CEO Hometown Identity and Firm Green Innovation

Abstract

Drawn on the upper echelons theory, this study investigates how chief executive officer (CEO) hometown identity drives firm green innovation. We propose that CEO hometown identity has a positive impact on a firm's green innovation performance. Furthermore, we explore the moderating role of managerial discretion determined by organizational and environmental factors (i.e., institutional ownership and market complexity). We propose that institutional ownership negatively moderates the positive relationship between CEO hometown identity and green innovation, but market complexity plays a positive moderating role. Using Chinese publicly listed firms from 2002-2016 in heavily polluting industries, our findings support these hypotheses. Our research contributes to the upper echelons theory and CSR literature and has substantial practical implications.

Keywords: CEO hometown identity; Green innovation; Upper echelons theory; Managerial discretion

1. Introduction

In recent years, the environment has become one of the greatest concerns of corporate social responsibility (Bird et al., 2007; Babiak and Trendafilova, 2011). Firms are increasingly paying attention to environmental issues and implementing environmental management practices to simultaneously maximize their economic interests and take social responsibility. Therefore, as a new sustainable development pattern, green innovation has attracted wide attention from researchers and practitioners (Polzin et al., 2016). Existing research has suggested a number of antecedents of green innovation, including technological capabilities (Cuerva et al., 2014), environmental regulations (Demirel and Kesidou, 2011), green knowledge sharing (Song et al., 2020), consumer pressure (Zhang and Zhu, 2019), market demand (Horbach, 2008).

Recent studies in the upper echelons theory have started to explore the role of executive characteristics on firm green innovation. The central tenet of the upper echelons theory is that executives will make highly personalized interpretations of the situations and choices they face, in turn, influence their decision. That is, executives inject a lot of their own personality, experience and value into their behaviour. This degree of personalization can determine the formation of strategies or the actions of others, and thus the organization becomes a reflection of executives (Hambrick and Mason, 1984; Hambrick, 2007). It is clear that these characteristics shape the cognitive makeup of the firm and thus affect firm's green innovation (Horbach and Jacob, 2018). Consistent with these views, the present work attempts to answer the question why

firms with broadly similar characteristics make different decisions about green-innovation, from a perspective of CEO characteristic.

In this research, we focus on an important but understudied CEO characteristic: hometown identity. This characteristic represents the emotional relationship between individuals and their hometowns through their life and growth process. Previous studies have found that hometown identity is associated with a psychological bias, which plays an important role in decision making of political leaders (Cohen et al., 2011; Hodler and Raschky, 2014; Knight, 2008) and of CEOs in terms of employee favouritism and acquisition behaviour (Jiang et al., 2019; Yonker, 2017). However, the existing research has neither delineated the psychological mechanisms to explain how CEO hometown identity plays a role in firm strategic decisions and outcomes, nor extended the idea of CEO hometown identity to the context of green innovation. The long-term nature of the green innovation investment and the high risk of innovation failure make green innovation a particularly challenging task (Arena et al., 2018; Kemp and Volpi, 2008). Therefore, whether and how top executive hometown identity influences green innovation is unclear. This research aims to fill this gap.

Drawing on the upper echelons theory, we propose that CEO hometown identity is positively associated with green innovation performance, because emotional ties to their hometowns motivate them to pay more attention to the environment and the well-being of the people of their hometowns, and drive them to protect the environment and reduce pollution there. CEOs can achieve this goal through green innovation, because

green innovation not only can reduce environmental pollution but also can provide public benefits by reducing environmental hazards and improve environmental quality.

The relationship between top executive hometown identity and firm green innovation may be subject to some important contingent factors. We focus on managerial discretion, the degree of action available to a manager, which sets up a boundary condition on managers' impact on steering firm strategies (Hambrick and Finkelstein, 1987). That is, the extent to which managers exert influence on a green innovation strategy depends on the level of managerial discretion. In this study, we examine institutional ownership and market complexity that represent managerial discretion and discuss how they moderate the relationship between CEO hometown identity and green innovation. Specifically, institutional investors have the power to block or sanction executives' behaviours, thereby increasing the restriction on CEO. Therefore, we propose that institutional ownership weakens the positive effect of CEO hometown identity on green innovation. Market complexity increases the market change, uncertainty and range of options the CEOs face, which increase ambiguity and reduces restrictions and CEOs tend to have more discretion. Therefore, we propose that market complexity strengthens the positive effect of CEO hometown identity on green innovation.

By using a sample of publicly listed Chinese firms in heavy polluting industries from 2002-2016, we find strong support for our hypotheses. Our research contributes to the literature in three ways. First, this study contributes to upper echelons theory and

CSR literature by investigating the effect of executive hometown identity on green innovation performance. Executive hometown identity, as a type of psychological characteristic (Jiang et al, 2019), has shown to influence decision-making of political leaders and on human resource and financial investment decision (e.g., Hodler and Raschky, 2014; Jiang et al., 2019; Yonker, 2017). However, the motivation and goal of political leaders vary substantially from firm top executives and decision-making process of financial and human resource investment also differ from that of green innovation. These differences require a better understanding on the mechanism how hometown identity impacts on firm green innovation performance. Therefore, this study explores the link between the two. Second, by exploring the drivers of green innovation from the CEO hometown identity perspective, this study advances the investigation on the antecedents of green innovation and contributes to the research on the corporate environment and corporate social responsibility. Third, this study provides a boundary condition on the relationship between top executive hometown identity and green innovation by considering the moderating role of managerial discretion. We focus on the role of institutional ownership and market complexity; one stands for a weakened and the other stands for a strengthened managerial discretion in moderating the effect of top executive hometown identity on green innovation. Understanding the moderating effect of managerial discretion will provide a better understanding on how top executive psychological bias, hometown identity in our research, influences firm strategic choice and outcomes.

2. Related Literature and Hypothesis Development

2.1 Executive Characteristics, Innovation and CSR

Our research focuses on investigating the effect of CEO characteristics on green innovation. Green innovation refers to new or improved product, process, technology, or practice innovation for avoiding or mitigating environmental damage (Kemp and Pearson, 2008; Rennings, 2000). As a part of CSR, the investment of green innovation is uncertain and require a long period to pay off, reflecting firms' long-term strategic orientation (Oh et al., 2016). Compared with traditional innovation, green innovation has both the traditional knowledge externalities in the R&D phase and the externalities of positive environmental impact in the adoption and diffusion phases (Oltra, 2008). Therefore, green innovation has the dual characteristics of innovation and CSR. We thus first examine prior studies pertinent to the effects of executive characteristics on innovation and then their effects on CSR.

The central tenet of the upper echelons theory is that executives' experiences, values, and personalities will affect their vision, selective perception, interpretation, strategic choices, and ultimately firm outcomes (Arena et al., 2018; Hambrick and Mason, 1984). Extant literature affiliated with the upper echelons theory has investigated how CEO characteristics impact on innovation in terms of innovation performance and R&D investment. One stream of these studies shows that CEO characteristics have positive impact on firm innovation. For example, CEOs' pilot credentials (Sunder et al., 2017), better education experience (Lin et al., 2011),

transformational leadership (Chen et al., 2014) can lead to better firm innovation outcome. The other stream of literature shows that CEO characteristics can have negative (i.e., tenure, see Naveen, 2006), insignificant (i.e., education, see Barker and Mueller, 2002) or non-linear (i.e., tenure, see Chen, 2013) impact on R&D investment. Therefore, the mixed empirical evidence on the relationship between CEO characteristics and innovation suggests much needed further investigations.

Moreover, a growing body of literature focuses on how CEO characteristics affect CSR based on the upper echelons theory. It shows that demographic characteristics of CEO such as younger age, having a bachelor's degree in the humanities, a breadth of career experience, and being female, and pay structure have positive impact on CSR (Oh et al., 2016; Manner, 2010; Deckop et al., 2006). In addition, deeper level characteristics of CEO characteristics, such as CEOs' hubris (Tang et al., 2015), narcissism (Petrenko et al., 2016), ability (Yuan et al., 2019), political ideologies (Chin et al., 2013), ethical leadership (Wu et al., 2015) have shown significant direct or indirect effect on CSR. These studies have also lent strong support to the central tenet of the upper echelons theory (Hambrick and Mason, 1984).

