Do political connections foster or hamper firm environmental investment?

Lihong Song, Likai Zou & Qiang Liang

Published online: 30 May 2022.

Submit your article to this journal ⧉

Article views: 661

View related articles ⧉

View Crossmark data ⧉

Routledge
Taylor & Francis Group

Do political connections foster or hamper firm environmental investment?

Lihong Song [ID], Likai Zou and Qiang Liang

School of Business, Shantou University, Shantou, China

ABSTRACT

Extant studies of environmental investment determinants have not distinguished between different types of political connections. This study tries to close this gap by employing an extensive data-set based on the four-yearly Chinese Private Enterprises Survey conducted between 2006 and 2012. The central question in this paper asks whether different political connections (ascribed vs. achieved) are fostering or hindering environmental protection expenditures in private enterprises. The results show that achieved political connections serve as binds of promoting firm environmental investment while ascribed political connections act as buffers, hampering firm environmental expenditures. The moderating roles of environmental regulation and innovation capability demonstrate heterogeneous effects: environmental regulation stringency strengthens the positive impact of achieved political connections only. In contrast, innovation capability enhances the negative impact of ascribed political connections.

1. Introduction

Environmental degradation has become one of the prominent challenges for human development. For instance, WHO data shows that seven million people die from air pollution worldwide each year and 90% of the people are breathing the pollutant air containing excessive pollutants than WHO guideline limits. Accompanied with the rapid economic growth, emerging economies including China suffer from severe ecological deterioration. According to the *Ecological Environment Statistical Bulletin 2020* issued by the Ministry of Ecology and Environment of the People's Republic of China, the ambient air quality in 135 cities among all 337 cities exceeds the guideline limits; Additionally, 126,100 environmental administrative penalty decisions were issued nationwide, and the total amount of fines reached 8.236 billion yuan. As the corporation and industry are important sources of environmental pollution (Prechel & Zheng, 2012), Chinese governments have strengthened environmental regulation

---

CONTACT Likai Zou ✉ lkzou@stu.edu.cn; 417653607@qq.com

policies and supervisions across multiple levels to promote firms' environmental awareness and investments.

However, so far many firms still keep scant investments in environmental protection, particularly private enterprises. In the survey of Chen (2020), 65% of Chinese private enterprises had no environmental investment, which ratio is comparatively higher than the number of 9% in the Flash Eurobarometer survey on 'SMEs, resource efficiency, and green market' (Hoogendoorn et al., 2015). Scholars have committed to exploring multiple determinants that influence corporate environmental strategy, such as conforming to the institutional pressures from stakeholders (Delmas & Toffel, 2004; Yang et al., 2019), managerial attitudes (Özen & Küskü, 2009; Testa et al., 2016), or reducing costs of pollution and preserving better reputation (Chang et al., 2015; Zou et al., 2015).

As in the transformation of China's economy, the state is still the key source of environmental regulation power and resource allocator, political connections have become a prevalent strategy for private firms to cope with risk and gain scarce resources controlled by the government (Zhang et al., 2019). Existing research asserts that political connections can serve as buffering or binding to firms' environmental investment (Chen, 2020; Lin et al., 2014; Luo & Wang, 2019; Xu & Yan, 2020; Zhang & Xie, 2020). However, the debate over buffering or binding role of political connections is still inconclusive. For instance, Luo and Wang (2019) found that companies with political connections gain legitimacy through selectively taking part in socially responsible activities, donating more but investing less in environmental protection. Zhang et al. (2019) revealed that private firms with political connections spend more environmental protection funds than firms without political connections only when environmental courts are established locally. Consequently, whether and when political connections facilitate private enterprises investing more in pollution control (binding effect) or reducing environmental efforts (buffering effect) need to be addressed to reconcile the contradictory findings in present studies.

To address the research gaps, we thus differentiated two most common types of political connections (ascribed vs. achieved) according to the time of political connections formation and examined whether they have different impacts on firm environmental investment. Based on the extensive literature on the role of environmental governance and innovation (Huang & Lei, 2021; Liao & Tsai, 2019; You et al., 2019), we further propose the moderating effect of regional environmental regulation and firm innovation capability on the relationship between political connections and environmental investment. The results from a sample of 8838 Chinese private enterprises from 2006 to 2012 partly support our hypotheses.

As one of the first empirical studies to test the heterogeneous effects of political connections on firm green investment, our study makes at least three contributions to the literature. First, our study adds value to the determinants of firm environmental investment by probing the role of two types of political connections, echoing the calling of (Chen, 2020; Chen & Cao, 2016; Zhang et al., 2016) for introducing different types of political connection. The results of this study help solve the dispute by revealing that the two types of ascribed and achieved political connections impact firm environmental investment differently. Moreover, by investigating the moderating

effect of environmental regulations and firm innovation capabilities, our study contributes to the boundary conditions that influence the effects of political connections on corporate environmental investment. Lastly, our research contributes to the full picture of political connections and green investment decisions by employing a longitudinal and large-scale survey of private enterprises in an emerging economy, responded to Chen (2020)'s statements about 'has no information about firm owner's prior governmental connection'.

The rest of the paper is constructed as follows. Section 2 summarizes the literature on political connections and environmental investment, followed by the development of our hypotheses. Section 3 explains the methodology of this study including model specification, measurement of key variables and data sources. Section 4 presents the results of regression analysis for hypotheses testing and robustness tests. Section 5 concludes the results and summarizes practical implications and limitations of this study.

2. Literature review and hypotheses development

2.1. The role of political connections in environmental investment

Political connections refer to the formal or informal relationships established between individuals in an enterprise and the government (Lin et al., 2014; Zhang et al., 2015). Studies have found the influence of political capital on corporate philanthropy depends on the type of relationship with the political system (Chen & Cao, 2016; Zhang et al., 2016). Zhang et al. (2016) elaborated the difference between ascribed vs. achieved political connections. Ascribed political connection refers to the political ties formed before founders entering into entrepreneurship, basically through working experience in the government offices at various levels. Achieved political connection is defined as entrepreneurs' political appointment in organs of state such as the National People's Congress (NPC) and the Chinese People's Political Consultative Conference (CPPCC) which is usually achieved after entrepreneurship (Zhang et al., 2016). Although there are explicit differences between the two types of political connections about the timing of connection establishment, the nature and their impact on the decision-making of private entrepreneurs are slightly divergent.

Regarding the relationship between the two types of political connections and the environmental investment in Chinese private enterprises, this paper proposes that ascribed political connections are more likely to work as a buffer because firms can rely on the political connections to evade environmental pollution punishment and keep a safe distance from the government in case of expropriation. In contrast, achieved political connections are more of a binding effect because firms are more inclined to be responsive to the government initiatives for the sake of preserving the political identity.

2.2. Ascribed political connections and environmental investment

Extant studies show that ascribed political connections facilitate firm interactions with the government because of their previous common working experience (Chen &

Cao, 2016; Shi et al., 2014; Wu et al., 2012). In addition, entrepreneurs having experience in the government could be more alert to government policies and prize the regulation opportunities (Hillman, 2005; Dai et al., 2018). Moreover, private firms with ascribed political connections can seek help from their previous colleagues in the government to ease government regulatory constraints (Keim & Zeithaml, 1986).

