

External Pressures, Top Executives' Characteristics and Environmental Information Disclosure: Empirical Evidence from Listed Companies of Heavy Pollution Industry

Wenbing Luo^{1,2}, Juanzhi Wang¹ & Bo Li¹

¹ Business School, Hunan University of Science and Technology, Xiangtan, Hunan, China

² Collaborative Innovation Center of Resource-conserving & Environment-friendly Society and Ecological Civilization, Xiangtan, Hunan, China

Correspondence: Juanzhi Wang, Business School, Hunan University of Science and Technology, Xiangtan, Hunan, China. Tel: 86-183-9024-8952. E-mail: 1538453256@qq.com

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Abstract

Based on stakeholder theory, this paper takes China's listed companies of heavy pollution industry from 2011 to 2014 as the research objects, and studies the working mechanism of external pressures and top executives' characteristics on level of environmental information disclosure (EDI). The results show that external pressures from government regulation and public opinion supervision significantly improve EDI; Top executives' compensation affects EDI most, followed by top executives' political connections; Top executives' shareholding is slightly positively correlated with EDI; Enterprises with political connections receive more government regulation and public opinion supervision than those without; Top executives' political connections weaken the effect of government regulation on EDI.

Keywords: level of environmental information disclosure; external pressures; top executives' characteristics; political connections

1. Introduction

Environmental information disclosure is an important way for enterprises to provide utilization of environmental resources and environmental pollution control, etc., which is also an important approach for outsiders to understand the enterprise environmental conditions. Scholars home and abroad have made studies on the factors that affect EDI (Shen, 2010; Norhasimah, 2016). Some focused on the influence of enterprise's scale and financial status on EDI (Cheng et al., 2011; Chaklader, 2015). Some focused on the influence of top executives' characteristics on EDI (Xiao et al., 2016; Zhang et al., 2016). Top executives' characteristics include the executives' own characteristics and their characteristics resulted from external conditions. Top executives' characteristics, such as age, gender, education, etc., have an impact on the enterprise EDI (Chi et al., 2014; Wu et al., 2013). The characteristics of the external conditions of top executives are mainly related to top executives' compensation, shareholding, and political connections. The existent studies on top executives' compensation are mainly about compensation allocation (Qi et al., 2014; Pascal et al., 2013), and the relationship between top executives' compensation and corporate performance (Tao et al., 2016; Chen et al., 2016). Executives' stock ownership is an important way for executives to share the enterprise achievements, and their ownership stimulates the enterprise's research and development, as well as its performance (Wang et al., 2015; Zhen et al., 2015); The proportion of top executives' shareholding will affect corporate EDI (Huang et al., 2012; Sahar et al., 2016), but the conclusions of influence direction and significance are not consistent. Top executives' political connections refers to that the corporate top executives are appointed by the central government or they were central government officials, or they are the national (local) NPC, CPPCC members (Chen et al., 2016). Top executives' political connections make the corporate more closely linked with the government and the society. Top executives' political connections have an impact on government subsidies and corporate social responsibility (Du et al., 2016; Meng et al., 2013). There are also a lot of studies on political connections and EDI (Chen et al., 2016; Wu et al., 2015); What needs further study is the influence of the integration of the three dimensions about top executives' characteristics on EDI.

With the strengthening of government regulation of corporate environmental behavior and news media's reports on corporate environmental information disclosure, the influence of government regulation and public opinion supervision on EDI is increasing (Zhang et al., 2016; Ericka et al., 2016). Therefore, this paper tries to put political connections as a mediator variable between external pressures and EDI, inspecting whether political connections can enhance or weaken the impact of external pressures on corporate EDI.

2. Theoretical Analysis and Research Hypothesis

2.1 External Pressures and EDI

According to the external pressure theory, environmental information disclosure is the result of the external pressures brought to enterprises. Without the external pressures for environmental protection, especially the pressure from government, the top executives may share the same attitude –mainly paying attention to the economic goal rather than environmental responsibility. Therefore, the external pressures play an important role in improving corporate EDI. The external pressures on corporate environmental information disclosure mainly come from government regulation and public opinion supervision.

