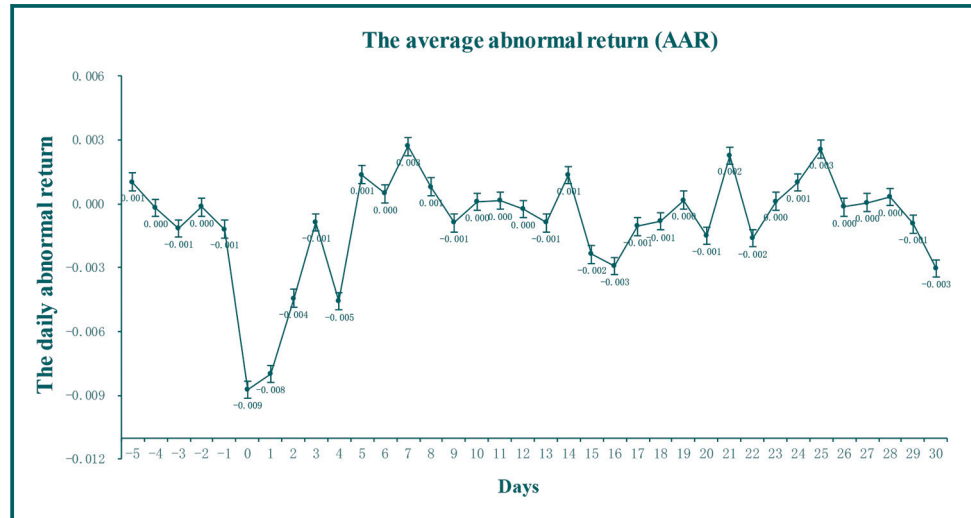
5. Results

The daily average abnormal returns (AAR) are shown in Figure 1 where negative values indicate that the crisis events have a negative impact on the firm value. Abnormal returns are significantly depressed on the day of the crisis as well as over the two-day period following the crisis event (i.e. day 0 to day 2). The vulnerability was significantly high for the two days before a crisis (i.e. day -1 and day -2), indicating possible crisis information leakage that induces an earlier negative reaction among stakeholders (Wei *et al.*, 2017). All descriptive data for the variables are presented in Table 1.

Table 2 includes the regression models showing the values of CAR connected with crises in the 3-day window (i.e. day [-1, 1]). We estimated Model 1 as the base model, which includes only control variables. The main effects of independent variables, i.e. unrelated diversification and attribution of knowledge deficiency and moderating variable, i.e. corporate transparency, are added in Model 2. Additionally, we respectively included the moderating effect of corporate transparency on unrelated diversification in Model 3 and the interaction effect of unrelated diversification and attribution of knowledge deficiency in Model 4. Model 5 is the full model that contains all main and moderating effects in this study. The highest variance inflation factor (VIF) in Model 5 is 1.640. Multicollinearity is, thus, not a serious problem in our data.

Model 2 tests the main effects of unrelated diversification and attribution of knowledge deficiency. The increase in the R^2 statistic from Model 1 to Model 2 is significant (0.060, $p = 0.000$). Unrelated diversification is significantly and positively related to CAR ($p = 0.011$), supporting $H1$ that unrelated diversification can provide a buffering effect for the firm value

Figure 1 Stock market responses to firm crisis (95% confidence interval in brackets)



at the crisis' onset. This buffering effect is also seen as the benefits associated with unrelated diversification in this study. Additionally, the attribution of knowledge deficiency has a negative and significant effect on CAR ($p = 0.007$), supporting $H3$ that stronger attribution of knowledge deficiency represents a burden for investors at the crisis' onset.

The moderating effect of corporate transparency on unrelated diversification is tested by Model 3. The increase in the R^2 statistic from Models 2 to 3 is significant (0.045 , $p = 0.000$). A positive and significant moderating effect of corporate transparency on unrelated diversification (0.237 , $p = 0.001$) is revealed. The positive effect of unrelated diversification on CAR remains significant at a high-level corporate transparency, but is non-significant at a low-level of corporate transparency. $H2$ is thus supported. For further interpreting this moderating effect, based on the Johnson–Neyman technique (Hayes, 2017; Spiller *et al.*, 2013), we identified the region indicating the range of corporate transparency beyond which the effect of unrelated diversification is significant (Figures 2 and 3). According to the figures, only when the value of the corporate transparency is greater than 79 can the positive effect of unrelated diversification be significant.

Model 4 tests hypothesis 4 by examining the interaction between unrelated diversification and attribution of knowledge deficiency. The R^2 statistic increases significantly from Models 2 to 4 (0.034 , $p = 0.000$). A negative interaction effect between unrelated diversification and attribution of knowledge deficiency is revealed by the regression analysis (-0.201 , $p = 0.005$). The analysis shows that the unrelated diversification has a positive effect on the abnormal stock return for the victim (0.576 , $p = 0.003$) and explicit knowledge deficiency (0.203 , $p = 0.018$), but its effect is negative and not significant for the tacit knowledge deficiency (-0.002 , $p = 0.990$) (Figure 4). That is, unrelated diversification buffers the negative effect of crises on investor reaction only when the initial attribution of knowledge deficiency is at a lower level (i.e. victim and explicit knowledge deficiency), but not when it is higher (i.e. tacit knowledge deficiency). This depression of the firm value condoned by the unrelated diversification is regarded as the costs associated with unrelated diversification. These results are supportive of $H4$. We also tested all above results by adding all main and moderating effects simultaneously, the results still remained substantially unchanged (see Model 5).

Among the control variables, severe crises that result in a great number of fatalities damage more the firm value. A positive and significant effect of the corporate market share on CAR

Table 1

	1. CAR ³	2. CAR ⁷	3. Profitability	4. Tobin Q	5. Leverage	6. Firm size	7. Number of fatalities	8. Product harms	9. Technical accidents	10. Organizational misdeeds	11. Return on industry assets	12. Market share	13. Corporate transparency	14. Unrelated diversification	15. Attribution of knowledge deficiency
1. CAR ³	-0.020	0.056													
2. CAR ⁷	-0.026	0.079	0.811** (0.000)												
3. Profitability	0.094	0.153	-0.176* (0.012)	-0.126 (0.072)											
4. Tobin Q	2.901	1.975	-0.071(0.312)	-0.115* (0.103)	0.255** (0.000)										
5. Leverage	4.477	0.208	0.119** (0.090)	0.198** (0.005)	-0.223** (0.000)	-0.385** (0.000)									
6. Firm size	9.550	0.648	0.078(0.269)	0.071(0.315)	0.010(0.891)	-0.176* (0.012)	0.259** (0.000)								
7. Number of fatalities	2.281	10.567	-0.181** (0.010)	-0.234** (0.001)	0.103(0.143)	-0.066(0.350)	-0.091 (0.197)								
8. Product harms	0.108	0.312	-0.103 (0.143)	-0.071 (0.317)	0.008(0.143)	0.002 (0.980)	-0.095 (0.179)	0.137(0.051)							
9. Technical accidents	0.191	0.395	0.022 (0.758)	0.094 (0.184)	-0.024 (0.729)	-0.128 (0.068)	0.127(0.071)	0.078(0.271)							
10. Organizational misdeeds	0.182	0.387	0.019 (0.792)	0.017 (0.811)	0.000(0.999)	0.167* (0.018)	0.103 (0.143)	-0.083 (0.237)							
11. Return on industry assets	0.058	0.034	-0.153* (0.030)	-0.121 (0.085)	0.221** (0.002)	0.299** (0.000)	-0.366* (0.000)	-0.051 (0.471)							
12. Market share	4.147	7.555	0.145* (0.039)	0.094 (0.182)	0.138* (0.050)	-0.051 (0.473)	0.200** (0.004)	0.541** (0.000)							
13. Corporate transparency	0.984	0.497	-0.025 (0.724)	-0.054 (0.442)	-0.020 (0.775)	0.090(0.201)	-0.023 (0.743)	-0.045 (0.526)							
14. Unrelated diversification	0.290	0.332	0.172* (0.014)	0.153* (0.029)	-0.151* (0.031)	-0.084 (0.232)	0.234** (0.001)	-0.015 (0.834)							
15. Attribution of knowledge deficiency	2.251	0.711	-0.152* (0.030)	-0.171* (0.015)	-0.040(0.575)	0.025 (0.718)	0.041 (0.560)	-0.031 (0.658)							

Notes: $n = 203$; p -value are in parentheses

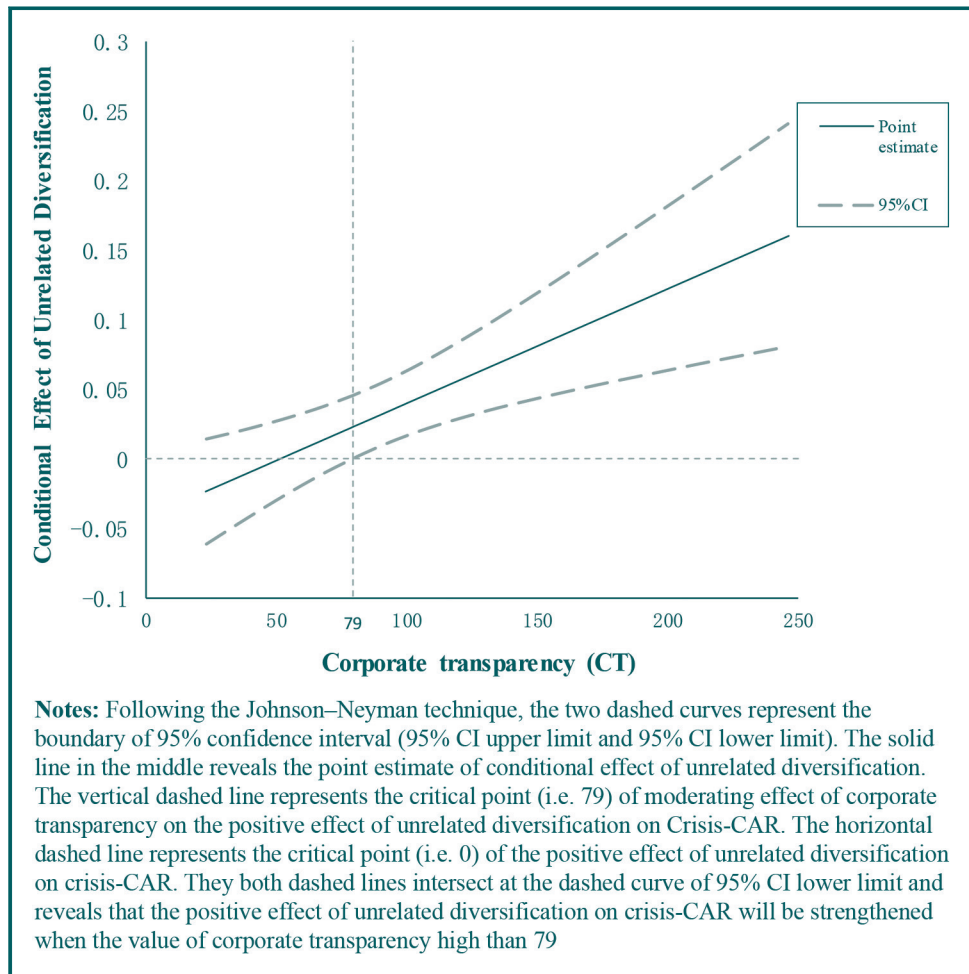
(continued)

Table 2 Regressions of crisis-related cumulative abnormal returns (three-day CAR)

Variables	Model 1	p-value	Model 2	p-value	Model 3	p-value	Model 4	p-value	Model 5	p-value
(Constant)	0.017 (0.095)	0.861	-0.042 (0.094)	0.659	-0.036 (0.092)	0.694	-0.026 (0.093)	0.776	-0.022 (0.090)	0.812
Profitability	-0.165(0.073)	0.025	-0.167 (0.071)	0.020	-0.152(0.069)	0.030	-0.165 (0.070)	0.019	-0.150(0.068)	0.029
Tobin's Q	-0.006 (0.079)	0.936	-0.015 (0.077)	0.848	-0.036 (0.075)	0.636	-0.028 (0.076)	0.717	-0.048 (0.074)	0.522
Leverage	-0.031 (0.083)	0.703	-0.087(0.082)	0.290	-0.135 (0.082)	0.101	-0.109(0.081)	0.180	-0.155 (0.081)	0.056
Firm size	-0.009(0.084)	0.918	-0.038(0.082)	0.646	-0.029 (0.080)	0.714	-0.037(0.080)	0.642	-0.029 (0.078)	0.709
Number of fatalities	-0.200(0.072)	0.006	-0.161(0.071)	0.024	-0.169 (0.069)	0.015	-0.175(0.070)	0.013	-0.182 (0.068)	0.008
Product harm	-0.367 (0.231)	0.113	-0.236 (0.230)	0.307	-0.247 (0.224)	0.272	-0.268 (0.226)	0.237	-0.278 (0.221)	0.209
Technical accidents	0.142 (0.188)	0.452	0.101 (0.184)	0.583	0.156 (0.180)	0.387	0.092(0.180)	0.612	0.146 (0.177)	0.410
Organizational misdeed	-0.023(0.191)	0.906	0.262 (0.208)	0.209	0.179 (0.204)	0.382	0.223 (0.205)	0.279	0.143 (0.201)	0.479
Return on industry assets	-0.101 (0.076)	0.187	-0.124 (0.076)	0.108	-0.144 (0.075)	0.055	-0.128 (0.075)	0.091	-0.148 (0.073)	0.046
Market share	0.208(0.084)	0.014	0.281 (0.084)	0.001	0.292 (0.082)	0.000	0.283(0.083)	0.001	0.293(0.081)	0.000
Corporate transparency (CT)			-0.053 (0.069)	0.439	-0.065 (0.067)	0.339	-0.079 (0.068)	0.249	-0.089 (0.067)	0.184
Unrelated diversification (UD)			0.181 (0.071)	0.011	0.246(0.072)	0.001	0.177 (0.069)	0.012	0.240 (0.070)	0.001
Attribution of knowledge deficiency (AD)			-0.207 (0.076)	0.007	-0.154 (0.076)	0.045	-0.215 (0.075)	0.005	-0.163 (0.075)	0.031
UD*CT					0.237 (0.072)	0.001			0.231(0.071)	0.001
UD*AD							-0.201 (0.071)	0.005	-0.195 (0.070)	0.006
R ²	0.120		0.180		0.225		0.214		0.256	
R ² adj	0.074		0.124		0.167		0.155		0.196	
F-statistic	2.615**		3.201**		3.897**		3.650**		4.291**	

Notes: $n = 203$; values in table are unstandardized regression coefficients. Standard errors are in parentheses

Figure 2 Conditional effect of unrelated diversification on crisis-CAR as a function of corporate transparency



was also tested, suggesting that higher competitive advantage in the market could result in the firms suffering less damage at the crisis' onset.