Both streams of literature clearly show the effect of CEOs' characteristics on innovation or CSR, but in a separate manner. Nevertheless, existing research rarely mentions that whether and how the characteristics of CEOs play a role in firm outcomes that combine both innovation and CSR such as, in our context, green innovation. A few exceptions include studies on how executives' gender (He and Jiang, 2019),

environmental concern (Tang et al., 2018), hubris (Arena et al., 2018) and temporal cognition (Liao, 2016) facilitate the engagement in green innovation. However, none of these research has shed light on examining the influence of CEO hometown identity on firm green innovation, which we follow this line of research by.

2.2 Place Identity and Hometown Identity

Hometown identity, in our research, refers to a psychological bias that individuals tend to make decisions favouring their hometowns due to emotional ties. Some scholars refer home identity as "hometown bias" (Jiang et al., 2019), "birthplace bias" (Lindblom et al., 2019), or "regional favortism" (Hodler and Raschky, 2014). Hometown identity relates to the concept of place identity. Proshansky (1978) first proposed that place identity based on the cognitive connection between individuals and their physical environment. Place identity is a process in which individuals or groups interact with places to achieve socialization. This special socialization includes a variety of complex processes such as emotions, perceptions and cognition (Stedman, 2002). Through this process, individuals or groups define themselves as a part of a specific place to build their status and role in society according to the place (Proshansky et al., 1983). Among many places related to individuals, we specifically focus on the hometown because it is a special place that can substantially influence individuals' cognition and behaviour by invoking sentiments (Scannell and Gifford, 2010).

Hometown identity has an important impact on individual decision making (e.g., Cohen et al., 2011; Hodler and Raschky, 2014; Knight, 2008) due to the emotional

relationship between individuals and their hometowns through individuals' life and growth. Since hometowns are where individuals were born and grew up, individuals are familiar with the natural geographic and social environment of their hometowns, which meet their need for security, comfort and consistency (Nielsen-Pincus et al., 2010; Scannell and Gifford, 2010). Moreover, a hometown not only is a geographic location but also includes local humanities, the environment and social psychology connotations (Qian and Zhu, 2014; Scannell and Gifford, 2010). Therefore, individuals can establish continuous emotional ties with their hometowns in daily life (Vaske and Kobrin, 2001), which bring them emotional satisfaction and promote an emotional preference (Proshansky, 1978).

Existing research shows that hometown identity may significantly influence individual decision making, i.e., people make decisions that favour their hometowns. For example, government officials are more inclined to tilt resources and make more transfer payments to their hometown (Cohen et al., 2011), and regions where political leaders were born are more strongly illuminated at night than other regions (Hodler and Raschky, 2014). Managers have also been found to make decisions that benefit their hometowns, such as showing a preference to hometown workers than others (Yonker, 2017) or exhibit hometown preference in acquisitions (Jiang et al., 2019). However, extant literature remains silent on the effect of hometown identity on green innovation. Therefore, in this study, our theoretical development focuses on CEO hometown

identity as their favouritism to hometown are argued to foster firm green innovation performance.

2.3 CEO Hometown Identity and Green Innovation

Based on the upper echelons theory and the effects of place identity on decision-making, we predict that CEO hometown identity has a positive effect on firms' green innovation in the following two ways.

First, according to the upper echelons theory, CEO's psychological bias/preference will exert strong influence on firm strategic decision making and outcome (Carpenter et al., 2004). We propose that their hometown identity, a psychological bias resulted from place identity, plays an important role in influencing firm strategies. Place identity is associated with individuals' pro-environment intentions and behaviours (Carrus et al., 2005; Hernández et al., 2010). Individuals will establish continuous emotional bonds with the local natural environment in their daily behaviours, and this type of emotional bond may regulate individuals' attitudes and behaviours towards the environment, such as daily protection behaviours of the resources and environment (Hernández et al., 2010; Tuan, 1977). Similarly, as the hometown is the place where individuals were born and grew up, they will establish an emotional connection with the natural environment of their hometown and thus show a friendly attitude and behaviour towards their hometown environment. As an important part of corporate environmentally friendly behaviours, green innovation can not only consume less resources, generate less waste, and increase the sustainable development ability of

a firm but also reduce the pollution and damage to the external environment (Dangelico et al., 2017; Sierzchula and Nemet, 2015). Therefore, firms with hometown CEOs may be more concerned about local environmental issues and are more likely to reduce environmental pollution by actively developing environmentally friendly products and improving the environmental performance of the manufacturing process.

Second, individuals are more likely to pursue the interests of their hometown community due to place identity (Carrus et al., 2005). Individuals may feel emotionally attached to their hometowns and may thus consider economic factors and the interests of the hometown group when making decisions (Lindblom et al., 2019). Therefore, hometown identity may activate individuals' pro-social motivation and drive them to focus on the goal of benefiting other people based on a concern for the welfare of the hometown group. Hometown CEOs may be more concerned about the health and welfare of the hometown group and may thus experience a moral obligation to prevent or solve environmental problems. As a sustainable development pattern, green innovation benefits firms and the ecological environment (Sierzchula and Nemet, 2015) and results in public benefits by reducing environmental hazards and improving environmental quality (Orsato, 2006). Corporate green innovation decisions not only impact the firm and the environment but also extend beyond the boundaries of the organization to customers, suppliers, employees' families, and other community members. Therefore, green innovation is commonly seen as a pro-social behaviour of firms (Bendell, 2017; Liao et al., 2018) that aims to improve the well-being of

individuals, groups or organizations (Brief and Motowidlo, 1986). We propose that hometown CEOs will show pro-social motivation and behaviour and are more concerned about the well-being of other people in their hometowns. Thus, while seeking financial profits, hometown CEOs are more likely to protect the environment through green innovation practices that will contribute to the well-being of other people. Thus, we propose the following hypothesis:

Hypothesis 1: There is a positive relationship between CEO hometown identity and firms' green innovation.

2.4 The Moderating Role of Managerial Discretion

If CEO hometown identity indeed has an impact on firms' green innovation, what factors mitigate this impact? Upper echelons theory suggests that executives' managerial discretion will affect the extent to which a CEO matters to firm strategies and outcomes (Hambrick and Finkelstein, 1987). Managerial discretion, defined as "latitude of managerial action" (Hambrick and Finkelstein, 1987), can be used to explain whether and the extent to which executives can have a significant impact on the organization (Child, 1972). When executives have more discretion, they will have a stronger influence on firm strategy and the results (Hambrick and Finkelstein, 1987). Therefore, the factors that influence whether and the extent to which CEOs will exercise their power on firm strategy can play important moderating roles on the relationship between CEO hometown identity and green innovation. Research shows that organizational and environmental factors are two important influences on management

discretion; some organizations give their executives more freedom, and more changes and variety can be made in certain types of environments than in other types of environments (Hambrick and Finkelstein, 1987). Based on the above research, we investigated the moderating effect of institutional ownership (the organizational factor) and market complexity (the environmental factor) on the relationship between CEO hometown identity and firms' green innovation.

Institutional investors refer to legal entities engaged in securities investment in financial markets, which mainly include insurance companies, pension funds, securities companies, banks, etc (Oh et al., 2011). As an organizational form of the modern corporate system, institutional investors are stakeholders who not only bring profits to the firm (Guercio and Hawkins, 1999) but also play an active role in corporate governance. Prior studies have found that institutional investors can leverage their professional advantages to supervise the management of firms and participate in corporate governance (Lange et al., 2015). For example, Grier and Zychowicz (1994) provided evidence that institutional investors' shareholdings were negatively related to corporate financial leverage, which is considered to be the result of potential supervision by institutional investors. Bushee (1998) and Tihanyi et al. (2003) found that institutional investors influence managers by controlling the executives' compensation, preventing attempts to reduce R&D expenditure and promoting investment in international expansion.

