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# Activating the different sides of top management team faultlines in enterprise sustainable development: Is environmental responsibility a burden or boost to small and medium-sized enterprises in China?

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## Abstract

Whether environmental responsibility can promote corporate performance has always been a focus of debate in theory and practice. We address the dispute regarding the effect of environmental responsibility by focusing on small and medium-sized enterprises (SMEs) in China. Furthermore, based on team faultline theory, we argue that top management team (TMT) faultlines and bankruptcy threat combine to affect the relationship between environmental responsibility and long-term performance in SMEs. Using data from 410 Chinese companies listed on the Growth Enterprise Market (GEM) during 2011–2020, we find that SMEs that engage in more environmental responsibility tend to have worse long-term performance. Additionally, this relationship varies depending on the conditions of TMT composition (i.e., faultlines) and situation (i.e., bankruptcy threat). Specifically, when the bankruptcy threat is high, TMT faultlines negatively affect the relationship between environmental responsibility and long-term firm performance. However, TMT faultlines positively affect this relationship when the bankruptcy threat is low. This paper sheds new light on corporate environmental responsibility by adopting a theoretical perspective of TMT faultlines and identifying the specific situations in which TMT faultlines act.

**KEYWORDS**
bankruptcy threat, environmental responsibility, firm performance, SME, sustainable development, TMT faultlines

## 1 | INTRODUCTION

With its remarkable economic growth, China is gradually transforming its economic development mode from extensive to refined. To achieve carbon peak by 2030 and carbon neutrality by 2060 has become China's important environmental strategic goal. This crucial national development goal places the responsibility for environmental protection on every enterprise (Nguyen et al., 2021). In enterprise practice, due to its strategic importance, the environmental responsibility of large enterprises has been a key focus, and critical progress has been made. However, the focus on the environmental behavior and performance of small and medium-sized enterprises (SMEs) remains limited.

SMEs have made significant contributions to economic and social development in China; however, they are also an essential factor that causes environmental pollution. According to the National Bureau of Statistics and the State Environmental Protection Administration, more than 50%–60% of environmental pollution and waste comes from SMEs in China. In recent years, a large number of SMEs have been warned or punished for their poor environmental behaviors during environmental inspection and treatment campaigns. Thus, identifying the performance difficulties regarding SMEs' environmental

responsibility and putting forward targeted development countermeasures are not only of great significance to the steady development of SMEs and the green growth of local economies but also of great value to the overall progress of global environmental quality.

There is, however, a lack of research consistency concerning the relationship between environmental responsibility and firm performance, which puts SMEs in a dilemma in terms of whether to participate in environmental responsibility. On the one hand, involvement in environmental responsibility can increase the updating and application of clean technology (Porter & van der Linde, 1995), strengthen the effective use of resources, respond to key institutional pressures (Ntim & Soobaroyen, 2013), and thus improve enterprise competitiveness. On the other hand, the lack of environment-related knowledge and resources, as well as the high costs and extended return period of environmental responsibility investment, always discourages enterprises' determination to implement environmental responsibility (Ambec et al., 2013; Arouri et al., 2012; Kabir & Thai, 2017). In such cases, we aim to answer two research questions: (1) What is the relationship between environmental responsibility and firm performance for SMEs in China? (2) Under what conditions can these enterprises improve their performance by assuming environmental responsibility?

Since whether and how to participate in environmental responsibility are strategic decisions within an enterprise, the characteristics of decision-makers have a significant impact on the effectiveness of the decision made. Neglecting the effectiveness of the strategic decisions made by the top management team (TMT) in environmental responsibility has led to a large theoretical gap (Aguilera et al., 2007). Investigating the detailed characteristics of the TMT thus overcomes this significant gap in our understanding of how firms differ in terms of the effectiveness of their environmental responsibility activities. Since limited research has begun to focus on the influence of TMT diversity on corporations' environmental responsiveness, decisions, and performance (e.g., Elmagrhi et al., 2019; Glass et al., 2016; Lewis et al., 2014; Shahab et al., 2018), scholars have failed to investigate TMT characteristics in depth; these scholars have studied the demographic characteristics of the TMT (e.g., gender, tenure, education, tenure, and experience) in isolation, ignoring their combined effects. Team faultline theory holds that a team is likely to be divided into several homogeneous subgroups based on individual members' alignment along multiple demographic characteristics (Lau & Murnighan, 1998). From this perspective, the role of the TMT in the relationship between environmental responsibility and firm performance can be explored more comprehensively.

In this paper, we adopt Lau and Murnighan's (1998) term, faultlines, referring to the hypothetical dividing lines that may separate a TMT into several subgroups based on its members' alignment along multiple demographic attributes. According to the categorization–elaboration model (CEM; van Knippenberg et al., 2004), demographic faultlines have been argued to have, on the one hand, a "dark side" through which they encourage social categorization processes (and therefore lead to emotional conflict, poor communication, and coordination, internal competition and polarization) within a team (Jehn & Bezrukova, 2010; Li & Hambrick, 2005; van Knippenberg et al., 2011) and have, on the other hand, a "bright side" through that engenders information processing, task conflict, and learning (Bezrukova et al., 2009; Choi & Sy, 2010; Cooper et al., 2014; Tegarden et al., 2009). Furthermore, we know from the notion of faultline triggers that whether positive or negative effects of TMT faultlines are produced when a decision is made regarding environmental responsibility depends on whether the salience of subgroup categorization is activated (Jehn & Bezrukova, 2010; Lau & Murnighan, 1998; Meyer et al., 2015; Pearsall et al., 2008; Rupert et al., 2019; Spoelma & Ellis, 2017).

Drawing from recent works demonstrating that faultline effects in work groups depend on precipitating events, such as threatening contextual circumstances (Meyer et al., 2015; Spoelma & Ellis, 2017), we argue that TMT faultlines and bankruptcy threat state combine to influence the relationship between a firm's environmental responsibility decision and its long-term performance. Bankruptcy threat, as a predictor of bankruptcy, refers to the extent to which an enterprise is near operating and financial distress (Altman, 1968; Staw et al., 1981). We expect that the bankruptcy threat may activate the opposing effects of TMT faultlines by trapping the TMT into a "need for closure," which is the desire to make definite and clear-cut solutions (Kruglanski et al., 1993; Webster, 1993; Webster et al., 1996). As such, activated TMT faultlines intensify the negative effect of environmental responsibility decisions on long-term firm performance, while dormant TMT faultlines mitigate this effect.

In summary, we employ faultline theory to explain the impact of corporate environmental responsibility on firm performance in Chinese SMEs. This paper uses a sample of 410 Chinese companies listed on the Growth Enterprise Market (GEM) during 2011–2020. We focus on these companies for the following reasons: (1) SMEs account for more than 90% of the total number of enterprises in China and contribute 65% to the country's GDP. A large number of Chinese SMEs go public and file for bankruptcy every year, which guarantees the base of our research sample. (2) In recent years, China has dedicated itself to environmental protection and launched various environmental protection policies and regulations. For companies listed on the GEM that are short on funds and subject to tremendous growth pressure, how to balance environmental responsibility and economic interest has become one of the most realistic and urgent problems. (3) Due to the imperfections of organizational structures and management systems, the effect of environmental responsibility on SMEs largely depends on TMT decision-making behavior.

This study offers several contributions to previous research. First, it provides insight into the relationship between environmental responsibility and corporate performance for SMEs in China, given that large enterprises have been well-researched. Second, it addresses the research inconsistency concerning the relationship between environmental responsibility and firm performance via faultline theory. Finally, it extends faultline theory by introducing bankruptcy threat as an intriguing factor in the impact of TMT faultlines, providing support for the principle of "threat rigidity."

## 2 | LITERATURE REVIEW

### 2.1 | Environmental responsibility and firm performance

A substantial volume of research has attempted to explain how environmental responsibility influences firm performance, yet the studies in this area have been relatively inconsistent. On the one hand, some studies argue that fulfilling corporate environmental responsibility fosters competitive advantage by stimulating innovation, enabling the acquisition of key resources, helping obtain necessary support, and building corporate reputation. First, environmental protection enterprises usually solve environmental problems innovatively, which are believed to incorporate their intangible resources and capabilities (Shu et al., 2016) and improve their sustainable development (Hart, 1995; Hart & Dowell, 2011). For example, by introducing technologies or redesigning processes to achieve green transformation, enterprises can reduce resource consumption and pollution control costs and improve their environmental and financial performance (Christmann, 2000; Hart, 1995). Second, enterprises with a high level of environmental CSR receive more financial resources than their counterparts (Cheng et al., 2014). Companies that are actively carrying out environmental responsibility establish an image of attaching importance to environmental governance and forming good development prospects (Barnett & Salomon, 2006); therefore, they are more likely to win the favor of investors (Shahab et al., 2018). Third, enterprises' active participation in environmental protection can effectively improve and strengthen their relationship with the government, allowing them to obtain more support and thus reducing their transaction costs with the government (Jiang et al., 2018). Peloza (2006) has suggested that enterprises' environmental responsibility activities can reduce sanctions and punishment due to poor environmental performance and liabilities and losses caused by environmental accidents and lawsuits. Finally, enterprises that actively fulfill their environmental responsibility form a brand image in the consumer market and establish reputation advantages (Hur et al., 2014), improving their consumers' purchase intention and product value perception (Schmuck et al., 2018) and enabling competitive advantage.