Although private enterprises are expected to share some non-economic goals required by the government such as stable employment and merging under-performing firms (Zhang et al., 2019), firms with ascribed political connections endure less pressure to meet these requirements as they do not need to satisfy the government for the continuance of the political ties. Furthermore, entrepreneurs with ascribed political connections mostly still have an intimate friendship with current government officials privately, so they could refrain from being the focus of environmental regulation. Thus, we propose:

H1: Firms with ascribed political connections invest less in environmental protection.

2.3. Achieved political connections and environmental investment

Private firms with achieved political connections may confront higher expectations or requirements from the government on environmental protection due to the 'exchange' nature of political ties (Bertrand et al., 2018; Chen & Cao, 2016). In China, only a small proportion of entrepreneurs who succeed in entrepreneurship and are politically recognized by the government are awarded political identities. As the representative of private enterprises, these firms with achieved political connections are more likely to be expected to act as pioneers in environmental protection. Thus, by maintaining the relationship and preserving the political identity (Sun et al., 2012; Zhang et al., 2019), firms are inclined to fulfill government expectations on environmental protection to gain legitimacy.

Furthermore, private enterprises with achieved political connections are more likely to be the public focus as a result of their higher visibility (Luo & Wang, 2019). Environmental investment is generally regarded as the response to the institutional pressures from multiple stakeholders (Delmas & Toffel, 2004), whereas entrepreneurs with political identities will attract more media attention and monitoring for their environmental performance. Once caught in any environmental scandal, it is detrimental to their political career and public trust. Hence, compared with firms without political connections, firms with achieved political connections will enhance their investment in environmental protection to maintain a better personal and corporate image. Based on the above arguments, the following hypothesis is proposed:

H2: Firms with achieved political connections invest more in environmental protection.

2.4. The moderating effect of environmental regulation

Environmental regulation generally refers to the government interventions that use command-and-control methods and financial approaches such as pollution fees and emission trading systems to improve the ecological environment (You et al., 2019). Studies have shown that environmental regulation policies are different across regions (Maung et al., 2016). As there are significant variations in natural resources and

uneven development in the economy among different areas of China, thus each province or city issues local regulatory policies under the national standards. Accordingly, firms may differ in their responsive strategies in different regions with different levels of stringency of environmental regulations.

In regions with higher levels of environmental regulation, private enterprises with both kinds of political connections will bear more substantial pressure from the government on environmental protection. Kathuria (2007) found that the effect of environmental regulations on pollution control in developing countries is limited, especially for private firms. If the local government depreciates the priority of environmental governance, private firms with political connections are unlikely to invest more in environmental protection as it is costly and implausible to be rewarded. Even more, firms that lack environmental investment are rarely punished for pollution, considering the government's lax regulations. On the contrary, in areas with stricter environmental regulations, it is difficult for private firms to utilize ascribed political connections to elude the punishment of pollution. Furthermore, environmental investment can be regarded as a useful strategy to court the government to gain legitimacy and recognition.

When environmental regulation is stricter, it could be hot news if private firms with political connections are found to be involved in pollution issues, which is detrimental to the firm reputation and stakeholder relationships (Lin et al., 2016). For ascribed political connection, it will be too risky for governmental officials to protect their old colleagues who are the principal targets of environmental regulation. Thus, the buffering effect will be weaker. In comparison, those firms with achieved political connection, are more probable to take part in the environmental campaign actively and reinforce the positive and green image. Therefore, private enterprises with political connections are of higher motivation and capability to cooperate with the government on environmental governance when environmental regulation is higher. Based on the above arguments, H3 is proposed as follows:

> H3a: In regions with stringent environmental regulations, the negative relationship between ascribed political connection and environmental investment is weaker.

> H3b: In regions with stringent environmental regulations, the positive relationship between achieved political connection and environmental investment is stronger.

2.5. The moderating effect of innovation capability

Firm innovation capability refers to a firm's ability to convert available resources into new products or new processes (Zhou et al., 2017), representing the pursuit of new technologies or business methods. Firms can gain competitive advantages through innovation or political connections, especially in industries highly dependent on government control. Shou et al. (2014) found that in firms with a higher perception of relationship importance, the impact of corporate technical capabilities on performance is weaker.

Considering innovative private enterprises can obtain valuable resources, such as venture capital and talents from the market more easily, they are less inclined to comply with the environmental expectations of the government. Hence, when firms are more innovative, they will be less responsive to the government's environmental demand, as the need for maintenance of political connections is relatively reduced,
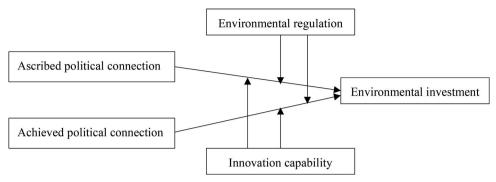
Figure 1. The research framework.
Source: The authors.

particularly for those with achieved political connections. Also, innovative firms have to allocate capital to the innovation projects annually, which crowds out the available resources for maintaining political connections and networking through increasing environmental investment (Popp & Newell, 2012; Yang et al., 2019). Generally, firms' innovation activities are risky and capital-intensive, but financial resources are always limited (Zhang & Guo, 2019). Firms have to purchase extra equipment and attract pioneering R&D talents, leading to the reduction of investment in non-productive activities such as political networking. Besides, ascribed political connections are formed based on past working experience, with high embeddedness and a low necessity for maintenance when facing financial constraints (Chen & Cao, 2016). For private enterprises with achieved political connections, environmental investment is mostly squeezed out by innovation input. This is manifested by lowering their environmental protection investment. Based on the above arguments, H4 is proposed as follows:

H4a: The negative relationship between ascribed political connection and environmental investment is stronger for firms with higher innovation capabilities.

H4b: The positive relationship between achieved political connection and environmental investment is weaker for firms with higher innovation capabilities.

Figure 1 depicted the research framework.

3. Methodology

3.1. Model specification and measurement

We introduced *environmental investment* (*EI*) as the dependent variable in our model to reflect firms' efforts on environmental protection. Following the literature (Xu & Yan, 2020; Zhang & Xie, 2020), we used three ways to measure firm environmental investment. The first one is *environmental investment amount* (*EI_1*), computed as the logarithm of firm annual expenditure on environmental governance and pollution control. The second one is *environmental investment ratio* (*EI_2*), measured as a firm's yearly expenditure on environmental protection divided by its annual sales revenue, adjusting the firm scale effect. The third one is *environmental investment behavior* (*EI_3*), a dummy variable indicating whether the firm invests in environmental protection during the survey year.

As the variable of *environmental investment amount* (*EI_1*) and *ratio* (*EI_2*) are a set of truncated data, having a minimum value of zero, Tobit regression was adopted to test the hypotheses because it can deliver an unbiased and consistent estimation (Zhang et al., 2020). Otherwise, Logit regression was employed when the dependent variable is *environmental investment behavior* (*EI_3*) as it is a dummy variable.