Therefore, we believe that institutional investors who hold relatively large shares of a firm can exert influence on the organization and CEO (Ryan and Schneider, 2002) and have a strong motivation to supervise executive behaviours (Sanders and Boivie, 2010). In addition, prior studies have suggested that institutional investors act as speculators, who mainly search for short-term gains from their investments and have little interest in a firm's long-term performance (Drucker, 1986; Rong et al., 2017). Considering that green innovation is costly and requires a long period to pay off (Arena et al., 2018), institutional investors may force managers to sacrifice green innovation for better short-term financial performance. Accordingly, institutional investors have the power to constrain CEOs to invest in risky long-term activities and thus have a negative moderating effect on the relationship between CEO hometown identity and green innovation. Therefore, we propose that

Hypothesis 2: The proportion of institutional investors weakens the positive relationship between CEO hometown identity and firms' green innovation.

The characteristics of industry structure play an important role in influencing the discretion of management (Hambrick and Finkelstein, 1987). In this article, we consider market complexity, a major factor that affects the organizational structure (Dess and Beard, 1984), as an important factor that influences the discretion of management. Market complexity reflects the degree of competitiveness and heterogeneity of a firm's operating environment (Dess and Beard, 1984). Existing research shows that the degree to which the environment allows choice and variety has a significant impact on the

discretion of a CEO. Hambrick and Finkelstein (1987) pointed out that managerial discretion is enhanced when there is more ambiguity and less constraint. For example, Hambrick and Finkelstein (1987) argued that oligopolistic industries provide the least discretion because executives must abide by unofficial norms that define firms' areas of endeavour and protect firms' competitive position. In contrast, executives of firms who operate under either monopolistic or pure competition do not face these restrictions and have a relatively higher level of managerial discretion (Clearly, in regulated monopoly, restrictions may be severe, but not because of the industry structure itself). Therefore, we emphasize that managers who face complex environments tend to perceive greater uncertainty and have more information processing needs than managers who face simple environments (Duncan, 1972; Pennings, 1975). A highly complex environment will subsequently make the CEO more influential on the firm's decision making (Hambrick and Finkelstein, 1987).

Following this reasoning, we propose that market complexity moderates the relationship between hometown CEOs and firms' green innovation. In a complex market environment, the range of managers' untested manoeuvring is enhanced (Zajac and Bazerman, 1991), which causes the CEO to have more discretion, and this enhanced discretion may strengthen the impact of CEO hometown identity on firms' green innovation. In contrast, in a relatively simple market environment, there are highly developed rules and interaction norms (Hambrick and Finkelstein, 1987), which may limit CEOs' discretion. When CEOs have limited discretion over corporate strategic

decisions, the influence of their personal attitudes on firms' green innovation decisions is less significant than when they have more discretion. Accordingly, we propose that when firms operate in more complex markets, hometown CEOs are more capable of exercising their power in promoting firms' green innovation. We thus predict the following hypothesis:

Hypothesis 3: Market complexity strengthens the positive relationship between CEO hometown identity and firms' green innovation.

3. Method

3.1 Samples

The sample of this study is publically listed Chinese firms from 2002-2016. China has huge diversity across its provinces. The differences across provinces are great not only in dialects and customs but also in history and culture, which provides sufficient variation for a CEO's diversified hometown background. Therefore, Chinese firms provide a good sample for us to test our hypotheses.

In this study, we used the following sampling procedures. First, we chose the heavily polluting industries based on the "List of Listed Companies' Environmental Verification Industry Classification" (2008) and the "China Securities Regulatory Commission Industry Classification Guidelines" because firms in heavily polluting industries have more impact on the environment and are more sensitive to environmental problems. Second, considering the availability of data, we selected the publically listed Chinese firms from 2002-2016 as the initial sample in the above-

mentioned heavily polluting industries. Finally, this paper excluded firms that issue B-shares and/or H-shares, whose governance structures and regulatory requirements are different (Chen et al., 2017). Industry composition of sampled firms are shown in Appendix Table 1.

The data used in the sample were derived from three resources as follows. First, we manually collected CEO characteristics data based on the executive resume information disclosed by the China Stock Market Accounting Research Database (CSMAR database). Second, we obtained patent data from the Baiten database, and third, we obtained financial data from the CSMAR database and firms' annual reports. Finally, we merged the above three sets of data and excluded the missing data. Our final sample included 6,831 firm-year observations for 590 firms.

3.2 Measures

Dependent variable

Green innovation (G_Inno). According to the research of Lim and Prakash (2014), we adopted the resource conservation and environmentally friendly patents that firms applied for to measure the firms' green innovation.[1] We considered the patents that contain the keywords of "green", "clean", "sustainable", "cycle", "ecological", "low carbon", "saving", "energy saving", "environment", "environmental protection",

[1] In fact, some listed firms may have several subsidiaries, and these subsidiaries may be located in different provinces. To avoid confusion regarding the hometown effects, we include only the green innovation of corporate headquarters.

"environmental pollution" and "emission reduction" as green innovation (Bansal and Clelland, 2004).

Independent variable

CEO hometown identity (Hometown). If a firm's headquarter place is consistent with its CEO's hometown, Hometown equals 1 and is 0 otherwise. When manually searching for CEO's hometown information, we found that most of this information can only be searched at the provincial level and that only some is specific to the city level. Therefore, in the regression analysis, we used only the province information to represent the CEO's hometown (Feng and Seasholes, 2004) and compared it with the province where the firm is headquartered. In the robustness test, hometown identity is measured by a mixture of the province and city. If the CEO's hometown information at the city level was found, we compared it with the city where the firm is headquartered[2]. Otherwise, only the province-level information was used for measurement.

Moderating variables

Institutional ownership (Institution). The shares held by institutional investors/total shares was employed to measure institutional ownership (Rong et al., 2017).

Market complexity (Complexity). Industry concentration was used to measure market complexity (Keats and Hitt, 1988; Palmer and Wiseman, 1999). We used the

[2] Results of using provincial measurement and those of using both provincial and city measurement are highly consistent.

sum of the squares of the market shares of all firms in a particular industry for measurement and selected sales revenue as the scale for calculation. Smaller values indicated greater market complexity.

Control variables

To control for a number of factors that may potentially affect firms' green innovation, we included firm- and CEO-level controls in our study.

Firm age (Firm Age). Older firms may have a longer exposure to the isomorphic processes related to green innovations (Slawinski and Bansal, 2015). Therefore, firm age was controlled for by measuring the number of years since a firm's foundation.

Firm size (Firm Size). Larger firms have more resources to invest in green innovation but may exhibit greater inertia (Gilinsky et al., 2012). The natural logarithm of total assets at the end of each year was employed for this measurement.

R&D investment (R&D). Previous studies have shown a positive correlation between firm R&D investment and green innovation (Liao et al., 2019; Arranz et al., 2020). We use research and development expenses to measure the firms' overall levels of innovation (Wagner, 2010).

Export (Export). Previous research has shown that export is positively associated with green innovation (Galbreath, 2019). We use a dummy variable to proxy export behaviours, i.e., Export equals 1 if a firm has export business; otherwise, it equals 0.

Board independence (Independence). Previous research has found that board independence is related to the level of corporate social responsibility (Chang et al.,

2017). We used the independent directors/board size ratio to measure board independence (Uddin and Tsamenyi, 2009).

State-owned enterprises (SOE). State-owned enterprises can boost green innovation because of their abundant resources. However, they may also invest less in green innovation because their political networks protect them from government pressure (Li and Zhang, 2007). A dummy variable was introduced here that equalled 1 for SOEs and 0 for other enterprises.

Corporate performance (ROA). Firms with good financial performance can afford to implement more green innovation (Arena et al., 2018). We used the ROA (return on assets) to measure firm performance.