On the other hand, due to certain constraints, the effect of corporate environmental responsibility can reverse. First, environmental responsibility often requires enterprises to invest vast technological resources and process innovation. To fulfill their environmental responsibility, enterprises must shift their focus from their original investment in the core business to environmental protection (Duanmu et al., 2018). Vast investment in environmental pollution control and clean technology costs enterprises more. Meanwhile, these environmental protection investments tend to have more extended asset return periods and higher return uncertainty (Ortiz-de-Mandojana & Bansal, 2016). Second, corporate environmental responsibility leads to a decline in prior production efficiency. In essence, enterprise green transformation, a particular environmental practice to implement environmental responsibility, is a kind of strategic change (Amundsen & Hermansen, 2021). It is therefore bound to be accompanied by corresponding management routine changes, industrial structure adjustments, technological innovations, organizational structure optimizations, etc. (Maxwell et al., 1997). These behaviors, in turn, affect enterprises' operation efficiency and financial performance due to their reallocation of resources and interference with organizational inertia (Haveman et al., 2001). Third, proactive environmental responsibility does not seem to appeal to investors. The market is always short-term oriented, and investors do not consider long-term environmental information when making investment decisions (Hassel et al., 2005). Therefore, the implementation of environmental responsibility by enterprises cannot be quickly and effectively transformed into the support of key stakeholders.

### 2.2 | Team faultlines and the CEM framework

Faultlines indicate how diversity characteristics are aligned in teams and the extent to which a team is separated into several subgroups. For instance, a group composed of "two 50-ish white male plant managers and two 30-ish black female clerical staff" is depicted as a group with strong faultlines (Thatcher et al., 2003) when all the demographic attributes align—such that homogeneous subgroups are created (Lau & Murnighan, 1998). In contrast, if the group includes "a 20-year-old Native American female who is an unskilled worker, a 30-year-old white male supervisor, a 65-year-old black female executive, and a 50-year-old Asian male machinist" (Thatcher et al., 2003), then the faultline strength is lower given that there is no clear-cut subgroup boundary.

In this study, we conceptualize TMT demographic faultlines based on gender and age because the chosen attributes work in several ways. Research has consistently found that female and elderly directors differ in terms of value orientation (Andreoni & Vesterlund, 2001; Stern et al., 1993), organizational focus and priorities (Eagly et al., 2003), long-term-oriented strategies (Silverman, 2003), environment-related experience and knowledge (Post et al., 2011), and risk-taking (Hambrick & Mason, 1984) compared with their male and younger counterparts. Elmagrhi et al. (2019) also argued that directors' gender and age have a combined impact on firms' environmental strategy, implementation, and disclosure. Therefore, we focus on two demographic dimensions—gender and age.

Previous studies have mixed views of faultlines' effects on team effectiveness. While several studies have agreed on the adverse effects exerted by faultlines on team functionality (e.g., Li & Hambrick, 2005; Rico et al., 2007; Thatcher & Patel, 2011), others have found their effects to be positive (Cooper et al., 2014; Thatcher et al., 2003). To address this divergence in theories, explanations are provided. On the one hand, self-categorization (Turner, 1982) and social identity (Tajfel, 1978) theories suggest that faultlines dampen team performance due to a social categorization process and an "us versus them" mindset, while on the other hand, the information/decision-making view (Horwitz & Horwitz, 2007) argues that the broader cognitive resources had by faultline teams lead to better performance.

To reconcile the inconsistent predictions of social categorization and information/decision making, van Knippenberg et al. (2004) developed the CEM by integrating two theoretical perspectives (Cooper et al., 2014; Ellis et al., 2013; Meyer & Schermuly, 2012; van Knippenberg et al., 2004). According to CEM theory, social categorization and information/decision-making processes coexist and interact (van Knippenberg et al., 2004). Therefore, the focus of team faultline research is not on the test of the main effect but on identifying the conditions that break the balance between categorization and information processes.

## 3 | THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

### 3.1 | Environmental responsibility for Chinese SMEs

China's high-quality economic resources are increasingly concentrated in large enterprises compared to its SMEs. Therefore, the challenge for large enterprises to undertake environmental responsibility is minor. Thus, they tend to take initiatives to undertake social responsibilities in keeping with national and public expectations (Jenkins, 2006). In contrast, most SMEs in China participate in the market competition based on the mode of "low cost, low price, and low profit." Due to their scale disadvantages and resource constraints, SMEs are more inclined to pursue the maximization of economic benefits in their operation, whereby their profit-seeking behavior is more prominent (Yu et al., 2021). Therefore, fulfilling environmental responsibility is a high-risk and expensive investment for SMEs, and SMEs must spend more on their environmental responsibility than their larger peers (Russo & Perrini, 2010). Accordingly, SMEs may face obstacles in fulfilling their environmental responsibility.

### 3.2 | Environmental responsibility and firm performance among Chinese SMEs

Despite a number of studies insisting that companies can build a competitive advantage by fulfilling their environmental responsibility, as shown in our above discussion (e.g., Cheng et al., 2014; Hur et al., 2014; Shu et al., 2016), we suggest that there is a negative relationship between environmental responsibility and performance outcomes for Chinese SMEs. These SMEs reactively run environmental projects according to external stimuli from 'green' movements, governments, regulators, or other companies (Azzone et al., 1997). Enterprises involved in reactive environmental responsibility are described as spending only the minimum level of effort required for involuntary regulatory compliance (Carroll, 1979; Groza et al., 2011). While proactive environmental responsibility emphasizes long-term performance-related issues and has been demonstrated to benefit firm performance (Bansal, 2005), reactive participation in environmental responsibility is often not conducive to developing long-term performance (Del Brío & Junquera, 2003). Therefore, SMEs are unlikely to benefit from the pattern of reactive corporate social responsibility (Russo & Fouts, 1997; Tilley, 1999).

Furthermore, SMEs' lack of internal capabilities reduces the effect of reactive environmental responsibility. Generally, the successful transformation of performance behavior into environmental performance requires some necessary organizational conditions, such as a standardized and well-structured organization (Alberti et al., 2000) or well-trained managers and human resources with strong environmental awareness and high skills (del Brío & Junquera, 2003). This is perhaps why larger companies usually enjoy more advantages when implementing environmental projects (Arora & Cason, 1995). However, for the same reason, SMEs typically lack the necessary resources for addressing and implementing strict regulations compared to their larger counterparts, let alone conducting preventive action to help fulfill environmental requirements (Dean & Brown, 1995). In short, both the challenges in environmental practice and the lack of resources in organizations increase the burden on SMEs and place them in a losing position. Based on the above analysis, we propose the following assumptions:

> **Hypothesis H1.** Environmental responsibility is negatively related to long-term firm performance.

### 3.3 | Moderations of TMT faultlines and bankruptcy threats

#### 3.3.1 | Role of TMT faultlines in environmental responsibility activities

We have already pointed out that environmental responsibility activities dampen long-term firm performance. While limits on the ability of firms to profit in an environmentally sustainable way are universal (Lee, 2012), we further argue that the impact of these limits hinges on the power of a firm's TMT to properly handle the information processing demands associated with added environmental responsibility activities. To improve the effectiveness of environmental responsibility activities and reduce their risks, top managers need knowledge about their firm's resources and to successfully coordinate the environmental responsibility processes (Meyer et al., 2015). Thereby, their information processing is emphasized.

How well do TMT members gather, share, and attend to relevant information and then jointly analyze and integrate it into the environmental responsibility decision processes? Prior studies have indicated that team faultlines are critical factors affecting information processing and decision making, regardless of whether the work team or TMT is involved (e.g., Hutzschenreuter & Horstkotte, 2013; Pelled et al., 1999). However, according to the CEM, we argue that the effects of TMT faultlines are multifaceted. Moreover, the moderating effects of TMT faultlines on the relationship between environmental responsibility and long-term firm performance are contingent on the bankruptcy threat faced by firms.

### 3.3.2 | Bankruptcy threat and the "need-for-closure" effect

The concept of bankruptcy threat has been applied in the research on the decision-making behavior of enterprises under extreme conditions (e.g., near bankruptcy; Chen & Miller, 2007; Iyer & Miller, 2008; Miller & Chen, 2004). Altman (1968) showed that the smaller the distance from bankruptcy was, the greater the financial distress and survival pressure faced by the firm, which is reflected as low probability and low operational efficiency and poses a threat to the organization. According to the "threat-rigidity" hypothesis (Staw et al., 1981), organizations avoid risks and adopt conservative behaviors when close to bankruptcy. The concept of bankruptcy distance provides an appropriate research situation; that is, an enterprise is in a state of "distress" or "bankruptcy." In this situation, how are TMT information processing and decision-making behaviors affected?