6. Robustness checks

A series of robustness checks were performed to further confirm the results from this study. First, we calculated the seven-day CAR and ran the models again. The main results did not change ([Appendix Table A3](#)). Second, considering the high correlation between the crisis types and attribution of knowledge deficiency, we also conducted a robustness check by analyzing the models without the three dummy variables. Our results did not change ([Appendix Table A4](#)).

Third, we selected substitution variables to measure unrelated diversification and corporate transparency again. For unrelated diversification, we chose the measurement of the Blau coefficient ([Blau, 2001](#)) to replace the method of entropy measure [4]. The results also did not change ([Appendix Table A5](#)). For corporate transparency, we respectively chose the number of announcements made by the firms in the two (and three) years before the crisis to replace the number of announcements in the one year prior to the crisis. We reran the regression model and the results did not change ([Appendix Tables A6 and A7](#)).

Figure 3 Moderating effect of corporate transparency on unrelated diversification

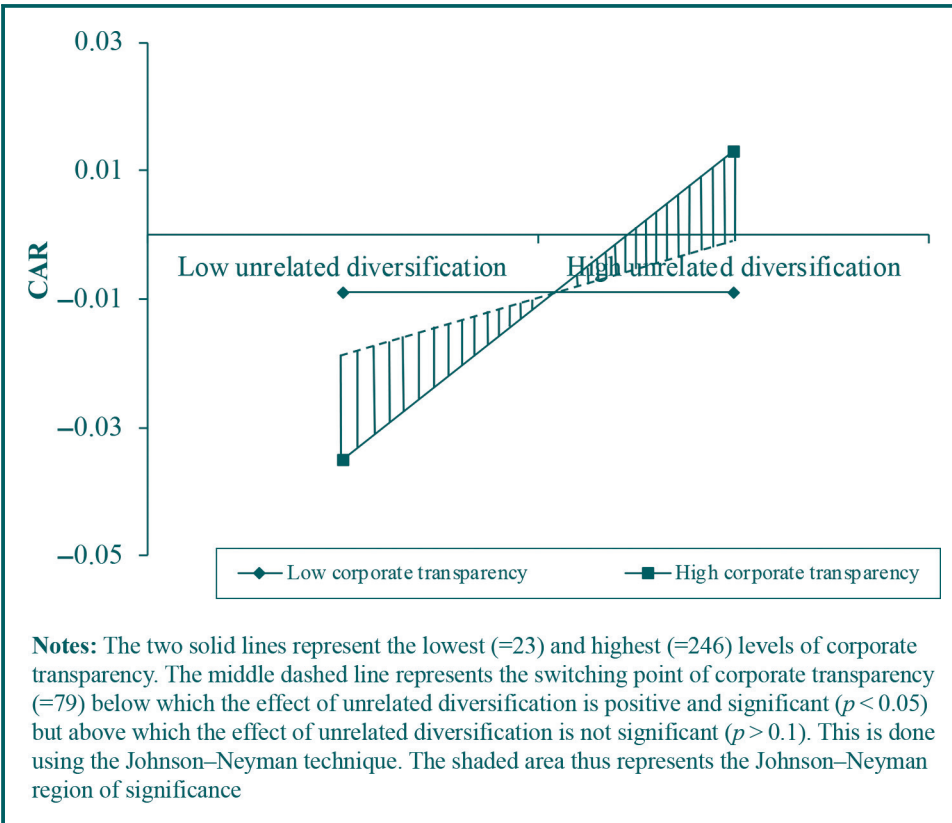
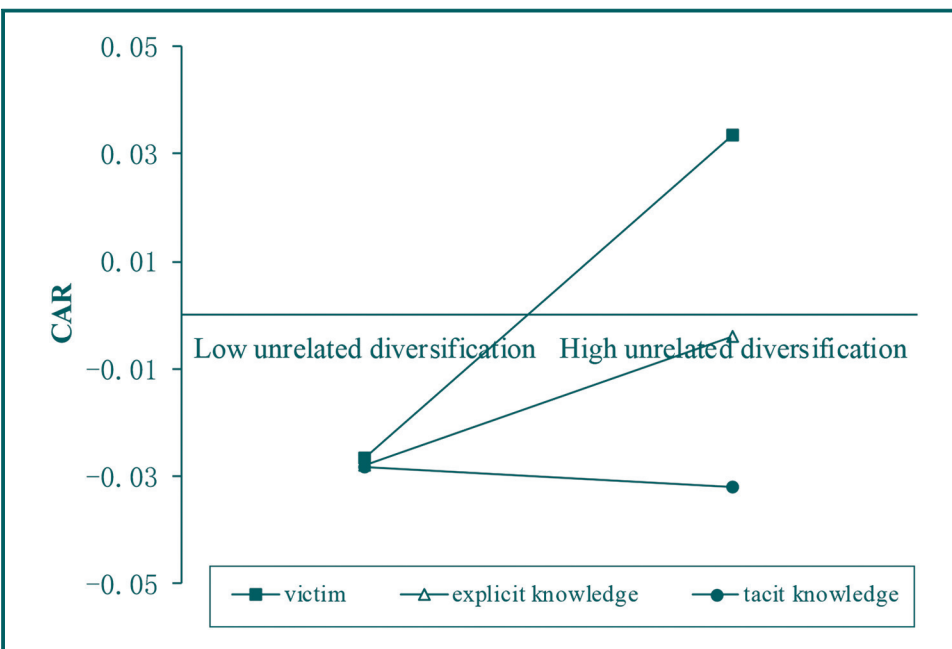


Figure 4 Interaction effect of unrelated diversification and attribution of knowledge deficiency on crisis-CAR



Finally, for additional control variables, we also considered the effects of corporate tenure in the stock market and type. The former was measured by the time interval between the date when the firm went public and the date of the event. For the latter, we created four dummies for the corporate types that occurred most frequently in our data, including pharmacy (30.5%, 62), manufacturing of chemical materials and products (8.3%, 17), wine, beverage and refined tea manufacturing (6.4%, 13) and capital market services (0.9%, 2). After re-running the regression model by adding them as control variables, all results did not change (Appendix Tables A8 and A9). All robustness checks confirmed the vigor of our findings.

7. Discussion, conclusion and limitations

7.1 Discussion

Although past research has extensively explored the effects of diversification strategy on the firm value in daily operations ([Aggarwal and Samwick, 2003](#); [Ataullah *et al.*, 2014](#); [Chen and Keung, 2018](#)), there is insufficient analysis of its impacts in a crisis situation. Using an event study of 203 corporate crises in China, we tested the relationships between the unrelated diversification, corporate transparency, knowledge deficiency attribution and the stock market's responses to the crisis. Our empirical results show that in a crisis situation the “information effect” and “agency effect” of unrelated diversification on the firm value can be partially explained.

Using a cross-border knowledge management perspective ([Aoki, 2010](#); [Hadlock *et al.*, 2001](#)), we explored a unique dimension of corporate diversification – unrelated diversification, which captures the external stakeholders' perception of corporate cross-industry knowledge ([Chen and Keung, 2018](#)). Our investigation of the interaction between unrelated diversification and corporate transparency shows that firms with higher unrelated diversification level are initially insulated from crises, especially when they possess higher transparency. These results resonate with the conclusion of [Ataullah *et al.* \(2014\)](#) that corporate transparency plays a crucial role in the external stakeholders' correct assessment of unrelated diversification value, revealing the “information effect” of diversification in a crisis situation. In this case, the benefits associated with unrelated diversification can be thus obtained by the firm.

The simultaneous examination of unrelated diversification and corporate transparency also allowed us to illuminate the effect of centralized strategy on the firm value at the crisis' onset. [Figure 3](#) reveals, at very low unrelated diversification levels (i.e. centralized strategy), the firm value drop significantly when corporate transparency is higher. This phenomenon may reveal the fact that high daily interaction between the firm and stakeholders makes the stakeholders more aware of the limitations in the abilities of centralized firms to spread the crises' risk. Additionally, these results could also be combined with the [Kang's \(2013\)](#) research, which explores the impacts of unrelated diversification on the firm's willingness to communicate with its stakeholders, to further explore the reasonable information disclosure mechanism of firms in response to crises.

Additionally, our finding that perceived corporate knowledge deficiency in the crisis has effects on the firm value provides empirical evidence for the impacts of causal attribution which was hypothesized but rarely tested previously ([Coombes, 2004](#)). Meanwhile, our results also show that the buffering effect of unrelated diversification is valid only when the crisis' cause is not attributed to the tacit knowledge deficiency by stakeholders. These results could partly explain the “agency effect” of diversification in a crisis situation ([Aggarwal and Samwick, 2003](#)), that is, unrelated diversification will not have the positive impact on the firm value at the crisis' onset if the corporate managers are perceived as having ethical deficiency. In this case, the costs associated with unrelated diversification will be suffered by the firm.

7.2 Implications and conclusion

7.2.1 Theoretical contributions. First, prior literature has extensively discussed the influence mechanism of diversification on the firm value in daily operations (e.g. “information effect” and “agency effect” of diversification) (Ataullah *et al.*, 2014; Denis *et al.*, 1999). In this study, based on the stakeholders’ responses to the corporate crisis in the context of information asymmetry (Bundy and Pfarrer, 2015; Wei *et al.*, 2017), we partly explain the agency and information effects of diversification with cross-industry knowledge in a crisis situation. These findings expand the research perspective of cross-industry knowledge management to the crisis management field and shed new light on the long-standing discussion of the value of diversification strategy to the firm in the strategic management literature.

Second, in the literature on applied attribution theory, responsibility attribution has long been regarded as a critical construct in determining stakeholders’ response to corporate crises (Bundy and Pfarrer, 2015). However, one point that is usually neglected previously is that at the crisis’ onset, stakeholders should attribute the crisis’ cause first and then make the responsibility attribution. For instance, before the firm takes more responsibility for the crisis such as financial fraud, stakeholders should have attributed the crisis’ cause to corporate ethical failings rather than competence problems or rumor. We, therefore, extend the application of attribution theory by empirically testing the influence of knowledge deficiency attribution on the firm value at the crisis’ onset.

Finally, prior literature based on resource dependence view held that the key to protecting the firm value is to reduce its dependence on external resources (Oliver, 1991; Pfeffer and Salancik, 2003) while those based on agency theory emphasized that effective supervision of managers is an effective way to reduce agency cost and thus improve corporate performance (Hillman and Dalziel, 2003; Jensen and Meckling, 1979). Although these two fields have been intensively studied previously, only a few studies have focused on the interaction between these two modes of firm value intervention. By empirically testing the interaction between attribution of knowledge deficiency and unrelated diversification under a crisis scenario, we find that when the supervision mode fails (e.g. firms are considered to possess tacit knowledge deficiency), the protection mode will be also invalid (i.e. the buffering effect of unrelated diversification is ineffective). These findings thus provide meaningful insights into the jointly discussion of the two theories.

7.2.2 Practical implications. First, the exploration of the buffering effect of unrelated diversification in a crisis situation assists firms to understand the stakeholders’ crisis response mechanism – stakeholders tend to rely on their perceptions of the firm’s unrelated diversification level to evaluate the impacts of crises to the firm and then response to the crises, so as to help firms to repair the crisis-caused damage by making better use of their own strategic advantages. For instance, after the crisis, unrelated diversified firms can promote the initial positive evaluation of stakeholders by quickly publicizing their advantages in the autonomy of diversified resources, so as to mitigate the damage of the crisis to the firm value.

Second, the finding of the information effect of unrelated diversification in a crisis scenario suggests that firms with unrelated diversification structure should increase their daily information interaction with stakeholders, so as to increase stakeholders’ understanding of the benefits of unrelated diversification strategy to the firm value. Also, firms implementing centralized strategy should avoid causing concern to stakeholders about their ability for resource autonomy while communicating with them.

