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Regional Fiscal Competition and Corporate Environmental Information Disclosure: Provincial-Level Evidence From China

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Abstract

The *race to the bottom* theory of environmental regulation mainly refers to state or local governments competing to lower their environmental regulation standards in pursuit of their own interests. Since the reform of the Chinese tax distribution system in 1994, local governments have encouraged economic competition through various industrial subsidies and tax preferences. Moreover, in China's political system, which promotes fiscal decentralization and economic competition, competition has provided local governments with the opportunity to *race to the bottom* by secretly reducing the environmental regulations of enterprises to obtain financial returns and promote capital. Using the *race to the bottom* theory of environmental regulation, this article identifies the land revenue data and environmental information disclosure (EID) quality data of listed companies in China from 2012 to 2014 and uses the hierarchical linear model to study the direct and indirect effects of local governments' financial competition on the EID of listed companies in their jurisdictions. It was found that (a) Regional financial competition does not directly influence the quality of an enterprise's EID but has a significant negative regulatory effect. (b) The higher the degree of regional competition, the more obvious the negative regulatory effect. (c) The financial competitiveness of tropical and subtropical regions in China is higher than that of other regions, and the EID quality of enterprises in these regions is lower. (d) Governmental financial competition in tropical and subtropical regions regulates the quality of EID of listed companies in their jurisdictions through indirect effects on enterprises with different ownership and profitability; However, with the exception of tropical and subtropical regions, this phenomenon is not significant in other provinces.

Keywords

environmental information disclosure, fiscal competition, environmental regulation, regional economy, corporate social responsibility

Introduction

Over the past 40 years of China's reform and opening up, its economy has continued to develop steadily and rapidly. This has simultaneously brought about a rise in environmental pollution, which has affected the value of corporate stakeholders and has gradually generated widespread public concern, causing the Chinese government to gradually strengthen environmental supervision. In 2008, in guidelines regarding industrial classification and management of listed companies' environmental verification, issued by China's Ministry of Environmental Protection, heavy polluting industries of listed companies were divided into 14 categories to further refine the environmental verification task. In addition, in 2010, China's Ministry of Environmental Protection publicly consulted its guidelines for the environmental information disclosure (EID) of listed companies to further improve the transparency

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and operability of corporate EID. At present, the study of corporate EID is of great significance to both the public, in providing an understanding of the environmental behavior of enterprises, and government departments, in helping them to monitor the pollution levels of enterprises.

Listed companies in China continue to disclose environmental information on a voluntary basis due to problems surrounding corporate EID, such as low disclosure ratios, low quality, and delayed disclosure. The factors that affect the willingness and quality of corporate EID are still unknown. The majority of studies focus on two aspects of enterprises, namely internal characteristics and external factors. Internal characteristics consist of firm size (Brammer & Pavelin, 2004; Gray, Javad, Power, & Sinclair, 2001; Liu & Anbumozhi, 2009; Zeng, Xu, Dong, & Tam, 2010), industry (Bayoud, Kavanagh, & Slaughter, 2012; Gao, Heravi, & Xiao, 2005), governance structure (Cormier, Magnan, & Velthoven, 2005; Iatridis, 2013; Zeng et al., 2010), leverage (Aerts & Cormier, 2009; Clarkson, Li, Richardson, & Vasvari, 2008), and financial performance (Anderson & Frankle, 1980; Freedman & Jaggi, 2005; Milne & Patten, 2002; Patten, 2002). External factors mainly constitute laws and regulations (Barth, Mcnichols, & Wilson, 1997; Hughes, Anderson, & Golden, 2002), political influence (Faccio, 2006; Fisman, 2001; Heflin, Subramanyam, & Zhang, 2003), cultural differences (Du, 2013), media reports (Aerts & Cormier, 2009; Bewley & Li, 2000; Brown & Deegan, 1998; Clarkson et al., 2008; Rupley, Brown, & Marshall, 2012), social reputation (Al-Tuwaijri, Christensen, & Hughes Ii, 2004; Belkaoui & Karpik, 1989; Deegan & Rankin, 1996), and regulation costs (Blacconiere & Patten, 1994). Relative to research on the influence of internal characteristics on corporate EID, the research on external environmental factors is insufficient and needs to be expanded.

Fiscal policy is widely perceived as an effective means of environmental management (Zhou, Wang, Yan, & Xie, 2018). Compared with the fiscal policies of countries around the world, economic policies controlled by governments usually have strong administrative intervention capabilities. In China, a tax-sharing system was introduced in 1994, which realized the centralized and decentralized relationship between the central and local governments in the financial management system. Through the implementation of fiscal tax-sharing reforms, the proportion of central government revenue to total fiscal revenue increased from 22% in 1993 to 55.7% in 1994. The proportion of local fiscal revenue to central fiscal revenue dropped from 77.98% to 44.30% between 1993 and 1994. In terms of fiscal expenditure, the proportion of central government expenditure to total expenditure in China has only increased by 2% over the previous year. On the one hand, the fiscal decentralization system has increased the macroregulation capability of China's central government, strengthened key areas of national economic development, improved the efficiency of government work, and promoted the country's rapid economic growth (Buchanan, 1965; Oates, 1972; Qian & Weingast, 1997). On the other hand, with the continuous development of fiscal system reforms, contradictions arising from the economic interests of the central and local governments have become increasingly prominent, and the drawbacks of local government governance jurisdictions have gradually emerged. In the fiscal transfer payment system established by the tax-sharing reform, the general transfer payment is insufficient, which makes it difficult for local governments to make up for the huge fiscal revenue and expenditure gap in their jurisdiction and form a local government fiscal deficit.

Environmental governance as a public service has the characteristics of externality (Que, Zhang, Liu, & Yang, 2018). In the process of the game between the central government and the local governments, the local governments relax their environmental control of enterprises in their jurisdiction in pursuit of regional economic interests. This negative external effect between the economic entity and environmental protection can be explained in two aspects. First, economic competition between local governments has exacerbated environmental degradation (Zhou et al., 2018). There is no incentive or constraint mechanism for fiscal decentralization, and it is difficult to control environmental problems caused by the actions of local governments. Through industry subsidies, tax breaks, and institutional slacks, local governments have explored all the possible avenues for investment and capital competition to stimulate local economic growth (Qian & Roland, 1998). Therefore, there may be a phenomenon wherein local governments ignore environmental protection efforts to stimulate economic growth. Even local governments lower their local government environmental regulations to attract investment, thus creating the *race to the bottom* theory of environmental regulation (Busse & Silbergers, 2013; Woods, 2006). Second, in the context of the tax-sharing system, the central government pays more attention to improving economic performance when assessing the performance indices of local government officials (Li & Zhou, 2003) while ignoring environmental factors. As a result, local government officials who tend to significantly improve their performance during their tenure may ignore environmental protection efforts and loosen environmental regulations, thereby leading to environmental pollution (Wilson, 1999). From the earlier two perspectives, local governments are often willing to sacrifice the natural environment when pursuing economic and political interests, because environmental

costs are asymmetric between jurisdictions (Zhou et al., 2018).