Importantly, when the company is threatened by bankruptcy, the TMT is faced with high stress and is expected to be badly in "need of cognitive closure." This "need for closure" (defined as the desire for definite, clear-cut solutions) in a group, studied by Kruglanski and his colleagues, occurs when the group finds itself facing stressful work conditions (e.g., time pressure, organizational change, and lack of control). These conditions make extensive information processing laborious and costly (Kruglanski et al., 1993; Webster, 1993; Webster et al., 1996) and thus instill a stronger desire or even pressure for consensus and uniformity within the group (de Grada et al., 1999). A quicker agreement may be generally reached through the centralization of power in the hands of a few influential group members (e.g., leaders; Kerr & Tindale, 2004) and, more specifically, through the emergence of a greater conversational and power asymmetry within the group (De Grada et al., 1999) and creation of relatively centralized communication networks toward more authoritative members (Brown & Miller, 2000; Pierro et al., 2003). Although cognitive closure may benefit a team in stressful conditions in terms of the affordance of predictability and guidance for action (De Grada et al., 1999), we believe that it may also render the subgroup identity salience within a faultline TMT.

### 3.3.3 | Activating the moderating effect of TMT faultlines through bankruptcy threat

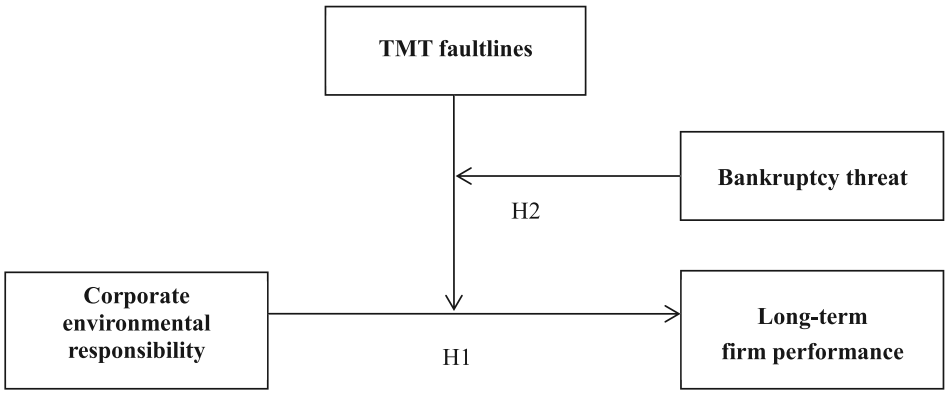
Precipitating events or circumstances can exacerbate the activation of faultlines and increase identity salience (Gover & Duxbury, 2012; Meyer et al., 2015; Spoelma & Ellis, 2017). We propose that the bankruptcy threat will likely serve as a basis for amplifying faultlines. As we argue above, a "need-for-closure" cognition accompanies the TMT threatened with bankruptcy. Considering a TMT with two identity subgroups (divided on the basis of gender and age), when it seeks a consensus under a heightened need for closure, there tends to be conflict over which subgroup's opinions predominate. Previous studies have supported that the "need for closure" is related to prejudice toward the out-subgroup (Onraet et al., 2011; Roets & van Hiel, 2006, 2011; van Hiel et al., 2004) and a preference for coercive actions in intersubgroup conflict and competition (Golec, 2002; Winter, 2007). In this case, the "need for closure" may exacerbate intersubgroup comparisons, likely increasing demographic identity salience and activating the identity subgroups (Turner et al., 1994).

Once activated, demographic faultlines may lead to adverse emotional and cognitive outcomes, such as perceptions of emotional contradiction, mistrust, and dislike (Choi & Sy, 2010; Lau & Murnighan, 1998). These faultlines may also encourage the emergence of a one-subgroup-dominated TMT structure. In a threatening situation, minority members' opinions seem to deviate and threaten to undermine group consensus and are, therefore, often suppressed. Even if they do not initiate a confrontation, they may feel that their opinions are not being respected. In turn, they decrease their commitments and thus reduce their work collaboration since they are not involved in the decision (Polzer et al., 2006). Concerning the TMT decision on environmental responsibility, the lack of the full engagement of all team members in the discussion, formulation, and implementation of the decision is detrimental to the expected performance returns from environmental responsibility.

These activated faultlines, in addition, have an intriguing implication. Groups with a high "need for closure" tend to make quick but low-quality decisions based on easily accessible knowledge and inconclusive evidence (De Grada et al., 1999; Kerr & Tindale, 2004; Kruglanski et al., 1993). Similarly, if a bankruptcy threat strikes, then TMTs with activated identity faultlines tend to make suboptimal decisions by using stereotypic cues and inconclusive evidence (de Dreu et al., 1999), reducing the frequency of information exchanged (Kelly & Karau, 1999; Kelly & Loving, 2004), monopolizing the attention of decision-makers, decreasing the opportunity to pool unshared information and impairing hidden profile performance (Bowman & Wittenbaum, 2012). Given the complexity and ambiguity faced by TMTs when making environmental responsibility decisions, a "scarcity mindset" may be detrimental (Leder et al., 2016).

In contrast, if the firm is in a safe environment, away from bankruptcy, then the faultlines within the TMT may not be activated, making TMT faultlines based on gender and age beneficial in several ways. Research has already indicated cognitive diversity and informational advantages in terms of environmental decisions, strategies, and management through mixing TMT members of different genders and ages (Elmagrhi et al., 2019; Post et al., 2011). Therefore, we believe that if there are several dormant subgroups (based on gender and age) within a TMT, then they are likely to bring about a diverse range of ideas, opinions, perspectives, and decision preferences. Moreover, TMT subgroups may act as "supportive cohorts," in which TMT members' views and thoughts can be supported by an identity-based coalition and be given serious consideration by the out-subgroups (Gibson & Vermeulen, 2003; Rupert et al., 2019). By sharing and integrating such disparate knowledge, the TMT can ultimately reach a shared understanding and generate high-quality solutions (De Dreu et al., 2008). In sum, we propose that bankruptcy threat, acting as a faultline trigger, moderates the effects of TMT faultlines and environmental

FIGURE 1 Conceptual framework




responsibility so that it exacerbates their impact on long-term firm performance. We, thus, postulate the following hypothesis:

> **Hypothesis H2.** Bankruptcy threat moderates the effects of the relationship between TMT faultlines and environmental responsibility on long-term firm performance: When bankruptcy threat is high (i.e., bankruptcy distance is low), TMT faultlines intensify the negative consequences of environmental responsibility on long-term firm performance. When bankruptcy threat is low (i.e., bankruptcy distance is high), TMT faultlines mitigate the negative effect of environmental responsibility on long-term firm performance.

The conceptual model is delineated in Figure 1.

## 4 | METHODS

### 4.1 | Sample and procedure

We select companies listed on the GEM as a sample. There are two reasons for this selection: (1) sample reliability, as according to regulatory provisions, companies listed on the GEM are required to publish complete and accurate corporate environmental and performance data that meet international standards, and (2) high matching with this study, as GEM-listed companies face a highly uncertain and complex external environment and are more susceptible to bankruptcy threat. Thus, we collect data on the period 2011–2020 from published reports. Moreover, there is a lag in the impact of environmental responsibility on long-term firm performance. We take 2 years as the lag length; i.e., the 2020 data measuring the dependent variable match the 2018 data measuring the independent variable. The collected data in 2011–2018 are used as independent, moderating, and control variables, while those in 2012–2020 are used as dependent variables.

The original samples are screened and adjusted as follows: (1) Samples with a report of environmental responsibility lasting less than five consecutive years were eliminated; (2) the abnormal value in the samples, e.g., the negative sales revenue, was deleted; (3) ST, ST*, and PT companies with poor performance were eliminated; and (4) samples with missing data for the variables were excluded. As a result, we deleted a total of 311 enterprise samples. The sample, which contained 410 companies with 2,109 observations, was collected from the CSMAR, Wind, and East money databases.

### 4.2 | Measures

#### 4.2.1 | Long-term enterprise performance

Long-term enterprise performance is measured using Tobin's Q value (TQV) according to Lakonishok et al. (1994), as this value reflects the relationship between the internal operating status of a company and its market value and is suitable for measuring value creation over a long period. TQV is the ratio of the enterprise market value to the enterprise capital's replacement cost, which comes from the Tai'an database. We calculate long-term enterprise performance by averaging the TQV of two adjacent periods (the current and subsequent periods) because previous studies have suggested that the lag time required for innovation expenditure to produce effects is generally 0–18 months (Blundell et al., 2002; Hall et al., 1986; Mudambi & Swift, 2014).

#### 4.2.2 | Corporate environmental responsibility

We measure corporate environmental responsibility by the enterprise environmental information disclosure (SEID) score, adopted by Meng et al. (2015, 2013); Chen et al. (2017). The SEID score consists of 10 classes of items, as shown in Table A1. If the item is described in terms of currency and quantity, then its value is 3; if the description of the item is concrete, then its value is 2; if the description of the item is general, then its value is 1; and otherwise, the value is set to 0 if there is no information. The SEID score is calculated by summing the values of the items.