The analysis is performed in three steps: First, the direct effect of ascribed and achieved political connection (*Pc*) on firm environmental investment is tested separately and simultaneously by estimating Equation (1). Second, the moderating effect of environmental regulation (*Regu*) is examined by adding the interaction item between each type of political connection and environmental regulation as in Equation (2); Third, the moderating effect of innovation capability (*inno*) is analyzed by adding the interaction item between each type of political connection and innovation capability as in Equation (3).

$$EI = \beta_{0+}\beta_1 Pc + \sum_{i=2}^{n} \beta_n CV_i + \varepsilon \tag{1}$$

$$EI = \beta_{0+}\beta_1 Pc + \beta_2 Regu + \beta_3 Pc*Regu + \sum_{i=4}^{n} \beta_n CV_i + \varepsilon \tag{2}$$

$$EI = \beta_{0+}\beta_1 Pc + \beta_2 Inno + \beta_3 Pc*Inno + \sum_{i=4}^{n} \beta_n CV_i + \varepsilon \tag{3}$$

where *Pc* representing political connection, is divided into *ascribed political connection* (*Pc_1*) and *achieved political connection* (*Pc_2*). As in Zhang et al. (2016), *ascribed political connection* (*Pc_1*) indicates whether entrepreneurs worked in party or government offices, public institutions, state-owned enterprises (SOEs), or collective-owned enterprises before starting a business. Unlike ascribed political connections, *achieved political connection* (*Pc_2*) refers to the relationship built after entrepreneurship, which is presenting in political identities awarded by the government. We set *achieved political connection* (*Pc_2*) as one when entrepreneurs are currently serving as deputies of the NPC or members of the CPPCC, otherwise it is zero. Besides, we classify NPC deputies and CPPCC members by rank at four levels of county, municipal, provincial and national as an alternative measure of achieved political connection in the robustness analysis (Xu & Yan, 2020).

The first moderator variable is environmental regulation (*Regu*), which reflects the government's efforts in promoting environmental protection in each province. Following Liu et al. (2018), we used the annual number of cases under administrative fines divided by provincial GDP to measure *Regu*. The second moderator variable, innovation capability (*Inno*), is computed as R&D input divided by firm revenue as used in previous studies (Zhou et al., 2017).

Among other independent variables, CV_i represents all control variables related to firm environmental investment, including: (1) The individual-level variables of entrepreneur characteristics: *Age*; *Gender*, equal to one for the male entrepreneur; *Edu*, measured with the highest degree entrepreneurs obtained in six levels, from primary school to postgraduate. (2) Firm-level variables: *Fage*, measured with the number of years since registration to the year of survey; *Fsize*, in the logarithm of firm sales;

Table 1. Measurement of key variables.

Variable	Calculating method/data meaning
EI_1	The logarithm of annual environmental investment amount
EI_2	Firm annual investment on environmental protection/revenue
EI_3	Dummy. Equaling to zero if the firm has no investment on environmental protection.
Pc_1	Dummy. Equaling to one if the entrepreneur has working experience in government or state-owned enterprises before start-up
Pc_2	Dummy. Equaling to one if the entrepreneur is a member of the National People's Congress (NPC) or Chinese People's Political Consultative Conference (CPPCC)
Regu	Number of administrative fine cases/GDP (provincial level)
Inno	R&D expenditure/revenue
Bothpc	Dummy. Equaling to one if the entrepreneur has both ascribed and achieved political connection simultaneously
Age	Entrepreneur age
Gender	Dummy. Equaling to zero if the entrepreneur is female.
Edu	Ranging from 1 to 6 (1 = primary school, 2 = secondary school, 3 = high school, 4 = college, 5 = university, 6 = postgraduate)
Fage	Year of survey-year of founding
Fsize	The logarithm of firm revenue
ROS	Profit/revenue
Export	Dummy. Equalling to one if the firm exports products or services to other countries
Sgm	Dummy. Equaling to one if the firm has set shareholder general meeting
Dboard	Dummy. Equaling to one if the firm has a board of directors
Sboard	Dummy. Equaling to one if the firm has a board of supervisors
Ind	Dummy. Equalling to one if the firm is in manufacturing industries
Year	Year of survey
Region	Classified as Eastern, Western, Middle and North-Eastern region

Source: The authors.

ROS, computed as the return of sales to capture firm profitability; *Export*, indicated by whether firms have exported products or services to other countries; three indicators related to firm corporate governance, consist of *Sgm*, equaling to one when the firm has shareholder meetings; *Dboard*, equaling to one when the firm has a board of directors; *Sboard*, equaling to one when the firm has a board of supervisors; *Ind*, equaling to one when the firm is in the manufacturing industry; Finally, *Region*, in the name of the eastern, western, middle and northeastern area according to the geographical classification by National Bureau of Statistics of China, and *Year* are included to control the fixed effect. Moreover, *Bothpc*, indicated as entrepreneurs have both ascribed and achieved political connections, is also controlled to rule out the conflicting impacts of two types of political connections (Zhang et al., 2016). Table 1 provides the definitions and measurements of all relevant variables.

3.2. Data source

The firm level data used in this study are taken from four waves of the Chinese Private Enterprises Survey (CPES) and the regional level data is obtained from Chinese Environmental Annual Reports and Chinese Statistics Yearbook. CPES, jointly collaborated by the All-China Industry and Commerce Federation, the China Society of Private Economy at the Chinese Academy of Social Sciences, and the United Front Work Department of the Central Committee of the Communist Party of China (Chen et al., 2019), has been conducted every two years since 1993. Multi-stage sampling is performed nationwide and the sample size is around 4000 with slight differences each year. Although the content of each survey varies, the basic information about business owners and firm

Table 2. Descriptive statistics of major variables.

Variables	Obs	Mean	Std.Dev.	Min	Max
EI_1	8838	2.823	4.601	0	18.20
EI_2	8838	0.003	0.012	0	0.106
EI_3	8838	0.360	0.480	0	1
Pc_1	8838	0.596	0.491	0	1
Pc_2	8838	0.500	0.500	0	1
Regu	8838	0.320	0.388	0.005	2.451
Inno	8838	0.016	0.048	0	0.474
Bothpc	8838	0.319	0.466	0	1
Age	8838	44.290	8.203	24	67
Gender	8838	0.865	0.341	0	1
Edu	8838	3.413	1.181	1	6
Fage	8838	7.804	4.756	1	27
Fsize	8838	7.057	2.174	0.095	21.98
ROS	8838	0.076	0.160	−0.705	0.800
Export	8838	0.157	0.364	0	1
Sgm	8838	0.598	0.490	0	1
Dboard	8838	0.591	0.492	0	1
Sboard	8838	0.340	0.474	0	1
Ind	8838	0.445	0.497	0	1

Source: The authors.

environmental investment are regular items; thus, the data have continuity and comparability. This database has been used in studies related to political connections and environmental investment of private firms in China (Zhang et al., 2020). Because of the lack of data on environmental investment in the early years, the survey data in 2006, 2008, 2010, and 2012 are employed. Several data cleaning processes are conducted. First, samples with missing data in our key variables are removed. Second, we exclude firms with a zero-year business age, as many questions are based on the full-year range. Finally, to avoid the potential impact of outliers, the continuous variables are winsorized at the 1% level. The final data set contains 8838 observations. The sample has a comparatively even distribution among different survey years: 31.9% of the samples are from the 2012 survey and the other three years each account for about 22.5%.