According to the *race to the bottom* theory of environmental regulation, local governments may relax their supervision of environmental protection of enterprises in their jurisdictions in pursuit of financial performance and political promotion, which in turn affects the quality of corporate EID. In 2014, the Chinese government implemented its new environmental protection law, and therefore, this article focuses on the first 3 years of the implementation of the law (2012–2014), sampling 1,717 listed companies within 28 provinces in China. In addition, we use the hierarchical linear model (HLM) to combine the external factors and internal characteristics of enterprises to analyze the influence of local government financial competition on the EID of listed companies in the jurisdiction. During the research process, we further analyze the specific financial situation of tropical and subtropical regions and other regions.

The remainder of the article is organized as follows: The next section discusses theoretical analysis and research hypothesis, and introduces research design, data, model together; Secondly, we develops an empirical study using Chinese provinces as a sample and conducts a robustness test. Furthermore, we divide the sample into two groups with high and low financial dependency for further empirical analysis and interprets the financial situation in both tropical and subtropical regions and other regions. The final section concludes the article.

Methods

HLM Method

This article uses the HLM model to study the direct and indirect effects of the land finance index on the quality of EID. This model is widely used in social science research. It is suitable for samples from different levels and units and can be used to analyze the cross-layer (multilayer) characteristics of data. It is widely used in the fields of psychology and human resources and can effectively describe cross-level problems in the field of social sciences. For example, Ilmari, Tarja, Paula, and Philip (2011), Glisson and James (2002), and Papadopoulos and Wurm (2012) all use HLM models in their respective research fields. With the integration of micro- and macro-levels in the field of corporate governance, the application of the HLM model in the field of corporate governance has gradually attracted the attention of some researchers. Dalton and Dalton (2011), based on two controversial issues in the study of corporate governance structure and financial performance of trade, argued that the ineffective results of research may have been related to inadequate analysis, but depended more on the choice of methods. The HLM model is better suited to the study of such issues. Lee and Veasna (2013) adopted this model and found that procedural fairness at the company level has a significant influence on employee satisfaction and job engagement. Dalton and Dalton (2011) also used the HLM model to explain why corporate governance structures play different roles in different countries.

In our sample, the company level data and provincial-level data have typical nested structure characteristics. This article finds the HLM model to have good applicability. We use this method to study the influence of different indicators at the company and provincial levels on the quality of EID. Specifically, the regression coefficients of specific variables in the model are decomposed into fixed and random parts, which can effectively distinguish whether the influence comes from the enterprise level or the regional level. The process of model building is divided into three steps, as follows.

1. The null model (univariate analysis of variance with random effects)

The null model is used to analyze the differences between data at the company level and at the government level. If the differences are significant, we continue to analyze those data in the next step. The model is as follows:

$$\text{Level } 1: EID_{ij} = \beta_{0j} + \varepsilon_{ij} \tag{1}$$

$$\text{Level } 2: \beta_{0j} = \gamma_{00} + \mu_{oj} \tag{2}$$

In Formula (1), i denotes sample companies, j denotes the provinces, and EID_{ij} denotes the level of EID of i listed companies located in province j, which is regressed by the provinces. β_{oj} is the average level of EID of listed companies in each province, and ε_{ij} is the random difference of β_{oj}; that is, the intraprovince difference. In Formula (2), γ_{00} is the average of the overall EID level, and μ_{oj} is the random difference of the average; that is, the difference between the provinces.

2. The random model (the random-coefficient regression model)

The random model is used to test the direct influence of the independent variables (control variables) in Level 1 on the dependent variable (EID). We run a regression analysis of the companies in each province. For example, for province j, the model is as follows:

$$\begin{aligned}\text{Level } 1: EID_{ij} = {} & \beta_{0j} + \beta_{1j} Size + \beta_{2j} ROE + \beta_{3j} Lev \\ & + \beta_{4j} State + \beta_{Sj} OC + \gamma_{ij}\end{aligned} \tag{3}$$

$$\text{Level } 2: \beta_{0j} = \gamma_{00} + \mu_{oj} \quad (4)$$

In Formula (3), β_{0j} is the intercept, and r_{ij} denotes random variations. In Formula (4), γ_{00} is the average of β_{0j}, and μ_{0j} is the random variation of γ_{00}.

3. The complete model (the intercept model or slope model)

The intercept model is used to test whether Level 2 variables have a direct influence on EID, and the slope model is used to test whether Level 2 variables have an effect on β_{ij} by analyzing whether these variables have an influence on EID and by testing whether they play a role in regulating the influence of control variables on EID in Level 1. A regression analysis is conducted for companies in each province, for example, province j, and the model is set as follows:

$$\text{Level } 1: EID_{ij} = \beta_{0j} + \beta_{1j} Size + \beta_{2j} ROE + \beta_{3j} Lev + \beta_{4j} State + \beta_{Sj} OC + \gamma_{ij} \quad (5)$$

$$\text{Level } 2: \beta_{0j} = \gamma_{00} + \gamma_{01} TDCZ + \mu_{0j} \quad (6)$$

$$\text{Level } 2: \beta_{ij} = \gamma_{i0} + \gamma_{il} TDCZ + \mu_{ij}, \quad i = 1, 2, 3, 4, 5 \quad (7)$$

$$\text{Var}(\mu_{0j}) = \tau_{00}, \quad \text{Var}(\mu_{ij}) = \tau_{ii} \quad (8)$$

In Formula (5), β_{0j} is the intercept, β_{ij} $(i = 1, 2, 3, 4, 5)$ is the slope, and r_{ij} is the random difference. In Formulas (6) and (7), γ_{00} is the average of β_{0j}, γ_{i0} is the average of β_{ij}, and the stochastic differences of β_{0j} and β_{ij} are μ_{0j} and μ_{ij}, respectively, representing the difference between the second layers. TDCZ is the provincial level explanatory variable of the company i, and γ_{0l} is the regression coefficient of the intercept model. It represents the effect of the provincial level explanatory variable (TDCZ) on the first level intercept β_{0j}, to test the direct influence of Level 2 variable (TDCZ) on EID. γ_{il} is the regression coefficient of the slope model, which represents the effect of TDCZ on the first level slope β_{ij}, to test the regulating effect of Level 2 variable on EID. τ_{00} and τ_{ij} are the residual variances of the intercept and the slope of the first level between the second-level provinces.