This paper carried out exploratory factor analysis (EFA) on the scale. These results are shown in Tables 1 and 2. They show that Cronbach's α and the coefficient are greater than 0.5, indicating that

**TABLE 1** Cronbach's alpha test results of environmental responsibility

| Cronbach's alpha = 0.568 | | | | |
|---|---|---|---|---|
| | Scale mean if item deleted | Scale variance if item deleted | Corrected item−Total correlation | Cronbach's alpha if item deleted |
| SCID1 | 2.83 | 8.959 | 0.268 | 0.538 |
| SCID2 | 2.65 | 9.230 | 0.220 | 0.550 |
| SCID3 | 3.20 | 10.701 | 0.038 | 0.574 |
| SCID4 | 2.53 | 8.059 | 0.344 | 0.513 |
| SCID5 | 3.02 | 9.442 | 0.248 | 0.544 |
| SCID6 | 2.87 | 8.449 | 0.255 | 0.545 |
| SCID7 | 3.21 | 10.681 | 0.062 | 0.573 |
| SCID8 | 2.75 | 7.405 | 0.457 | 0.469 |
| SCID9 | 2.96 | 9.552 | 0.154 | 0.567 |
| SCID10 | 2.91 | 8.810 | 0.345 | 0.518 |

**TABLE 2** KMO and Bartlett's test

| KMO and Bartlett's test | | |
|---|---|---|
| Kaiser-Meyer-Olkin measure of sampling adequacy | | 0.655 |
| Bartlett's test of sphericity | Approx. Chi-square | 2,263.156 |
| | df | 45 |
| | Sig. | 0.000 |

the reliability is acceptable (Cheng, 2011; Streiner, 2003). The chi-square value of the Bartlett ball test reached a significant level ($p < 0.001$), and the Kom value was more significant than 0.6, indicating that the content of each dimension can explain most of the information of this variable. Therefore, the data used in this paper have a good structural validity.

### 4.2.3 | Bankruptcy distance

We measure bankruptcy distance with Altman's Z score model (1968). A higher $Z$ score implies a greater distance from enterprise bankruptcy and a minor enterprise bankruptcy threat. The $Z$ value is calculated as follows:

$$Z = 1.2 * X_1 + 1.4 * X_2 + 3.3 * X_3 + 0.6 * X_4 + 1.0 * X_5,$$

where $X_1$ represents the ratio of working capital to total assets (WC/TA), $X_2$ is the ratio of retained earnings to total assets (RE/TA), $X_3$ is the ratio of earnings before interest and tax to total assets (EBIT/TA), $X_4$ represents the ratio of the market value of equity to total liabilities (MVE/TL), and $X_5$ is the ratio of sales to total assets (S/TA). If $Z < 1.8$, then the enterprise is in danger of financial distress. If $1.8 < Z < 2.675$, the enterprise is in a "gray area" with high financial risk. If $Z > 2.675$, then the enterprise has a relatively safe status with stable financial conditions.

### 4.2.4 | Faultlines

We measure TMT faultline strength by employing the average silhouette width (ASW) measure (Meyer & Glenz, 2013), which has been proven to be both robust and versatile (Meyer et al., 2014). Mainstream faultline studies have extensively utilized this algorithm (e.g., Li & Jones, 2019; Mo et al., 2019). The ASW approach involves a two-step clustering procedure. First, cluster-analytic methods identify a set of starting subgroup configurations within a given team. Second, the algorithm merges subgroups with similar team members into new larger subgroups until the solution reaches the maximum ASW value (Meyer & Glenz, 2013). The ASW reflects the extent to which a TMT is split into homogeneous subgroups, making it ideal for quantifying faultline strength. The ASW score ranges from −1 to 1, where 1 indicates that there are multiple subgroups and that the members within each subgroup are entirely homogeneous. The calculations are performed by the asw.cluster package for faultline calculation (Meyer & Glenz, 2013) in R software.

### 4.2.5 | Control variables

It is commonly believed that several variables reflect the state of a company; i.e., firm size (FS), firm age (FA), TMT size (TS), firm debt (LEV), governance structure, and industry (IND), are likely to influence long-term enterprise performance. Thus, these variables are controlled in this study. The governance structure is measured by the proportion of independent directors (PID), the proportion of institutional ownership (PIO), and the proportion of state ownership (PSO). We assign

**TABLE 3** Descriptive statistics and correlations

| Variables | MEAN | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Long-term enterprise performance | 3.365 | 2.137 | 1 | | | | | | | | | | | |
| 2. Environmental responsibility (SEID) | 3.167 | 3.205 | −0.110*** | 1 | | | | | | | | | | |
| 3. Bankruptcy distance | 11.930 | 13.700 | 0.223*** | −0.128*** | 1 | | | | | | | | | |
| 4. TMT faultlines | 0.848 | 0.091 | 0.027 | −0.077*** | 0.149*** | 1 | | | | | | | | |
| 5. TMT diversity | 0.122 | 1.410 | −0.031 | −0.023 | −0.074*** | −0.323*** | 1 | | | | | | | |
| 6. TMT size | 16.950 | 3.662 | −0.079*** | 0.117*** | −0.137*** | −0.049*** | 0.213*** | 1 | | | | | | |
| 7. Firm size | 21.320 | 0.816 | −0.098*** | 0.226*** | −0.324*** | −0.369*** | 0.151*** | 0.247*** | 1 | | | | | |
| 8. Firm debt | 0.300 | 0.171 | −0.129*** | 0.076*** | −0.594*** | −0.184*** | 0.101*** | 0.147*** | 0.450*** | 1 | | | | |
| 9. Firm age | 14.000 | 5.248 | 0.042* | 0.038** | −0.123*** | −0.108*** | −0.046** | 0.073*** | 0.127*** | 0.154*** | 1 | | | |
| 10. Proportion of independent directors | 0.380 | 0.052 | 0.016 | −0.085*** | 0.010 | −0.103*** | 0.095*** | −0.230*** | −0.050*** | 0.002 | −0.044** | 1 | | |
| 11. Proportion of institutional ownership | 0.007 | 0.046 | 0.083*** | 0.010 | 0.049*** | 0.035* | −0.052*** | 0.017 | 0.024 | −0.001 | −0.061*** | 0.014 | 1 | |
| 12. Proportion of state ownership | 0.013 | 0.065 | 0.075*** | −0.014 | 0.028 | 0.104*** | −0.111*** | 0.129*** | −0.030 | −0.027 | −0.023 | −0.071*** | 0.175*** | 1 |

*$p < .10$.**$p < .05$.***$p < .01$.