Table 2 presents the primary characteristics and distributions of our sample. It can be seen from the data in Table 2 that the ratio of environmental investment on average is relatively low (0.3%), and only 36% of firms have expenditures on environmental protection. What stands out in this table is the high rate of entrepreneurs with political connections: Specifically, 59.6% of the sampled entrepreneurs had worked in government offices, etc. before starting their businesses; About half of the entrepreneurs served as deputies to the NPC or members of the CPPCC, which is similar to the ratio mentioned in Zhang and Xie (2020). Moreover, 31.9% of the entrepreneurs have both types of political connections. On average, sample firms typically spend 1.6% of annual sales in research and development, 15.7% of them have been exporting products or services to other countries, and 44.5% of the sampled firms are manufacturing enterprises.

4. Results

4.1. Regression analysis and hypothesis test

Taking environmental investment as the dependent variable, Table 3 shows the direct effect of two types of political connections. The results show that ascribed political

Table 3. The regression results of environmental investment on political connection.

	M1	M2	M3	M4	M5	M6	M7	M8	M9
		EI_1 (Tobit model)			EI_2 (Tobit model)			EI_3 (Logit model)	
Bothpc	1.964***	0.040	0.035	0.055***	−0.005	0.000	0.370***	−0.021	−0.060
	(4.08)	(0.10)	(0.06)	(4.25)	(−0.51)	(0.01)	(3.69)	(−0.25)	(−0.51)
Age	0.017	0.013	0.013	0.000	0.000	0.000	0.003	0.002	0.002
	(1.04)	(0.79)	(0.79)	(0.86)	(0.54)	(0.60)	(0.92)	(0.74)	(0.65)
Gender	1.410***	1.348***	1.348***	0.030*	0.028**	0.028**	0.271***	0.258***	0.257***
	(3.89)	(3.63)	(3.66)	(3.13)	(2.89)	(2.91)	(3.83)	(3.54)	(3.55)
Edu	−0.114	−0.111	−0.111	−0.002	−0.002	−0.002	−0.032	−0.030	−0.030
	(−0.90)	(−0.88)	(−0.88)	(−0.52)	(−0.46)	(−0.48)	(−1.06)	(−0.99)	(−0.98)
Fage	0.002	−0.019	−0.019	−0.001	−0.001	−0.001	0.007	0.002	0.002
	(0.07)	(−0.58)	(−0.58)	(−0.79)	(−1.50)	(−1.49)	(0.96)	(0.23)	(0.22)
Fsize	1.347***	1.270***	1.270***	0.012***	0.010***	0.010***	0.249***	0.232***	0.232***
	(14.48)	(13.50)	(13.69)	(4.91)	(3.87)	(3.92)	(13.86)	(13.09)	(13.29)
ROS	6.462***	6.210***	6.210***	0.191***	0.184***	0.184***	1.440***	1.390***	1.389***
	(7.75)	(7.43)	(7.43)	(6.21)	(5.87)	(5.86)	(7.60)	(7.44)	(7.44)
Export	2.268***	2.281***	2.281***	0.038***	0.038***	0.038***	0.512***	0.516***	0.517***
	(4.91)	(4.96)	(4.98)	(3.44)	(3.51)	(3.52)	(5.13)	(5.18)	(5.20)
Sgm	−1.272***	−1.217***	−1.217***	−0.035***	−0.033***	−0.033***	−0.270***	−0.259***	−0.259***
	(−5.39)	(−5.34)	(−5.36)	(−4.29)	(−4.22)	(−4.22)	(−4.72)	(−4.69)	(−4.70)
Dboard	0.480*	0.450*	0.450*	0.026***	0.025***	0.025***	0.098*	0.092*	0.091*
	(2.58)	(2.43)	(2.44)	(4.25)	(4.12)	(4.17)	(2.43)	(2.26)	(2.25)
Sboard	0.706*	0.682*	0.682*	0.023**	0.022**	0.023**	0.129*	0.127*	0.126*
	(2.37)	(2.33)	(2.31)	(2.67)	(2.61)	(2.60)	(1.98)	(2.01)	(1.99)
Ind	3.927***	3.932***	3.932***	0.087***	0.087***	0.087***	0.829***	0.834***	0.834***
	(11.61)	(11.74)	(11.74)	(8.43)	(8.67)	(8.66)	(13.20)	(13.58)	(13.65)
Pc_1	−1.041*		0.006	−0.035**		−0.005	−0.188*		0.041
	(−2.51)		(0.01)	(−3.10)		(−0.44)	(−2.12)		(0.49)
Pc_2		2.077***	2.080***		0.062***	0.059***		0.439***	0.462***
		(4.64)	(4.65)		(4.79)	(4.01)		(4.09)	(4.23)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	−16.117***	−16.194***	−16.196***	−0.345***	−0.348***	−0.346***	−3.483***	−3.493***	−3.504***
	(−10.39)	(−10.86)	(−10.62)	(−10.85)	(−10.92)	(−10.90)	(−12.41)	(−12.84)	(−12.70)
Obs.	8838	8838	8838	8838	8838	8838	8838	8838	8838
Pseudo R^2	0.060	0.061	0.061	0.144	0.151	0.151	0.125	0.128	0.128
F/Chi²	117.664	122.684	127.731	28.540	27.167	37.051	1817.286	3521.778	3898.089

Notes: t statistics in parentheses;
*$p < 0.05$,
**$p < 0.01$,
***$p < 0.001$.
Source: The authors.

connections are negatively and significantly related to environmental investment ($\beta = -1.041$, $p < 0.05$ in model 1; $\beta = -0.035$, $p < 0.01$ in model 4; $\beta = -0.188$, $p < 0.05$ in model 7), while achieved political connection is positively and significantly related to environmental investment ($\beta = 2.077$, $p < 0.001$ in model 2; $\beta = 0.062$, $p < 0.001$ in model 5; $\beta = 0.439$, $p < 0.001$ in model 8). But it is worthy to notice that when achieved political connections and ascribed political connections enter the model simultaneously, the negative effect of ascribed political connections becomes insignificant ($\beta = 0.006$, $p > 0.05$ in model 3; $\beta = -0.005$, $p > 0.05$ in model 6; $\beta = 0.041$, $p > 0.05$ in model 9), while the positive effect of achieved political connections persists ($\beta = 2.080$, $p < 0.001$ in model 3; $\beta = 0.059$, $p < 0.001$ in model 6; $\beta = 0.462$, $p < 0.001$ in model 9). Thus, H1 is not supported, and H2 is supported.