ISO 14001 (ISO). The implementation of ISO 14001 certification can improve firms' environmental performance (Jiang and Bansal, 2003). Thus, we predict that ISO 14001 certification may promote green innovation. We introduced a dummy variable coded as 1 if the firm passed the ISO 14001 certification and is 0 otherwise.

CEO age (Age). Older CEOs seem to have better performance concerning social responsibility (Daboub et al., 1995) so we controlled for CEOs' age.

CEO gender (Male). Prior studies show that females may be of stronger environmental preferences than males (He and Jiang, 2019), which could affect green innovation orientation (Galbreath, 2019). A dummy variable was introduced 1 for males, 0 for females.

CEO tenure (Tenure). CEOs with longer tenure will have a deeper understanding of corporate socially responsible investments, so they will be more open to environmental imperatives and more likely to engage in responsible environmental activities (Ortiz-de-Mandojana et al., 2019). The number of years since the CEO has occupied the CEO position was employed for measurement (Hubbard et al., 2017).

CEO's social capital. The measurement of a CEO's hometown identity may include the social capital advantage of hometown CEOs. Compared to a non-hometown CEO, a hometown CEO has more relatives, friends and other resources in his or her hometown and is more familiar with local dialects, customs and culture. Therefore, the local social networks provide better social capital for the hometown CEO, which helps to strengthen the resource acquisition and communication outside the firm to promote firms' green innovation (Subramaniam and Youndt, 2005).

Therefore, we controlled for CEOs' social capital. Faleye et al. (2014) found that the social capital of CEOs refers to people who have shared experiences in other firms, elite schools, and external economic associations, which reflects the external connections and networks of CEOs (Cao et al., 2016). Referring to the research of Belliveau et al. (1996) and Kim (2007), we controlled for the CEOs' social capital from the following three aspects. (1) CEOs' *political relationship (Connect)*. We introduced a dummy variable coded as 1 if the CEO is a member of national, provincial or municipal people's congresses or political consultative conferences, which was 0 otherwise. (2) CEOs involvement in other social activities *(SC_Other)*. A dummy

variable was created: 1 refers to a CEO who is a member of a trade association, charity, scientific institution, or other non-profit organization (Faleye et al., 2014) and is 0 otherwise. (3) CEOs' part-time job in other listed firms *(SC_Empl)*. SC_Empl proxies for CEOs' network connections and knowledge developed due to the exposure to a variety of strategic and governance issues that result from multiple directorships. We introduced a dummy variable coded as 1 if the CEO works part-time in other listed firms and is 0 otherwise. All variable definitions are shown in Appendix Table 2.

3.3 Model

To test hypothesis 1, we used Ordinary Least Squares (OLS) to estimate the following model:

$$G\_Inno_{it} = \beta_0 + \beta_1 Hometown_{it} + \beta_2 X_{it} + Industry_c + Year_t + Province_j + \varepsilon_{it} \quad (1)$$

Where G_Inno_{it} is the dependent variable that represents the green innovation performance of firm i in year t. $Hometown_{it}$ is 1 if a listed firm's place of registration is consistent with its CEO's hometown and is 0 otherwise. X_{it} is a set of control variables that include firm- and CEO-level controls. $Industry_c$,$Year_t$and $Province_j$ represent the industry, time and regional fixed effects, respectively.

According to hypotheses 2-3, we constructed the following models (2)-(4):

$$G_{Inno\,it} = \beta_0 + \beta_1 Hometown_{it} + \beta_2 Homwtown_{it} \times Institution_{it} + \beta_3 Institution_{it} + \beta_4 X_{it} + Industry_c + Year_t + Province_j + \varepsilon_{it} \quad (2)$$

$$G\_Inno_{it} = \beta_0 + \beta_1 Hometown_{it} + \beta_2 Hometown_{it} \times Comlexity_{it} + \beta_3 Comlexity_{it} + \beta_4 X_{it} + Industry_c + Year_t + Province_j + \varepsilon_{it} \quad (3)$$

$$G\_Inno_{it} = \beta_0 + \beta_1 Hometown_{it} + \beta_2 Hometown_{it} \times Institution_{it} + \beta_3 Institution_{it} + \beta_4 Hometown_{it} \times Comlexity_{it} + \beta_5 Comlexity_{it} + \beta_6 X_{it} + Industry_c + Year_t + Province_j + \varepsilon_{it} \quad (4)$$

Among them, $Institution_{it}$ refers to the institutional shareholding ratio, $Comlexity_{it}$ refers to the market complexity, and the other variables are the same as the definition of Formula (1).

4. Results

4.1 Hypothesis Tests

Table 1 provides the descriptive statistics and correlation analysis. In all samples, hometown CEOs account for approximately 47% of the total sample. The average number of green innovations in the sample was 0.66. Table 2 shows the regression analysis results of CEO hometown identity on firms' green innovation. Model 1 only includes the control variables. In Model 2, we add the independent variable. Hometown is positively related to green innovation ($p<0.01$), which supports hypothesis 1. Based on the estimation result in Model 2, we can find that firms with hometown CEOs, on average, submit 39.1% more of green patent applications than similar firms with non-hometown CEOs. This effect is economically significant.

We test hypotheses 2 and 3 by using Models 3-5. In Model 3, the interaction between CEO hometown identity and institutional ownership is negative and significant ($p<0.1$), which indicates that a firm's institutional ownership has a negative moderating effect on the relationship between CEO hometown identity and firms' green innovation. Thus, hypothesis 2 is also supported. In Model 4, the interaction between CEO

hometown identity and market complexity is negative and significant ($p<0.01$), suggesting that when firms face a more complex market environment, the effect of CEO hometown identity and green innovation strengthens, which supports hypothesis 3.

Insert Table 1 & Table 2

To demonstrate the moderating effect of institutional ownership and market complexity, we draw Figures 1 and 2. Figure 1 shows that the institutional ownership ratio weakens the effect of CEO hometown identity on green innovation. Figure 2 shows that market complexity strengthens the effect of CEO hometown identity on green innovation.

Insert Figure. 1& Figure. 2

In addition, to ensure the robustness of the regression results and control the influence of missing values, we added the variable *Miss* to the regression model. Miss measures missing CEO hometown information. A dummy variable was introduced: 1 refers to a CEO whose hometown information cannot be found and is 0 otherwise. The results are shown in Table 3. In Models 1-5, Miss was not significant, and the coefficient of the independent variable was still positive and significant, which indicates that our regression results are robust.

Insert Table 3

4.2 Robustness Tests

4.2.1 Alternative Measure of Variables

To ensure the robustness of our results, we employ a combination of province and city information as our alternative measure of CEO hometown identity. Specifically, if we can search for the city where the CEO's hometown is located, we compare it with the city where the firm is headquartered; if we cannot find the specific city of the CEO's hometown, only province-level information was used for the measurement. A dummy variable was thus introduced here that equals 1 for hometown CEOs and is 0 for other CEOs. The results are shown in Table 4. The coefficients of Hometown_2 are all positive and significant. In Models 3, the interaction between CEO hometown identity and institutional ownership was negatively related to green innovation but not significant. In Models 4, the interaction between the CEO hometown identity and market complexity was negatively related to green innovation ($p<0.05$). The results support our hypotheses.

Insert Table 4

Second, we employ the total number of patents that firms applied for as our alternative measure of green innovation. The results are shown in Table 5. The coefficients of Hometown are all positive and significant. In Models 3-4, the interaction between CEO hometown identity and institutional ownership was negatively related to green innovation ($p<0.1$), while the interaction between the CEO hometown identity

and market complexity was negatively related to green innovation ($p<0.05$). Overall, the results support our hypotheses.