2.1.1 Government Regulation Pressure

Although most enterprises voluntarily make their environmental information known to the public, the externality of environmental problems determines that it is bound by external pressure. For example, the government introduces environmental policies and takes environmental regulatory measures to supervise the environmental behaviors of enterprises. Environmental regulatory system can be a hard constraint on the formation of corporate environmental information disclosure (Wang, 2008). System pressure plays a key role in promoting EDI (Bi et al., 2013; Tao et al., 2013). The aspects of external pressures from government regulation, public opinion supervision and market all promote corporate EDI (Li et al., 2014; Ye et al., 2015; He et al., 2010). In addition, government regulation tremendously enhances corporate EDI (Shen et al., 2012; Zhang et al., 2016; Wei et al., 2014). Regarding the above, this paper proposes the following hypothesis:

H1a: Government regulation plays a significant role in promoting corporate EDI.

2.1.2 Public Opinion Supervision Pressure

Behaviors of corporate environmental information disclosure are affected by the media and the public. Media expose enterprises' environmental pollution behaviors to safeguard the public interests. Media reports on environmental issues and public exposure of corporate environmental pollution will promote corporate EDI. As for the role of public opinion supervision in corporate EDI, scholars have not reached agreement. Public opinion supervision pressure and EDI are significantly positively correlated (Ren et al., 2015; Shen et al., 2012; Fu and Wang, 2014). The negative media reports have adverse effects on corporate EDI (Tao et al., 2013). There is no obvious correlation between public opinion pressure and EDI (Zhang et al., 2016). Hence, it is hypothesized that:

H1b: Public opinion supervision dramatically promotes corporate EDI.

2.2 Top Executives' Characteristics and EDI

With the professional divisions, the enterprise ownership and its management are separated. The principal-agent theory believes that, the principal (the shareholders) and agent (the executives) have different utility function, thus the principals pursue their maximum wealth while the agents pursue the maximum of their income, luxury consumption and leisure time, which will inevitably lead to conflict of both sides. Therefore, when the corporate top executives make decisions, they will be more inclined to consider the social responsibility, rather than the maximization of wealth. At the same time, top echelon theory thinks that managers' characteristics influence their strategic choices and then affect the behaviors of enterprises. Accordingly, there is a certain relationship between top executives' characteristics and EDI. This paper illustrates the three characteristics of top executives, i.e., executives' compensation, executives' shareholding and political connections.

2.2.1 Top Executives' Compensation

Top executives' compensation is always the social focus. The higher compensation top executives receive, the more social concern they make. Thus top executives who have high compensation will be more cautious when they make environmental decisions. In addition, if decisions about environmental information disclosure once are made incorrectly, top executives will face the decline of social reputation or suffer the social condemnation. The higher compensation the top executives receive, the more environmental information disclosure there will be (Norhasimah et al., 2016). Top executives of listed companies have the right to discuss the compensation, which is a reasonable corporate governance mechanism (Marinilka et al., 2016; Steven et al., 2016). Top executives' compensation system of listed companies has incentive effects on top executives' behaviors (Huang et al., 2009).

On the other hand, Top executives' compensation incentive is negatively correlated with EDI (Huang et al., 2009), because the compensation incentive can only bring short-term economic performance and ignore the long-term environmental performance. This paper puts forward the following hypothesis:

H2a: Top executives' compensation is positively related with corporate EDI.

2.2.2 The Proportion of Top Executives' Shareholding

Zhang et al (2012) believes that the proportion of top executives' shareholding is related to disclosure. Top executives' shareholding has incentive effect on the corporate performance (Wang et al., 2016). The proportion of executives' shareholding affects decision-making power. The higher proportion of executives' shareholding can help top executives make decisions. Top executives' shareholding is positively correlated with EDI (Huang et al., 2012; Li et al., 2015); Shareholding incentive will encourage executives to pay more attention to the long-term development of the enterprise and corporate EDI (Li et al., 2015). Top executives' shareholding has impact on EDI, but not significantly (Zhang et al., 2014). However, some scholars hold the opposite view. For example, Sahar et al (2016) studies that top executives' shareholding plays a significantly negative impact on EDI. Based on the above discussion, this paper puts forward the following hypothesis:

H2b: The proportion of top executives' shareholding is positively related to corporate EDI.