**TABLE 4** Description samples by industry

| | | Long-term enterprise performance | Environmental responsibility (SEID) | Bankruptcy distance | TMT Faultlines | TMT diversity | TMT size | Firm size | Firm debt | Firm age | Proportion of independent directors | Proportion of institutional ownership | Proportion of state ownership |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indcode 1 A agriculture, forestry, animal husbandry and fishery | *N* | 35 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 | 48 |
| | Mean | 2.440 | 3.479 | 6.867 | 0.850 | 0.180 | 17.940 | 21.480 | 0.373 | 13.980 | 0.375 | 0.003 | 0.028 |
| | sd | 1.569 | 3.531 | 8.647 | 0.104 | 1.917 | 3.744 | 0.609 | 0.183 | 5.155 | 0.049 | 0.002 | 0.097 |
| | Min | 1.185 | 0 | 0.724 | 0.642 | −3.582 | 12 | 20.540 | 0.039 | 3 | 0.333 | 0 | 0 |
| | Max | 9.195 | 12 | 40.570 | 1 | 3.005 | 28 | 22.950 | 0.705 | 23 | 0.500 | 0.007 | 0.469 |
| Indcode 2 B mining | *N* | 32 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | Mean | 2.944 | 1.475 | 18.120 | 0.827 | 0.124 | 18.400 | 21.420 | 0.246 | 14.750 | 0.400 | 0.002 | 0.003 |
| | sd | 2.320 | 1.536 | 26.830 | 0.092 | 1.487 | 4.150 | 0.538 | 0.147 | 4.797 | 0.0529 | 0.002 | 0.018 |
| | Min | 1.045 | 0 | 0.724 | 0.649 | −3.378 | 11 | 20.330 | 0.039 | 6 | 0.333 | 0 | 0 |
| | Max | 11.29 | 5 | 83.170 | 1 | 2.646 | 28 | 22.570 | 0.630 | 25 | 0.500 | 0.006 | 0.114 |
| Indcode 3 C manufacturing | *N* | 1,487 | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 | 2,134 |
| | Mean | 3.251 | 3.640 | 11.930 | 0.851 | 0.053 | 16.900 | 21.270 | 0.289 | 13.710 | 0.379 | 0.009 | 0.013 |
| | sd | 2.024 | 3.282 | 13.600 | 0.089 | 1.402 | 3.588 | 0.775 | 0.164 | 5.283 | 0.051 | 0.055 | 0.064 |
| | Min | 1.045 | 0 | 0.724 | 0.615 | −3.582 | 11 | 19.740 | 0.039 | 3 | 0.333 | 0 | 0 |
| | Max | 12.69 | 13 | 83.170 | 1 | 3.005 | 28 | 23.640 | 0.746 | 27 | 0.571 | 0.461 | 0.485 |
| Indcode 4 E construction | *N* | 32 | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 41 | 41 |
| | Mean | 2.401 | 5.220 | 3.865 | 0.869 | 0.408 | 18.880 | 21.850 | 0.502 | 14.390 | 0.389 | 0.003 | 0.002 |
| | sd | 1.361 | 3.883 | 3.048 | 0.098 | 1.301 | 4.681 | 0.755 | 0.182 | 7.297 | 0.056 | 0.002 | 0.006 |
| | Min | 1.123 | 0 | 1.196 | 0.658 | −2.79 | 11 | 20.480 | 0.174 | 3 | 0.333 | 0 | 0 |
| | Max | 6.229 | 13 | 14.600 | 1 | 3.005 | 28 | 23.070 | 0.746 | 26 | 0.571 | 0.006 | 0.035 |
| Indcode 5 F wholesale and retail | *N* | 30 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 | 44 |
| | Mean | 2.864 | 0.841 | 9.395 | 0.820 | 0.325 | 16.910 | 21.280 | 0.405 | 12.910 | 0.374 | 0.001 | 0.001 |
| | sd | 1.848 | 1.346 | 8.588 | 0.116 | 1.241 | 3.026 | 0.835 | 0.238 | 4.690 | 0.047 | 0.001 | 0.007 |
| | Min | 1.068 | 0 | 1.366 | 0.615 | −2.891 | 12 | 20.010 | 0.041 | 3 | 0.333 | 0 | 0 |
| | Max | 8.493 | 6 | 34.850 | 1 | 3.005 | 23 | 22.6 | 0.746 | 23 | 0.500 | 0.006 | 0.050 |
| Indcode 6 G transportation, storage and postal services | *N* | 7 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Mean | 2.727 | 0.900 | 4.409 | 0.758 | 0.724 | 15.100 | 20.840 | 0.400 | 18.500 | 0.357 | 0.002 | 0 |
| | sd | 0.835 | 1.287 | 2.299 | 0.083 | 1.048 | 2.558 | 0.700 | 0.163 | 3.028 | 0.040 | 0.001 | 0 |
| | Min | 1.480 | 0 | 0.724 | 0.645 | −0.684 | 13 | 19.880 | 0.199 | 14 | 0.333 | 0.001 | 0 |
| | Max | 3.776 | 4 | 7.282 | 0.881 | 2.133 | 22 | 21.700 | 0.746 | 23 | 0.429 | 0.003 | 0 |

(Continues)

**TABLE 4** (Continued)

| | | Long-term enterprise performance | Environmental responsibility (SEID) | Bankruptcy distance | TMT Faultlines | TMT diversity | TMT size | Firm size | Firm debt | Firm age | Proportion of independent directors | Proportion of institutional ownership | Proportion of state ownership |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indcode 7 I information transmission, software and information technology services | *N* | 340 | 496 | 496 | 496 | 496 | 496 | 496 | 496 | 496 | 496 | 496 | 496 |
| | Mean | 3.977 | 1.234 | 14.020 | 0.847 | 0.253 | 16.810 | 21.260 | 0.287 | 15.170 | 0.387 | 0.002 | 0.013 |
| | sd | 2.516 | 1.748 | 14.680 | 0.092 | 1.414 | 3.912 | 0.818 | 0.175 | 5.123 | 0.056 | 0.002 | 0.061 |
| | Min | 1.144 | 0 | 0.724 | 0.615 | −3.582 | 11 | 19.740 | 0.039 | 3 | 0.333 | 0 | 0 |
| | Max | 12.690 | 12 | 83.17 | 1 | 3.005 | 28 | 23.640 | 0.746 | 27 | 0.571 | 0.009 | 0.485 |
| Indcode 8 J finance | *N* | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | Mean | 3.105 | 2.667 | 9.444 | 0.839 | −0.035 | 13.330 | 23.320 | 0.542 | 16 | 0.333 | 0.002 | 0 |
| | sd | 1.785 | 1.155 | 12.150 | 0.006 | 1.785 | 1.528 | 0.545 | 0.237 | 2.646 | 0 | 0 | 0 |
| | Min | 1.976 | 2 | 2.152 | 0.834 | −2.090 | 12 | 22.690 | 0.270 | 14 | 0.333 | 0.002 | 0 |
| | Max | 5.163 | 4 | 23.470 | 0.846 | 1.116 | 15 | 23.640 | 0.699 | 19 | 0.333 | 0.003 | 0 |
| Indcode 9 L leasing and business services | *N* | 20 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 | 29 |
| | Mean | 3.613 | 3.103 | 8.088 | 0.822 | 1.184 | 16.930 | 21.610 | 0.428 | 13.690 | 0.365 | 0.0023 | 0 |
| | sd | 1.935 | 3.331 | 7.257 | 0.074 | 0.986 | 4.070 | 1.339 | 0.166 | 4.343 | 0.040 | 0.002 | 0.001 |
| | Min | 1.178 | 0 | 1.460 | 0.667 | −0.618 | 11 | 19.740 | 0.163 | 6 | 0.333 | 0 | 0 |
| | Max | 8.437 | 10 | 30.410 | 0.973 | 2.679 | 26 | 23.640 | 0.667 | 24 | 0.429 | 0.008 | 0.003 |
| Indcode 10 M scientific research and technology services | *N* | 45 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 | 74 |
| | Mean | 3.889 | 3.743 | 9.501 | 0.857 | −0.027 | 18.140 | 21.390 | 0.344 | 15.410 | 0.377 | 0.003 | 0.026 |
| | sd | 2.764 | 2.896 | 11.200 | 0.089 | 1.371 | 3.089 | 0.788 | 0.156 | 5.422 | 0.058 | 0.002 | 0.097 |
| | Min | 1.138 | 0 | 0.724 | 0.646 | −3.291 | 12 | 19.740 | 0.071 | 3 | 0.333 | 0 | 0 |
| | Max | 12.690 | 13 | 60.120 | 1 | 2.664 | 26 | 23.200 | 0.746 | 27 | 0.571 | 0.007 | 0.485 |
| Indcode 11 N water conservancy, environment and public facilities management | *N* | 22 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| | Mean | 2.703 | 7.179 | 4.292 | 0.796 | −0.138 | 17.930 | 22.220 | 0.438 | 13.040 | 0.352 | 0.004 | 0.007 |
| | sd | 1.196 | 4.065 | 3.736 | 0.082 | 1.188 | 4.036 | 1.017 | 0.159 | 3.533 | 0.037 | 0.002 | 0.020 |
| | Min | 1.045 | 1 | 0.724 | 0.638 | −3.068 | 14 | 20.770 | 0.159 | 6 | 0.333 | 0 | 0 |
| | Max | 4.863 | 13 | 12.410 | 0.976 | 2.274 | 28 | 23.640 | 0.666 | 19 | 0.429 | 0.007 | 0.082 |

TABLE 4 (Continued)

| | | Long-term enterprise performance | Environmental responsibility (SEID) | Bankruptcy distance | TMT Faultlines | TMT diversity | TMT size | Firm size | Firm debt | Firm age | Proportion of independent directors | Proportion of institutional ownership | Proportion of state ownership |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Indcode 12 Q health and social work | *N* | 15 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | Mean | 5.711 | 2.900 | 14.900 | 0.796 | 0.180 | 16.950 | 22.030 | 0.357 | 13.500 | 0.387 | 0.005 | 0.004 |
| | sd | 2.469 | 2.447 | 9.844 | 0.091 | 1.304 | 2.762 | 1.054 | 0.149 | 3.120 | 0.054 | 0.002 | 0.019 |
| | Min | 1.343 | 0 | 2.147 | 0.674 | −3.452 | 12 | 20.210 | 0.178 | 8 | 0.333 | 0.001 | 0 |
| | Max | 9.790 | 9 | 39.640 | 1 | 2.495 | 22 | 23.470 | 0.601 | 19 | 0.500 | 0.008 | 0.084 |
| Indcode 13 R culture, sports and entertainment | *N* | 41 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 |
| | Mean | 3.567 | 1.424 | 10.730 | 0.817 | 0.822 | 15.710 | 21.940 | 0.313 | 12.860 | 0.372 | 0.003 | 0.041 |
| | sd | 1.728 | 1.694 | 10.800 | 0.116 | 1.282 | 2.989 | 1.177 | 0.164 | 3.897 | 0.044 | 0.002 | 0.124 |
| | Min | 1.084 | 0 | 0.724 | 0.618 | −2.376 | 11 | 19.740 | 0.055 | 6 | 0.333 | 0 | 0 |
| | Max | 8.938 | 6 | 41.210 | 1 | 2.692 | 24 | 23.640 | 0.622 | 24 | 0.5 | 0.007 | 0.485 |

the IND variable for manufacturing to 1 and that for service to 0. Moreover, since the collected sample ranges from 2012 to 2016, five annual dummy variables are set in this study.