The logical relationship of the model is shown in Figure 1.

Research Hypothesis

Based on the external pressure theory, compared with smaller organizations, larger ones have a greater influence on the environment and receive more attention and supervision from the public (Campbell, 2000). External attention and supervision directly stimulate large-scale companies to assume more responsibility for environmental protection while disclosing more corporate environmental information. In addition, large-scale companies have significant scale benefits. Compared with smaller companies, they are more capable of controlling pollution and protecting the environment at lower costs. Therefore, this article proposes Hypothesis 1.1.

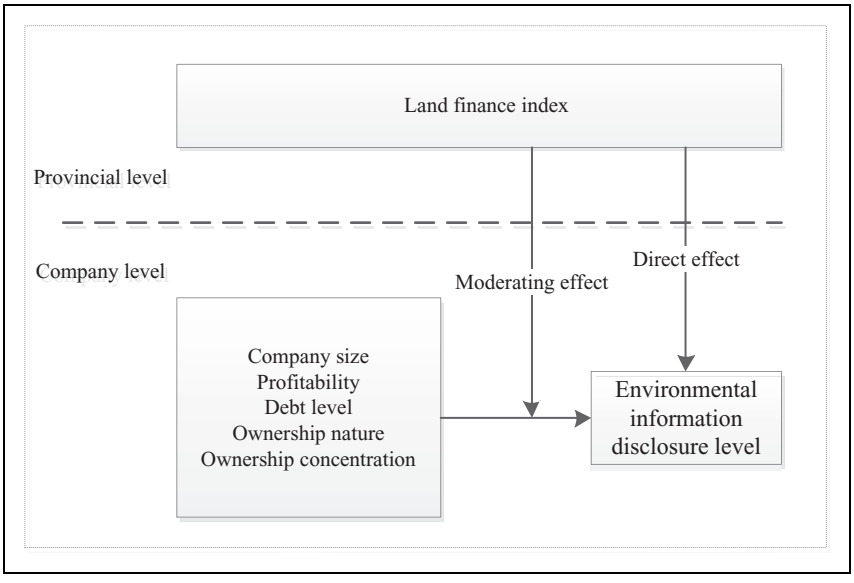

Figure 1. Theoretical model of regional financial competition, corporate characteristics, and enterprise environmental information disclosure.

Hypothesis 1.1. The larger a company is, the more likely it is to disclose high-quality environmental information.

In extant studies, there are different opinions on how profitability affects the quality of EID. Based on the signaling theory, some scholars believe that companies with stronger profitability tend to disclose more information and transmit more signals to the outside world, thus differentiating themselves from companies with poor profitability, thereby showing themselves in a better light (Bowman & Haire, 1976; Milne & Patten, 2002). However, some scholars believe that companies with poor profitability tend to disclose more environmental information or assume more social responsibility to divert the attention of stakeholders and the public (Freedman & Jaggi, 2005; Patten, 2002). This article tends to support the second view: The companies with poor profitability choose to glorify their corporate image by disclosing more environmental information to divert public attention. Therefore, this article proposes Hypothesis 1.2.

Hypothesis 1.2. The more profitable a company is, the less likely it is to disclose environmental information.

Corporate financial risk is usually reflected by financial leverage. Greater corporate financial leverage could put a company at greater risk and make it difficult for it to meet its refinancing needs. Therefore, companies with a high asset-liability ratio tend to showcase the profitable side of their operations to the outside world, actively take on more social responsibilities, and disclosing more information about their business status and environmental protection plan. The more companies rely on debt financing, the more likely they are to adopt an active EID strategy (Clarkson et al., 2008). Therefore, this article proposes Hypothesis 1.3.

Hypothesis 1.3. Companies with higher debt levels tend to disclose more environmental information.

In China, according to the controlling shareholders of listed companies, government, or nongovernment units, companies are divided into state-owned holding companies and nonstate-owned companies. State-owned holding enterprises generally play a leading role in the national economy. According to the legitimacy theory (Owen, 1996), the public believes that state-owned holding companies are responsible for assuming more social responsibilities and disclosing more corporate information. Therefore, state-owned holding companies tend to disclose more information, thereby contributing to the public in terms of social responsibility. Therefore, this article proposes Hypothesis 1.4.

Hypothesis 1.4. State-owned holding companies tend to disclose more environmental information.

Among their many stakeholders, companies usually first consider the interests of their major stakeholders when making decisions. Wilmshurst and Frost (2000) surveyed 62 financial executives belonging to heavy polluting industries in Australia. Their results showed that the shareholders' interests and regulatory constraints are the most important factors in their decision-making on EID. Shareholder rights can be reflected by quantifying the degree of stock ownership concentration. The greater the degree of ownership concentration, the greater the shareholders' rights and the influence on corporate decision-making. To attract investment and solve the problem of information asymmetry, companies tend to disclose more information about the environment. Therefore, this article proposes Hypothesis 1.5.

Hypothesis 1.5. The higher the degree of ownership concentration, the higher is the level of environmental information disclosure.

The *race to the bottom* theory of environmental regulation refers to state or local governments competing to relax their local environmental regulations in the pursuit of their own interests. Dua first put forward the theory in 1997 and called it *race to the bottom*, then scholars at home and abroad began to study the practicality of the theory gradually. Domestic and foreign scholars have made a lot of research results on this issue and mainly use empirical methods. Cumberland (1981) confirmed that to attract business and create employment opportunities, local governments may reduce the social costs of companies by relaxing environmental supervision, resulting in a *race to the bottom* between local governments. Woods (2006) claimed that local governments tend to consider nearby areas as references when implementing environmental regulations in a region. This study also directly proved the existence of the *race to the bottom* phenomenon of environmental regulation. Chakraborty and Mukherjee (2013) used multinational data to prove that national or local governments would compete to relax environmental regulations to attract investment through empirical methods. Local governments' lowering their levels of environmental regulation has a negative influence on the economic effectiveness of other local governments. Therefore, local governments take the initiative to participate in the *race to the bottom* phenomenon of environmental regulation, which has become a rational choice for local governments.

With respect to the special system of fiscal decentralization in China, the competition between local governments is further intensified, and so is the *race to the bottom* phenomenon of environmental regulation.

Table 1. Criteria for Environmental Information Disclosure.