Finally, the partly explanation of the agency effect of unrelated diversification in a crisis scenario suggests that at the crisis’ onset, firms need try to avoid creating stakeholders’ perceptions that the crisis is caused by corporate tacit knowledge deficiency. If the firms fail, the corporate crisis repair behaviors should focus on eliminating the negative cognitive

bias of stakeholders toward the firms. One possible solution is to replace the CEO and all employees involved in the crisis.

7.2.3 Conclusion. In studying how corporate diversification with cross-industry knowledge affects stakeholders' reactions to a corporate crisis, we provided empirical evidence for the combined effects of corporate unrelated diversification, corporate transparency and attribution of knowledge deficiency on the corporate market value at the crisis' onset. Our research extends the "agency effect" and "information effect" of diversification on the firm value in a crisis scenario, and enlightens how firms can better conduct corporate strategic and knowledge management in their daily operations to better cope with crises in the future.

7.3 Limitations and future work

Several limitations of this study provide more opportunities for future research. First, based on the perspective of cross-border knowledge management, this study only explored the impact of unrelated diversification on the firm value in the context of a crisis. Future research can further explore the effects of related diversification on the stakeholders' crisis responses, and discuss the differential effects of these two dimensions of diversification strategies in a crisis situation.

Second, in this study, we focused on how unrelated diversification, corporate transparency and attribution of knowledge deficiency jointly affect the firm value at the crisis' onset. After the crisis' initial stage, different intermediaries such as news media, We-Media and even the firms themselves, often provide investors with more crisis-related information (Bundy and Pfarrer, 2015). Therefore, with the development of the crisis, how these independent variables in this study interact with other factors to jointly influence the firm value deserves further systematic investigation in the future.

Finally, although this study has controlled for many variables related to the firm, crisis and industry, other variables may also drive the relationship between unrelated diversification and the firm value, which is worth further exploration in the future. For instance, future research could explore the corporate crisis experience and how it affects the firm value (Wei *et al.*, 2017). We speculate that whether a firm has had similar crises in the past may have an effect on stakeholders' perceptions of the firm at the crisis' onset.

Notes

1. Jensen and Meckling (1979) classify agency costs into monitoring costs, compliance costs and residual costs. Monitoring costs refer to the expenditures of external shareholders to supervise the manager's excessive consumption or self-relaxation; compliance costs mean the self-restraint expenses incurred by managers to gain the external shareholders' trust such as regular financial reporting; other losses due to inconsistent interests of shareholders and managers are residual costs.

2. https://www.sohu.com/a/345202947_239259

3. http://www.stats.gov.cn/tjsj/tjbz/201905/t20190522_1666232.html

4. Blau coefficient: $UD = 1 - \sum_{j=1}^n P_j^2$

where P_j is the proportion of the j -th industry group sales in the corporate total sales. The larger values for the Blau coefficient reveal a less concentration of sales among industry groups and represent a higher unrelated diversification level.

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Appendix

Table A1 Crisis events and types

No.	Event name	Event time	Event type	Stock code
1	Gree recalled 2.25 million dehumidifiers in a \$150m lawsuit	2013.9.13	Product defects	000651
2	Environmental pollution incident	2013.8.11	Stealth pollution	000629
3	Environmental pollution incident	2013.6.19	Stealth pollution	600596
4	Vitamin c yinqiao tablet incident	2013.6.18	Product defects	002424
5	Vitamin c yinqiao tablet incident	2013.6.18	Product defects	600750
6	Vitamin c yinqiao tablet incident	2013.6.18	Product defects	600594
7	Toxic wastewater leaks have brought aquaculture to a standstill	2013.6.18	Environment spill	601899
8	Tongrentang mercury incident	2013.5.7	Technical accidents	600085
9	The quality of the medicine is not up to standard	2013.5.6	Product defects	600666
10	Zhengtian pills toxic incident	2013.4.17	Product harms	000999
11	CCTV exposed vitamin C yinqiao tablets containing poison	2013.3.28	Product harms	600332
12	Yunnan baiyao contains poison	2013.2.5	Malicious rumors	000538
13	Environmental pollution events cause cancer	2013.2.28	Stealth pollution	600362
14	Oil emulsification event	2013.2.20	Product defects	000625
15	Six people died in the accident	2013.12.21	Technical accidents	000422
16	Gynecological qianjin tablets were exposed character unqualified	2013.10.9	Product defects	600479
17	A safety accident occurred in the production process	2013.10.25	Technical accidents	000553
18	Food coliform group exceeds standard door	2013.10.16	Product harms	600029
19	Network speed is unusually slow	2013.10.15	Product defects	600804
20	Contamination accident	2013.10.13	Environment spill	600422
21	Unqualified drugs	2013.1.6	Product defects	600420
22	Unqualified drugs	2013.1.22	Product defects	000650
23	Unqualified drugs	2013.1.17	Product defects	000895
24	Cement is mixed with other substances	2013.1.17	Malicious rumors	000401
25	The quality of the medicine is in question	2013.4.26	product defects	002422
26	Student milk poisoning incident	2012.9.22	Product defects	600127
27	Recall of bad drugs	2012.9.14	Product harms	600196
28	The gutter oil incident	2012.8.30	Malicious rumors	600380
29	Shanxi fenjiu is suspected of deliberately concealing the recall	2012.8.27	Organizational misdeed	600809
30	Liquor blending scandal	2012.8.22	Product harms	000596
31	Rongshida electric saucepan spot-check unqualified	2012.8.2	Product defects	600983
32	Production process safety accident	2012.7.28	Technical accidents	600117
33	Bright dairy products quality problems	2012.7.21	Product defects	600597
34	The PH value of qingrejiedu oral solution was not up to standard	2012.7.18	Product defects	600129
35	The quality of steel causes problems	2012.7.17	Product tampering	600569
36	Kangmei pharmaceutical's norfloxacin capsule drug dissolution test results were not up to standard	2012.7.17	Product defects	600518
37	Drug quality problem event	2012.6.26	Product harms	000919
38	Drug quality problem event	2012.6.15	Malicious rumors	600059
39	Pork quality problem	2012.6.12	Product harms	600887
40	Drug quality problem event	2012.5.28	Malicious rumors	600253
41	Drug quality problem event	2012.5.27	Product tampering	000895
42	Drug quality problem event	2012.5.27	Malicious rumors	600466
43	Drug quality problem event	2012.5.26	product harms	000522
44	Drug quality problem event	2012.5.26	Product harms	002644
45	Drug quality problem event	2012.5.26	Malicious rumors	002370
46	Drug quality problem event	2012.5.26	Malicious rumors	600666
47	Drug quality problem event	2012.5.26	Malicious rumors	600789
48	Drug quality problem event	2012.5.24	Malicious rumors	600557
49	Sanjing oral liquid showed foreign body	2012.5.2	Product tampering	600829
50	Drug quality problem event	2012.4.29	Malicious rumors	002424
51	Drug quality problem event	2012.4.29	Malicious rumors	600594
52	Drug quality problem event	2012.4.29	Malicious rumors	002390
53	Drug quality problem event	2012.4.24	Product defects	600624

(continued)

Table A1

No.	Event name	Event time	Event type	Stock code
54	Drug quality problem event	2012.4.15	Product harms	000766
55	Production safety accident	2012.2.23	Technical accidents	600019
56	Production safety accident	2012.2.20	Technical accidents	000898
57	Vanke toxic floor incident	2012.2.16	Product harms	000002
58	Plasticizer storm	2012.12.4	Malicious rumors	600519
59	Milk quality problems	2012.12.27	Product harms	600429
60	Environmental pollution event	2012.12.25	Environment spill	000568
61	Environmental pollution event	2012.12.10	Stealth pollution	000488
62	Environmental pollution event	2012.1.3	Stealth pollution	600267
63	The subway crash events	2011.9.27	Technical accidents	600834
64	Production safety accident	2011.9.17	Technical accidents	601898
65	Environmental pollution event	2011.6.5	Stealth pollution	600664
66	Employee strike	2011.5.6	Technical accidents	000591
67	Production safety accident	2011.5.20	Technical accidents	600228
68	Taking bribes	2011.4.19	Malicious rumors	600031
69	Ten people died in the industrial accident	2011.3.29	Malicious rumors	600408
70	Shuanghui "clenbuterol" incident	2011.3.15	Product harms	000895
71	Eight people died in the industrial accident	2011.3.12	Technical accidents	600333
72	Drug quality problem	2011.2.11	Technical accidents	300086
73	Vaccine incident	2011.12.8	Product defects	600132
74	Environmental pollution event	2011.12.28	Stealth pollution	002365
75	Production safety accident	2011.11.9	Technical accidents	000553
76	Production safety accident	2011.11.3	Technical accidents	600403
77	Plasticizer exceed the standard in liquor	2011.11.19	Product harms	000799
78	Production safety accident	2011.10.5	Technical accidents	600282
79	Production safety accident	2011.10.19	Technical accidents	002217
80	Production safety accident	2011.10.17	Technical accidents	000157
81	Machine quality problem	2011.10.13	Product defects	002032
82	Quality problem of stainless steel products	2011.10.11	Product defects	600285
83	Production safety accident	2010.8.17	Technical accidents	002113
84	The efficacy of drugs is questioned	2010.7.16	Product defects	000538
85	Electrical quality problem	2010.6.29	Product defects	000651
86	Production safety accident	2010.6.29	Technical accidents	000069
87	Production safety accident	2010.6.13	Technical accidents	601666
88	Electrical quality problem	2010.5.23	Product tampering	000527
89	Drug quality problem event	2010.4.15	Product harms	600297
90	Financial fraud crisis	2010.3.30	Financial fraud	600202
91	Production safety accident	2010.3.28	Technical accidents	601898
92	Environmental pollution events	2010.10.21	Environment spill	000060
93	Drug quality problem event	2009.7.23	Product defects	600750
94	Production safety accident	2009.7.11	Technical accidents	000709
95	Housing quality defect	2009.4.8	Product defects	600048
96	Collapse accident	2009.3.24	Technical accidents	000950
97	Production safety accident	2009.3.23	Technical accidents	600096
98	Drug quality problem event	2009.2.6	Product harms	600535
99	Production safety accident	2009.2.22	Technical accidents	000983
100	Product marketing problems	2009.12.24	Organizational misdeed	600588
101	Death by electric leakage event	2008.9.4	Technical accidents	000533
102	Vanke donation event	2008.5.15	Malicious rumors	000002
103	China Eastern turning back event	2008.3.31	Organizational misdeed	600115
104	Production safety accident	2008.3.27	Technical accidents	600505
105	Drug quality problem event	2014.3.22	Product tampering	000423
106	Production safety accident	2014.8.27	technical accidents	000488
107	Yunnan baiyao "cross-provincial investigation" incident	2014.7.17	Organizational misdeed	000538
108	Production safety accident	2014.1.7	Technical accidents	000552
109	Drug quality problem event	2014.1.2	Product tampering	000566
110	Automobile quality problem	2014.3.15	Product defects	000625

(continued)

Table A1

No.	Event name	Event time	Event type	Stock code
111	Production safety accident	2014.6.8	Technical accidents	000693
112	Production safety accident	2014.4.29	Technical accidents	000789
113	Plasticizer storm	2014.8.4	Product tampering	000799
114	Bidding fraud	2014.10.8	Organizational misdeed	000801
115	Production safety accident	2014.2.8	Technical accidents	002114
116	Buried carcinogens exposed event	2014.2.17	Organizational misdeed	002440
117	Product quality problem	2014.2.25	Malicious rumors	002570
118	Improper trading and CSRC investigation	2014.12.9	Malicious rumors	600051
119	Environmental pollution event	2014.6.9	Malicious rumors	600059
120	Environmental pollution event	2014.1.7	Environment spill	600267
121	Environmental pollution event	2014.11.4	environment spill	600746
122	Environmental pollution event	2014.12.25	Stealth pollution	600789
123	Selling fake products	2014.3.12	Organizational misdeed	601258
124	Customer rights protection event	2014.6.11	Organizational misdeed	601519
125	False record of financial data	2018.10.18	Organizational misdeed	600112
126	Swine flu	2018.10.15	Malicious rumors	002385
127	The Yangtze alligator nature reserve was invaded	2018.10.12	Technical accidents	002230
128	Employees were killed	2018.8.28	Technical accidents	000782
129	Environmental pollution event	2018.8.14	Stealth pollution	600298
130	Environmental pollution event	2018.8.14	Stealth pollution	002105
131	Illegal guarantee event	2018.7.31	Malicious rumors	000752
132	Vaccine fraud incident	2018.7.15	Product tampering	002680
133	Boli international "backup" storm	2018.6.5	Disputes accidents	300135
134	U.S. government procurement ban	2018.5.24	Malicious rumors	002583
135	Environmental pollution event	2018.4.20	Stealth pollution	002496
136	Environmental pollution event	2018.4.17	Stealth pollution	000755
137	Suspected of dropping dead seedlings	2018.2.22	Malicious rumors	002069
138	Product packaging infringement	2018.1.12	Disputes accidents	000799
139	Accused of copying American technology	2018.1.9	Organizational misdeed	601558
140	The efficacy of benzidarine eye drops was questionable	2017.12.22	Product harms	603168
141	Production safety accident	2017.12.19	Technical accidents	300214
142	Investor suit	2017.5.12	Organizational misdeed	002323
143	Investor suit	2017.8.4	Organizational misdeed	002200
144	Improper trading and CSRC investigation	2017.7.27	Organizational misdeed	600775
145	Break a contract and CSRC investigation	2017.7.26	Organizational misdeed	000712
146	Short swing trading and CSRC investigation	2017.7.25	organizational misdeed	000651
147	Improper trading and CSRC investigation	2017.7.24	Malicious rumors	600873
148	Employees are not paid on time	2017.7.23	Malicious rumors	600233
149	Executive resignations	2017.7.17	Organizational misdeed	600423
150	Insider trading	2017.7.15	Organizational misdeed	600055
151	Improper trading and CSRC investigation	2017.6.26	Malicious rumors	600761
152	Insider trading	2017.6.15	Organizational misdeed	002454
153	Short swing trading and CSRC investigation	2017.6.14	Organizational misdeed	002508
154	Improper trading and CSRC investigation	2016.12.29	Organizational misdeed	300135
155	Audit non-standard opinions and CSRC investigation	2017.4.6	Financial fraud	002490
156	Financial information disclosure violations	2017.2.6	Financial fraud	002263
157	Chinese medicinal materials were exposed dyeing adulterated	2017.1.17	Product tampering	600479
158	African swine fever virus was detected in feed samples	2018.11.11	product harms	002567
159	Contract fraud	2018.10.26	Organizational misdeed	600240
160	Investor suit	2018.9.21	Financial fraud	600576
161	False record of financial information	2018.4.17	Financial fraud	600576
162	Financial information fraud	2018.9.13	Financial fraud	002501
163	Financial information fraud and CSRC investigation	2018.9.11	Malicious rumors	603777
164	Improper trading and CSRC investigation	2018.8.30	Organizational misdeed	000883
165	Executives arrested and CSRC investigation	2018.8.25	Financial fraud	300310
166	Senior executives committed serious violations of discipline and law	2018.8.24	Organizational misdeed	000858
167	Improper trading and CSRC investigation	2018.8.22	Disputes accidents	600408