## 5 | RESULTS

### 5.1 | Descriptive statistics

Table 3 displays the results of the descriptive statistical analysis of the variables in this paper, illustrating that the enterprises differ significantly under the same variables, except for scale. Since the enterprise samples are selected from companies listed on the GEM, different enterprises have relatively similar scales. Compared with other variables, the standard deviation of the enterprise scale is much smaller. In addition, as shown in Table 4, we also made descriptive statistics on the data by the industry following previous studies (Ji & Miao, 2020; Li et al., 2020).

We calculate the correlations of the variables, as shown in Table 1. The negative correlation between TQV (dependent variable) is positively related to the SEID score (independent variable) $(r = -0.110,\ p < 0.01)$. The correlation analysis shows the same direction as Hypothesis H1.

### 5.2 | Hypothesis testing

To examine whether any relevant variables are missing in the model, we used Stata 17.0 for data analysis and then ran and passed the Hausman test. Thus, our study applies a fixed effects model. Following Aiken et al. (1991), we grand-mean-center all the predictor variables to avoid the potential influence caused by multicollinearity. Finally, deviations in the data statistics lead to outliers in the corporate data, affecting the empirical results of this article; thus, the key variables are Winsorized at the 1st and 99th percentiles to prevent the influence of outliers. We use the xtgls Stata module, which fits the cross-sectional time-series linear models, applying feasible generalized least squares (GLS) estimation to allow a more flexible covariance structure for disturbances and random effects. The xtgls command allows estimation of autocorrelation within panels and cross-sectional correlation and/or heteroskedasticity across panels. We specify the force command, where xtgls fits the model, and assume that the lags are appropriate (Anderson et al., 2020; Lee, 2003).

Table 5 presents the results of the regression analysis to test our hypotheses. First, environmental responsibility is negatively and significantly related to long-term enterprise performance (Model 2: $\beta_1 = -0.026, p < 0.01$), which supports Hypothesis H1.

Second, Model 3 addresses the interaction effects of TMT faultlines and environmental responsibility on long-term performance. The results in Table 5 show a significant interaction effect of the relationship between TMT faultlines and environmental responsibility on long-term performance (Model 3: $\beta_2 = -0.154, p < 0.1$). Furthermore,

**TABLE 5** Results of regression analysis

| | Long-term enterprise performance | | | |
|---|---|---|---|---|
| **Variables** | **Model 1** | **Model 2** | **Model 3** | **Model 4** |
| Environmental responsibility (SEID) | | −0.026*** (−3.40) | −0.037*** (−4.90) | −0.027*** (−3.20) |
| TMT Faultlines (Fau) | | | 1.658*** (5.61) | 1.304*** (4.03) |
| SEID*Fau | | | −0.154* (−1.84) | −0.162 (−1.62) |
| Bankruptcy distance (Z score) | | | | 0.024*** (6.58) |
| SEID*Z score | | | | 0.003*** (3.72) |
| Fau*Z score | | | | −0.132*** (−3.96) |
| SEID*Fau*Z score | | | | 0.020* (1.81) |
| Industry | −0.442*** (−7.66) | −0.343*** (−4.99) | −0.263*** (−3.51) | −0.237*** (−3.06) |
| TMT size | 0.001 (0.20) | 0.003 (0.46) | 0.001 (0.24) | −0.001 (−0.17) |
| Firm size | −0.605*** (−16.41) | −0.563*** (−14.15) | −0.500*** (−13.50) | −0.472*** (−12.17) |
| Firm debt | −0.748*** (−4.74) | −0.668*** (−4.27) | −0.660*** (−4.24) | 0.323* (1.67) |
| Firm age | −0.012* (−1.85) | −0.013** (−1.97) | −0.015** (−2.30) | −0.014** (−2.01) |
| Proportion of independent directors | 0.641 (1.38) | 0.161 (0.34) | 0.524 (1.08) | 0.756 (1.53) |
| Proportion of institutional ownership | 3.202*** (3.39) | 3.347*** (3.68) | 3.249*** (3.75) | 2.433*** (2.60) |
| Proportion of state ownership | 0.602 (1.08) | 0.526 (0.95) | 0.650 (1.16) | 0.831 (1.46) |
| TMT diversity | −0.044** (−2.46) | −0.044** (−2.49) | −0.029 (−1.60) | −0.016 (−0.88) |
| _cons | 5.833*** (66.15) | 5.728*** (60.78) | 2.269*** (23.00) | 5.746*** (57.56) |
| No. of observations | 2,109 | 2,109 | 2,109 | 2,109 |
| Wald $\chi^2$ | 3,120.57*** | 2,735.90*** | 2,524.64*** | 2,846.03*** |

*Note*: Standard errors in parentheses.
*$p$ < .10.**$p$ < .05.***$p$ < .01.

**TABLE 6** Slope difference tests for TMT faultlines and bankruptcy distance

| Pair of slopes | Slope difference | *t* value | *p* value |
|---|---|---|---|
| Model 1 vs. Model 2 | 0.161 | 2.986 | 0.003 |
| Model 1 vs. Model 3 | −0.020 | −0.439 | 0.661 |
| Model 1 vs. Model 4 | 0.087 | 2.020 | 0.044 |
| Model 2 vs. Model 3 | −0.181 | −4.395 | 0.000 |
| Model 2 vs. Model 4 | −0.074 | −2.065 | 0.039 |
| Model 3 vs. Model 4 | 0.107 | 2.823 | 0.005 |

the estimate of the three-way interaction of enterprise environmental responsibility, TMT faultlines, and bankruptcy distance is significantly positive (Model 4: $\beta_3 = 0.020, p < 0.1$). This result indicates that bankruptcy distance triggers and moderates the moderating effect of TMT faultlines on the relationship between enterprise environmental responsibility and long-term performance. The results support Hypothesis H2, further verified by the slope difference test, as shown in Table 6.

The interaction effects are plotted. Figure 2 illustrates that given the high level of TMT faultlines, enterprise environmental responsibility is positively related to long-term performance when bankruptcy distance is high (minor bankruptcy threat). In contrast, enterprise environmental responsibility negatively impacts long-term performance when bankruptcy distance is low (major bankruptcy threat). At the same time, given the low level of bankruptcy distance, enterprise environmental responsibility is more negatively related to long-term performance when TMT faultlines are stronger.

## 5.3 | Addressing endogeneity concerns with an instrumental variable approach

Despite our inclusion of higher order fixed effects to control for unobservable industry-year level heterogeneity, it is possible that an omitted endogenous firm characteristic, correlated with both SEID and firm performance, could drive our results. In our estimation, while environmental responsibility variables can affect a firm's performance, their performance measures can also affect the environmental responsibility variables. Thus, the estimates may ignore the bi-causality between environmental responsibility and a firm's performance, which can create biased results. Additionally, consistency in the fixed-effect estimation requires the reverse causality problem (first endogeneity problem) to be addressed using instruments for the potential endogenous variables (Baltagi et al., 2003). Thus, we implement a two-stage least squares (2SLS) instrumental variables approach to address this endogeneity concern.

**FIGURE 2** Three-way interactive effect of environmental responsibility, TMT faultlines and bankruptcy distance on long-term performance

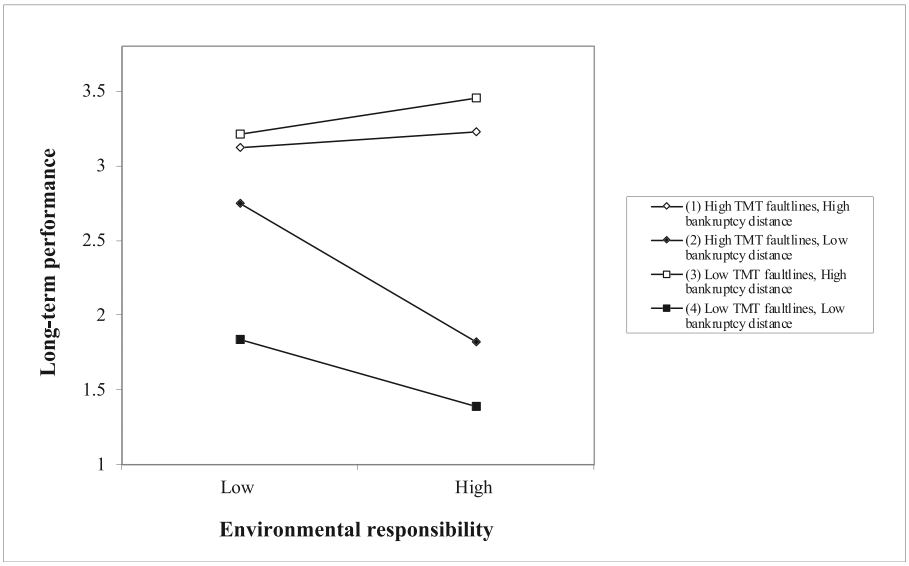



**TABLE 7** Instrumental variable approach

| | (1) | (2) |
|---|---|---|
| | First stage | Second stage |
| Variables | Environmental responsibility (SEID) | Long-term enterprise performance |
| TMT size | 0.022 (1.576) | −0.016 (−1.442) |
| Firm size | 0.403*** (5.519) | −0.385*** (−6.387) |
| Firm debt | −0.464 (−1.442) | −1.551*** (−6.010) |
| Firm age | −0.013 (−1.116) | −0.011 (−1.224) |
| Proportion of independent directors | −1.518 (−1.558) | −0.957 (−1.224) |
| Proportion of institutional ownership | 1.210 (0.996) | 3.528*** (3.630) |
| Proportion of state ownership | −1.261 (−1.126) | 1.830** (2.040) |
| Industry | 0.597*** (5.297) | −0.371*** (−3.970) |
| gap_SEID | 0.714*** (43.328) | |
| SEID | | −0.081*** (−4.387) |
| Constant | −7.291*** (−4.506) | 12.712*** (9.627) |
| Observations | 2,109 | 2,109 |
| *R*-squared | 0.549 | 0.288 |

*Note*: Standard errors in parentheses.
*$p$ < .10.**$p$ < .05.***$p$ < .01.