Component	Definition	Criteria
e(1)	ISO environment system certification information	The scores of specific projects are calculated according to the following criteria: 3—monetary information; 2—specific nonmonetary information; 1—general nonmonetary information; 0—was not disclosed; The total score of the information disclosure quality of an enterprise is equal to the sum of all the scores.
e(2)	Government funding, tax relief, and financial subsidies related to environmental protection	
e(3)	Reduction of pollutant discharge and pollutant discharge in enterprises	
e(4)	Enterprise environmental protection investment and environmental technology development	
e(5)	Measures to improve the ecological environment	
e(6)	The impact of government environmental protection policy on enterprises	
e(7)	Loans for environmental protection	
e(8)	Legal proceedings, fines, compensation, and incentives related to environmental protection	
e(9)	The concept and goal of enterprise environmental protection	
e(10)	Other environmental-related income and expenditure items	

The fiscal decentralization system has caused a huge gap in the revenue and expenditure of local governments. To make up for this gap, local governments compete to increase tax revenue by transferring the right to use land and gradually get more dependent on land finance. With respect to the environmental effects of decentralization in China, the central government is responsible for formulating and promulgating environmental laws and regulations, and the local governments are responsible for executing and supervising the environmental behavior of enterprises in their jurisdictions. Based on the *rational person* hypothesis, fiscal decentralization lacks incentive and restraint mechanisms, which makes it difficult to control environmental problems caused by local governments. Only when local governments obtain higher benefits, they can implement stricter measures to control pollution than central governments (Gary & Shadbegian, 2004; Oates, 2002). In addition, under the system of fiscal decentralization, to gain advantages in economic competition and expand the tax base, local governments adopt strategies of reducing tax burdens, relaxing environmental regulations, or both (Rauscher, 2005; Wilson, 1999). Therefore, this article proposes Hypothesis 2.

> Hypothesis 2. The higher the degree of regional financial competition, the lower the level of corporate environmental information disclosure.

Sample Selection

In 2008, China's Ministry of Environmental Protection published a *List of Classified Management of Environmental Protection Verification Industries of Listed Companies*, which classified the polluting industries of listed companies in China into eight industry categories, namely mining, food and beverage, textile and garment fur, paper and printing, petrochemical plastics, metal and nonmetal, pharmaceutical and biological products, and hydropower and gas. Based on these classification criteria, we select polluting companies listed on the Shanghai and Shenzhen stock exchanges. After excluding ST and *ST companies, 1,717 sample companies are collected. As China implemented the new Environmental Protection Law in 2015, to avoid the influence of exogenous factors, the first 3 years of implementing the new law, namely 2012–2014, were selected.

Variable Design

In this article, dependent variables represent the level of EID. Since there is no standard index to measure the quality of enterprise EID at present, this study evaluates the quality of enterprise EID by referring to the existing literature (Liu & Anbumozhi, 2009; Meng, Zeng, Tam, & Xu, 2013; Zeng et al., 2010; Zhang, 2016). We collect the annual reports of listed companies from the official website of the China Securities Regulatory Commission and use the content analysis method to select 10 specific environmental information quality indicators. We analyze the details of monetary and nonmonetary EID of each listed company's annual report, and comprehensively evaluate the quality of EID, as shown in Table 1. To avoid the influence of subjective factors on the process of artificial valuation, we organize 20 graduate students who had majored in accounting to conduct

Table 2. Variable Description of Research.

Variable name (Symbol)	Calculation explanation
Land finance index (TDCZ)	Transaction price of state-owned construction land or general budget income of local government
Company size (Size)	Log(the total assets)
Profitability (ROE)	Net profit or average shareholder equity
Debt level (Lev)	Total liabilities or total assets
Ownership nature (State)	The virtual variable is 1 for state-owned enterprises and 0 for nonstate-owned holding enterprises
Ownership concentration (OC)	Shareholding proportion of the first controlling shareholder of listed companies
Environmental information disclosure level (EID)	Scores of environmental information disclosure level

unified training and scoring training for specific companies, thereby minimizing the scoring error of the target company. We ask three graduate students to score each enterprise separately, and then take the average as the final score of EID quality of the enterprise. The total EID score of a firm is as follows: $EID_j = \sum e(i)$, $i = 1 \sim 10$, Specific scoring criteria are shown in Table 1.

The explanatory variables are composed of two levels: The first level consists of data on the financial characteristics of the company, and the second level consists of financial data for the province to which the company belongs.

The first-level data are taken from China's stock markets and the China Stock Market and Accounting Research database developed by GTA Information Technology Company, a research database of large-scale, accurate information, and comprehensive data of securities markets and listed companies in China. We use the natural logarithm of the total assets (Size) of listed companies at the end of the term to indicate the size of listed companies (Brammer &Pavelin, 2004; Zeng et al., 2010), the return on net assets (ROE) to represent the profitability of listed companies (Freedman &Jaggi, 2005; Milne & Patten, 2002), the asset-liability ratio (Lev) to represent the degree of debt of listed companies (Aerts & Cormier, 2009; Clarkson et al., 2008), the virtual variable (State) to represent the nature of equity (the nonstate-owned enterprises being 0 and the state-owned enterprises being 1; Clarkson et al., 2008; Zeng et al., 2010), and the proportion of shareholders holding the largest common stock (OC) of listed companies to represent the degree of ownership concentration (Iatridis, 2013; Zeng et al., 2010). The specific variables are shown in Table 2.

The second-level data are taken from the China Statistical Yearbook and the China Land and Resources Statistical Yearbook, from 2012 to 2014. These are informative yearbooks compiled by the State Statistical Bureau of China, which reflect China's economic and social development and the use of state-owned land resources, respectively. As the data on state-owned land transference in Beijing, Hainan, Tibet, Hong Kong, Macao, and Taiwan are abnormal compared with those on other provinces, we exclude them from the research process.

The fiscal decentralization system has led to a huge gap in the revenue and expenditure of local governments. To make up for this gap, local governments strive for factor endowment through a series of preferential conditions to achieve regional economic development, and even compete to increase tax revenue in the form of transferring land-use rights. In the long run, local governments have gradually become dependent on land finance. We use the land finance index (TDCZ) to measure the degree of regional financial competition. The specific method of calculation is

$$TDCZ = \frac{\begin{pmatrix}\text{provincial state}-\text{owned construction}\\ \text{land transfer transaction price}\end{pmatrix}}{\begin{pmatrix}\text{the general budget income}\\ \text{of the local government}\end{pmatrix}}.$$

A higher ratio indicates that the local government relies heavily on land finance and the regional financial competition is stronger; a lower ratio indicates that the degree of land financial dependence is weaker and the regional financial competition is smaller. To ensure data matching accuracy, we average the 3-year land finance index. The specific variables are shown in Table 2.