Insert Table 5

4.2.2 Endogenous Analysis

To solve the possible endogenous problem, we use quasi-natural experiments to estimate the impact of CEO hometown identity on green innovation. Referring to the method of Huang and Kisgen (2013), we think that if a former CEO is a hometown CEO, the new CEO may be from the local or other regions; similarly, if the former CEO is a non-hometown CEO, the new CEO may be from the local or other regions. Thus, we constructed the following differences-in-differences (DID) model to test the impact of CEO hometown identity on the firms' green innovation. The sample for this test is firm years three years before and three years after a CEO transition.

$$G\_Inno_{it} = \beta_0 + \beta_1 Turnover_{it} \times Post_{it} + \beta_2 Turnover_{it} + \beta_3 post_{it} + \beta_4 X_{it} + Industry_c + Year_t + Province_j + \varepsilon_{it} \quad (5)$$

In this model, $Turnover_{it}$ is a dummy variable that represents the CEO turnover, $Turnover_{it}$ takes the value of 1 if a firm changes its non-hometown CEO to a hometown CEO and takes the value of 0 if a firm has a non-hometown CEO before and after the CEO's turnover. $Post_{it}$ is represented by a dummy variable that equals 1 for the years after a CEO transition and equals 0 for the years before the change.

Models 1-2 report the estimation results in Table 6. The coefficient of the intersection item $Turnover_{it} \times Post_{it}$ is positively significant ($p<0.05$). The

coefficient shows that due to CEO turnover, a former CEO with a non-hometown identity was replaced by a new hometown CEO, which leads to a significant increase in the firm's green innovation. Table 6 suggests that our results are robust.

Insert Table 6

5. Discussion

5.1 Theoretical Implications

While the management of green innovation has gained considerable scholarship, research on how CEO characteristics affect green innovation is still in its infancy (Arena et al., 2018). Building on the upper echelons theory and CSR literature, we investigate one important factor, CEO hometown identity, on how it affects green innovation. We propose and find that CEO hometown identity has a positive effect on firms' green innovation. Moreover, we examine the boundary condition on the relationship between the two and the moderating role of two perspectives of managerial discretion—institutional ownership and market complexity. Specifically, when the proportion of institutional investors is large, the CEO has limited power, and the positive relationship between the CEO hometown identity and green innovation is weaker; when the market complexity is high, the CEO has more freedom to exert power, and the positive relationship between CEO hometown identity and green innovation is stronger.

To the best of our knowledge, our research is the first empirical study to examine the relationship between CEO hometown identity and green innovation. Our research

offers several contributions. First, our research enriches the upper echelons theory by investigating an important yet understudied CEO characteristic and its impact on firm green innovation. Previous studies from this theoretical lens focus on the effect of executive demographic characteristics (Deckop et al., 2006; Manner, 2010; Slater and Dixon-Fowler, 2009) and deeper personality traits (Hemingway and Maclagan, 2004; Petrenko et al., 2016; Tang et al., 2015) on organizational outcomes. However, executives' hometown identity has gained little attention from scholars. A few exceptions have examined the effect of home bias on political (Cohen et al., 2011; Hodler and Raschky, 2014; Knight, 2008), human resource and financial investment decisions (Jiang et al., 2019; Yonker, 2017). However, none of them has extended the investigation of CEO hometown identity to the context of green innovation. Due to its long-term and risky nature of green innovation, whether and how top executive hometown identity impact on green innovation is unclear. This study fills this gap by introducing the construct of hometown identity as a reflection of CEOs' background characteristics and by demonstrating its influence on firms' green innovation. We explain that the psychological mechanism of hometown identity is associated with an attention to environment and a goal/desire to the well-being of people in their hometown. Our findings help reinforce the central tenet of the upper echelons theory and address the much-needed theoretical development area that organization performance is associated with executives' background characteristics.

Second, this study provides new insights into the drivers of green innovation. Most of the prior research has examined organizational and institutional drivers of green innovation (e.g., Demirel and Kesidou, 2011; Rennings, 2000). Recently, scholars have begun to consider that green innovation is a complex process that is largely under a CEO's discretion (Arena et al., 2018). In this study, we examine the relationship between CEO hometown identity and green innovation by looking at the underlying mechanism of their emotional tie to their hometown. The findings emphasize the importance of executives in green innovation (Arena et al., 2018; Liao, 2016) and contribute to the emerging research on managerial characteristics that can shape a firm's orientation towards the environment and socially responsible actions (Sharma, 2000; Waldman and Siegel, 2008; Lewis et al., 2014; Horbach and Jacob, 2018; He and Jiang, 2019; Konadu et al., 2020).

Third, our findings explicate how managerial discretion sets up the boundary condition on the relationship between CEO hometown identity and firm green innovation. Our theorization is drawn on the upper echelons theory and explores to what extent CEOs are able to influence firm strategies and outcomes depending on managerial discretion (Hambrick and Finkelstein, 1987). Specifically, we find a negative moderating effect of institutional investors and a positive moderating effect of market complexity. Previous research shows that institutional investors cannot easily divest their holdings in the short run; therefore, they may be interested in the investments by the firm that are potentially beneficial in the long run, such as innovation

(Rong et al., 2017). In contrast, our findings are aligned with Drucker's (1986) myopic investor hypothesis. Specifically, the myopic viewpoint suggests that institutional investors value short-term benefits over long-term gains; thus, they are motivated to constrain CEOs from investing in green innovation, which is costly and requires a longer period to pay off. The extent to which hometown CEOs can thus exert their power on promoting green innovation depends on how influential institutional investors are. Therefore, this finding provides a nuanced understanding on such boundary condition of the impact of CEO characteristics on green innovation.

Moreover, the investigation on the moderating effect of market complexity extends the understanding on how industry characteristics can influence the degree of managerial discretion based on the upper echelons theory (Hambrick and Finkelstein, 1987) and how such discretion, in turn, affects hometown CEOs' decision making. Market complexity increases the market change, uncertainty and range of options the CEOs face, which allows them to make strong influence on firm decision-making and outcomes. Thus, when firms operate in industries with higher market complexity, their CEOs will have more discretion, and CEOs' hometown identity will be more likely to be reflected in firms' green innovation initiatives. The reasoning of this finding supports our theorization that CEOs' hometown identity plays a more important role when their managerial discretion is high, which in this case, is when market complexity is at a relatively higher level. The findings on both moderating effects show that both organizational and environmental factors determine the extent to which CEO

hometown identity can influence green innovation. Our research thus extends the application of the upper echelons theory on CSR literature and show how managerial discretion sets the boundary condition of the impact of CEO characteristics on firm green innovation performance.

5.2 Practical Implications

Our research offers several practical implications. First, given the impact of the hometown CEO on green innovation, firm boards need to consider this characteristic when making decisions on selecting senior managers and seeing that their decisions adhere to the firm's goals (profit driven vs. CSR driven). Specifically, if firms in heavily polluting industries are confronted with environmental legitimacy pressure (e.g., firm pollution), CEO turnover from non-hometown to hometown might be an effective approach to make necessary strategic changes (Barron et al., 2010). In this case, the findings of this study can be particularly informative to the firms that emphasize green innovation. This study suggests that a hometown CEO could be beneficial from both the environmental and ethical perspectives, particularly with respect to green innovations, which is an area seen as important to firm strategy (Arena et al., 2018), ceteris paribus. Second, our research shows that the effect of CEO hometown identity on firm green innovation is contingent on the discretion of the CEO. Specifically, aligning CEO hometown identity with institutional ownership and market complexity promotes firms' green innovation. For example, in the case of a high degree of discretion (high market complexity or low institutional ownership), hiring or promoting

a hometown CEO may increase firms' green innovation. On the contrary, when a firm constrains the managerial discretion of a hometown CEO, CEO hometown identity may have little impact on firms' green innovation. In this sense, to promote firms' green innovation, boards need to consider the CEO hometown identity and the firm's external characteristics (e.g., market complexity) and internal characteristics (e.g., governance characteristics).