2.2.3 Top Executives' Political Connections

When top executives with political connections make decisions about environmental information disclosure, they need to consider not only the economic benefits, but also their political impact, social reputation, etc. Therefore, top executives' political connections will significantly restrict the corporate environmental pollution behaviors (Chen et al., 2016). Political connections have a significantly positive impact on corporate EDI (Lin et al., 2015; Wang et al., 2013; Wu et al., 2015). Political connections are negatively correlated with corporate EDI (Wu et al, 2015; Yao, 2011). In view of this, this paper puts forward the following hypothesis:

H2c: In the case of the same other conditions, EDI of corporate with political connections is higher than those without.

2.3 Top Executives' Political Connections and External Pressures

Through social responsibility theory, we find that enterprises with political connections attract more attention from governments, mass media than those without. This kind of pressure will make top executives form a self-regulation mechanism, making them pay more attention to their own image, and actively fulfill their social responsibility. However the principal-agent theory thinks that the corporate top executives' aim of establishing political connections is to seek for friends in politics to achieve their own interests, which may weaken the impact that government regulation and public opinion supervision have on executives' behaviors. Therefore, this paper focuses on the relationship between top executives' political connections and external pressures.

2.3.1 Top Executives' Political Connections and Government Regulation pressure

In the process of law enforcement, the government department is likely to succumb to pressures from the departments which are equal or superior to them (Neil, 2002; Li et al., 2013). Hence, when government carrying out environmental regulation, it often evades the crucial point and makes the corporate with political connections suffer less punishment. Meanwhile, the establishment and maintenance of political connections make top executives have the ability to escape the regulation of relevant government departments, and may encourage them to arbitrarily pollute environment (Chen et al., 2016), which makes them throw daylight on environment information falsely. Political connections can significantly reduce the negative market reaction caused by pollution accidents (Lei et al., 2014). When the listed companies own political connections, the effect of the government's environmental regulation on them will be weakened. In view of this, this paper puts forward the following hypothesis:

H3a: In the case of the same other conditions, enterprises with political connections received less government regulation than those without.

2.3.2 Top Executives' Political Connections and Public Opinion Supervision

Companies with political connections will receive widespread attention from the media and the public. The media will supervise and restrict behaviors of top executives with political connections (Wu, 2012), such as behaviors of environmental information disclosure. Richard et al (2011) also points out that as for the enterprises with executives of particular political identity, the media tend to report their negative news, just for the pursuit of sensational effect. However, when the media report negative news, they will also be subject to constraints of political connections. Chen (2016) further points out that the higher social performance the enterprises receive,

the more public opinion constraints they received. In view of this, this paper puts forward the following hypothesis:

H3b: In the case of the same other conditions, enterprises with political connections received less public opinion supervision than those without.

3. Variable Definition and Model Design

3.1 Variable Setting and Measurement

This paper selects level of environmental information disclosure (EDI) as dependent variable and borrows Zhang and Liu's Calculation method: Content scores in MCT system of RANKINS CSR RATINGS is used to measure the level of environmental information disclosure (EDI). Compared with the content analysis method, the evaluation results by using RANKINS CSR RATINGS are more objective.