Results

Statistical Description

In Table 3, the average EID score is 5.77 (total score is 27), and the highest score is 19; the lowest score is 1, and the standard deviation is 3.25, suggesting that the overall level of EID of Chinese listed companies is low and the quality of information varies greatly. Among the 1,717 listed companies selected, the proportion of state-owned holdings reached 44%, indicating that nearly half of the

Table 3. Descriptive Statistics of Variables.

	Variable	Observed	Mean	*SD*	Min	Max
Explained variables	EID	1,717	5.77	3.25	1.00	19.00
Level 1	State	1,717	0.44	0.50	0.00	1.00
	Size	1,717	9.60	0.53	8.26	11.39
	ROE	1,717	0.05	0.20	–4.69	0.76
	Lev	1,717	0.45	0.21	0.01	1.11
	OC	1,717	0.37	0.15	0.04	0.88
Level 2	TDCZ	28	0.32	0.14	0.13	0.69

listed companies in the main polluting industries in China have state-owned holdings. The mean values of ROE, Lev, and OC are 0.06, 0.45, and 0.37, respectively, which indicates that the listed companies in heavy polluting industries in China have a weak profitability, high debt levels, and high ownership concentration. The Level 2 explanatory variable TDCZ has a mean value of 0.32, with a maximum value of 0.69, and a minimum value of 0.13, suggesting that there is a large gap in land fiscal revenue between provinces in China. Zhejiang has the highest land fiscal revenue, accounting for 69%, and Xinjiang has the lowest, accounting for 13%. In addition, from a national perspective, the overall trend of the land fiscal index is higher in the southern regions than in the northern regions, and higher in the tropical and subtropical regions than in other regions.

Correlation Analysis

Table 4 shows the correlations between the explanatory variables and the explained variables in Level 1 of the model. In Table 4, company size, profitability, debt level, equity nature, ownership concentration, and EID quality are significantly correlated at the 1% significance level, indicating that the independent variable index selection is appropriate. Although the correlation coefficient of company size and debt degree is 0.48, which belongs to the moderate correlation category, the correlation coefficients of other explanatory variables are low. Moreover, there is no collinearity between the explanatory variables. Therefore, the research model can be considered well established.

Regression Analysis

Null model regression analysis. The purpose of a null model is to decompose the total differences into intragroup differences and intergroup differences, and to determine the size of intergroup differences by calculating the ICC of the intragroup correlation coefficient. If the difference is large, it is more reasonable to use a multilevel linear model. The null model is the basis of stochastic model and complete model analysis. According to Table 5, $ICC = 0.816/(0.816 + 9.839) = 0.0766$. As observed by Cohen (1988), the correlation degree is moderate, and the influence of intergroup differences cannot be ignored. Therefore, the HLM model is appropriate.

Stochastic models and complete model analysis. A stochastic model is used to test the direct influence of Level 1 explanatory variables on EID. Table 6 shows that all of the regression results pass the significance test, assuming that 1.1 to 1.5 is valid. Specifically, there is a positive correlation between the nature of enterprises and EID ($\gamma_{10} = 0.845$), indicating that state-owned enterprises tend to disclose more environmental information than other enterprises. This may be because state-owned enterprises need to assume more social responsibility, so they tend to show their attitude of social responsibility by disclosing more information; There is a positive correlation between enterprise size and EID ($\gamma_{20} = 1.001$), which indicates that larger enterprises tend to disclose more environmental information. This can be explained from the perspective of legitimacy and external pressure. Larger enterprises usually receive more attention from the outside world, so more social responsibility information should be disclosed accordingly; corporate profitability is negatively correlated with EID (γ_{30}=–1.149), which indicates that profitability does not directly lead to more EID, on the contrary, the more profitable an enterprise is, the more likely it is to neglect the fulfillment of its social responsibility, thus reducing the disclosure of its environmental information; debt degree is positively correlated with EID ($\gamma_{40} = 1.736$), indicating that the higher the degree of corporate debt, the more likely it is to disclose more environmental information. This may be due to the consideration of refinancing demand they actively disclosure environmental information to increase public interest in enterprises and reduce the difficulty of refinancing; there is a positive correlation between the degree of ownership concentration and EID ($\gamma_{50} = 1.343$), which indicates that enterprises with higher degree of ownership concentration tend to increase the disclosure of environmental information, which may be to solve the problem of information asymmetry.

Table 4. Correlation Analysis.

	EID	Size	ROE	Lev	OC	State
EID	1					
Size	0.300***	1				
ROE	–0.091***	0.061**	1			
Lev	0.282***	0.480***	–0.280***	1		
OC	0.113***	0.295***	0.061**	0.053**	1	
State	0.256***	0.387***	–0.075***	0.349***	0.178***	1

*, **, and *** denote the statistical significance at the levels of 10%, 5%, and 1%, respectively.

Table 5. Null Model Analysis.

	Null model
Fixed effects	
Average EID scores of provinces (β_0)	5.952***
Intercept term (γ_{00})	(0.190)
Variance components	
Level 2 between provinces	
EID's random variance between provinces (τ_{00})	0.816***
Level 1 random variance inter provinces (σ^2)	9.839
Deviance (–2LL)	8848.76

+, *, **, and *** denote the statistical significance at the levels of 10%, 5%, 1%, and 0.1%, respectively. Standard error in parentheses.

The complete model examines the direct and indirect influence of the Level 2 variable *land finance index* on EID. The intercept model shows that the land finance index is negatively correlated with EID, but not significantly ($\gamma_{01} = 11.862$, $p = .275$); the reason why the financial competition of local governments does not directly affect the quality of EID of enterprises may be that the central government of China pays more and more attention to environmental issues, and local governments dare not neglect it. In China, the central government directly formulates environmental policies, local governments are responsible for supervising the implementation of environmental policies by enterprises. At the same time, local environmental protection is also included in the performance evaluation system of local governments. Therefore, local governments dare not relax their attitudes toward the environment of enterprises in their jurisdictions.

The slope model shows that the land finance index and the quality of EID are negatively moderated, with a significant influence. Specifically, the land finance index indirectly and negatively affects the quality of the EID of enterprises by adjusting the nature and profitability of enterprises in the first control variable and therefore Hypothesis 2 holds. In the Level 1 explanatory variables, the nature of enterprises is positively

Table 6. Stochastic Model and Complete Model Analysis.