5.3 Limitations and Future Research

There are some limitations in this study. First, different personal backgrounds and growing experiences will lead to different degrees of personal hometown identity. We measure the CEO's hometown identity by matching the provincial location of a firm's headquarters with its CEO's hometown, which may not fully reflect the within-province difference in hometown identity. Therefore, we encourage future research to develop a more accurate measurement for this factor.

Second, in the empirical analysis, we found that CEO tenure was positively correlated with green innovation. Consistent with our result, Ortiz-de-Mandojana et al (2019) suggest that CEOs with longer tenure will have a deeper understanding of corporate socially responsible investments, so they will be more open to environmental imperatives and more likely to engage in responsible environmental activities. However, Oh et al (2016) find that if CEOs are closer to the end of their tenure or late in their career, they may believe they will not benefit from long-term and uncertain investment because this kind of investment is likely to be recouped in a long run—probably after

their incumbency. Therefore, given the long-term and uncertain nature of green innovation, CEOs who are closer to the end of their tenure may disengage in green innovation. In brief, the role of CEO tenure in green innovation is still controversial, which need further investigations.

Third, our research only focuses on the impact of CEOs on firms. Studies of the upper echelons theory have noted that the overall characteristics of the executive team may better predict organizational outcomes than CEO characteristics (Hambrick, 2007). Therefore, future research can focus on the impact of hometown identity on the board of directors, middle managers, or other members of the organization.

Forth, CEO hometown identity is an emotional characteristic of corporate executives and has an impact on corporate strategic decisions (Hambrick and Mason, 1984). Due to a different research focus, we limit our research scope to the relationship between hometown CEO and firms' green innovation. Subsequent studies can continue to explore whether the hometown identity of corporate executives affects the other strategic decisions of the firm, such as traditional innovation, environmental information disclosure and corporate social responsibility (Sunder et al., 2017; Lewis et al., 2014; Wu et al., 2015).

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Table 1 Descriptive statistics and correlations

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1)	G_Inno	1																	
(2)	Hometown	0.09***	1																
(3)	Firm Age	0.08***	-0.04***	1															
(4)	Firm Size	0.20***	0.04***	0.21***	1														
(5)	R&D	0.49***	0.05***	0.16***	0.34***	1													
(6)	Export	0.10***	0.06***	-0.02	-0.04***	0.06***	1												
(7)	Independence	0.04***	0.03***	0.15***	0.09***	0.06***	0.03**	1											
(8)	SOE	-0.03**	-0.04***	-0.03**	0.24***	0.01	-0.15***	-0.16***	1										
(9)	ROA	0.00	0.02*	-0.00	0.05***	0.01	-0.01	-0.00	0.01	1									
(10)	ISO	0.22***	0.14***	0.08***	0.18***	0.17***	0.15***	0.11***	-0.20*	0.02*	1								
(11)	Age	0.07***	0.02	0.15***	0.19***	0.08***	-0.04***	0.04***	0.03	0.03	0.10*	1							
(12)	Male	0.02*	-0.02*	0.02*	0.06***	0.02*	-0.04***	-0.03***	0.09**	0.00	-0.02	0.00	1						
(13)	Tenure	0.05***	0.17***	0.22***	0.14***	0.04***	0.00	0.10***	0.00	0.01	0.12***	0.26***	-0.01	1					
(14)	Connect	0.03**	0.21***	0.07***	-0.07***	-0.01	-0.00	0.07***	-0.20***	0.01	0.09**	0.10***	-0.07**	0.07**	1				
(15)	Sc_empl	-0.03**	0.03**	0.03*	0.05***	-0.01	-0.07	-0.09	-0.01	0.00	-0.09	0.02	-0.01	0.08**	0.04**	1			
(16)	Sc_other	-0.00	0.08***	-0.01	-0.02*	-0.01	-0.01	-0.16***	-0.12**	0.00	0.02	-0.04***	-0.07**	0.03***	0.07**	0.04***	1		
(17)	Institution	-0.03**	-0.02	0.18***	0.20***	0.04***	-0.07	0.07***	0.01	0.02	0.10***	0.11**	-0.02	0.10***	0.03**	0.04**	0.09*	1	
(18)	Complexity	-0.07***	-0.06***	0.02	-0.00	-0.04***	-0.04***	-0.04***	0.05***	0.00	-0.16**	-0.03	-0.01	-0.06***	-0.00	0.01	0.04**	0.02	1
	mean	0.66	0.47	13.68	7.97	36.32	0.47	0.35	0.60	0.02	0.36	47.89	0.96	3.27	0.16	0.03	0.02	0.17	0.11
	SD	2.47	0.50	6.88	1.19	151.49	0.50	0.07	0.49	0.60	0.48	6.41	0.20	2.70	0.37	0.18	0.15	0.20	0.10

N=6831, ***, **, and *indicate statistical significance at the 1, 5, and 10 levels, respectively

Table 2 Regression analysis of CEO hometown identity on green innovation

Variables	Dep. = G_Inno				
	(1)	(2)	(3)	(4)	(5)
Hometown		0.275***	0.379***	0.481***	0.566***
		(0.084)	(0.101)	(0.141)	(0.146)
Institution			-0.348*		-0.325
			(0.200)		(0.199)
Hometown*Institution			-0.666*		-0.655*
			(0.356)		(0.358)
Complexity				0.809	0.588
				(0.683)	(0.688)
Hometown*Complexity				-1.959***	-1.797**
				(0.713)	(0.723)
Firm Age	0.006	0.006	0.007	0.007	0.007
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Firm Size	0.041	0.034	0.050	0.034	0.049
	(0.045)	(0.044)	(0.046)	(0.045)	(0.046)
R&D	0.007***	0.007***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Export	0.106	0.103	0.095	0.099	0.092
	(0.115)	(0.115)	(0.114)	(0.115)	(0.115)
Independence	-0.469	-0.528	-0.517	-0.555	-0.542
	(0.480)	(0.477)	(0.472)	(0.476)	(0.471)
SOE	-0.139	-0.132	-0.122	-0.136	-0.125
	(0.133)	(0.131)	(0.130)	(0.132)	(0.131)
ROA	-0.008	-0.010	-0.010	-0.011	-0.011
	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)
ISO	0.622***	0.589***	0.595***	0.588***	0.595***
	(0.124)	(0.122)	(0.122)	(0.122)	(0.122)
Age	0.007	0.008	0.008	0.008	0.008
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Male	0.162	0.162	0.174	0.168	0.180
	(0.131)	(0.127)	(0.125)	(0.126)	(0.124)
Tenure	0.020	0.011	0.011	0.010	0.011
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Connect	0.158	0.081	0.092	0.073	0.084
	(0.129)	(0.127)	(0.125)	(0.126)	(0.124)
Sc_empl	-0.418***	-0.428***	-0.407***	-0.440***	-0.418***
	(0.120)	(0.122)	(0.122)	(0.122)	(0.122)
Sc_other	-0.064	-0.140	-0.111	-0.154	-0.125
	(0.186)	(0.196)	(0.192)	(0.199)	(0.195)
Year fixed	Y	Y	Y	Y	Y
Province fixed	Y	Y	Y	Y	Y
Industry fixed	Y	Y	Y	Y	Y
Constant	0.137	0.114	-0.027	0.064	-0.041
	(0.646)	(0.643)	(0.647)	(0.630)	(0.634)
Observations	6,831	6,831	6,831	6,831	6,831
R-squared	0.287	0.289	0.292	0.291	0.293

All equations are estimated by OLS, and standard error clustering is at the firm level