The results further verified the different role of two types of political connections in firm environmental investment: Only achieved political connections foster environmental investment while ascribed political connections do not. The findings support the binding effect of achieved political connections and the marginal buffering effect of ascribed political connection on corporate environmental investment, in line with previous empirical research (Chen, 2020; Xu & Yan, 2020). A possible explanation for turning insignificant and negative role of ascribed political connection when considering achieved political connections, may be the disincentive, pressure extraction, and inefficacy arising from using ascribed political capital (Lin et al., 2014).

Table 4 reported the moderating effect of environmental regulation on the relationship between political connections and environmental investment. The results show that the interaction between ascribed political connections and environmental regulation is positive but not significant ($\beta = 0.394$, $p > 0.05$ in model 1; $\beta = 0.004$, $p > 0.05$ in model 4; $\beta = 0.100$, $p > 0.05$ in model 7), thus H3a is not supported. The interaction term between achieved political connection and environmental regulation is positive and significant ($\beta = 0.929$, $p < 0.001$ in model 2; $\beta = 0.020$, $p < 0.001$ in model 5; $\beta = 0.194$, $p < 0.001$ in model 8), supporting H3b. Hence, for private enterprises, regional environmental regulation will only strengthen the relationship between achieved political connections and environmental investment but do not affect the relationship between ascribed political connections and environmental investment.

Table 5 reported the moderating effect of innovation capability on the relationship between political connections and environmental investment. The results show that the interaction term between ascribed political connections and innovation capability is negative and significant ($\beta = -13.473$, $p < 0.001$ in model 1; $\beta = -0.585$, $p < 0.01$ in model 4; $\beta = -3.371$, $p < 0.01$ in model 7), thus H4a is supported. The interaction term between achieved political connection and environmental regulation is negative but insignificant ($\beta = -6.306$, $p > 0.05$ in model 2; $\beta = -0.228$, $p > 0.05$ in model 5; $\beta = -1.311$, $p > 0.05$ in model 8), not supporting H4b. The above results indicate that firm innovation capability could strengthen the negative impact of ascribed political connections on environmental investment but have no influence on the positive effect of achieved political connections on environmental protection expenditure.

The diverged moderating effects of environmental regulation and innovation capability reflect the role of political connections relies on the nature of political connections and firms' dependence on the government. Specifically, in regions with

Table 4. The regression results by including the moderating effect of environmental regulation.

	M1	M2 EL_1 (Tobit model)	M3	M4	M5 EL_2 (Tobit model)	M6	M7	M8 EL_3 (Logit model)	M9
Bothpc	1.957***	0.043	−0.016	0.055***	−0.005	−0.001	0.372***	−0.020	−0.071
	(4.20)	(0.11)	(−0.03)	(4.27)	(−0.52)	(−0.05)	(3.78)	(−0.23)	(−0.62)
Age	0.017	0.013	0.013	0.000	0.000	0.000	0.003	0.003	0.002
	(1.04)	(0.85)	(0.84)	(0.86)	(0.58)	(0.63)	(0.94)	(0.84)	(0.74)
Gender	1.396***	1.350***	1.332***	0.030**	0.028**	0.028**	0.269***	0.260***	0.255***
	(3.88)	(3.64)	(3.62)	(3.09)	(2.88)	(2.86)	(3.81)	(3.56)	(3.52)
Edu	−0.114	−0.114	−0.113	−0.002	−0.002	−0.002	−0.031	−0.030	−0.030
	(−0.92)	(−0.91)	(−0.90)	(−0.52)	(−0.47)	(−0.49)	(−1.05)	(−0.99)	(−0.97)
Fage	0.002	−0.020	−0.021	−0.001	−0.001	−0.001	0.006	0.002	0.001
	(0.07)	(−0.60)	(−0.64)	(−0.78)	(−1.53)	(−1.54)	(0.96)	(0.22)	(0.17)
Fsize	1.338***	1.269***	1.268***	0.012***	0.010***	0.010***	0.248***	0.233***	0.233***
	(14.28)	(13.76)	(13.82)	(4.86)	(3.92)	(3.96)	(13.67)	(13.27)	(13.33)
ROS	6.441***	6.200***	6.192***	0.191***	0.184***	0.184***	1.442***	1.393***	1.394***
	(7.75)	(7.27)	(7.34)	(6.15)	(5.86)	(5.85)	(7.66)	(7.29)	(7.36)
Export	2.256***	2.279***	2.286***	0.038***	0.039***	0.039***	0.511***	0.517***	0.520***
	(4.87)	(4.91)	(4.96)	(3.41)	(3.47)	(3.48)	(5.12)	(5.09)	(5.16)
Sgm	−1.268***	−1.217***	−1.214***	−0.035***	−0.033***	−0.033***	−0.269***	−0.259***	−0.258***
	(−5.38)	(−5.41)	(−5.39)	(−4.31)	(−4.24)	(−4.24)	(−4.68)	(−4.71)	(−4.66)
Dboard	0.478*	0.458*	0.455*	0.026***	0.025***	0.025***	0.098*	0.093*	0.093*
	(2.52)	(2.43)	(2.41)	(4.27)	(4.13)	(4.19)	(2.39)	(2.28)	(2.25)
Sboard	0.692*	0.662*	0.656*	0.023**	0.022**	0.022**	0.125	0.124*	0.121
	(2.34)	(2.29)	(2.27)	(2.66)	(2.61)	(2.60)	(1.95)	(1.98)	(1.94)
Ind	3.870***	3.899***	3.901***	0.087***	0.087***	0.087***	0.824***	0.833***	0.834***
	(11.34)	(11.69)	(11.63)	(8.21)	(8.55)	(8.54)	(12.90)	(13.46)	(13.42)
Pc_1	−1.038*		0.046	−0.035**		−0.005	−0.189*		0.049
	(−2.56)		(0.12)	(−3.13)		(−0.39)	(−2.19)		(0.63)
Regu	0.269	−0.042	−0.312	0.005	−0.005	−0.008	−0.001	−0.050	−0.121
	(0.74)	(−0.12)	(−0.80)	(0.56)	(−0.73)	(−0.85)	(−0.02)	(−0.77)	(−1.63)
Pc_1* Regu	0.394		0.422	0.004		0.004	0.100		0.109*
	(1.55)		(1.72)	(0.54)		(0.59)	(1.93)		(2.20)
Pc_2		2.041***	2.089***		0.062***	0.059***		0.433***	0.467***
		(4.38)	(4.66)		(4.61)	(4.00)		(3.85)	(4.20)
Pc_2* Regu		0.929***	0.916***		0.020***	0.020***		0.194***	0.194***
		(4.23)	(3.93)		(3.66)	(3.61)		(4.47)	(4.40)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	−15.947***	−16.142***	−16.129***	−0.343***	−0.348***	−0.347***	−3.469***	−3.512***	−3.524***
	(−10.21)	(−10.84)	(−10.65)	(−10.54)	(−10.59)	(−10.54)	(−12.36)	(−13.24)	(−13.24)
Obs.	8838	8838	8838	8838	8838	8838	8838	8838	8838
Pseudo R^2	0.060	0.062	0.062	0.145	0.154	0.154	0.126	0.130	0.130
F/Chi²	102.560	320.908	444.524	36.456	61.562	97.191	2842.394	7149.901	1.4e + 04

Notes: t statistics in parentheses.
* $p < 0.05$,
** $p < 0.01$,
*** $p < 0.001$.
Source: The authors.