		Stochastic model		Complete model	
		Parameter estimation	*SE*	Parameter estimation	*SE*
Average EID scores of provinces (β_0)	Intercept term (γ_{00})	–5.404*	(1.973)	–9.069*	(4.117)
	TDCZ (γ_{01})			11.862	(10.646)
State slope mode (β_1)	Intercept term (γ_{10})	0.845***	(0.211)	1.410**	(0.430)
	TDCZ (γ_{11})			–1.726+	(0.993)
Size slope mode (β_2)	Intercept term (γ_{20})	1.001***	(0.227)	1.424***	(0.477)
	TDCZ (γ_{21})			–1.389	(1.209)
ROE Slope mode (β_3)	Intercept term (γ_{30})	–1.149*	(0.483)	–5.179***	(1.235)
	TDCZ (γ_{31})			12.567***	(3.405)
Lev slope mode (β_4)	Intercept term (γ_{40})	1.736**	(0.563)	0.801	(1.325)
	TDCZ (γ_{41})			3.056	(2.837)
OC slope mode (β_5)	Intercept term (γ_{50})	1.343+	(0.726)	1.050	(1.856)
	TDCZ (γ_{51})			1.237	(5.483)
Variance components		Parameter estimation	*SE*	Parameter estimation	*SE*
Level 2 between provinces					
Average EID scores of provinces (τ_{00})		47.189	(6.869)	58.495	(7.648)
State slope (τ_{11})		0.703	(0.838)	0.665	(0.815)
Size slope (τ_{22})		0.624*	(0.790)	0.763*	(0.874)
ROE slope (τ_{33})		1.854	(1.361)	0.526+	(0.725)
Lev slope (τ_{44})		3.550**	(1.884)	4.920**	(2.218)
OC slope (τ_{55})		8.483**	(2.913)	10.244**	(3.200)
Level 1 random variance inter provinces (σ^2)		8.257	(2.874)	8.210	(2.865)
Deviance (–2LL)		8590.579		8559.548	

+, *, **, and *** denote the statistical significance at the levels of 10%, 5%, 1%, and 0.1%, respectively. Standard error in parentheses.

Table 7. Stochastic Model and Complete Model Analysis (Robustness Check).

		Stochastic model		Complete model	
		Parameter estimation	*SE*	Parameter estimation	*SE*
Average EID scores of provinces (β_0)	Intercept term (γ_{00})	–5.404*	(1.973)	–9.478*	(4.401)
	TDCZ (γ_{01})			0.984	(0.909)
State slope mode (β_1)	Intercept term (γ_{10})	0.845***	(0.211)	1.559**	(0.460)
	TDCZ (γ_{11})			–0.162+	(0.090)
Size slope mode (β_2)	Intercept term (γ_{20})	1.001***	(0.227)	1.491**	(0.499)
	TDCZ (γ_{21})			–0.120	(0.099)
ROE slope mode (β_3)	Intercept term (γ_{30})	–1.149*	(0.483)	–5.145**	(1.459)
	TDCZ (γ_{31})			0.939**	(0.311)
Lev slope mode (β_4)	Intercept term (γ_{40})	1.736**	(0.563)	0.496	(1.388)
	TDCZ (γ_{41})			0.295	(0.240)
OC slope mode (β_5)	Intercept term (γ_{50})	1.343+	(0.726)	0.504	(1.719)
	TDCZ (γ_{51})			0.214	(0.583)
Variance components		Parameter estimation	*SE*	Parameter estimation	*SE*
Level 2 between provinces					
Average EID scores of provinces (τ_{00})		47.189	(6.869)	57.471	(7.581)
State slope (τ_{11})		0.703	(0.838)	0.649	(0.806)
Size slope (τ_{22})		0.624*	(0.790)	0.746*	(0.864)
ROE slope (τ_{33})		1.854	(1.361)	0.692	(0.831)
Lev slope (τ_{44})		3.550**	(1.884)	4.534**	(2.130)
OC slope (τ_{55})		8.483**	(2.913)	9.974**	(3.158)
Level 1 random variance inter provinces (σ^2)		8.257	(2.874)	8.212	(2.866)
Deviance (–2LL)		8590.579		8590.019	

+, *, **, and *** denote the statistical significance at the levels of 10%, 5%, 1%, and 0.1%, respectively. Standard error in parentheses.

correlated with the EID, but when Level 2 explanatory variables such as regional financial competition is added, the land finance index plays a negative regulatory role in this positive correlation; that is, regional financial competition weakens the quality of EID of the original enterprises. The profitability of variables is negatively correlated with the quality of EID. However, when the Level 2 regional financial competition explanatory variable is added, the land finance index plays a positive role in regulating the negative correlation; that is, it strengthens the problem of enterprises being reluctant to disclose the quality of environmental information. This phenomenon of negative correlation between regional financial competition and enterprise EID can be explained by the *race to the bottom* theory of environmental regulation. Essentially, when local governments rely on land financial behavior to gain a regional competitive advantage, loosening one environmental regulation after another can reduce the resistance to regional investment. The relaxation of environmental regulations by local governments weakens the willingness of listed companies to voluntarily disclose environmental information within their jurisdiction, which ultimately leads to the decline of the quality of EID of enterprises.

Robustness test. We conduct a robustness test by changing the calculation caliber of land finance. We take

$$\text{TDCZ} = \frac{\left(\begin{array}{c}\text{provincial state}-\text{owned construction}\\ \text{land transfer transaction price}\end{array}\right)}{\text{tax revenue of local government}}$$

as an alternative indicator of land finance. The HLM model is used to reestimate the influence of land financial indicators on EID. The results of the stochastic and complete models are shown in Table 7. The research results still support the original conclusions. In other words, the land financial indicator has an indirect influence on the disclosure of environmental information through the negative adjustment of equity nature and profitability indicators. Therefore, our results are found to be robust.

Regional financial competition level and enterprise EID quality. The national average of regional financial competition is 32%, indicating that 32% of China's general budget revenue comes from land transfer income. There are 34 central administrative regions in China. After excluding Beijing, Hainan, Tibet, Hong Kong, Macao, and

Table 8. Grouping Table of Regional Financial Competition Degree.