Table 1. Specific instructions of variables

Variable types	Variable name	Variable symbol	Variable description
Dependent variable	Level of corporate environmental information disclosure	EDI	Content scores in MCT system of RANKINS CSR RATINGS
	Government regulation	GOV	Data of Pollution Information Transparency Index (PITI)
	Public opinion supervision	MEDIA	The natural logarithm of the sum(the number of annual reports of the sample firms plus one)
Independent variables	Top executives' compensation	COMP	The natural logarithm of the sum of the top three executives' compensation
	The proportion of top executives' shareholding	ES	Top executives' shareholdings divided by the total share capital
	Top executives' political connections	PC	PC is assigned 1 when corporate top executives have political connections, otherwise, it is 0
	Return on net assets	ROA	the ratio of earnings before interest and taxes to total assets at the beginning of the year
Control variables	Book value per share	BV	Price of the company on its books divided by the number of shares outstanding
	Increase rate of business revenue	ROR	Ratio of operating income growth to total revenue of last year
	Financial leverage	LEV	Total debt divided by total assets
	Company size	SIZE	Natural logarithm of total assets

Based on the method of setting variables by Shen (2012) and Zhang (2016), this paper adopts PITI index as the variable of GOV. The PITI index is one of the most comprehensive and objective evaluation indicators of local government environmental information disclosure. PITI index data were collected from the IPE Notice of Institute of Public & Environmental Affairs. Based on the method of setting variables by Shen (2012) and Zheng (2013), this paper adopts the number of news articles from the China Economic News Database with the title of sample firms as the variable of MEDIA. Considering the large differences in the number of news reports of different enterprises, and the large difference between the news report number and other variables, this paper takes the natural logarithm of the sum (the number of annual reports of the sample firms plus one) as the variable of MEDIA, which can reduce the calculation error.

The difference between top executives' compensation and other variables is too large, so in order to reduce the calculation error, this paper takes the natural logarithm of the sum of the top three executives' compensation as the variable of top executives' compensation (COMP). The result of top executives' shareholdings divided by the total share capital is taken as the variable of the proportion of executives' shareholding (ES). Based on the above definition of political connections and Tang (2014) and Liu (2010)'s variable-setting method, the variable of political connections (PC) is 1 when corporate top executives have political connections, otherwise, it is 0. The data of variables of top executives' characteristics are obtained from CSMAR and the lost data are supplemented by the data on the companies' website.

Companies' size, profitability, and operating ability are positively correlated with EDI (Cheng et al., 2011; Li et al., 2008). The degree of corporate debt and media attention has a significant impact on EDI (Zheng, 2013; Liu et al., 2014). Therefore this paper selects the following variables as control variables: company size (SIZE),

increase rate of business revenue (ROR), Financial leverage (LEV), book value per share (BV), return on net assets (ROA). These data are obtained from financial statements of listed companies. The variables are specifically shown in Table 1.

According to the variable setting, this paper selects the listed companies of heavy pollution industry in China as the research sample, removes the missing data of the above variables, and screens out the 340 pieces of panel data between 2011 and 2014.

3.2 Model Design

In order to verify the hypothesis, this paper considers that the difference which results from the diversity of variables or data loss, and meanwhile in order to further test the mediating effect of political connections on external pressures and EDI. This paper makes hierarchical modeling.

$$EDI = \alpha + \beta_1 GOV + \beta_2 MEDIA + \sum \beta_i CONTROLS + \varepsilon \quad (1)$$

$$EDI = \alpha + \beta_1 COMP + \beta_2 PC + \beta_3 ES + \sum \beta_i CONTROLS + \varepsilon \quad (2)$$

$$GOV = \alpha + \beta_1 PC + \sum \beta_i CONTROLS + \varepsilon \quad (3)$$

$$MEDIA = \alpha + \beta_1 PC + \sum \beta_i CONTRLOS + \varepsilon \quad (4)$$

$$EDI = \alpha + \beta_1 GOV + \beta_2 MEDIA + \beta_3 PC + \sum \beta_i CONTOLS + \varepsilon \quad (5)$$

$$EDI = \alpha + \beta_1 COMP + \beta_2 PC + \beta_3 ES + \beta_4 GOV + \beta_5 MEDIA + \beta_i CONTROLS + \varepsilon \quad (6)$$