Table 5. The regression results by including the moderating effect of firm innovation.

	M1	M2	M3	M4	M5	M6	M7	M8	M9
	EL_1 (Tobit model)	EL_1 (Tobit model)			EL_2 (Tobit model)	(Tobit model)		EL_3 (Logit model)	(Logit model)
Bothpc	1.932***	0.018	0.113	0.052***	−0.007	0.004	0.363***	−0.026	−0.047
	(4.00)	(0.05)	(0.20)	(4.05)	(−0.69)	(0.25)	(3.60)	(−0.30)	(−0.39)
Age	0.017	0.013	0.013	0.000	0.000	0.000	0.003	0.002	0.002
	(1.04)	(0.77)	(0.81)	(0.86)	(0.50)	(0.63)	(0.94)	(0.71)	(0.67)
Gender	1.398***	1.327***	1.334***	0.028**	0.026**	0.027**	0.268***	0.252***	0.254***
	(3.88)	(3.59)	(3.64)	(3.02)	(2.79)	(2.81)	(3.79)	(3.48)	(3.51)
Edu	−0.125	−0.114	−0.122	−0.002	−0.002	−0.002	−0.034	−0.030	−0.032
	(−1.01)	(−0.89)	(−0.98)	(−0.72)	(−0.50)	(−0.68)	(−1.14)	(−0.99)	(−1.06)
Fage	0.003	−0.020	−0.019	−0.001	−0.001	−0.001	0.007	0.001	0.002
	(0.08)	(−0.61)	(−0.56)	(−0.81)	(−1.55)	(−1.46)	(0.98)	(0.19)	(0.25)
Fsize	1.373***	1.299***	1.299***	0.014***	0.012***	0.012***	0.255***	0.239***	0.239***
	(14.79)	(13.86)	(14.06)	(5.44)	(4.46)	(4.50)	(14.27)	(13.57)	(13.89)
ROS	6.246***	5.996***	6.012***	0.179***	0.172***	0.173***	1.405***	1.350***	1.356***
	(7.83)	(7.51)	(7.46)	(6.03)	(5.68)	(5.70)	(7.51)	(7.48)	(7.36)
Export	2.153***	2.186***	2.176***	0.031***	0.032***	0.031**	0.488***	0.496***	0.494***
	(4.71)	(4.82)	(4.78)	(2.98)	(3.12)	(3.04)	(5.01)	(5.11)	(5.08)
Sgm	−1.279***	−1.229***	−1.229***	−0.035***	−0.033***	−0.033***	−0.272***	−0.261***	−0.262***
	(−5.47)	(−5.38)	(−5.44)	(−4.32)	(−4.28)	(−4.27)	(−4.73)	(−4.71)	(−4.71)
Dboard	0.434*	0.401*	0.410*	0.023***	0.022***	0.022***	0.087*	0.079*	0.081*
	(2.40)	(2.23)	(2.28)	(3.69)	(3.57)	(3.68)	(2.21)	(2.00)	(2.06)
Sboard	0.705*	0.686*	0.680*	0.023**	0.023**	0.022**	0.128*	0.128*	0.126*
	(2.36)	(2.31)	(2.29)	(2.70)	(2.68)	(2.62)	(1.96)	(2.00)	(1.96)
Ind	3.842***	3.839***	3.854***	0.081***	0.081***	0.082***	0.813***	0.815***	0.820***
	(11.34)	(11.27)	(11.42)	(8.31)	(8.35)	(8.46)	(12.94)	(12.99)	(13.30)
Pc_1	−0.850*		0.112	−0.026*		−0.001	−0.144		0.071
	(−2.04)		(0.28)	(−2.42)		(−0.05)	(−1.67)		(0.86)
Inno	18.968***	12.942**	20.351***	0.979***	0.701**	1.027***	4.552***	2.874**	4.747***
	(5.23)	(3.15)	(4.94)	(4.34)	(3.10)	(3.63)	(4.23)	(2.62)	(3.98)
Pc_1*Inno	−13.473***		−11.905***	−0.585**		−0.540**	−3.371***		−3.078***
	(−4.30)		(−3.73)	(−2.95)		(−2.96)	(−3.71)		(−3.42)
Pc2		2.146***	2.058***		0.064***	0.056***		0.452***	0.456***
		(4.67)	(4.65)		(4.64)	(3.98)		(4.06)	(4.15)
Pc2*Inno		−6.306	−5.064		−0.228	−0.161		−1.311	−0.898
		(−1.30)	(−1.16)		(−0.91)	(−0.71)		(−1.00)	(−0.78)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	−16.379***	−16.398***	−16.472***	−0.354***	−0.356***	−0.357***	−3.552***	−3.538***	−3.575***
	(−10.58)	(−11.07)	(−10.86)	(−10.73)	(−10.69)	(−10.67)	(−12.68)	(−13.14)	(−13.05)
Obs.	8838	8838	8838	8838	8838	8838	8838	8838	8838
Pseudo R²	0.060	0.061	0.061	0.168	0.170	0.174	0.128	0.130	0.130
F/Chi²	125.190	176.127	183.138	25.249	42.227	42.106	2318.104	6015.056	1.1e + 04

Notes: t statistics in parentheses.
*$p < 0.05$,
**$p < 0.01$,
***$p < 0.001$.
Source: The authors.

stringent environmental regulations, pollution control can be a critical criterion in local government officials' promotion (Chen, 2020; Chen & Cao, 2016). Thus entrepreneurs with achieved political connections are motivated to shoulder more environmental investments to get access to the political council. While entrepreneurs with ascribed political connections, are less dependent on government recognition and need not please government officials by allocating more resources on pollution control. Likewise, innovative firms, depend less on the government for acquiring key resources and preferential treatments. Correspondingly, entrepreneurs with ascribed political ties comparatively bear less pressure and incentives to invest in environmental protection.

4.2. Robustness tests

Robustness tests are performed to account for the sensitivity of the results, including endogeneity analysis and using alternative measures of political connections. The results may be subject to endogeneity issues due to the reverse causal relationship between achieved political connections and environmental investment. For instance, entrepreneurs whose firms are performing better environmental responsibility are more likely to be elected as political deputies as it is usually essential to promote entrepreneurs with a good reputation when nominating candidates for NPC and CPPCC members. Thus, the formation of achieved political connections may be influenced by firm performance in environmental protection.

To address this endogeneity concern, we used the political connection intensity at both the industry and province-level as the instrumental variables of achieved political connections as is suggested in previous studies (Krammer & Jiménez, 2020; Xu & Yan, 2020). The idea for the choice of instrumental variable is that the local political connection intensity will influence the possibility of entrepreneurs' participation in political institutions but has no impact on firm decisions on environmental investment. We conducted the two-stage Probit-Tobit (Probit model is adopted when the dependent variable is environmental investment behavior) regression procedures, and the second-stage regression results are presented in Table 6. The interaction term between Pc_2 and $Regu$ are all positive and significant, and the interaction between Pc_2 and $Inno$ is not significant, consistent with the above analysis. Moreover, the estimated impact of achieved political connection and the moderating effect of environmental regulation are much larger than the coefficients in Table 4.