Referring to the relevant research of Surroca et al. (2010), we choose instrumental variables by lagging by one period the potential endogenous variable (A lag of SEID). First, we have found that the $p$ value is less than 0.05 through the Durbin–Wu–Hausman test; thus, there are endogenous explanatory variables. Accordingly, we can use the instrumental variable method. In addition, we conducted a weak instrumental variable test. We found that the $F$ value is greater than 10, indicating that the IV estimator can reduce the deviation of OLS estimation by about 90%. Thus, we are not concerned with weak tool variables. Next, we performed a 2SLS estimation. The 2SLS estimation results are listed in Table 7. They reveal that the instrumental variables are significantly correlated with endogenous variables and that SEID negatively correlates with long-term enterprise performance. Thus, Hypothesis H1 is verified again.

## 5.4 | Robustness analysis

We conduct additional tests to ensure the robustness of our findings. First, we include TMT diversity as a control variable to test for the effects of TMT faultlines above and beyond the impact of diversity. Precisely, TMT diversity consists of age diversity (using the Blau index developed by Blau, 1977) and gender diversity (using the coefficient of standard deviation proposed by Allison, 1978). The two TMT diversity measures are then standardized and summed to obtain the overall TMT diversity index. At the same time, we tested the robustness by replacing the core variable measurement method. We replaced the measurement method of TMT faultlines. The regression results (as shown in Table 8) exactly replicate those of our initial testing. Specifically, enterprise environmental responsibility is significantly and negatively related to long-term performance (Model 2: $\beta_4 = -0.028, p < 0.01$). Hypothesis H1 is supported as well in the robustness testing. Furthermore, the effect of the three-way interaction term of enterprise environmental responsibility, bankruptcy distance, and TMT faultlines is positively significant (Model 4: $\beta_5 = 0.030, p < 0.05$). Thus, Hypothesis H2 is also supported. In summary, the regression results shown in Table 8 verify the robustness of our findings.

**TABLE 8** Results of robust analysis

| Variables | Long-term enterprise performance | | | |
|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 |
| Environmental responsibility (SEID) | | −0.028*** (−3.89) | −0.027*** (−3.41) | −0.011 (−1.22) |
| TMT Faultlines (Fau) | | | 0.557* (1.65) | 0.784** (2.17) |
| SEID*Fau | | | −0.065 (−0.73) | 0.087 (0.77) |
| Bankruptcy distance (Z score) | | | | 0.033*** (9.19) |
| SEID*Z score | | | | 0.004*** (4.04) |
| Fau*Z score | | | | −0.030 (−0.87) |
| SEID*Fau*Z score | | | | 0.030** (2.44) |
| Industry | −0.420*** (−6.98) | −0.290*** (−4.39) | −0.288*** (−3.90) | −0.291*** (−4.07) |
| TMT size | 0.002 (0.27) | 0.004 (0.64) | 0.004 (0.60) | 0.001 (0.09) |
| Firm size | −0.613*** (−16.45) | −0.550*** (−15.05) | −0.558*** (−14.10) | −0.473*** (−12.10) |
| Firm debt | −0.733*** (−4.59) | −0.772*** (−5.56) | −0.685*** (−4.41) | 0.275 (1.43) |
| Firm age | −0.011* (−1.68) | −0.010 (−1.59) | −0.012* (−1.68) | −0.006 (−0.92) |
| Proportion of independent directors | 0.630 (1.35) | −0.175 (−0.39) | −0.061 (−0.13) | 0.249 (0.51) |
| Proportion of institutional ownership | 3.234*** (3.39) | 3.356*** (3.96) | 3.395*** (3.87) | 2.616*** (2.98) |
| The proportion of state ownership | 0.508 (0.91) | 0.532 (0.93) | 0.506 (0.90) | 0.884 (1.50) |
| TMT diversity | −0.029** (−2.22) | −0.035*** (−2.72) | −0.030** (−2.19) | −0.034** (−2.52) |
| _cons | 2.430*** (25.68) | 2.325*** (24.69) | 5.670*** (58.32) | 2.433*** (25.36) |
| No. of observations | 2,109 | 2,109 | 2,109 | 2,109 |
| $\chi^2$ | 3203.45*** | 2956.20*** | 2646.33*** | 2567.13*** |

*Note*: Standard errors in parentheses.
*$p$ < .10,**$p$ < .05,***$p$ < .01.

**TABLE 9** Results of robust analysis

| Variables | Long-term enterprise performance | | | |
|---|---|---|---|---|
| | Model 1 | Model 2 | Model 3 | Model 4 |
| Environmental responsibility (SEID) | | −0.036** (−2.19) | −0.035** (−2.10) | −0.016 (−0.85) |
| TMT Faultlines (Fau) | | | 1.611*** (2.68) | 1.971*** (3.16) |
| SEID*Fau | | | −0.208 (−1.29) | −0.021 (−0.12) |
| Bankruptcy distance (Z score) | | | | 0.027*** (3.63) |
| SEID*Z score | | | | 0.005*** (3.02) |
| Fau*Z score | | | | 0.075 (1.47) |
| SEID*Fau*Z score | | | | 0.045*** (3.43) |
| Industry | −0.621*** (−3.65) | −0.562*** (−3.25) | −0.529*** (−3.09) | −0.529*** (−3.15) |
| TMT size | 0.003 (0.24) | 0.005 (0.36) | 0.004 (0.29) | 0.002 (0.18) |
| Firm size | −0.390*** (−3.96) | −0.363*** (−3.77) | −0.374*** (−3.90) | −0.339*** (−3.55) |
| Firm debt | −0.918** (−2.21) | −0.935** (−2.26) | −0.882** (−2.15) | −0.042 (−0.09) |
| Firm age | −0.009 (−0.44) | −0.010 (−0.50) | −0.009 (−0.46) | −0.011 (−0.61) |
| Proportion of independent directors | −0.527 (−0.54) | −0.615 (−0.63) | −0.634 (−0.65) | −0.583 (−0.60) |
| Proportion of institutional ownership | 3.902** (2.32) | 3.943** (2.37) | 3.991** (2.42) | 3.560** (2.34) |
| Proportion of state ownership | 1.178 (1.05) | 1.101 (0.98) | 1.052 (0.92) | 1.098 (0.95) |
| TMT diversity | 0.008 (0.31) | 0.006 (0.25) | 0.025 (0.97) | 0.024 (0.91) |
| _cons | 3.248*** (21.06) | 3.189*** (20.37) | 3.148*** (19.89) | 3.140*** (20.68) |
| No. of observations | 2,109 | 2,109 | 2,109 | 2,109 |
| Wald $\chi^2$ | 940.72*** | 953.58*** | 961.12*** | 943.69*** |

*Note*: Robust standard error is in parentheses.
*$p$ < .10.**$p$ < .05.***$p$ < .01.

It is generally believed that GEE analysis is robust; that is, even if the form of the relevant work matrix is specified incorrectly, the parameter estimates and their standard errors are basically the same. Therefore, we adopt the method of changing the regression model and use xtgee to carry out the robustness test (Aloisio et al., 2014; Xu et al., 2020; Zhao & Tan, 2021). To further test the robustness of the previous conclusions, we changed the measurement methods of TMT and Tobin's Q value (TQV). After replacing the adjustment and outcome variable, we performed regression again. The results in Table 9 show that enterprise environmental responsibility is still significantly and negatively related to long-term performance (Model 2: $\beta_4 = -0.036, p < 0.05$). Hypothesis H1 is supported as well in the robustness testing. Furthermore, the effect of the three-way interaction term of enterprise environmental responsibility, bankruptcy distance, and TMT faultlines is positively significant (Model 4: $\beta_5 = 0.045, p < 0.01$). Thus, Hypothesis H2 is also supported. Therefore, the regression results in Table 5 also verify the robustness of our findings.