Model (1) is conducted to investigate the effects of external pressures on corporate EDI. Model (2) aims to examine the top executives' characteristics related to EDI. Model (3) and (4) are aimed at the effects of political connections on government regulation pressure, public opinion supervision pressure. Model (5) aims to investigate whether the political connections can strengthen or weaken the influence of government regulation and public opinion supervision on EDI, and verify the mediating effect of political connection on EDI. According to Lin (2015), this paper adopts ordinal regression coefficient method successively. Firstly, it tests whether the relationship between independent variables (public opinion supervision, government regulation) and dependent variable (EDI) is significant, i.e. Model (1), then puts the independent variables of Model (1) and mediating variables (political connections) together to test its effect on the dependent variables (i.e. Model 5). If the significance of the influence of the independent variable on the dependent variable disappears or reduces, it indicates that there exists full moderation effect or partial moderation effect. Model (6) aims to investigate the effect of multiple variables on EDI.

4. Empirical Test and Result Analysis

4.1 Descriptive Statistics

As can be seen from Table 2, the EDI values of the sample companies vary considerably and the maximum value reached 39.5900, with the minimum value being 0. As for standard deviation, standard deviation of EDI is 6.486289, bigger than that of any other variables but GOV. As for the independent variables, the standard deviation of government regulation is the largest, reaching 17.09452, which shows that the pressure of government regulation also differs among different companies. In respect of top executives' characteristics, the results of variables of PC and ES show that there exists little difference as for the maximum value, standard deviation, etc.

Table 2. The main variable descriptive statistics

	EDI	GOV	MEDIA	COMP	PC	ES
Mean	18.07679	49.48324	1.009678	6.218004	0.321121	0.007704
Median	16.67000	50.15000	0.954243	6.206042	0.000000	0.000000
Maximum	39.59000	83.30000	2.883093	7.144303	1.000000	0.492927
Minimum	0.000000	13.40000	0.000000	5.301030	0.000000	0.000000
Std. Dev.	6.486289	17.09452	0.537198	0.308450	0.467411	0.048658
Observations	340	340	340	340	340	340

In order to further investigate whether the effects of political connections on EDI, government regulation, public opinion supervision are different, this paper divides the sample companies into different groups regarding their political connections, and does t-test accordingly.

As seen from Table 3, the EDI mean value (19.6791) of enterprises with political connections is higher than that

of those without (17.3189) at 1% significance level, consistent with H2c; the number of media reporting about enterprises with political connections is more than enterprises without at 1% significance level, consistent with H3b. The governance strength of corporate with political connections is stronger than those without at 1% significance level, which does not meet H3a.

Table 3. Analysis of variable of political connections

	Political connections(0/1)	N	mean value	standard deviation	Mean difference T value
EDI	0	243	17.3189	5.98306	.3.710***
	1	97	19.6791	7.20153	
GOV	0	243	47.507	16.8615	-3.426***
	1	97	54.433	16.7507	
MEDIA	0	243	.934342827	.5009461443	-4.482***
	1	97	1.168944625	.5768556049	

Note. 0 indicates top executives without political connections; 1 indicates top executives with political connections; ***, **, * indicate significance at the level of 1%, 5% & 10% respectively.

4.2 Correlation Analysis of Variables

Table 4 shows that the independent variables of GOV, MEDIA, COMP, PC and the dependent variable of EDI are positively related (1% significance level), consistent with expectations; there also exists correlation between the independent variables, and most coefficients are below 0.4, with the correlation coefficient variable (SIZE) and variable (MEDIA) 0.598. Judged from the multicollinearity coefficient, when the correlation coefficient is below 0.8, there exists no serious multicollinear problem. Moreover, according to the multiple synteny rule of thumb -- If the maximum value of VIF is not over 10, there exists no serious multicollinear problem. According to the statistics, the maximum of VIF is 2.150577, which means there exists no serious multicollinear problem. Therefore, we can build regression model and make analysis. The results of VIF test are shown in Table A.

4.3 Analysis of Multicollinearity Regression

4.3.1 Analysis of the Impact of External Pressures on EDI

With EDI as the dependent variable, external pressures (GOV, MEDIA) as independent variables for multiple regression, the impact of external pressures on EDI is tested, and the results are shown in model (1) of Table 5. In model (1), the value of F in the regression equation is 17.79065 at the 1% significance level and can pass the significant test. Variables of GOV and MEDIA play a significant role in promoting EDI at the level of 1%, which is consistent with H1a and H1b. In respect of control variables, variables of BV and SIZE also have a positive correlation with EDI at the 5% significance level.