***, **, and *indicate statistical significance at the 1, 5, and 10 levels, respectively

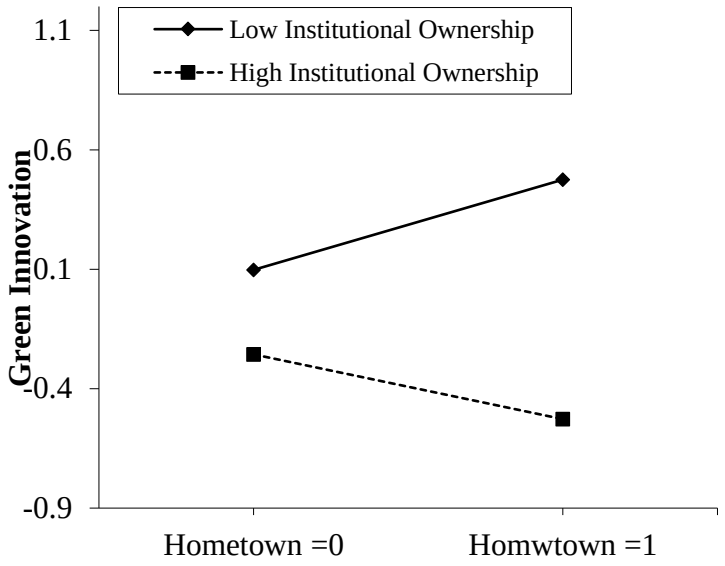

Fig. 1 Moderating effects of institutional ownership

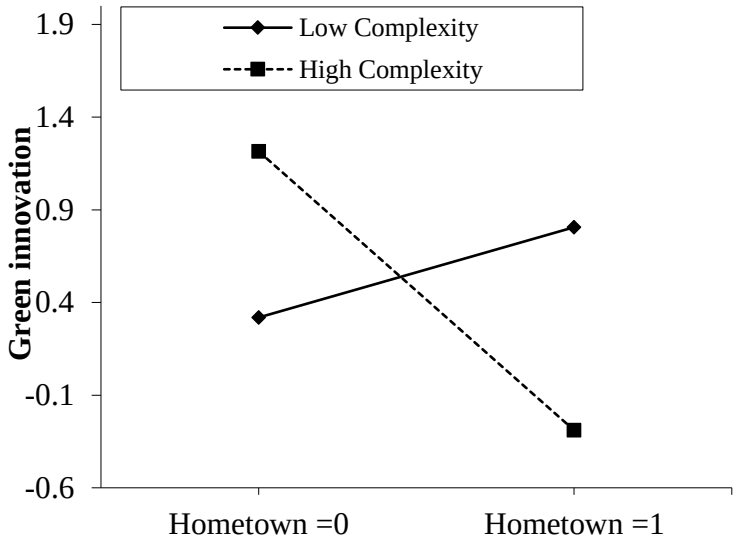

Fig. 2 Moderating effects of market complexity

Table 3 Results adding Miss variable

Variables	Dep. = G_Inno				
	(1)	(2)	(3)	(4)	(5)
Hometown		0.312***	0.416***	0.521***	0.607***
		(0.106)	(0.122)	(0.161)	(0.168)
Institution			-0.345*		-0.322
			(0.200)		(0.199)
Hometown*Institution			-0.670*		-0.659*
			(0.356)		(0.358)
Complexity				0.830	0.609
				(0.685)	(0.691)
Hometown*Complexity				-1.970***	-1.808**
				(0.717)	(0.727)
Miss	-0.105	0.076	0.075	0.081	0.079
	(0.065)	(0.087)	(0.087)	(0.087)	(0.088)
Firm Age	0.006	0.007	0.007	0.007	0.007
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Firm Size	0.037	0.036	0.052	0.036	0.051
	(0.045)	(0.044)	(0.045)	(0.044)	(0.046)
R&D	0.007***	0.007***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Export	0.103	0.104	0.096	0.101	0.094
	(0.115)	(0.115)	(0.114)	(0.115)	(0.115)
Independence	-0.474	-0.533	-0.521	-0.560	-0.547
	(0.480)	(0.477)	(0.471)	(0.476)	(0.470)
SOE	-0.133	-0.135	-0.125	-0.140	-0.129
	(0.132)	(0.132)	(0.131)	(0.132)	(0.131)
ROA	-0.009	-0.009	-0.010	-0.010	-0.010
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
ISO	0.617***	0.588***	0.594***	0.587***	0.594***
	(0.124)	(0.122)	(0.122)	(0.122)	(0.122)
Age	0.007	0.008	0.008	0.008	0.008
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Male	0.164	0.160	0.173	0.167	0.179
	(0.130)	(0.127)	(0.125)	(0.126)	(0.124)
Tenure	0.018	0.011	0.011	0.011	0.011
	(0.023)	(0.022)	(0.022)	(0.022)	(0.022)
Connect	0.138	0.086	0.097	0.078	0.089
	(0.131)	(0.128)	(0.126)	(0.127)	(0.125)
Sc_empl	-0.425***	-0.424***	-0.403***	-0.436***	-0.414***
	(0.120)	(0.123)	(0.123)	(0.123)	(0.123)
Sc_other	-0.089	-0.133	-0.104	-0.146	-0.117
	(0.188)	(0.197)	(0.192)	(0.199)	(0.196)
Year fixed	Y	Y	Y	Y	Y
province fixed	Y	Y	Y	Y	Y
Industry fixed	Y	Y	Y	Y	Y
Constant	0.175	0.083	-0.058	0.028	-0.077
	(0.646)	(0.642)	(0.647)	(0.629)	(0.633)
Observations	6,831	6,831	6,831	6,831	6,831
R-squared	0.287	0.290	0.292	0.291	0.293

All equations are estimated by OLS, and standard error clustering is at the firm level

***, **, and *indicate statistical significance at the 1, 5, and 10 levels, respectively

Table 4 Alternative Measure of the CEO hometown identity

Variables	Dep. = G_Inno				
	(1)	(2)	(3)	(4)	(5)
Hometown_2		0.300***	0.354***	0.399***	0.416**
		(0.104)	(0.135)	(0.148)	(0.164)
Institution			-0.436**		-0.463**
			(0.208)		(0.207)
Hometown_2*Institution			-0.449		-0.354
			(0.379)		(0.381)
Complexity				0.547	0.303
				(0.643)	(0.648)
Hometown_2*Complexity				-1.140*	-0.860
				(0.669)	(0.632)
Firm Age	0.006	0.006	0.007	0.006	0.007
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Firm Size	0.041	0.037	0.054	0.039	0.055
	(0.045)	(0.044)	(0.046)	(0.045)	(0.046)
R&D	0.007***	0.007***	0.007***	0.007***	0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Export	0.106	0.088	0.078	0.082	0.074
	(0.115)	(0.116)	(0.115)	(0.117)	(0.116)
Independence	-0.469	-0.519	-0.511	-0.525	-0.522
	(0.480)	(0.473)	(0.468)	(0.471)	(0.467)
SOE	-0.139	-0.129	-0.118	-0.132	-0.120
	(0.133)	(0.131)	(0.130)	(0.131)	(0.130)
ROA	-0.008	-0.011	-0.011	-0.011	-0.011
	(0.009)	(0.010)	(0.009)	(0.010)	(0.009)
ISO	0.622***	0.595***	0.602***	0.601***	0.604***
	(0.124)	(0.120)	(0.122)	(0.121)	(0.122)
Age	0.007	0.008	0.008	0.008	0.008
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Male	0.162	0.157	0.166	0.160	0.167
	(0.131)	(0.126)	(0.124)	(0.126)	(0.124)
Tenure	0.020	0.010	0.010	0.010	0.010
	(0.022)	(0.021)	(0.021)	(0.021)	(0.021)
Connect	0.158	0.086	0.102	0.091	0.104
	(0.129)	(0.133)	(0.128)	(0.133)	(0.129)
Sc_empl	-0.418***	-0.409***	-0.385***	-0.409***	-0.387***
	(0.120)	(0.123)	(0.122)	(0.123)	(0.123)
Sc_other	-0.064	-0.156	-0.126	-0.162	-0.132
	(0.186)	(0.199)	(0.194)	(0.200)	(0.196)
Year fixed	Y	Y	Y	Y	Y
Province fixed	Y	Y	Y	Y	Y
Industry fixed	Y	Y	Y	Y	Y
Constant	0.137	0.118	0.003	0.080	0.003
	(0.646)	(0.641)	(0.645)	(0.630)	(0.634)
Observations	6,831	6,831	6,831	6,831	6,831
R-squared	0.287	0.290	0.292	0.290	0.292