(continued)

Table A1

No.	Event name	Event time	Event type	Stock code
168	Environmental pollution event	2018.8.15	Malicious rumors	600874
169	Illegal stock pledge business and investor suit	2018.8.15	Financial fraud	600909
170	Contract fraud and executives arrested	2018.8.8	Organizational misdeed	002164
171	The valsartan API was detected by NDMA	2018.8.4	Product harms	002923
172	The valsartan API was detected by NDMA	2018.8.4	Product harms	300702
173	The valsartan API was detected by NDMA	2018.7.6	Product harms	600521
174	Insider trading	2018.7.20	Organizational misdeed	300030
175	Contract fraud and executives arrested	2018.7.17	Malicious rumors	600310
176	Illegal guarantee event	2018.7.13	Disputes accidents	000662
177	Production safety accident	2018.2.6	Technical accidents	000717
178	Production safety accident	2018.2.10	Technical accidents	000717
179	Investor suit	2018.6.14	Organizational misdeed	002562
180	Financial information disclosure is illegal	2018.5.10	Financial fraud	002473
181	Executives were killed	2018.5.7	Disputes accidents	000899
182	Environmental pollution event	2018.5.2	Stealth pollution	002496
183	Financial information disclosure is illegal	2018.1.28	Financial fraud	002628
184	Executive resignations together	2017.12.19	Organizational misdeed	002323
185	Financial information fraud and CSRC investigation	2017.12.16	Financial fraud	002288
186	Production management defect	2017.11.28	Technical accidents	300106
187	Financial information disclosure is illegal	2017.10.12	Financial fraud	300531
188	Illegal guarantee event	2017.10.11	Organizational misdeed	600745
189	Short swing trading and CSRC investigation	2017.8.11	Organizational misdeed	600139
190	Spreading misleading information	2017.8.10	Technical accidents	300033
191	Insider trading and CSRC investigation	2017.7.20	Organizational misdeed	002161
192	Executive resignations together	2016.11.30	Malicious rumors	000430
193	Insider trading and CSRC investigation	2016.11.7	Organizational misdeed	000012
194	Financial information disclosure is illegal	2016.11.10	Organizational misdeed	600802
195	Drug quality problem event	2016.7.19	Product harms	600332
196	Financial information disclosure is illegal	2016.4.4	Organizational misdeed	600812
197	Falsification of clinical data	2015.12.8	Organizational misdeed	300404
198	Falsification of clinical data	2015.12.8	Organizational misdeed	300347
199	Environmental pollution event	2015.9.21	Malicious rumors	002294
200	Financial information disclosure is illegal	2015.7.21	Organizational misdeed	600781
201	Illegal use of project land and CSRC investigation	2015.3.30	Disputes accidents	600211
202	Executives committed serious disciplinary violations	2016.3.15	Organizational misdeed	600519
203	Illegal production and sales	2015.3.6	Organizational misdeed	002030

Table A2 Corporate information

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/RMB)	Firm revenue (Billion/RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
1	Gree Electric Appliances Inc.	2013.9.13	1996.11.18	C38	Electrical machinery and equipment manufacturing	000651	7.50	107.57	108.05	74.36	201
2	Panzhuhua steel group panel Co. Ltd.	2013.8.11	1996.11.15	C32	Nonferrous metal smelting and rolling processing	000629	3.84	31.06	15.27	50.45	200
3	Zhejiang xin'an chemical industry group co. Ltd.	2013.6.19	2001.9.6	C26	Manufacturing of chemical materials and products	600596	2.38	7.24	6.58	39.17	141
4	Guizhou Bailing Enterprise Group Pharmaceutical Co., Ltd.	2013.6.18	2010.6.3	C27	Pharmacy	002424	16.73	3.24	1.40	36.96	36
5	Jiangzhong Pharmaceutical Co., Ltd.	2013.6.18	1996.9.23	C27	Pharmacy	600750	7.11	3.23	2.77	14.76	200
6	Guizhou Yibai Pharmaceutical Co., Ltd.	2013.6.18	2004.3.23	C27	Pharmacy	600594	15.04	2.28	2.78	32.12	110
7	Zijin Mining Group Co., Ltd.	2013.6.18	2008.4.25	B09	Nonferrous metal mining	601899	12.71	67.35	49.77	50.14	61
8	Tongrentang Chinese Medicine Co., Ltd.	2013.5.7	1997.6.25	C27	Pharmacy	600085	11.71	9.67	7.50	42.03	190
9	Southwest Pharmaceutical Co., Ltd.	2013.5.6	1993.7.12	C27	Pharmacy	600666	2.95	1.51	1.20	71.44	237
10	China Resources Sanjiu Pharmaceutical Co., Ltd.	2013.4.17	2000.3.9	C27	Pharmacy	000999	15.69	8.61	6.87	35.26	157
11	Guangzhou Baiyunshan Pharmaceutical Co., Ltd.	2013.3.28	2001.2.6	C27	Pharmacy	600332	4.96	6.24	8.13	32.25	145

(continued)

Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
12	Yunnan Baiyao Group Co., Ltd.	2013.2.5	1993.12.15	C27	Pharmacy	000538	11.56	10.66	13.64	34.10	229
13	Jiangxi Copper Industry Co., Ltd.	2013.2.28	2002.1.11	C32	Nonferrous metal smelting and rolling processing	600362	3.34	78.13	158.16	43.80	133
14	Chongqing Changan Automobile Co., Ltd.	2013.2.20	1997.6.10	C36	Motor	000625	4.80	46.12	37.74	59.48	188
15	Hubei Yihua Group Co., Ltd.	2013.12.21	1996.8.15	C26	Manufacturing of chemical materials and products	000422	7.62	29.65	18.91	73.48	208
16	Zhuzhou Qianjin Pharmaceutical Co., Ltd.	2013.10.9	2004.3.12	C27	Pharmacy	600479	8.27%	1.65	1.96	35.33	114
17	Hubei Sanonda Co., Ltd.	2013.10.25	1993.12.3	C26	Manufacturing of chemical materials and products	000553	4.45	2.41	3.49	47.42	238
18	China Southern Airlines Group Co., Ltd.	2013.10.16	2003.7.25	G56	Air transport	600029	3.74	142.49	96.35	72.21	122
19	Chengdu Dr. Peng Telecom Media Group Co., Ltd.	2013.10.15	1994.1.3	I64	Internet and related services	600804	8.12	8.67	0.83	56.44	237
20	Kunyao Pharmaceutical Group Co., Ltd.	2013.10.13	2000.12.6	C27	Pharmacy	600422	6.67%	2.15	3.56	50.89	154
21	Shanghai Hyundai Pharmaceutical Co., Ltd.	2013.1.6	2004.6.16	C27	Pharmacy	600420	7.56	2.47	0.72	51.78	102
22	Renhe Pharmaceutical Co., Ltd.	2013.1.22	1996.12.10	C27	Pharmacy	000650	13.23	2.09	2.07	18.27	193

(continued)

Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/RMB)	Firm revenue (Billion/RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
23	Henan Shuanghui Investment Development Co., Ltd.	2013.1.17	1998.12.10	C13	Farm and sideline food processing	000895	7.73	16.70	40.58	24.80	169
24	Tangshan Jidong Cement Co., Ltd.	2013.1.17	1996.6.14	C30	Manufacture of non-metallic mineral products	000401	0.94%	41.50	4.36	67.80	199
25	Sichuan Kelun Pharmaceutical Co., Ltd.	2013.4.26	2010.6.3	C27	Pharmacy	002422	18.58	14.93	5.88	39.29	34
26	Jinjian Rice Industry Co., Ltd.	2012.9.22	1998.5.6	C13	Farm and sideline food processing	600127	-4.96	1.39	1.44	44.71	172
27	Fosun Pharmaceutical Co., Ltd.	2012.9.14	1998.8.7	C27	Pharmacy	600196	21.35%	22.29	7.26	48.99	169
28	Joincare Pharmaceutical Group Industry Co., Ltd.	2012.8.30	2001.6.8	C27	Pharmacy	600380	10.25	8.81	0.58	38.06	134
29	Shanxi Fen Wine Co., Ltd.	2012.8.27	1994.1.6	C15	Wine, beverage and refined tea	600809	20.60	4.91	4.27	25.10	223
30	Gujing Gong Wine Co., Ltd.	2012.8.22	1996.9.27	C15	Wine, beverage and refined tea	000596	17.12	4.24	4.54	34.91	190
31	Hefei Rongshida Sanyo Electric Co., Ltd.	2012.8.2	2004.7.27	C38	Electrical machinery and equipment	600983	8.25	3.72	3.89	64.62	96
32	Xining Special Steel Co., Ltd.	2012.7.28	1997.10.15	C31	Ferrous metal smelting and rolling processing	600117	5.95	13.41	9.14	74.68	177
33	Guangming dairy co., Ltd.	2012.7.21	2002.8.28	C14	Food manufacturing	600597	2.30	7.37	11.58	58.73	118

(continued)

Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
34	Chongqing Taiji Industry (Group) Co., Ltd.	2012.7.18	1997.11.18	C27	Pharmacy	600129	0.69	7.95	6.54	79.61	176
35	Anyang Iron & Steel Co., Ltd.	2012.7.17	2001.8.20	C31	Ferrous metal smelting and rolling processing	600569	0.12	32.95	20.51	67.04	130
36	Kangmei Pharmaceutical Co., Ltd.	2012.7.17	2001.3.19	C27	Pharmacy	600518	16.53	15.24	11.16	37.00	135
37	Jinling Pharmaceutical Co., Ltd.	2012.6.26	1999.11.18	C27	Pharmacy	000919	9.33	2.96	0.83	21.40	151
38	Zhejiang Guyue Longshan Shaoxing Wine Co., Ltd.	2012.6.15	1997.5.16	C15	Wine, beverage and refined tea manufacturing	600059	13.76	3.09	0.75	26.40	180
39	Inner Mongolia Yili Industrial Group Co., Ltd.	2012.6.12	1996.3.12	C14	Food manufacturing	600887	4.89	19.93	37.27	68.36	195
40	Henan Tianfang Pharmaceutical Co., Ltd.	2012.5.28	2000.12.27	C27	Pharmacy	600253	1.41	3.37	1.33	72.29	137
41	Henan Shuanghui Investment Development Co., Ltd.	2012.5.27	1998.12.10	C13	Farm and sideline food processing	000895	1.71	7.84	36.63	44.69	161
42	Sichuan Dikang Technology Pharmaceutical Co., Ltd.	2012.5.27	2001.2.12	C27	Pharmacy	600466	7.42	0.63	0.31	13.44	135
43	Guangzhou Baiyunshan Pharmaceutical Co., Ltd.	2012.5.26	1993.11.8	C27	Pharmacy	000522	7.38	3.15	3.76	55.28	222
44	Lanzhou Foci Pharmaceutical Co., Ltd.	2012.5.26	2011.12.22	C27	Pharmacy	002644	11.82	0.83	0.27	21.84	5
45	Zhejiang Asia Pacific Pharmaceutical Co., Ltd.	2012.5.26	2010.3.16	C27	Pharmacy	002370	10.42	0.87	0.42	14.51	26

(continued)

Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
46	Southwest Pharmaceutical Co., Ltd.	2012.5.26	1993.7.12	C27	Pharmacy	600666	3.55	1.57	0.97	74.79	226
47	Shandong Lukang Pharmaceutical Co., Ltd.	2012.5.26	1997.2.26	C27	Pharmacy	600789	0.81	3.48	2.30	51.35	183
48	Jiangsu Kangyuan Pharmaceutical Co., Ltd.	2012.5.24	2002.9.18	C27	Pharmacy	600557	12.32	2.58	1.54	42.87	116
49	Harbin Pharmaceutical Group Sanjing Pharmaceutical Co., Ltd.	2012.5.2	1994.2.24	C27	Pharmacy	600829	10.77	3.84	3.60	49.64	218
50	Guizhou Bailing Enterprise Group Pharmaceutical Co., Ltd.	2012.4.29	2010.6.3	C27	Pharmacy	002424	18.44	3.02	0.89	35.72	22
51	Guizhou Yibai Pharmaceutical Co., Ltd.	2012.4.29	2004.3.23	C27	Pharmacy	600594	14.07	1.80	1.90	36.90	97
52	Guizhou Xinbang Pharmaceutical Co., Ltd.	2012.4.29	2010.4.16	C27	Pharmacy	002390	12.68	1.24	0.36	21.23	24
53	Shanghai Fudan Fuhua Technology Co., Ltd.	2012.4.24	1993.1.5	C27	Pharmacy	600624	3.98	1.52	0.72	58.17	231
54	Tonghua Golden-Horse Pharmaceutical Industry Co.Ltd	2012.4.15	1997.4.30	C27	Pharmacy	000766	6.19	0.88	0.00	30.99	179
55	Baoshan Iron and Steel Co., Ltd.	2012.2.23	2000.12.12	C31	Ferrous metal smelting and rolling processing	600019	3.48	231.10	0.22	50.90	134
56	Angang Steel Co., Ltd.	2012.2.20	1997.12.25	C31	Ferrous metal smelting and rolling processing	000898	-2.58	102.99	0.90	49.21	169
57	Vanke Enterprise Co., Ltd.	2012.2.16	1991.1.29	K70	Real estate	000002	16.16	296.21	0.01	77.10	252

(continued)

Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
58	Guizhou Moutai Co., Ltd.	2012.12.4	2001.8.27	C15	Wine, beverage and refined tea manufacturing	600519	50.27	34.90	18.40	27.21	135
59	Beijing Sanyuan Food Co., Ltd.	2012.12.27	2003.9.15	C14	Food manufacturing	600429	0.66	3.46	3.55	48.59	111
60	Luzhou Laojiao Co., Ltd.	2012.12.25	1994.5.9	C15	Wine, beverage and refined tea manufacturing	000568	36.26	12.48	11.28	42.10	223
61	Shandong Chenming Paper Group Co., Ltd.	2012.12.10	2000.11.20	C22	Papermaking and paper products	000488	3.32	45.63	20.15	67.15	144
62	Zhejiang Hisun Pharmaceutical Co., Ltd.	2012.1.3	2000.7.25	C27	Pharmacy	600267	9.99	8.23	5.07	44.19	137
63	Shanghai Shentong Metro Co., Ltd.	2011.9.27	1994.2.24	G54	Road transport	600834	11.23	1.78	0.78	38.35	211
64	China Coal Energy Co., Ltd.	2011.9.17	2008.2.1	B06	Coal Mining	601898	10.62	120.82	88.87	29.22	43
65	Harbin Pharmaceutical Group Sanjing Pharmaceutical Co., Ltd.	2011.6.5	1993.6.29	C27	Pharmacy	600664	9.04	11.76	13.49	44.35	215
66	Chongqing Tongjunge Co., Ltd.	2011.5.6	1996.2.8	C27	Pharmacy	000591	0.43	2.30	0.00	76.86	182
67	Jiangxi Changjiu Biochemical Co., Ltd.	2011.5.20	1999.1.19	C26	Manufacturing of chemical materials and products	600228	-14.89	0.94	0.95	79.12	148
68	Sany Heavy Industry Co., Ltd.	2011.4.19	2003.7.3	C35	Special equipment manufacturing	600031	18.15	31.34	0.05	61.97	93

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Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
69	Shanxi Antai Group Co., Ltd.	2011.3.29	2003.2.12	C31	Ferrous metal smelting and rolling processing	600408	0.47	6.81	4.82	56.89	97
70	Henan Shuanghui Investment Development Co., Ltd.	2011.3.15	1998.12.10	C13	Farm and sideline food processing	000895	3.92	6.71	36.63	35.78	147
71	CHANGCHUN GAS CO., LTD	2011.3.12	2000.12.11	D45	Gas production and supply	600333	4.80	2.36	1.51	40.94	123
72	Kangzhi Pharmaceutical Co., Ltd.	2011.2.11	2010.5.26	C27	Pharmacy	300086	44.30	1.90	0.00	3.99	8
73	Chongqing Beer Co., Ltd.	2011.12.8	1997.10.30	C15	Wine, beverage and refined tea manufacturing	600132	15.02	3.55	2.61	57.88	169
74	Qianjiang Yonggan Pharmaceutical Co., Ltd.	2011.12.28	2010.3.5	C27	Pharmacy	002365	14.42	1.09	0.42	6.98	21
75	Hubei Sanonda Co., Ltd.	2011.11.9	1993.12.3	C26	Manufacturing of chemical materials and products	000553	1.50	2.01	1.61	44.5	215
76	Henan Dayou Energy Co., Ltd.	2011.11.3	2003.10.9	B06	Coal Mining	600403	3.71	0.36	7.69	11.24	96
77	Jiujiu Liquor Co., Ltd.	2011.11.19	1997.7.18	C15	Wine, beverage and refined tea manufacturing	000799	14.05	1.29	0.36	41.41	172
78	Nanjing Iron and Steel Co., Ltd.	2011.10.5	2000.9.19	C31	Ferrous metal smelting and rolling processing	600282	3.05	35.21	38.57	71.17	132

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Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
79	Shandong United Chemical Co., Ltd.	2011.10.19	2008.2.20	C26	Manufacturing of chemical materials and products	002217	9.91	1.31	1.13	35.28	43
80	Zoomlion Heavy Industry Co., Ltd.	2011.10.17	2000.10.12	C35	Special equipment manufacturing	000157	14.25	63.00	0.00	56.39	132
81	Zhejiang Supor Co., Ltd.	2011.10.13	2004.8.17	C33	Metal products	002032	7.88	3.93	7.00	30.37	85
82	Henan Lingrui Pharmaceutical Co., Ltd.	2011.10.11	2000.10.18	C27	Pharmacy	600285	12.68	1.20	0.00	40.81	131
83	Hunan Tianrun Chemical Development Co., Ltd.	2010.8.17	2007.2.8	C26	Manufacturing of chemical materials and products	002113	-19.98	0.66	0.07	44.91	42
84	Yunnan Baiyao Industrial Co., Ltd.	2010.7.16	1993.12.15	C27	Pharmacy	000538	8.49	6.01	0.00	39.56	199
85	Zhuhai Gree Electric Appliance Co., Ltd.	2010.6.29	1996.11.18	C38	Electrical machinery and equipment manufacturing	000651	6.90	51.53	0.00	79.33	163
86	Overseas Chinese Town A Co., Ltd.	2010.6.29	1997.9.10	K70	Real estate	000069	17.01	30.74	10.91	62.76	153
87	Pingdingshan Tianan Coal Industry Co., Ltd.	2010.6.13	2006.11.23	B06	Coal Mining	601666	7.47	15.85	21.63	49.41	42
88	Guangdong Midea Electric Co., Ltd.	2010.5.23	1993.11.12	C38	Electrical machinery and equipment manufacturing	000527	5.32	31.66	0.09	59.80	198
89	Dalian Meiluo Pharmaceutical Co., Ltd.	2010.4.15	2000.11.16	C27	Pharmacy	600297	1.10	1.95	1.03	59.40	112
90	Harbin Air Conditioning Co., Ltd.	2010.3.30	1999.6.3	C38	Electrical machinery and equipment manufacturing	600202	13.41	2.87	0.68	63.90	129
91	China Coal Energy Co., Ltd.	2010.3.28	2008.2.1	B06	Coal Mining	601898	13.20	109.68	0.00	29.02	25

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Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
92	Shenzhen Zhongjinlingnan Nonferrous Metals Co., Ltd.	2010.10.21	1997.1.23	C32	Nonferrous metal smelting and rolling processing	000060	6.89	11.65	0.00	59.42	164
93	Jiangzhong Pharmaceutical Co., Ltd.	2009.7.23	1996.9.23	C27	Pharmacy	600750	8.88	1.59	2.64	38.88	154
94	Hebei Iron and Steel Co., Ltd.	2009.7.11	1997.4.16	C31	Ferrous metal smelting and rolling processing	000709	3.58	41.52	0.01	68.63	146
95	Poly Real Estate (Group) Co., Ltd.	2009.4.8	2006.7.31	K70	Real estate	600048	19.61	53.63	47.03	70.78	32
96	Chongqing Jianfeng Chemical Co., Ltd.	2009.3.24	1999.9.16	C26	Manufacturing of chemical materials and products	000950	18.82	2.49	3.31	60.49	114
97	Yunnan Yuntianhua Co., Ltd.	2009.3.23	1997.7.9	C26	Manufacturing of chemical materials and products	600096	10.69	17.66	7.99	69.24	140
98	Tianjin Tasly pharmaceutical Co., Ltd.	2009.2.6	2002.8.23	C27	Pharmacy	600535	7.29	3.45	6.54	39.30	77
99	Shanxi Xishan Coal and Electricity Power Co., Ltd.	2009.2.22	2000.7.26	B06	Coal Mining	000983	26.65	17.49	29.85	40.38	102
100	UFIDA Network Technology Co., Ltd.	2009.12.24	2001.5.18	I65	Software and information technology services	600588	23.63	3.11	2.45	31.82	103
101	Guangdong Wanjiata Co., Ltd.	2008.9.4	1994.1.3	C38	Electrical machinery and equipment manufacturing	000533	4.11	2.61	0.00	77.33	176
102	Vanke Enterprise Co., Ltd.	2008.5.15	1991.1.29	K70	Real estate	000002	14.97	100.09	0.01	66.11	207

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No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
103	China Eastern Airlines Co., Ltd.	2008.3.31	1997.11.5	G56	Air transport	600115	1.40	67.14	0.08	94.69	124
104	Jiangxi Changjiu Biochemical Co., Ltd.	2008.3.27	2002.5.30	D44	Electricity and heat production and supply	600505	16.07	1.65	0.55	86.26	69
105	Dong aijao co., Ltd.	2014.3.22	1996.7.29	C27	Pharmacy	000423	30.37	5.98	1.13	14.97	211
106	Shandong Chenming Paper Group Co., Ltd.	2014.8.27	2000.11.20	C22	Papermaking and paper products	000488	3.39	47.52	17.42	69.20	165
107	Yunnan Baiyao Group Co., Ltd.	2014.7.17	1993.12.15	C27	Pharmacy	000538	14.68	12.88	16.37	29.91	247
108	Yunnan Baiyao Group Co., Ltd.	2014.1.7	1994.1.6	B06	Coal Mining	000552	11.50	5.73	4.09	54.55	240
109	Hainan Haiyao Co., Ltd.	2014.1.2	1994.5.25	C27	Pharmacy	000566	9.99	3.47	1.05	54.21	235
110	Chongqing Changan Automobile Co., Ltd.	2014.3.15	1997.6.10	C36	Motor	000625	9.01	53.36	0.00	65.07	201
111	Chengdu Huaze Cobalt Nickel Materials Co., Ltd.	2014.6.8	1997.2.26	B09	Nonferrous metal mining	000693	2.54	3.41	4.37	65.61	207
112	Jiangxi Wannianqing Cement Co., Ltd.	2014.4.29	1997.9.23	C30	Manufacture of non-metallic mineral products	000789	11.30	7.85	6.17	54.77	199
113	Jiangxi Wannianqing Cement Co., Ltd.	2014.8.4	1997.7.18	C15	Wine, beverage and refined tea	000799	-5.67	2.18	0.68	17.92	204
114	Sichuan Jiuzhou Electric Co., Ltd.	2014.10.8	1998.5.6	C39	Manufacturing of computers, communications and other electronic equipment	000801	3.06	3.19	2.20	53.96	197

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Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
115	Chengdu Huaze Cobalt Nickel Materials Co., Ltd.	2014.2.8	2007.2.15	C32	Nonferrous metal smelting and rolling processing	002114	-5.89	1.77	0.81	55.84	83
116	Zhejiang Lutu Co., Ltd.	2014.2.17	2010.7.6	C26	Manufacturing of chemical materials and products	002440	19.30	6.39	4.78	20.70	43
117	Beinmei co., Ltd.	2014.2.25	2011.4.12	C14	Food manufacturing	002570	11.79	5.09	6.06	23.16	34
118	Ningbo United Group Co., Ltd.	2014.12.9	1997.4.10	F51	Wholesale trade	600051	1.58	7.73	0.00	75.62	211
119	Zhejiang Guyue Longshan Shaoxing Wine Co., Ltd.	2014.6.9	1997.5.16	C15	Wine, beverage and refined tea manufacturing	600059	9.88	3.59	0.83	29.85	204
120	Zhejiang Hisun Pharmaceutical Co., Ltd.	2014.1.7	2000.7.25	C27	Pharmacy	600267	5.90	13.97	8.48	57.36	161
121	Jiangsu Thorpe Chemical Co., Ltd.	2014.11.4	1996.9.18	C26	Manufacturing of chemical materials and products	600746	3.81	0.62	0.64	30.22	217
122	Shandong Lukang Pharmaceutical Co., Ltd.	2014.12.25	1997.2.26	C27	Pharmacy	600789	0.19	4.07	2.29	59.88	213
123	Jumbo Auto Trading Group Co., Ltd.	2014.3.12	2011.4.28	F52	Retail	601258	0.34	65.06	63.99	86.01	34
124	Shanghai Great Wisdom Co., Ltd.	2014.6.11	2011.1.28	I65	Software and information technology services	601519	-13.65	3.43	0.65	13.54	40