Group	Provinces and their land fiscal index
Group 1 (High degree of regional competition)	Chongqing (46%), Anhui (48%), Fujian (41%), Guizhou (34%), Hebei (38%), Henan (33%), Jiangsu (50%), Jiangxi (37%), Liaoning (55%), Shandong (45%), Sichuan (35%), Yunnan (40%), Zhejiang (69%)
Group 2 (Low level of regional competition)	Shanghai (14%), Tianjin (23%), Gansu (26%), Guangdong (16%), Guangxi (31%), Heilongjiang (26%), Hubei (20%), Hunan (30%), Jilin (16%), Neimenggu (26%), Ningxia (27%), Qinghai (17%), Shānxi (18%), Shǎnxi (18%), Xinjiang (13%)

Taiwan, the sample contains data on 28 provinces. We divide the full sample data into two subsamples, which are classified according to the upper and lower than 32% of the average (see Table 8), and the two subsamples are studied separately. The first group has a high degree of financial competition and includes Chongqing, Anhui, Fujian, Guizhou, Hebei, Henan, Jiangsu, Jiangxi, Liaoning, Shandong, Sichuan, Yunnan, and Zhejiang. In this group, the province with the highest level of local financial competition is Zhejiang, and its land fiscal share index is as high as 69%, indicating that 69% of its fiscal revenue comes from land transfer income. The second group is a group with low fiscal competition and includes Shanghai, Tianjin, Gansu, Guangdong, Guangxi, Heilongjiang, Hubei, Hunan, Jilin, Inner Mongolia, Ningxia, Qinghai, Shanxi, Shaanxi, and Xinjiang. In the second group, the province with the highest local financial competition is Guangxi province, with a land finance index of 31%; the province with the lowest local fiscal competition is Xinjiang, with a land finance index of only 13%.

The results calculated using the HLM model for the first set of subsamples are shown in Table 9. It can be seen that during high levels of financial competition, both the nature of the enterprise and the profitability indicators pass the test ($\gamma_{11} = -2.678$, $\gamma_{31} = 17.676$), indicating that fiscal competition has an indirect negative influence on the quality of corporate EID. This influence is transmitted to the nature and profitability of enterprises. The results obtained further support the results of the whole sample calculation. The land fiscal indicators indirectly and negatively regulate the quality of EID through their influence on the nature and profitability of enterprises.

The second set of subsamples are measured using the HLM model. The results of the stochastic and complete models are shown in Table 10. It can be seen that during low levels of fiscal competition, no indicators pass the test, indicating that the influence of fiscal competition on the quality of corporate EID is not significant, and the quality of corporate EID cannot be indirectly affected by the first layer of variables. Comparing the regression results of the first and second subsample data, the higher the degree of fiscal competition, the more significant the negative influence on corporate EID.

In addition, on comparing the results for the full sample with the results for the first set of subsamples, we find that the first set of samples have a greater negative influence on corporate EID. In the full sample data, the adjustment factors of the land financial indicators to the nature and profitability of the enterprise are $\gamma_{11} = -1.726$, $\gamma_{31} = 12.567$ (Table 6); in the first set of sample data, the land financial indicators represent the nature of the enterprise. The profitability adjustment coefficients are $\gamma_{11} = -2.678$, $\gamma_{31} = 17.676$ (Table 9), respectively, which are larger than the γ_{11} and γ_{31} coefficients of the full sample data. Therefore, the higher the level of fiscal competition, the more companies tend to reduce the disclosure of environmental information. This result can also be explained by the *race to the bottom* theory of environmental regulation.

Tropical, subtropical, and other areas. By using the ArcGIS thermodynamic map tool in space, the degree of fiscal competition in different provinces and regions can be represented by different colors. Figure 2 demonstrates that the land finance index in the southern regions is generally higher than land finance index that in the northern regions, and the degree of fiscal competition in the tropical and subtropical regions is higher than that in other regions. Among them, the highest land finance index is that of Zhejiang province (68.62%), which is represented by the darkest color on the map. Beijing, Hainan, Tibet, Hong Kong, Macao, and Taiwan are excluded because of their abnormal land finance index indices. Therefore, these areas are represented by the lightest color on the map, and the land financial indices are 0 by default.

As shown in Figure 2, the land finance of the southern provinces of China is significantly higher than that of the northern provinces, and the tropical and subtropical regions are significantly higher than other regions. There may be four reasons for this. First, the degree of economic development. In areas with higher economic development, the land fiscal index is higher; the lower the degree of economic development, the lower is the

Table 9. Stochastic Model and Complete Model Analysis (Group 1).

		Stochastic model		Complete model	
		Parameter estimation	*SE*	Parameter estimation	*SE*
Average EID scores of provinces (β_0)	Intercept term (γ_{00})	–2.655	(3.227)	6.829	(15.015)
	TDCZ (γ_{01})			–20.982	(28.965)
State slope mode (β_1)	Intercept term (γ_{10})	0.639*	(0.231)	1.841*	(0.793)
	TDCZ (γ_{11})			–2.678+	(1.458)
Size slope mode (β_2)	Intercept term (γ_{20})	0.685+	(0.377)	–0.373	(1.746)
	TDCZ (γ_{21})			2.340	(3.275)
ROE slope mode (β_3)	Intercept term (γ_{30})	–0.665	(0.590)	–8.084***	(1.683)
	TDCZ (γ_{31})			17.676***	(4.924)
Lev slope mode (β_4)	Intercept term (γ_{40})	1.819*	(0.689)	–1.190	(2.722)
	TDCZ (γ_{41})			6.542	(4.886)
OC slope mode (β_5)	Intercept term (γ_{50})	2.405+	(1.182)	9.920+	(4.607)
	TDCZ (γ_{51})			–16.764+	(8.635)
Variance components		Parameter estimation	*SE*	Parameter estimation	*SE*
Level 2 between provinces					
Average EID scores of provinces (τ_{00})		93.165	(9.652)	108.143	(10.399)
State slope (τ_{11})		0.368	(0.606)	0.356	(0.597)
Size slope (τ_{22})		1.310*	(1.145)	1.518**	(1.232)
ROE slope (τ_{33})		1.928	(1.389)	1.328	(1.152)
Lev slope (τ_{44})		2.476+	(1.573)	3.482	(1.866)
OC slope (τ_{55})		14.288***	(3.780)	13.259***	(3.641)
Level 1 random variance inter provinces (σ^2)		8.214	(2.866)	8.194	(2.862)
Deviance (–2LL)		4979.351		4944.330	

+, *, **, and *** denote the statistical significance at the levels of 10%, 5%, 1%, and 0.1%, respectively. Standard error in parentheses.

Table 10. Stochastic Model and Complete Model Analysis (Group 2).