Table 4. Variables of pearson correlation coefficient

	EDI	GOV	MEDIA	COMP	ES	PC	ROA	BV	ROR	LEV	SIZE
EDI	1										
GOV	0.257***	1									
MEDIA	0.441***	0.186***	1								
COMP	0.303 ***	0.259***	0.291***	1							
ES	-0.047	0.037	-0.120**	-0.004	1						
PC	0.248***	0.202***	0.273	0.212***	-0.007	1					
ROA	0.061	-0.037	0.034	-0.019	-0.010	-0.041	1				
BV	0.264***	0.010	0.214***	0.222***	-0.136**	0.149***	0.011	1			
ROR	-0.096*	-0.031	-0.059	0.017	0.042	-0.065	-0.019	-0.022	1		
LEV	0.045	-0.038	0.148***	-0.153***	0.054	-0.020	0.018	-0.165***	-0.085	1	
SIZE	0.486***	0.185***	0.598***	0.207***	-0.131**	0.226***	0.016	0.319***	-0.055	0.385***	1

4.3.2 Analysis of the Impact of Top Executives' Characteristics on EDI

With EDI as the dependent variable and top executives' characteristics (COMP, ES, PC) as independent variables,

the influence of top executives' characteristics on EDI is tested. The results are shown in Table 5 (model 2). COMP significantly promotes EDI at 5% significance level, in accordance with H2a. PC and EDI are significantly positively correlated (10% significance level), which is consistent with H2c. And ES has little effect on EDI, for many top executives do not hold any stock of their companies.

4.3.3 Analysis of the Impact of Top Executives' Political Connections on External Pressures

With external pressures (GOV, MEDIA) as the dependent variable and political connections as the independent variable for multiple regression, the impact of the political connections on the external pressures is tested, and the results are listed in Model (3) of Table 5. PC has an enhancing effect on government regulation at 5% significance level, which is consistent with the previous analysis on the relationship between the single variable PC and GOV, which does not conform to H3a. PC is positively related to MEDIA at 1% significance level, consistent with H3b.

4.3.4 The Mediating Effect of Political Connections

In Model (1), the relationship between GOV and EDI is significant at 1% level. Then with the adding of the variable of PC, the relationship is only significant at 5% level and the coefficient is also smaller, which illustrates that PC has a partly moderate effect on the relationship between GOV and EDI, that is, PC weakens the impact of GOV on EDI. However, the impact of MEDIA on EDI is still significant at 1% significance level, which does not show that PC plays an intermediary role in the relationship between MEDIA and EDI.

4.3.5 The Influence of Multivariate on EDI

With EDI as the dependent variable and external pressures (GOV, MEDIA) and top executives' characteristics (COMP, ES, PC) as independent variables for multiple regression, the test results are shown in model (5). The influence of PC, GOV, MEDIA on EDI decreases. The relationship between COMP and EDI is still significant at 1% level, which illustrates that the variables of external pressures and internal top executives' characteristics interact with each other. In other words, EDI is influenced by both internal and external factors.