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Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
125	Guizhou Changzheng Tiancheng Holdings Co., Ltd.	2018.10.18	1997.11.27	C38	Electrical machinery and equipment manufacturing	600112	2.31	2.91	0.56	51.50	250
126	Beijing Dabeinong Technology Group Co., Ltd.	2018.10.15	2010.4.9	C13	Farm and sideline food processing	002385	7.03	19.26	18.74	43.59	102
127	IFLYTEK CO., LTD.	2018.10.12	2008.5.12	I65	Software and information technology services	002230	8.80	13.34	5.44	43.70	125
128	Qingdao Highly Media Co., Ltd.	2018.8.28	1997.6.19	C28	Chemical fiber manufacturing	000782	1.03	2.63	3.81	54.52	254
129	Angel yeast co., Ltd.	2018.8.14	2000.8.18	C14	Food manufacturing	600298	15.46	8.03	6.69	50.30	215
130	Shenzhen Xinlong Health Industry Development Co., Ltd.	2018.8.14	2007.1.12	C37	Manufacturing of railways, ships, aerospace and other transport equipment	002105	2.46	1.45	1.75	62.37	139
131	Tibet Yinhe Technology Development Co., Ltd.	2018.7.31	1997.6.25	C15	Wine, beverage and refined tea manufacturing	000752	12.38	1.50	0.36	11.19	253
132	Changsheng Biotechnology Co., Ltd.	2018.7.15	2012.6.5	C27	Pharmacy	002680	36.54	4.51	1.55	13.97	73
133	Jiangsu Baoli International Investment Co., Ltd.	2018.6.5	2010.10.26	C26	Manufacturing of chemical materials and products	300135	1.99	3.07	1.80	60.74	91
134	Hytera Communications Co., Ltd.	2018.5.24	2011.5.27	C39	Manufacturing of computers, communications and other electronic equipment	002583	4.58	13.93	5.35	58.63	83

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Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
135	Jiangsu Huifeng Agricultural Chemical Co., Ltd.	2018.4.20	2010.11.9	C26	Manufacturing of chemical materials and products	002496	11.02	8.12	3.95	46.62	89
136	Shanxi Road and Bridge Co., Ltd.	2018.4.17	1997.6.27	G54	Road transport	000755	4.01	2.00	2.29	59.99	249
137	Zhangzidao Group Co., Ltd.	2018.2.22	2006.9.28	A04	Fishery	002069	-22.64	3.94	3.21	89.78	136
138	Jiujiu Liquor Co., Ltd.	2018.1.12	1997.7.18	C15	Wine, beverage and refined tea	000799	19.83	2.54	0.88	21.09	245
139	Sinovel Wind Power Technology (Group) Co., Ltd.	2018.1.9	2011.1.13	C34	General machinery manufacturing	601558	81.59	6.71	0.05	80.66	83
140	Zhejiang Shapu Aisi Pharmaceutical Co., Ltd.	2017.12.22	2014.7.2	C27	Pharmacy	603168	28.17	1.84	0.94	10.33	41
141	Shandong Rike Chemical Co., Ltd.	2017.12.19	2011.5.11	C26	Manufacturing of chemical materials and products	300214	5.17	1.48	2.10	8.69	79
142	Jiangsu Yabaite Technology Co., Ltd.	2017.5.12	2009.12.18	E50	Building decoration and other construction	002323	19.10	2.04	1.38	62.30	88
143	Yunnan Yuntou Ecological Environment Technology Co., Ltd.	2017.8.4	2007.12.21	A02	Forestry	002200	6.71	3.44	0.67	72.28	115

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No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/RMB)	Firm revenue (Billion/RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
144	Nanjing Panda Electronics Co., Ltd.	2017.7.27	1996.11.18	C39	Manufacturing of computers, communications and other electronic equipment	600775	4.56	5.24	0.00	36.48	248
145	Guangdong Jinlong Development Co., Ltd.	2017.7.26	1997.4.15	J67	Capital market services	000712	81.58	26.17	1.17	82.31	243
146	Zhuhai Gree Electric Appliance Co., Ltd.	2017.7.25	1996.11.18	C38	Electrical machinery and equipment manufacturing	000651	14.33	182.37	148.29	73.82	248
147	Meihua Biotechnology Group Co., Ltd.	2017.7.24	1995.2.17	C14	Food manufacturing	600873	9.62	16.98	11.07	46.65	269
148	Yuantong Express Co., Ltd.	2017.7.23	2000.6.8	G60	Mail business	600233	8.16	11.17	0.00	23.18	205
149	Liuzhou Chemical Co., Ltd.	2017.7.17	2003.7.17	C26	Manufacturing of chemical materials and products	600423	-39.31	3.70	1.83	103.14	168
150	Beijing Wandong Medical Equipment Co., Ltd.	2017.7.15	1997.5.19	C35	Special equipment manufacturing	600055	8.41	2.20	0.80	15.30	241
151	Anhui Heli Co., Ltd.	2017.6.26	1996.10.9	C35	Special equipment manufacturing	600761	7.41	6.38	0.00	32.61	248
152	Shanghai Kallang Songzhi Automotive Air Conditioning Co., Ltd.	2017.6.15	2010.7.20	C36	Motor	002454	7.93	4.81	3.24	37.29	82
153	Hangzhou Boss Electric Co., Ltd.	2017.6.14	2010.11.23	C38	Electrical machinery and equipment manufacturing	002508	20.83	6.42	5.79	35.85	78

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Table A2

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154	Jiangsu Baoli International Investment Co., Ltd.	2016.12.29	2010.10.26	C26	Manufacturing of chemical materials and products	300135	1.34	2.79	1.75	59.09	74
155	Shandong Molong Petroleum Machinery Co., Ltd.	2017.4.6	2010.10.21	C35	Special equipment manufacturing	002490	-42.50	5.77	1.53	66.74	77
156	Zhejiang Dadongnan Packing Co., Ltd.	2017.2.6	2008.7.28	C29	Rubber and plastic products	002263	-20.23	3.97	0.95	29.72	102
157	Qianjin Pharmaceutical Co., Ltd.	2017.1.17	2004.3.12	C27	Pharmacy	600479	6.05	3.03	2.84	31.27	154
158	Tangrenshen Group Co., Ltd.	2018.11.11	2011.3.25	C13	Farm and sideline food processing	002567	2.81	6.03	13.72	38.09	91
159	Beijing Huaye Capital Holdings Co., Ltd.	2018.10.26	2000.6.28	K70	Real estate	600240	25.77	20.85	3.86	61.70	219
160	Zhejiang Xiangyuan Culture Co., Ltd.	2018.9.21	2003.2.20	R87	Arts and culture	600576	11.67	2.09	0.79	12.81	187
161	Zhejiang Xiangyuan Culture Co., Ltd.	2018.4.17	2003.2.20	R87	Arts and culture	600576	11.67	2.09	0.79	12.81	181
162	Jilin Liyuan Refining Co., Ltd.	2018.9.13	2010.11.17	C32	Nonferrous metal smelting and rolling processing	002501	17.26	15.23	3.03	52.42	93
163	Shanghai Lai Yifen Co., Ltd.	2018.9.11	2016.10.12	F52	Retail	603777	2.79	3.00	3.57	28.35	22
164	Hubel Energy Group Co., Ltd.	2018.8.30	1998.5.19	D44	Electricity and heat production and supply	000883	17.95	46.36	11.57	39.23	243

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Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
165	Yitong Century Technology Co., Ltd.	2018.8.25	2012.4.25	I63	Telecommunications, broadcast television and satellite	300310	8.40	4.55	2.58	21.18	76
166	Yibin Wuliangye Co., Ltd.	2018.8.24	1998.4.27	C15	transmission services Wine, beverage and refined tea	000858	33.41	70.92	30.19	27.21	243
167	Shanxi Antai Group Co., Ltd.	2018.8.22	2003.2.12	C31	manufacturing Ferrous metal smelting and rolling processing	600408	-4.29	5.47	6.32	75.71	186
168	Tianjin Chuangye Environmental Protection Co., Ltd.	2018.8.15	1995.6.30	D46	Water production and supply	600874	24.17	12.45	2.15	55.35	277
169	Huan Securities Co., Ltd.	2018.8.15	2016.12.6	J67	Capital market services	600909	42.30	39.91	1.92	73.11	20
170	Ningbo Dongli Co., Ltd.	2018.8.8	2007.8.23	L72	Commercial service	002164	1.24	16.39	12.87	98.07	131
171	Zhuhai Rundu Pharmaceutical Co., Ltd.	2018.8.4	2018.1.5	C27	Pharmacy	002923	11.63	0.71	0.78	20.05	6
172	Zhejiang Tianyu Pharmaceutical Co., Ltd.	2018.8.4	2017.9.19	C27	Pharmacy	300702	8.43	2.11	1.19	41.61	10
173	Zhejiang Huahai Pharmaceutical Co., Ltd.	2018.7.6	2003.3.4	C27	Pharmacy	600521	12.47	8.27	3.99	46.72	184
174	Guangzhou Yangpu Medical Technology Co., Ltd.	2018.7.20	2009.12.25	C35	Special equipment manufacturing	300030	1.50	1.75	0.55	42.63	102
175	Guangxi Guidong Electric Power Co., Ltd.	2018.7.17	2001.2.28	D44	Electricity and heat production and supply	600310	0.98	12.75	11.93	83.40	208

(continued)

Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
176	Tianxia Smart City Technology Co., Ltd.	2018.7.13	1996.12.16	I65	Software and information technology services	000662	34.48	7.11	1.67	18.75	258
177	Guangdong Shaogang Songshan Co., Ltd.	2018.2.6	1997.5.8	C31	Ferrous metal smelting and rolling processing	000717	9.66	14.42	26.04	79.38	248
178	Guangdong Shaogang Songshan Co., Ltd.	2018.2.10	1997.5.8	C31	Ferrous metal smelting and rolling processing	000717	9.66	14.42	26.04	79.38	249
179	Brother Technology Co., Ltd.	2018.6.14	2011.3.10	C27	Pharmacy	002562	25.76	3.47	1.56	34.64	87
180	Ningbo Shengleda Electric Co., Ltd.	2018.5.10	2010.9.10	C38	Electrical machinery and equipment manufacturing	002473	-49.23	0.38	0.12	23.38	92
181	Jiangxi Ganneng Co., Ltd.	2018.5.7	1997.11.26	D44	Electricity and heat production and supply	000899	0.77	7.32	2.13	39.21	245
182	Jiangsu Huifeng Biological Agriculture Co., Ltd.	2018.5.2	2010.11.9	C26	Manufacturing of chemical materials and products	002496	11.02	8.12	3.95	46.62	89
183	Chengdu Road and Bridge Construction (Group) Co., Ltd.	2018.1.28	2011.11.3	E48	Civil engineering construction	002628	1.12	5.60	1.99	52.20	74
184	Jiangsu Yabaite Technology Co., Ltd.	2017.12.19	2009.12.18	E50	Building decoration and other construction	002323	19.10	2.04	1.38	61.92	96

(continued)

Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
185	Guangdong Chaohua Technology Co., Ltd.	2017.12.16	2009.9.3	C39	Manufacturing of computers, communications and other electronic equipment	002288	-7.49	2.27	1.44	41.54	99
186	Xinjiang Western Animal Husbandry Co., Ltd.	2017.11.28	2010.8.20	A03	Grazery	300106	-7.04	2.77	0.69	63.87	87
187	Shenzhen Youboxun Technology Co., Ltd.	2017.10.12	2016.8.9	C39	Manufacturing of computers, communications and other electronic equipment	300531	20.29	0.64	0.44	23.59	14
188	Wingtech Technology Co., Ltd.	2017.10.11	1996.8.28	C39	Manufacturing of computers, communications and other electronic equipment	600745	1.43	12.88	16.87	70.22	253
189	Sichuan Western Resources Holdings Co., Ltd.	2017.8.11	1998.2.25	C36	communications and other electronic equipment Motor	600139	-16.82	6.07	0.29	72.99	233
190	Zhejiang Nuclear New Flush Network Information Co., Ltd.	2017.8.10	2009.12.25	I65	Software and information technology services	300033	69.89	4.08	1.41	28.74	91

(continued)

Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
191	Shenzhen Yuanwanggu Information Technology Co., Ltd.	2017.7.20	2007.8.21	C39	Manufacturing of computers, communications and other electronic equipment	002161	7.82	2.13	0.51	22.57	118
192	Zhangjiajie Tourism Group Co., Ltd.	2016.11.30	1996.8.29	N78	Public facilities management	000430	16.94	0.87	0.59	51.11	243
193	China CSG Group Co., Ltd.	2016.11.7	1992.2.28	C30	Manufacture of non-metallic mineral products	000012	7.37	15.66	8.97	51.33	296
194	Fujian Cement Co., Ltd.	2016.11.10	1994.1.3	C30	Manufacture of non-metallic mineral products	600802	-35.12	5.05	1.31	71.99	274
195	Guangzhou Baiyunshan Pharmaceutical Co., Ltd.	2016.7.19	2001.2.6	C27	Pharmacy	600332	7.03	15.87	2.48	46.14	185
196	North China Pharmaceutical Co., Ltd.	2016.4.4	1994.1.14	C27	Pharmacy	600812	0.64	16.00	7.80	67.65	266
197	Guangzhou Boji Pharmaceutical	2015.12.8	2015.4.24	C27	Pharmacy	300404	20.27	0.52	0.13	16.95	7
198	Biotechnology Co., Ltd. Hangzhou Tiger Pharmaceutical Technology Co., Ltd.	2015.12.8	2012.8.17	C27	Pharmacy	300347	21.84	4.62	0.96	28.70	39
199	Shenzhen Xinlitai Pharmaceutical Co., Ltd.	2015.9.21	2009.9.10	C27	Pharmacy	002294	36.20	5.39	3.48	13.00	72

(continued)

Table A2

No.	Firm name	Event time	Time to market	Industry code	Firm type	Stock code	Profitability (%)	Firm asset (Billion/ RMB)	Firm revenue (Billion/ RMB)	Asset liability ratio (%)	Tenure in stock market (Month)
200	Furen Pharmaceutical Group Pharmaceutical Co., Ltd.	2015.7.21	1996.12.18	C27	Pharmacy	600781	3.66	1.07	0.43	63.41	223
201	Tibet Nuodikang Pharmaceutical Co., Ltd.	2015.3.30	1999.7.21	C27	Pharmacy	600211	1.21	1.05	1.66	61.5	188
202	Guizhou Moutai Wine Co., Ltd.	2016.3.15	2001.8.27	C15	Wine, beverage and refined tea	600519	50.38	86.30	32.65	37.77	174
203	Sun Yat-sen University Daan Gene Co., Ltd.	2015.3.6	2004.8.9	C27	Pharmacy	002030	14.60	1.59	1.08	50.97	126

Notes: *Industry Code* reveals main business types of listed companies in this study, including 41 industry types from Forestry Industry (Industry code: A02) to Arts and Culture Industry (Industry code: R87). *Time to Market* reveals the time when the firm went public. *Profitability* means the net profit margin on sales in the year before the crisis. *Firm Asset* reveals the total assets of the firm in the year before the crisis. *Firm Revenue* means the corporate business revenue in the year before the crisis. *Tenure in Stock Market* means the time interval between the time when the firm went public and the event time

Table A3 Regressions of crisis-related cumulative abnormal returns (seven-day CAR)

Variables	Model 1	p-value	Model 2	p-value	Model 3	p-value	Model 4	p-value	Model 5	p-value
(Constant)	-0.049 (0.094)	0.603	-0.107 (0.095)	0.259	-0.102 (0.092)	0.272	-0.096 (0.094)	0.310	-0.091 (0.092)	0.324
Profitability	-0.073 (0.073)	0.315	-0.078 (0.071)	0.277	-0.062 (0.070)	0.376	-0.076 (0.071)	0.281	-0.061 (0.069)	0.380
Tobin's Q	-0.051 (0.079)	0.520	-0.056 (0.078)	0.473	-0.078 (0.076)	0.306	-0.066 (0.077)	0.395	-0.087 (0.075)	0.250
Leverage	0.075 (0.082)	0.362	0.034 (0.083)	0.686	-0.016 (0.082)	0.848	0.017 (0.082)	0.840	-0.031 (0.082)	0.704
Firm size	0.005 (0.083)	0.955	-0.020 (0.082)	0.809	-0.011 (0.080)	0.889	-0.020 (0.081)	0.809	-0.011 (0.079)	0.888
Number of fatalities	-0.265 (0.072)	0.000	-0.231 (0.071)	0.001	-0.239 (0.069)	0.001	-0.241 (0.071)	0.001	-0.248 (0.069)	0.000
Product harm	-0.202 (0.230)	0.381	-0.066 (0.231)	0.776	-0.078 (0.225)	0.730	-0.091 (0.229)	0.693	-0.101 (0.223)	0.650
Technical accidents	0.342 (0.188)	0.070	0.303 (0.185)	0.102	0.361 (0.180)	0.047	0.296 (0.183)	0.107	0.353 (0.179)	0.050
Organizational misdeed	0.030 (0.191)	0.877	0.308 (0.209)	0.142	0.222 (0.205)	0.281	0.278 (0.208)	0.183	0.194 (0.204)	0.343
Return on industry assets	-0.039 (0.076)	0.612	-0.066 (0.077)	0.392	-0.088 (0.075)	0.245	-0.069 (0.076)	0.366	-0.090 (0.074)	0.227
Market share	0.117 (0.083)	0.161	0.175 (0.085)	0.040	0.186 (0.082)	0.025	0.177 (0.084)	0.037	0.187 (0.082)	0.023
Corporate transparency (CT)			-0.056 (0.069)	0.420	-0.068 (0.068)	0.318	-0.076 (0.069)	0.276	-0.086 (0.067)	0.203
Unrelated diversification (UD)			0.122 (0.071)	0.087	0.190 (0.072)	0.009	0.119 (0.070)	0.093	0.185 (0.071)	0.010
Attribution of knowledge deficiency (AD)			-0.207 (0.077)	0.008	-0.152 (0.076)	0.048	-0.213 (0.076)	0.006	-0.159 (0.076)	0.038
UD*CT					0.247 (0.072)	0.001			0.243 (0.072)	0.001
UD*AD							-0.155 (0.072)	0.033	-0.148 (0.070)	0.037
R ²	0.125		0.172		0.220		0.191		0.238	
R ² adj	0.080		0.115		0.162		0.131		0.177	
F-statistic	2.750**		3.013**		3.790**		3.179**		3.898**	

Note: $n = 203$, values in table are unstandardized regression coefficients. Standard errors are in parentheses

Table A4	Regressions of crisis-related cumulative abnormal returns (three-day CAR, without three dummy variables)									
Variables	Model 1	p-value	Model 2	p-value	Model 3	p-value	Model 4	p-value	Model 5	p-value
(Constant)	0.000(0.068)	1.000	0.000(0.066)	1.000	0.000(0.064)	0.996	0.003(0.065)	0.966	0.002(0.063)	0.971
Profitability	−0.159(0.073)	0.030	−0.161(0.071)	0.025	−0.146(0.069)	0.037	−0.159(0.070)	0.024	−0.145(0.068)	0.035
Tobin's Q	−0.002(0.077)	0.979	0.012(0.075)	0.870	−0.016(0.074)	0.826	−0.003(0.074)	0.972	−0.030(0.073)	0.683
Leverage	−0.014(0.081)	0.867	−0.056(0.080)	0.491	−0.106(0.080)	0.187	−0.080(0.079)	0.315	−0.128(0.079)	0.107
Firm size	0.003(0.083)	0.973	−0.034(0.082)	0.678	−0.024(0.080)	0.768	−0.033(0.080)	0.678	−0.023(0.078)	0.766
Number of fatalities	−0.176(0.070)	0.013	−0.153(0.068)	0.026	−0.152(0.066)	0.023	−0.165(0.067)	0.015	−0.163(0.065)	0.013
Return on industry assets	−0.120(0.075)	0.112	−0.146(0.075)	0.053	−0.166(0.073)	0.025	−0.151(0.074)	0.042	−0.170(0.072)	0.019
Market share	0.181(0.082)	0.029	0.256(0.083)	0.002	0.266(0.081)	0.001	0.258(0.082)	0.002	0.268(0.080)	0.001
Corporate transparency (CT)			−0.045(0.068)	0.512	−0.061(0.067)	0.365	−0.072(0.068)	0.288	−0.087(0.066)	0.194
Unrelated diversification (UD)			0.174(0.071)	0.015	0.242(0.072)	0.001	0.170(0.069)	0.015	0.236(0.071)	0.001
Attribution of knowledge deficiency(AD)			−0.183(0.068)	0.007	−0.147(0.067)	0.028	−0.199(0.067)	0.003	−0.163(0.066)	0.014
UD*CT					0.238(0.071)	0.001			0.231(0.070)	0.001
UD*AD							−0.203(0.071)	0.005	−0.195(0.070)	0.006
R ²	0.103		0.164		0.211		0.198		0.242	
R ² adj	0.071		0.121		0.165		0.152		0.194	
F-statistic	3.205**		3.776**		4.642**		4.296**		5.060**	
Notes: n = 203, values in table are unstandardized regression coefficients. Standard errors are in parentheses										

Notes: $n = 203$, values in table are unstandardized regression coefficients. Standard errors are in parentheses

Table A5 Regressions of crisis-related cumulative abnormal returns (three-day CAR, alternative measurement of unrelated diversification)

Variables	Model 1	p-value	Model 2	p-value	Model 3	p-value	Model 4	p-value	Model 5	p-value
(Constant)	0.017 (0.095)	0.861	-0.041 (0.094)	0.663	-0.028 (0.092)	0.763	-0.028 (0.093)	0.761	-0.016 (0.091)	0.863
Profitability	-0.165 (0.073)	0.025	-0.169 (0.071)	0.018	-0.154 (0.070)	0.028	-0.165 (0.070)	0.020	-0.150 (0.068)	0.030
Tobin's Q	-0.006 (0.079)	0.936	-0.015 (0.077)	0.850	-0.036 (0.076)	0.632	-0.028 (0.076)	0.709	-0.049 (0.075)	0.512
Leverage	-0.031 (0.083)	0.703	-0.087 (0.083)	0.294	-0.139 (0.082)	0.092	-0.104 (0.082)	0.204	-0.154 (0.081)	0.059
Firm size	-0.009 (0.084)	0.918	-0.039 (0.082)	0.636	-0.027 (0.080)	0.736	-0.040 (0.081)	0.621	-0.028 (0.079)	0.719
Number of fatalities	-0.200 (0.072)	0.006	-0.163 (0.071)	0.022	-0.173 (0.069)	0.013	-0.175 (0.070)	0.013	-0.184 (0.068)	0.007
Product harm	-0.367 (0.231)	0.113	-0.237 (0.230)	0.305	-0.257 (0.225)	0.254	-0.261 (0.227)	0.251	-0.280 (0.221)	0.208
Technical accidents	0.142 (0.188)	0.452	0.103 (0.184)	0.576	0.158 (0.180)	0.381	0.095 (0.181)	0.600	0.149 (0.177)	0.400
Organizational misdeed	-0.023 (0.191)	0.906	0.258 (0.208)	0.217	0.165 (0.205)	0.422	0.228 (0.205)	0.268	0.138 (0.202)	0.495
Return on industry assets	-0.101 (0.076)	0.187	-0.126 (0.076)	0.101	-0.149 (0.075)	0.048	-0.127 (0.075)	0.092	-0.150 (0.074)	0.043
Market share	0.208 (0.084)	0.014	0.283 (0.085)	0.001	0.294 (0.083)	0.000	0.283 (0.083)	0.001	0.294 (0.081)	0.000
Corporate transparency (CT)			-0.050 (0.069)	0.472	-0.056 (0.067)	0.405	-0.075 (0.069)	0.278	-0.080 (0.067)	0.234
Unrelated diversification (UD)			0.177 (0.071)	0.013	0.240 (0.072)	0.001	0.174 (0.070)	0.013	0.235 (0.071)	0.001
Attribution of knowledge deficiency (AD)			-0.207 (0.076)	0.007	-0.151 (0.076)	0.049	-0.216 (0.075)	0.005	-0.161 (0.075)	0.034
UD*CT					0.237 (0.072)	0.001			0.231 (0.071)	0.001
UD*AD							-0.188 (0.071)	0.009	-0.181 (0.069)	0.010
R ²	0.120		0.179		0.223		0.208		0.250	
R ² adj	0.074		0.123		0.165		0.150		0.190	
F-statistic	2.615**		3.171**		3.857**		3.537**		4.165**	

Notes: $n = 203$, values in table are unstandardized regression coefficients. Standard errors are in parentheses

Table A6 Regressions of crisis-related cumulative abnormal returns (three-day CAR, alternative measurement of corporate transparency—two years before the crisis)