Furthermore, achieved political connections are remeasured as a continuous variable to capture the difference in political influence by coding the ranking of political appointment. The results show that H2 is supported and consistent with the above analysis.[1] The difference is that the moderating effect of innovation capacity turns marginally significant, indicating that only those firms with higher political status will release the binding effect when they are more capable of innovation.

5. Conclusions

Given China's market transformation background, the political connection is an essential factor influencing the corporate environmental investment of private

Table 6. The endogeneity analysis by using instrument variable.

	M1	M2	M3	M4	M5	M6	M7	M8	M9
	EL_1 (Tobit IV model)				EL_2 (Tobit IV model)			EL_3 (Probit IV model)	
Control[a]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pc_2	11.944***	12.405***	11.803***	0.323***	0.333***	0.313***	1.326***	1.378***	1.311***
	(6.11)	(7.04)	(6.06)	(8.32)	(8.86)	(8.20)	(6.70)	(7.70)	(6.58)
Pc_2*Regu		2.089***			0.041**			0.269***	
		(2.87)			(2.49)			(3.43)	
Regu		−0.737			−0.018			−0.121**	
		(−1.41)			(−1.61)			(−2.30)	
Pc_2*Inno			−17.164			−0.330			−1.431
			(−1.46)			(−0.54)			(−0.88)
Inno			17.173***			0.713*			1.781**
			(2.70)			(1.92)			(2.14)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	−14.929***	−14.973***	−14.929***	−0.315***	−0.317***	−0.312***	−1.801***	−1.800***	−1.805***
	(−10.49)	(−10.94)	(−10.56)	(−10.65)	(−10.44)	(−10.18)	(−13.70)	(−14.68)	(−13.69)
Obs.	8838	8838	8838	8838	8838	8838	8838	8838	8838
Chi²	2957.097	3803.375	2909.833	423.653	1260.499	525.000	5841.346	7383.604	6580.416

Notes: t statistics in parentheses.
*$p < 0.1$,
**$p < 0.05$,
***$p < 0.01$.
[a]The control variables are the same as in Tables 3–5.
Source: The authors.

enterprises. However, previous studies mixed different types of political ties and found contradictory relationships between political connections and firm environmental investment. This study set out to assess the effects of two most common types of political connections on firm environmental investment. In this study, we differentiated the role of ascribed vs. achieved political connections in firm environmental investment and explored the moderating effect of environmental regulation and innovation capability, employing a comprehensive dataset consisting of 8838 Chinese private enterprises from CPES.

The findings clearly indicate the heterogeneous effect of ascribed and achieved political connections. Specifically, private enterprises with achieved political connections invest more in environmental protection than those without such political connections, supporting the binding effect of political connections. However, firms with ascribed political connections significantly spend less on environmental protection than those without such political connections, exhibiting a marginal buffering effect. The test for the role of binding and buffering effect simultaneously shows the buffering effect is less robust, as it turns insignificant when considering the binding effect. Thus, the binding effect of achieved political connections is stronger and robust.

In addition, regional environmental regulation only strengthens the relationship between achieved political connection and environmental investment and does not influence the impact of ascribed political connections. Innovation ability only strengthens the negative relationship between ascribed political connection and environmental investment but does not influence the impact of achieved political connections. Taken the moderating effect together, the results suggest that the dependence of private enterprises on the government determines the impact of political connection on firm environmental expenditures.

The findings of this study draw practical implications as follows. Firstly, it is necessary for the government to bring environmental performance in political appointments or nominations, which will motivate firms to engage in environmental protection and pollution control. Secondly, more inspection can be conducted in regions with lax environmental regulations to prevent firms from shirking environmental penalties and using political connections as their asylum. Thirdly, the government should be alert to the environmental investment by less innovative firms as these firms may be locked in the path of seeking regulative policies and resources through environmental investment and lack sustainable growth intentions.

The study is also subject to several limitations. Although the study used four waves of Chinese private enterprises survey, it is unable to construct a panel database. Panel studies are expected in future studies to test the time trend of political connections in firm environmental decisions. Second, only formal environmental regulations by the government are examined in this paper, informal environmental regulations such as culture and public concern can also be examined in future studies to proliferate the informal institutional pressures on firm environmental investment. Thirdly, despite the fact that the study has a rather large sample to explore the drivers and contingencies influencing private firms' environmental investment, path analysis research will benefit the field by elaborating the complex logic of environmental investment decisions in private enterprises.

Disclosure statement

The authors declare no potential conflict of interest.

Note

1. Readers can request the results from the corresponding author.

Funding

ORCID

Lihong Song 🔟 http://orcid.org/0000-0003-3161-5190

References

Bertrand, M., Kramarz, F., Schoar, A., & Thesmar, D. (2018). The cost of political connections*. *Review of Finance*, *22*(3), 849–876. https://doi.org/10.1093/rof/rfy008

Chang, L., Li, W., & Lu, X. (2015). Government engagement, environmental policy, and environmental performance: Evidence from the most polluting Chinese listed firms: Governmental impact on environmental policy and performance in China. *Business Strategy and the Environment*, *24*(1), 1–19. https://doi.org/10.1002/bse.1802

Chen, G., Lu, P., Lin, Z., & Song, N. (2019). Introducing Chinese private enterprise survey: Points and prospects. *Nankai Business Review International*, *10*(4), 501–525. https://doi.org/10.1108/NBRI-01-2019-0001

Chen, Z. (2020). Mutual dependence and selective coercion: Corporate environmental investment among Chinese private firms. *Chinese Sociological Review*, *52*(5), 515–538. https://doi.org/10.1080/21620555.2020.1768526

Chen, Z., & Cao, Y. (2016). Chinese private corporate philanthropy: Social responsibility, legitimacy strategy, and the role of political capital. *Chinese Sociological Review*, *48*(2), 108–136. https://doi.org/10.1080/21620555.2015.1128815

Dai, W., Liu, Y., Liao, M., & Lin, Q. (2018). How does entrepreneurs' socialist imprinting shape their opportunity selection in transition economies? Evidence from China's privately owned enterprises. *International Entrepreneurship and Management Journal*, *14*(4), 823–856. https://doi.org/10.1007/s11365-017-0485-0

Delmas, M., & Toffel, M. W. (2004). Stakeholders and environmental management practices: An institutional framework. *Business Strategy and the Environment*, *13*(4), 209–222. https://doi.org/10.1002/bse.409

Hillman, A. J. (2005). Politicians on the board of directors: Do connections affect the bottom line? *Journal of Management*, *31*(3), 464–481. https://doi.org/10.1177/0149206304272187

Hoogendoorn, B., Guerra, D., & van der Zwan, P. (2015). What drives environmental practices of SMEs? *Small Business Economics*, *44*(4), 759–781. https://doi.org/10.1007/s11187-014-9618-9

Huang, L., & Lei, Z. (2021). How environmental regulation affect corporate green investment: Evidence from China. *Journal of Cleaner Production*, *279*, 123560. https://doi.org/10.1016/j.jclepro.2020.123560