		Stochastic model		Complete model	
		Parameter estimation	*SE*	Parameter estimation	*SE*
Average EID scores of provinces (β_0)	Intercept term (γ_{00})	–8.180	(2.466)	–13.494	(8.198)
	TDCZ (γ_{01})			27.159	(41.961)
State slope mode (β_1)	Intercept term (γ_{10})	1.056**	(0.324)	1.317	(0.57)
	TDCZ (γ_{11})			–1.243	(5.116)
Size slope mode (β_2)	Intercept term (γ_{20})	1.301***	(0.270)	1.963*	(0.841)
	TDCZ (γ_{21})			–3.350	(4.182)
ROE slope mode (β_3)	Intercept term (γ_{30})	–2.866***	(0.629)	–5.077+	(2.774)
	TDCZ (γ_{31})			10.150	(11.213)
Lev slope mode (β_4)	Intercept term (γ_{40})	1.968+	(1.015)	–1.376	(2.888)
	TDCZ (γ_{41})			15.731	(15.033)
OC slope mode (β_5)	Intercept term (γ_{50})	0.601	(0.930)	–1.477	(3.231)
	TDCZ (γ_{51})			10.108	(16.344)
Variance components		Parameter estimation	*SE*	Parameter estimation	*SE*
Level 2 between provinces					
Average EID scores of provinces (τ_{00})		38.417	(6.198)	44.293	(6.655)
State slope (τ_{11})		1.184	(1.088)	1.329	(1.153)
Size slope (τ_{22})		0.373	(0.611)	0.426	(0.653)
ROE slope (τ_{33})		2.212	(1.487)	1.952	(1.397)
Lev slope (τ_{44})		10.924***	(3.305)	11.655**	(3.414)
OC slope (τ_{55})		7.792	(2.791)	8,423	(2.902)
Level 1 random variance inter provinces (σ^2)		8.070	(2.840)	8.107	(2.847)
Deviance (–2LL)		3579.265		3540.397	

+, *, **, and *** denote the statistical significance at the levels of 10%, 5%, 1%, and 0.1%, respectively. Standard error in parentheses.

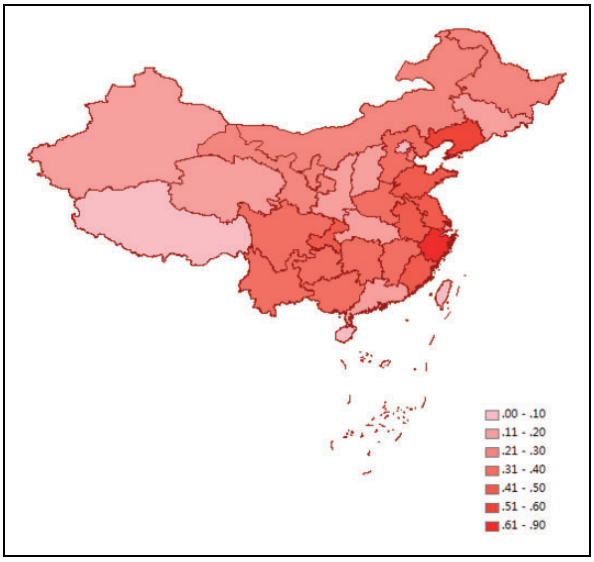

Figure 2. Regional fiscal competition classification map.

land finance index. In the 40 years since China's reform and opening up, the southern provinces have developed rapidly. The per capita gross domestic product of the southern provinces is significantly higher than that of the northern provinces. Therefore, the governments of the southern regions have the incentive are motivated to obtain political resources through land finance. Second, the rate of urbanization. As the rate of urbanization and the degree of dependence on land finance are represented as an inverted U-shaped curve relationship, the urbanization process is higher, the lower urban land financial dependence is lower, and the regional urbanization rate of the medium urbanization rate is more obvious. The urbanization process in the southern and northern provinces is faster, at a medium to high level, and the land finance index is relatively high. Third, the industrial structure. According to the calculation of the third industrial subregional domestic product data in the *China Statistical Yearbook 1980-2013*, since China's reform and opening up, the development of the industrial structure in the southern regions has been based mainly on secondary and tertiary industries, whereas that of the northern regions are largely based on primary and secondary industries. There are obvious differences in land transfer fees for different industrial types. The development of the second and third industries drives local governments to transfer land at high prices through agreement prices and bidding-auction methods to obtain huge profits. Therefore, the land dependence phenomenon in the southern region is relatively obvious in the north. Fourth, geographic location. Compared with the southern provinces, the northern provinces cover a larger territory, have a smaller population, have less land construction, and a weaker foundation of land financial competition.

Discussion

Based on the legitimacy theory in political economics and the *race to the bottom* theory in environmental regulation, this article selects the A-share listed companies in the eight major heavy polluting industries in China's Shanghai and Shenzhen stock markets from 2012 to 2014. We use the HLM to study the direct influence of corporate characteristics (company size, equity nature, profitability, equity structure, etc.) on corporate EID. Furthermore, we study the direct and indirect effects of regional financial competition on corporate EID. The study arrives at the following conclusions.

First, different characteristics at the company level have different effects on corporate EID. The results of stochastic models show that companies with larger scales tend to disclose environmental information, and state-owned enterprises tend to disclose more environmental information. Companies with better profitability disclose more environmental information. Companies with higher debt levels tend to disclose more environmental information, and companies with higher equity concentration are inclined to disclose more information.

Second, regional fiscal competition has a significant influence on corporate EID. The results of the complete model show that although the direct negative influence of regional fiscal competition on corporate EID is not significant, regional financial competition has a significant negative indirect effect on EID. Specifically, by adjusting the two indicators of equity nature and profitability, it plays a negative role in regulating the quality of EID, suggesting that there is a significant negative correlation between land financial competition and corporate EID, thus confirming our research hypothesis.

Third, the degree of regional fiscal competition and regional geographic location have different effects on the quality of EID. We find that the higher the degree of regional fiscal competition, the more significant is its influence on corporate EID, confirming the influence of fiscal competition on corporate EID. From the perspective of geography, the provinces with a high degree of financial competition are mainly concentrated in the southern provinces, tropical, and subtropical regions of China. Regional financial competition in these cities has a more significant influence on corporate EID. We believe that this is related to the great extent of economic development, rapid urbanization, and the optimization of industrial structures in the tropical and subtropical regions.

Implications for Conservation

Based on the earlier discussions, the following managerial suggestions are given as follows.

First, enhance environmental protection awareness from the local government level. The existence of fiscal decentralization system will inevitably lead local governments to strive for regional fiscal revenue through different channels as far as possible and then may discount the implementation of environmental protection policies issued by the central government, ignoring the responsibility of environmental protection. Therefore, we suggest that the central government should strengthen the supervision of environmental supervision, strengthen the supervision of local government's due diligence, and at the same time add environmental protection factors into the local government performance appraisal system and increase the proportion accordingly, so as to enhance the local government's awareness of environmental protection.

Second, fulfill environmental protection responsibility from the enterprise level. Because the EID of Chinese enterprises is still in the stage of voluntary disclosure, and the environmental responsibility consciousness of listed companies is weak, the quality of EID of enterprises is generally low. Therefore, we believe that it is of great significance to force listed companies to disclose environmental information.

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