Variables	Model 1	p-value	Model 2	p-value	Model 3	p-value	Model 4	p-value	Model 5	p-value
(Constant)	0.017(0.095)	0.861	−0.044(0.094)	0.779	−0.036(0.093)	0.702	−0.029(0.093)	0.755	−0.018(0.091)	0.840
Profitability	−0.165(0.073)	0.025	−0.167(0.071)	0.223	−0.152(0.070)	0.032	−0.164(0.070)	0.019	−0.148(0.069)	0.032
Tobin's Q	−0.006(0.079)	0.936	−0.014(0.077)	0.858	−0.032(0.076)	0.671	−0.027(0.076)	0.718	−0.049(0.075)	0.516
Leverage	−0.031(0.083)	0.703	−0.091(0.082)	0.272	−0.126(0.082)	0.129	−0.112(0.081)	0.168	−0.152(0.081)	0.062
Firm size	−0.009(0.084)	0.918	−0.036(0.082)	0.663	−0.022(0.081)	0.786	−0.034(0.080)	0.670	−0.019(0.079)	0.808
Number of fatalities	−0.200(0.072)	0.006	−0.161(0.070)	0.023	−0.166(0.070)	0.018	−0.175(0.069)	0.012	−0.181(0.068)	0.009
Product harm	−0.367(0.231)	0.113	−0.242(0.229)	0.293	−0.264(0.226)	0.245	−0.277(0.226)	0.221	−0.304(0.222)	0.172
Technical accidents	0.142(0.188)	0.452	0.104(0.183)	0.569	0.121(0.181)	0.503	0.097(0.180)	0.591	0.115(0.177)	0.518
Organizational misdeed	−0.023(0.191)	0.906	0.277(0.208)	0.186	0.201(0.207)	0.334	0.236(0.205)	0.250	0.151(0.204)	0.458
Return on industry assets	−0.101(0.076)	0.187	−0.133(0.077)	0.086	−0.152(0.076)	0.048	−0.138(0.076)	0.071	−0.158(0.075)	0.036
Market share	0.208(0.084)	0.014	0.283(0.084)	0.001	0.286(0.083)	0.001	0.284(0.083)	0.001	0.288(0.081)	0.000
Corporate transparency (CT)			−0.079(0.070)	0.261	−0.101(0.069)	0.147	−0.099(0.069)	0.151	−0.125(0.068)	0.069
Unrelated diversification (UD)			0.182(0.071)	0.011	0.235(0.073)	0.001	0.178(0.069)	0.011	0.235(0.071)	0.001
Attribution of knowledge deficiency (AD)			−0.206(0.076)	0.008	−0.165(0.077)	0.033	−0.214(0.075)	0.005	−0.170(0.075)	0.025
UD*CT					0.194(0.076)	0.011			0.211(0.074)	0.005
UD*AD							−0.201(0.071)	0.005	−0.216(0.070)	0.002
R ²	0.120		0.183		0.211		0.217		0.249	
R ² adj	0.074		0.127		0.152		0.158		0.189	
F-statistic	2.615**		3.264**		3.590**		3.716**		4.136**	

Notes: $n = 203$, values in table are unstandardized regression coefficients. Standard errors are in parentheses

Table A7 Regressions of crisis-related cumulative abnormal returns (three-day CAR, alternative measurement of corporate transparency—three years before the crisis)

Variables	Model 1	p-value	Model 2	p-value	Model 3	p-value	Model 4	p-value	Model 5	p-value
(Constant)	0.017 (0.095)	0.802	-0.043 (0.094)	0.645	-0.042 (0.093)	0.652	-0.027 (0.092)	0.767	-0.023 (0.091)	0.798
Profitability	-0.165 (0.073)	0.239	-0.167 (0.071)	0.019	-0.155 (0.070)	0.028	-0.165 (0.070)	0.019	-0.150 (0.069)	0.030
Tobin's Q	-0.006 (0.079)	0.974	-0.014 (0.077)	0.853	-0.029 (0.076)	0.701	-0.028 (0.076)	0.707	-0.049 (0.075)	0.511
Leverage	-0.031 (0.083)	0.122	-0.090 (0.082)	0.274	-0.121 (0.073)	0.146	-0.111 (0.081)	0.174	-0.151 (0.081)	0.064
Firm size	-0.009 (0.084)	0.881	-0.033 (0.081)	0.685	-0.014 (0.081)	0.859	-0.031 (0.080)	0.697	-0.008 (0.079)	0.921
Number of fatalities	-0.200 (0.072)	0.006	-0.158 (0.070)	0.026	-0.158 (0.070)	0.025	-0.171 (0.069)	0.015	-0.173 (0.068)	0.012
Product harm	-0.367 (0.231)	0.140	-0.243 (0.229)	0.290	-0.257 (0.227)	0.260	-0.278 (0.225)	0.219	-0.300 (0.222)	0.178
Technical accidents	0.142 (0.188)	0.524	0.097 (0.183)	0.596	0.111 (0.181)	0.542	0.089 (0.180)	0.623	0.104 (0.177)	0.557
Organizational misdeed	-0.023 (0.191)	0.772	0.280 (0.208)	0.179	0.223 (0.208)	0.284	0.237 (0.205)	0.248	0.160 (0.204)	0.432
Return on industry assets	-0.101 (0.076)	0.165	-0.136 (0.077)	0.078	-0.150 (0.077)	0.052	-0.139 (0.076)	0.069	-0.156 (0.075)	0.039
Market share	0.208 (0.084)	0.071	0.280 (0.084)	0.001	0.279 (0.083)	0.001	0.280 (0.082)	0.001	0.278 (0.081)	0.001
Corporate transparency (CT)			-0.092 (0.070)	0.193	-0.105 (0.070)	0.135	-0.105 (0.069)	0.132	-0.123 (0.068)	0.074
Unrelated diversification (UD)			0.184 (0.071)	0.010	0.222 (0.072)	0.002	0.180 (0.069)	0.010	0.226 (0.070)	0.002
Attribution of knowledge deficiency (AD)			-0.201 (0.076)	0.009	-0.172 (0.077)	0.026	-0.209 (0.075)	0.006	-0.175 (0.075)	0.021
UD*CT					0.164 (0.076)	0.032			0.202 (0.075)	0.008
UD*AD							-0.197 (0.071)	0.006	-0.228 (0.070)	0.001
R ²	0.120		0.185		0.205		0.218		0.247	
R ² adj	0.074		0.129		0.146		0.159		0.187	
F-statistic	2.615**		3.305**		3.462**		3.735**		4.089**	

Note: $n = 203$, values in table are unstandardized regression coefficients. Standard errors are in parentheses

Table A8 Regressions of crisis-related cumulative abnormal returns (three-day CAR), add the Tenure in Stock Market as a control variable)

Variables	Model 1	p-value	Model 2	p-value	Model 3	p-value	Model 4	p-value	Model 5	p-value
(Constant)	0.014(0.095)	0.861	-0.043(0.094)	0.649	-0.037(0.092)	0.687	-0.028(0.093)	0.765	-0.022(0.091)	0.805
Tenure in stock market	0.057(0.073)	0.434	0.039(0.071)	0.585	0.025(0.069)	0.721	0.037(0.070)	0.596	0.023(0.068)	0.732
Profitability	-0.164(0.073)	0.026	-0.166(0.071)	0.021	-0.151(0.070)	0.031	-0.164(0.070)	0.020	-0.150(0.068)	0.030
Tobin's Q	-0.003(0.079)	0.967	-0.013(0.077)	0.869	-0.034(0.076)	0.651	-0.026(0.076)	0.737	-0.046(0.075)	0.535
Leverage	-0.044(0.084)	0.599	-0.095(0.084)	0.257	-0.139(0.083)	0.094	-0.117(0.083)	0.159	-0.159(0.082)	0.053
Firm size	-0.019(0.085)	0.825	-0.044(0.083)	0.595	-0.033(0.081)	0.679	-0.044(0.081)	0.592	-0.033(0.079)	0.676
Number of fatalities	-0.193(0.072)	0.008	-0.157(0.071)	0.029	-0.166(0.070)	0.018	-0.170(0.070)	0.016	-0.179(0.068)	0.010
Product harm	-0.350(0.232)	0.132	-0.225(0.231)	0.332	-0.240(0.224)	0.289	-0.258(0.227)	0.259	-0.271(0.222)	0.223
Technical accidents	0.153(0.189)	0.421	0.108(0.184)	0.558	0.160(0.181)	0.376	0.099(0.181)	0.586	0.150(0.177)	0.399
Organizational misdeed	-0.030(0.192)	0.878	0.256(0.209)	0.222	0.176(0.205)	0.393	0.216(0.206)	0.294	0.139(0.202)	0.491
Return on industry assets	-0.110(0.077)	0.156	-0.129(0.077)	0.096	-0.148(0.076)	0.052	-0.133(0.076)	0.081	-0.151(0.074)	0.043
Market share	0.210(0.084)	0.013	0.282(0.084)	0.001	0.292(0.082)	0.000	0.284(0.083)	0.001	0.294(0.081)	0.000
Corporate transparency (CT)			-0.051(0.069)	0.462	-0.063(0.068)	0.354	-0.077(0.069)	0.265	-0.087(0.067)	0.194
Unrelated diversification (UD)			0.178(0.071)	0.013	0.244(0.072)	0.001	0.174(0.070)	0.014	0.238(0.071)	0.001
Attribution of knowledge deficiency (AD)			-0.206(0.076)	0.008	-0.154(0.076)	0.045	-0.214(0.075)	0.005	-0.163(0.075)	0.031
UD*CT					0.235(0.072)	0.001	-0.201(0.071)	0.005	0.229(0.071)	0.001
UD*AD							0.215		-0.195(0.070)	0.006
R ²	0.123		0.182		0.225		0.215		0.257	
R ² adj	0.072		0.121		0.163		0.152		0.193	
F-statistic	2.428**		2.983**		3.629**		3.412**		4.011**	

Note: $n = 203$, values in table are unstandardized regression coefficients. Standard errors are in parentheses

Table A9 Regressions of crisis-related cumulative abnormal returns (three-day CAR, add four dummy variables of corporate type as control variable)

Variables	Model 1	p-value	Model 2	p-value	Model 3	p-value	Model 4	p-value	Model 5	p-value
(Constant)	-0.025 (0.133)	0.851	0.000 (0.131)	1.000	0.005 (0.128)	0.971	0.025 (0.129)	0.845	0.029 (0.126)	0.819
Pharmacy	0.071 (0.198)	0.719	-0.152 (0.206)	0.461	-0.140 (0.201)	0.486	-0.161 (0.202)	0.426	-0.149 (0.197)	0.451
Manufacturing of chemical materials and products	-0.240 (0.266)	0.367	-0.295 (0.260)	0.258	-0.324 (0.254)	0.204	-0.305 (0.256)	0.235	-0.332 (0.250)	0.185
Wine, beverage and refined tea manufacturing	0.345 (0.421)	0.413	0.250 (0.419)	0.551	0.191 (0.408)	0.641	0.194 (0.412)	0.637	0.139 (0.402)	0.730
Capital market services	0.167 (0.819)	0.838	0.471 (0.798)	0.556	0.682 (0.780)	0.383	0.253 (0.788)	0.748	0.467 (0.771)	0.545
Profitability	-0.188 (0.081)	0.022	-0.192 (0.079)	0.016	-0.185 (0.077)	0.018	-0.180 (0.078)	0.022	-0.174 (0.076)	0.023
Tobin's Q	-0.007 (0.080)	0.928	-0.006 (0.078)	0.940	-0.025 (0.077)	0.745	-0.022 (0.077)	0.781	-0.040 (0.076)	0.602
Leverage	-0.037 (0.084)	0.656	-0.109 (0.084)	0.199	-0.159 (0.083)	0.058	-0.127 (0.083)	0.128	-0.176 (0.082)	0.034
Firm size	-0.007 (0.088)	0.934	-0.038 (0.086)	0.655	-0.023 (0.084)	0.783	-0.045 (0.084)	0.597	-0.030 (0.082)	0.720
Number of fatalities	-0.196 (0.073)	0.007	-0.152 (0.071)	0.035	-0.160 (0.069)	0.022	-0.167 (0.070)	0.019	-0.174 (0.069)	0.012
Product harm	-0.366 (0.238)	0.125	-0.166 (0.239)	0.487	-0.184 (0.233)	0.431	-0.203 (0.235)	0.389	-0.219 (0.229)	0.341
Technical accidents	0.226 (0.206)	0.275	0.123 (0.202)	0.545	0.185 (0.198)	0.351	0.109 (0.199)	0.585	0.170 (0.195)	0.384
Organizational misdeed	-0.023 (0.196)	0.906	0.247 (0.209)	0.241	0.166 (0.206)	0.421	0.210 (0.206)	0.309	0.133 (0.202)	0.512
Return on industry assets	-0.168 (0.107)	0.117	-0.167 (0.104)	0.108	-0.178 (0.101)	0.079	-0.165 (0.102)	0.107	-0.176 (0.099)	0.078
Market share	0.205 (0.093)	0.028	0.246 (0.091)	0.008	0.251 (0.089)	0.005	0.254 (0.090)	0.005	0.258 (0.087)	0.004
Corporate transparency (CT)			-0.070 (0.073)	0.339	-0.083 (0.071)	0.246	-0.096 (0.072)	0.185	-0.108 (0.071)	0.128
Unrelated diversification (UD)			0.203 (0.073)	0.006	0.267 (0.073)	0.000	0.197 (0.071)	0.006	0.260 (0.072)	0.000
Attribution of knowledge deficiency (AD)			-0.219 (0.078)	0.006	-0.165 (0.078)	0.035	-0.225 (0.077)	0.004	-0.173 (0.076)	0.025
UD*CT					0.240 (0.073)	0.001			0.233 (0.071)	0.001
UD*AD							-0.198 (0.072)	0.007	-0.190 (0.070)	0.007
R ²	0.127		0.193		0.238		0.225		0.268	
R ² adj	0.062		0.119		0.164		0.149		0.191	
F-statistic	1.951**		2.603**		3.196**		2.964**		3.517**	

Note: $n = 203$, values in table are unstandardized regression coefficients. Standard errors are in parentheses