Kathuria, V. (2007). Informal regulation of pollution in a developing country: Evidence from India. *Ecological Economics*, *63*(2-3), 403–417. https://doi.org/10.1016/j.ecolecon.2006.11.013

Keim, G. D., & Zeithaml, C. P. (1986). Corporate political strategy and legislative decision making: A review and contingency approach. *Academy of Management Review*, *11*(4), 828–843. https://doi.org/10.5465/amr.1986.4284029

Krammer, S. M. S., & Jiménez, A. (2020). Do political connections matter for firm innovation? Evidence from emerging markets in Central Asia and Eastern Europe. *Technological Forecasting and Social Change*, *151*, 119669. https://doi.org/10.1016/j.techfore.2019.05.027

Liao, Y.-C., & Tsai, K.-H. (2019). Innovation intensity, creativity enhancement, and eco-innovation strategy: The roles of customer demand and environmental regulation. *Business Strategy and the Environment*, *28*(2), 316–326. https://doi.org/10.1002/bse.2232

Lin, H., Zeng, S., Wang, L., Zou, H., & Ma, H. (2016). How does environmental irresponsibility impair corporate reputation? A multi-method investigation: How does environmental irresponsibility impair corporate reputation? *Corporate Social Responsibility and Environmental Management*, *23*(6), 413–423. https://doi.org/10.1002/csr.1387

Lin, H., Zeng, S. X., Ma, H. Y., Qi, G. Y., & Tam, V. W. Y. (2014). Can political capital drive corporate green innovation? Lessons from China. *Journal of Cleaner Production*, *64*, 63–72. https://doi.org/10.1016/j.jclepro.2013.07.046

Liu, Y., Li, Z., & Yin, X. (2018). Environmental regulation, technological innovation and energy consumption—A cross-region analysis in China. *Journal of Cleaner Production*, *203*, 885–897. https://doi.org/10.1016/j.jclepro.2018.08.277

Luo, X. R., & Wang, D. (2019). Are politically endorsed firms more socially responsible? Selective engagement in corporate social responsibility. *Journal of Business Ethics*, *170*(3), 535–555. https://doi.org/10.1007/s10551-019-04367-6

Maung, M., Wilson, C., & Tang, X. (2016). Political connections and industrial pollution: Evidence based on state ownership and environmental levies in China. *Journal of Business Ethics*, *138*(4), 649–659. https://doi.org/10.1007/s10551-015-2771-5

Özen, Ş., & Küskü, F. (2009). Corporate environmental citizenship variation in developing countries: An institutional framework. *Journal of Business Ethics*, *89*(2), 297–313. https://doi.org/10.1007/s10551-008-0001-0

Popp, D., & Newell, R. (2012). Where does energy R&D come from? Examining crowding out from energy R&D. *Energy Economics*, *34*(4), 980–991. https://doi.org/10.1016/j.eneco.2011.07.001

Prechel, H., & Zheng, L. (2012). Corporate characteristics, political embeddedness and environmental pollution by large U.S. corporations. *Social Forces*, *90*(3), 947–970. https://doi.org/10.1093/sf/sor026

Shi, W., Markóczy, L., & Stan, C. V. (2014). The continuing importance of political ties in China. *Academy of Management Perspectives*, *28*(1), 57–75. https://doi.org/10.5465/amp.2011.0153

Shou, Z., Chen, J., Zhu, W., & Yang, L. (2014). Firm capability and performance in China: The moderating role of guanxi and institutional forces in domestic and foreign contexts. *Journal of Business Research*, *67*(2), 77–82. https://doi.org/10.1016/j.jbusres.2012.11.014

Sun, P., Mellahi, K., & Wright, M. (2012). The contingent value of corporate political ties. *Academy of Management Perspectives*, *26*(3), 68–82. https://doi.org/10.5465/amp.2011.0164

Testa, F., Gusmerottia, N. M., Corsini, F., Passetti, E., & Iraldo, F. (2016). Factors affecting environmental management by small and micro firms: The importance of entrepreneurs' attitudes and environmental investment. *Corporate Social Responsibility and Environmental Management*, *23*(6), 373–385. https://doi.org/10.1002/csr.1382

Wu, W., Wu, C., Zhou, C., & Wu, J. (2012). Political connections, tax benefits and firm performance: Evidence from China. *Journal of Accounting and Public Policy*, *31*(3), 277–300. https://doi.org/10.1016/j.jaccpubpol.2011.10.005

Xu, X., & Yan, Y. (2020). Effect of political connection on corporate environmental investment: Evidence from Chinese private firms. *Applied Economics Letters*, 27(18), 1515–1517. https://doi.org/10.1080/13504851.2019.1693692

Yang, D., Wang, A. X., Zhou, K. Z., & Jiang, W. (2019). Environmental strategy, institutional force, and innovation capability: A managerial cognition perspective. *Journal of Business Ethics*, 159(4), 1147–1161. https://doi.org/10.1007/s10551-018-3830-5

You, D., Zhang, Y., & Yuan, B. (2019). Environmental regulation and firm eco-innovation: Evidence of moderating effects of fiscal decentralization and political competition from listed Chinese industrial companies. *Journal of Cleaner Production*, 207, 1072–1083. https://doi.org/10.1016/j.jclepro.2018.10.106

Zhang, D., & Guo, Y. (2019). Financing R&D in Chinese private firms: Business associations or political connection? *Economic Modelling*, 79, 247–261. https://doi.org/10.1016/j.econmod.2018.12.010

Zhang, J., Marquis, C., & Qiao, K. (2016). Do political connections buffer firms from or bind firms to the government? A study of corporate charitable donations of Chinese firms. *Organization Science*, 27(5), 1307–1324. https://doi.org/10.1287/orsc.2016.1084

Zhang, J., Tan, J., & Wong, P. K. (2015). When does investment in political ties improve firm performance? The contingent effect of innovation activities. *Asia Pacific Journal of Management*, 32(2), 363–387. https://doi.org/10.1007/s10490-014-9402-z

Zhang, Q., Yu, Z., & Kong, D. (2019). The real effect of legal institutions: Environmental courts and firm environmental protection expenditure. *Journal of Environmental Economics and Management*, 98, 102254. https://doi.org/10.1016/j.jeem.2019.102254

Zhang, T., & Xie, L. (2020). The protected polluters: Empirical evidence from the national environmental information disclosure program in China. *Journal of Cleaner Production*, 258, 120343. https://doi.org/10.1016/j.jclepro.2020.120343

Zhou, K. Z., Gao, G. Y., & Zhao, H. (2017). State ownership and firm innovation in China: An integrated view of institutional and efficiency logics. *Administrative Science Quarterly*, 62(2), 375–404. https://doi.org/10.1177/0001839216674457

Zou, H. L., Zeng, R. C., Zeng, S. X., & Shi, J. J. (2015). How do environmental violation events harm corporate reputation?: Environmental violation and reputation. *Business Strategy and the Environment*, 24(8), 836–854. https://doi.org/10.1002/bse.1849