Table 5. Regression results

Dependent variable	Model (1) EDI	Model (2) EDI	Model (3) GOV	Model (4) MEDIA	Model (5) EDI	Model (6) EDI
GOV	0.048388 (2.62)***				0.043789 (2.36)**	0.032487 (1.74)*
MEDIA	1.967895 (2.95)***				1.757610 (2.60)***	1.466399 (2.16)**
ES		6.899474 (0.66)				7.010981 (0.67)
COMP		4.266873 (3.80)***				3.520414 (3.07)***
PC		1.232393 (1.74)*	5.925300 (2.88)**	0.199959 (3.55)***	1.217978 (1.70)*	0.845770 (1.18)
ROA	0.190600 (2.1)**	0.205922 (2.31)**	-0.138991 (-0.53)	0.005814 (0.80)	0.198418 (2.22)**	0.201394 (2.28)**
BV	0.196320 (1.64)	0.089373 (0.74)	-0.813711 (-2.28)**	0.009787 (-0.72)	0.157552 (1.29)	0.130819 (1.08)
ROR	-0.793948 (-1.95)*	-0.864895 (-2.13)	-0.555519 (-0.46)	-0.017378 (-0.53)	-0.753658 (-1.85)*	-0.813876 (-2.02)**
LEV	-2.398238 (-1.29)	-1.861661 (-0.99)	-12.09658 (-2.22)**	-0.225018 (-1.50)	-2.203107 (-1.18)	-1.380852 (0.74)
SIZE	75.49452 (5.19)***	93.96376 (7.60)***	139.9116 (3.93)***	11.50297 (11.80)***	76.37418 (5.27)***	74.26772 (5.15)***
Constant c	-89.83742 (-4.77)***	-137.2461 (-8.41)***	-129.7447 (-2.77)***	-14.57029 (-11.36)***	-90.83736 (-4.84)***	-109.2696 (-5.62)***
N	340	340	340	340	340	340
Adj R-squared	0.283791	0.292635	0.079475	0.382996	0.287860	0.304918
F Value	17.7907***	16.583***	5.18113***	31.0614***	16.2256***	14.5193***

Note. The value in the brackets is T-value; ***, **, * indicate significance at the level of 1%, 5% & 10% .

4.4 Robustness Test

Robustness test is defined by replacing the key independent variable and the dependent variable to further test the results of regression and the feasibility of the model. Firstly, replace the key independent variable of PC. With the method of Wu (2015), the ratio between the number of top executives with political background and that of those without is used to replace previous variable setting. Secondly, replace the key dependent variable of EDI, with reference to the variable substitution method of Feng (2016). Select the companies' results of RANKINS CSR RATINGS to do regression analysis again. The test results are consistent with the above regression results, so the test results can be considered as robust and reliable. The results of robustness test are shown in Table B.

5. Conclusions and Implications

5.1 Conclusions

Based on stakeholder theory, this paper studies the factors that influence corporate EDI. Through the empirical study on the top executives' characteristics, external pressures and EDI of 340 listed companies in heavy-pollution industry in 2011-2014, this paper draws the following conclusion: (1) External pressures (GOV, MEDIA) improve corporate EDI. Strengthening government supervision and public opinion supervision can effectively improve EDI. (2) COMP, PC and EDI are significantly positively correlated, but ES has little influence on EDI. The short-term compensation incentive influences EDI significantly, but the equity incentive has no significant impact on EDI, which is the on the contrary to Li's research results about the relationship between top executives' incentive and EDI. Perhaps because top executives of most sample firms do not hold shares or the proportion of top executives' shareholding (ES) is so low that the gap is not obvious; Enterprises with political connections can play a role in encouraging or supervising enterprises to improve EDI. (3) PC weakens the influence of GOV on EDI. Maybe when top executives of enterprises have political background, government regulation may help hide some of negative environmental information, which leads to weakening the promotion effect of PC on corporate EDI.

5.2 Implications

Accordingly, the following measures may help to solve the problems. Firstly, construct an evaluation system of Enterprise Environmental Information Disclosure, based on the in-depth participation of stakeholders in environmental supervision. The government-led enterprise environment incentive mechanism is not only conducive to enterprises' consciously regulating their environmental information disclosure, improving the quality of environmental information disclosure, but also conducive to enhancing the comparability of environmental information between enterprises and the governance of enterprise sewage behavior. Moreover, make full use of the power of the media to encourage environmental information disclosure and public opinion supervision. For example, encourage the media to strengthen corporate environmental performance reports and give the honorary title or government subsidies to the media which report effectively about enterprise environmental information. Additionally, the government should establish appropriate norms of corporate executives' political identity system to prevent arbitrary decision-making. And the government should exert the same regulation on the enterprises, no matter whether they have political connections or not. Strengthen the government regulation, public opinion supervision and top executives' characteristics simultaneously.