## 6 | CONCLUSIONS

### 6.1 | Theoretical contributions

This paper examines the relationship between corporate environmental responsibility and long-term firm performance under the combined moderating effects of TMT faultlines and bankruptcy threat. Theoretically, this paper contributes to the literature in four ways.

First, whether and how to participate in environmental responsibility are strategic decisions within an enterprise. Although it is widely assumed that "green" can be a source of strategic competitive advantage, thus far, most of the research on environmental responsibility has focused on large companies rather than SMEs (Crossley et al., 2021). This paper, based on SMEs, demonstrates that environmental responsibility hurts long-term performance. Our results show that SMEs are not the epitome of large enterprises (Jenkins, 2004). Compared with large-scale companies, SMEs' willingness to participate in environmental responsibility is relatively low. In addition, although large enterprises might balance the "cost" and "income" of environmental responsibility, SMEs have difficulties transforming environmental behavior into environmental performance, especially in developing countries. SMEs not only tend to reactively involve environmental responsibility but also lack the necessary resources (i.e., structure, managers, and human resources) to gain advantages from fulfilling their environmental responsibility. Our study addresses the dispute over the "cost view" and "income view" of environmental responsibility by focusing on SMEs.

Second, this paper studies the impact of corporate environmental responsibility on firm performance from the theoretical perspective of TMT faultlines. Consistent with the shift in the focus of environmental management, decision making, and performance research from external to internal factors (e.g., Elmagrhi et al., 2019; Glass et al., 2016; Lewis et al., 2014; Shahab et al., 2018), our work takes one of the internal factors (i.e., TMT faultlines) into account. The empirical results show that the transformation of environmental responsibility into long-term firm performance is closely related to TMT composition and strategic decision-making behaviors, which echoes the results of the studies of Orsato (2006) and Aguilera et al. (2007). As a result, the research on the contextual mechanisms between environmental responsibility and firm performance is extended. This finding also advances strategic leadership research by suggesting that social mechanisms among top managers may have profound implications for strategic environmental responsibility decision-making, implementation, and performance outcomes. Unlike prior research that emphasizes TMT's cognitive and information processes, this study demonstrates that the effectiveness of TMTs' strategic environmental responsibility decision-making depends on their social context formed by faultlines.

Third, this paper contributes to faultline theory. It is found that bankruptcy threats can activate TMT faultlines. This finding is consistent with Meyer et al. (2015) but contrary to Spoelma and Ellis (2017). The main reason for this may be related to the difference in research samples. Meyer et al. (2015) chose 3,263 financial consultants (2005–2008) from 325 teams in a large German financial consulting company, which was an actual workplace. Spoelma and Ellis' (2017) study was based on 94 and 90 teams of 736 undergraduates at a large public university in a laboratory setting. Correspondingly, Meyer et al. (2015) and Spoelma and Ellis (2017) used different research methods—the former used a field study, while the latter used two laboratory experiments. In comparison, we select the enterprises listed on the GEM in China as samples, closer to Meyer's research background (2015) and thus more consistent with Meyer's (2015) conclusion.

Finally, this paper innovatively introduces bankruptcy threats to explain the relationships among TMT faultlines, environmental responsibility, and firm performance. In general, our research supports the theory of "threat rigidity" during the strategic decision-making process; that is, when the bankruptcy threat is high, the pressure faced by the top managers is severe, and they adopt more conservative strategic behaviors to avoid firm bankruptcy (Staw et al., 1981). We demonstrate that strategic decisions become conservative because of bankruptcy threat, and subgroup fragmentation occurs within the TMT, resulting in the convergence of strategic decision-making team opinions. This result is in line with real-world situations SMEs face—when companies respond to bankruptcy threats, TMT faultlines are strongly activated, resulting in TMT member stress and cognitive impairment. In turn, TMT faultlines and bankruptcy threats work together to regulate the relationship between corporate environmental responsibility and firm performance. Bankruptcy threats can therefore influence TMT faultlines' effectiveness during strategic environmental responsibility decision-making.

### 6.2 | Practical implications

In practice, this study puts forward two suggestions for SMEs. First, this paper confirms that participation in environmental responsibility

can inhibit the long-term performance of SMEs. SMEs' participation in environmental responsibility satisfies only the minimum standard required by national regulation. In the short term, this may help SMEs reduce the sanctions and punishment from the government and regulations. However, the participation of SMEs in environmental responsibility will not bring them long-term performance growth due to their lack of a long-term environmental strategy and the necessary organizational resources. Facing the environmental requirements raised by "green" movements, governments, regulators, or other companies, SMEs, on the one hand, should leverage their TMT's information resources and give full play to strategic decision-making on environmental responsibility with a long-term perspective. On the other hand, attention should be paid to their combination of existing resources at hand (i.e., resource bricolage) to resolve resource constraints in SMEs. Therefore, these enterprises should establish a sustainable development framework consistent with their enterprise development and environmental responsibility according to the situation of their own companies.

Second, this paper also examines the role of TMT faultlines in the relationship between corporate environmental responsibility and long-term firm performance at different threat levels. The results show that when the bankruptcy threat is high, there is more external pressure as the distance to bankruptcy increases. As a result, TMT members tend to make decisions as soon as possible based on previous experiences or fall into a quarrel in terms of reaching a consensus, which inevitably reduces the quality of team decisions. However, when the bankruptcy threat is low, the TMT fully and effectively collects and processes relevant information among all subgroup members. Therefore, the TMT produces effective conflicts of different viewpoints to reach decisions conducive to enterprises fulfilling their environmental responsibility. According to the above results, SMEs should try to coordinate the relationship between TMT members through various measures, especially when they face some threat (e.g., bankruptcy threat). For instance, when a firm is reasonably close to bankruptcy, e.g., there is financial risk, the TMT should be aware of and face up to the TMT's potential cognitive dysfunction, fully absorbing different points of view, to restrain the polarization of the team and the corresponding nuisance effect.

### 6.3 | Limitations and future research

There are also several limitations to this study. On the one hand, Chinese SMEs are taken as samples, which may provide a unique environment. Future research could take a broader research perspective and conduct cross-country and cross-cultural analyses by collecting large amounts of data from both developed and developing countries. On the other hand, the measure of TMT faultlines is mainly based on objective demographic characteristics such as gender and age. It does not pay attention to the influence of other characteristics (such as personality and values). In the future, we can explore the mechanism of different types of TMT faultlines in organizational decision-making.

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## CONFLICT OF INTEREST

The authors declare no conflict.

## AUTHOR CONTRIBUTIONS

Litian Chen is the project leader of the study. She contributes to conceptualization, methodology, formal analysis, investigation, and research design. Yun Zhou contributes to the manuscript preparation of the study, including conceptualization, methodology, data analysis, writing-original draft, and writing-review & editing. Xingwu Luo contributes to revision strategy, data supplement, and curation. Shuai Chen contributes to the supervision and coordination of the whole team. She is also involved in conceptualization, theoretical development, revision strategy, and writing-review & editing. Yuting Cao contributes to the data collection and basic analyses.

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## APPENDIX A

**TABLE A1** Examples of the 10 classes of items constituting SEID

| Item class | Example | Score |
|---|---|---|
| 1. Information of ISO environmental management system certification | The company has obtained the environmental management system certificate (ISO14001). | 2 |
| 2. Compliance with environmental regulations and disposal | Whether the listed company and its subsidiaries are included in the list of enterprises that cause serious pollution: ☑Yes ☐ No | 1 |
| 3. Influence on government environmental policies | / | 0 |
| 4. Enterprise environmental strategy and objectives | In the coming years, the company will continue to treat "creating a safe, eco-friendly and healthy working environment" as its corporate mission. | 2 |
| 5. Investment in the development of environmental technologies | The environmental protection division of the company has made every effort to develop grid-based monitoring and supervision of air pollution sources and has developed the "distributed atmospheric environment monitoring system," which adopts the technology of the internet of things platform to realize large-scale and timely monitoring of the atmospheric environment. | 2 |
| 6. Environmental initiatives (such as abatement of tax) | Grants \200,000 from provincial special fund for environmental protection. | 3 |
| 7. Environmental bank loans | In 2013, the company borrowed a loan of \150,000 for the construction of a new sewage treatment station. | 3 |
| 8. Environment protection behaviors (e.g., the treatment of sewage and toxic gasses) | The accumulative operation time of its sewage station is 4,500 hours. The environmental protection fan has run for 64,500 hours. The investment of environmental prevention activities of the company plays an important role in fulfilling the environmental protection responsibility of the company. | 3 |
| 9. Improvement of business environment | The company's generic supplies are in line with the government's initiatives for green offices and recycling consumption. Thus, the company is on the government procurement list, which offers new development opportunities. | 2 |
| 10. Other environment-related behaviors (e.g., education and donations for environmental protection) | The company has completed more than 30 lectures on safety and environmental protection responsibility throughout the year, with a total of 400 audiences participating in the training. The company has publicized production safety, energy conservation and environmental protection more than 20 times by means of safety bulletin board, posting safety wall charts, OA, etc. | 3 |