All equations are estimated by OLS, and standard error clustering is at the firm level

***, **, and *indicate statistical significance at the 1, 5, and 10 levels, respectively

Table 5 Alternative Measure of Green innovation

Variables	Dep. = Patent				
	(1)	(2)	(3)	(4)	(5)
Hometown		2.755***	3.843***	4.360***	5.376***
		(1.055)	(1.201)	(1.525)	(1.615)
Institution			1.272		1.444
			(2.243)		(2.252)
Hometown*Institution			-6.851*		-6.775*
			(3.761)		(3.765)
Complexity				2.339	1.515
				(9.277)	(9.304)
Hometown*Complexity				-15.298**	-14.736**
				(7.199)	(7.189)
Firm Age	-0.087	-0.081	-0.077	-0.080	-0.076
	(0.103)	(0.102)	(0.103)	(0.102)	(0.102)
Firm Size	-0.230	-0.300	-0.261	-0.302	-0.269
	(0.657)	(0.661)	(0.657)	(0.667)	(0.663)
R&D	0.121***	0.121***	0.121***	0.121***	0.120***
	(0.026)	(0.026)	(0.026)	(0.026)	(0.026)
Export	0.603	0.574	0.555	0.551	0.537
	(1.360)	(1.360)	(1.359)	(1.363)	(1.362)
Independence	1.809	1.219	1.477	0.989	1.255
	(7.458)	(7.411)	(7.396)	(7.404)	(7.392)
SOE	0.508	0.577	0.586	0.558	0.566
	(1.109)	(1.111)	(1.119)	(1.108)	(1.117)
ROA	0.139	0.116	0.105	0.112	0.100
	(0.136)	(0.128)	(0.130)	(0.127)	(0.129)
ISO	4.670***	4.340***	4.426***	4.335***	4.420***
	(1.522)	(1.516)	(1.521)	(1.515)	(1.520)
Age	-0.060	-0.054	-0.054	-0.054	-0.055
	(0.098)	(0.099)	(0.099)	(0.099)	(0.099)
Male	-0.466	-0.473	-0.388	-0.414	-0.332
	(2.119)	(2.135)	(2.112)	(2.130)	(2.108)
Tenure	0.273	0.185	0.190	0.180	0.185
	(0.209)	(0.217)	(0.216)	(0.217)	(0.216)
Connect	1.210	0.438	0.496	0.374	0.430
	(1.141)	(1.186)	(1.182)	(1.188)	(1.184)
Sc_empl	0.652	0.550	0.645	0.470	0.566
	(2.325)	(2.350)	(2.345)	(2.350)	(2.346)
Sc_other	-2.716*	-3.477**	-3.360**	-3.590**	-3.478**
	(1.576)	(1.653)	(1.670)	(1.676)	(1.694)
Year fixed	Y	Y	Y	Y	Y
Province fixed	Y	Y	Y	Y	Y
Industry fixed	Y	Y	Y	Y	Y
Constant	10.953	10.726	9.840	11.037	10.300
	(9.246)	(9.263)	(9.359)	(9.673)	(9.753)
Observations	6,831	6,831	6,831	6,831	6,831
R-squared	0.381	0.383	0.383	0.383	0.384

All equations are estimated by OLS, and standard error clustering is at the firm level

***, **, and *indicate statistical significance at the 1, 5, and 10 levels, respectively

Table 6 DID Model

Variables	Dep. = G_Inno	
	(1)	(2)
Turnover1*Post1		0.798**
		(0.340)
Post1		0.041
		(0.143)
Turnover1		-0.169
		(0.154)
Firm Age	0.006	0.038**
	(0.008)	(0.017)
Firm Size	0.041	0.105
	(0.045)	(0.071)
R&D	0.007***	0.006***
	(0.001)	(0.001)
Export	0.106	0.129
	(0.115)	(0.198)
Independence	-0.469	0.010
	(0.480)	(0.764)
SOE	-0.139	0.068
	(0.133)	(0.152)
ROA	-0.008	0.222
	(0.009)	(0.558)
ISO	0.622***	0.488
	(0.124)	(0.310)
Age	0.007	0.008
	(0.006)	(0.013)
Male	0.162	0.377**
	(0.131)	(0.163)
Tenure	0.020	-0.002
	(0.022)	(0.028)
Connect	0.158	0.679
	(0.129)	(0.432)
Sc_empl	-0.418***	-0.366
	(0.120)	(0.240)
Sc_other	-0.064	-0.452
	(0.186)	(0.483)
Year fixed	Y	Y
Province fixed	Y	Y
Industry fixed	Y	Y
Constant	0.137	-0.981
	(0.646)	(0.829)
Observations	6,831	1,151
R-squared	0.287	0.379

***, **, and *indicate statistical significance at the 1, 5, and 10 levels, respectively.

Appendix Table 1 Industry composition of sampled firms

Industry	Code	Observations	Percentage (%)
Mining and washing of coal	B06	271	3.97
Petroleum and natural gas extraction industry	B07	39	0.57
Ferrous Metals Mining and Dressing	B08	51	0.75
Processing of food from agricultural products	C13	369	5.40
Manufacture of foods	C14	289	4.23
Manufacture of liquor, beverages and refined tea	C15	410	6.00
Manufacture of textile	C17	348	5.09
Manufacture of paper and paper products	C22	273	4.00
Processing of petroleum, coking and processing of nuclear fuel	C25	166	2.43
Manufacture of raw chemical materials and chemical products	C26	1577	23.1
Manufacture of chemical fibers	C28	250	3.66
Manufacture of non-metallic mineral products	C30	644	9.43
Smelting and pressing of ferrous metals	C31	369	5.40
Smelting and pressing of non-ferrous metals	C32	622	9.11
Production and Supply of Electric Power and Heat Power	D44	828	12.12
Production and supply of gas	D45	164	2.40
Production and supply of water	D46	161	2.36
Total	—	6831	100.00

Appendix Table 2 Variable definitions

Variable	Code	Definition
Green innovation	G_Inno	The number of resource conservation and environmentally friendly patents that firms applied for.
CEO hometown identity	Hometown	Dummy variable that equals 1 if the firm is headquartered in its CEO's hometown and is 0 otherwise.
Institutional ownership	Institution	The shares held by institutional investors/total shares.
Market complexity	Complexity	The sum of the squares of the market shares of all firms in a particular industry being measured using sales revenue as the scale for calculation.
Firm age	Firm Age	Annual report deadline - date of establishment.
Firm size	Firm Size	The natural logarithm of the total assets at the end of the period.
R&D Investment	R&D	Research and development expense.
Export	Export	A dummy variable, 1 for export firm, 0 for others.
Board Independence	Independence	The independent directors/board size ratio.
State-owned enterprises	SOE	Dummy variable that equals 1 if the firm is a state-owned enterprise and is 0 otherwise.
Corporate performance	ROA	Net profit divided by the end of year total assets.
ISO 14001	ISO	Dummy variable that equals 1 if the firm passed the ISO 14001 certification and is 0 otherwise.
CEO age	Age	The age of the CEO.
CEO gender	Male	Dummy variable that equals 1 if the CEO is male and is 0 otherwise.
CEO tenure	Tenure	The number of years that the CEO has been in office.
CEOs' political relationship	Connect	Dummy variable that equals 1 if the CEO is a member of the national, provincial and municipal people's congresses or political consultative conferences and is 0 otherwise.
CEOs' part-time job in other listed firms	SC_Exp	Dummy variable that equals 1 if the CEO works part-time in another listed firm and is 0 otherwise.
CEOs involvement in other social activities	SC_Other	Dummy variable that equals 1 if the CEO is a member of a trade association, charity, scientific institution, or other non-profit organization and is 0 otherwise.