5.3 Contributions

The possible contribution of this paper are as follows: Firstly, on the basis of studying the influencing factors of the existing top executives' characteristics on EDI, this paper analyzes and compares the significance of the impact of different top executives' characteristics on EDI, which provides empirical evidence for optimizing top executives' characteristics to improve corporate EDI. Secondly, this paper analyzes EDI under various external pressures, and proposes that exerting institutional pressures or public opinion supervision pressure can improve the corporate EDI, which offers guidance for the optimization of pressure construction and the improvement of government regulation and public opinion supervision. Meanwhile, it enriches the theory of media governance and helps to improve people's supervision consciousness of corporate environmental information disclosure. The media's reports on corporate environmental pollution not only help the enterprises develop, but also benefit the whole mankind. Thirdly, it focuses on inspecting the role of political connections, which weakens or strengthens the influence of government regulation or public opinion supervision on EDI, and explains the reasons of differences affected by pressures in different enterprises.

5.4 Limitations and Future Directions

Like any other research, this study has its limitations. First, our sample data are limited. This study obtained 340 valid samples, a sufficient number for empirical analysis. However, there are only four years' data so that this

paper is not suitable for panel regression. Secondly, there are limitations with the scales and metrics. In this study, MEDIA scale is not very authoritative, because the news articles with the title of sample firms obtained include those from various media websites in China Economic News Database. The data of MEDIA should be collected from mainstream media accurately. Additionally, we are not able to avoid the error due to manual collection. Therefore, the robustness test depends on original data and the test method is still multivariate regression.

These limitations and shortcomings provide opportunities and directions for future research. First, continuous panel data for the samples should be collected and panel regression should be used. Simultaneously, the selection of MEDIA scale requires further optimization and improvement. The data of variable of MEDIA should be collected from mainstream media accurately. Secondly, the research direction needs to be further broadened. This paper mainly studies enterprise environmental information disclosure from the external reasons. The future research needs to focus on the internal driving force of enterprise environmental information disclosure, such as writing articles with “environmental informational disclosure”, “media attention” and “debt capital” in the titles.

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Appendix A**VIF Test**

	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
GOV	0.001765	10.90860	1.160007
MEDIA	2.298463	7.210734	1.695674
COMP	6.489073	573.0480	1.240939
ES	548.9378	1.063776	1.053026
PC	54.50674	1.484878	1.149191
ROA	0.039183	1.017121	1.006752
BV	0.071478	6.345330	1.288481
ROR	0.813502	1.049538	1.017847
LEV	17.68399	11.15620	1.432022
SIZE	1045.606	4435.151	2.150577
C	1913.974	4318.416	NA

Appendix B**The Results of Robust Test**

	Model (1)	Model (2)	Model (3)	Model (4)	Model (5)	Model (6)
Dependent variable	EDI	EDI	GOV	MEDIA	EDI	EDI
GOV	0.133503 (3.25)***				0.123429 (2.97)***	0.10355 (2.45)**
MEDIA	5.124269 (3.45)***				4.743536 (3.16)***	4.212676 (2.779)***
ES		15.72091 (0.66)				15.44828 (0.66)
COMP		8.274640 (3.30)***				5.913504 (2.32)**
PC		15.34030 (2.08)**	28.92870 (3.03)***	0.828087 (3.15)***	11.63834 (1.57)	9.900044 (1.34)
ROA	0.234228 (1.18)	0.268090 (1.33)	-0.138499 (-0.53)	0.005637 (0.78)	0.249397 (1.25)	0.256299 (1.29)
BV	0.477376 (1.79)*	0.288815 (1.07)	-0.689213 (-1.96)*	-0.002595 (-0.27)	0.450938 (1.69)*	0.392530 (1.47)
ROR	-1.308267 (-1.44)	-1.49 (-1.63)	-0.569983 (-0.47)	-0.019020 (-0.57)	-1.235299 (-1.36)	-1.332866 (-1.48)
LEV	-8.162062 (-1.97)*	-7.765213 (-1.82)*	-11.91148 (-2.19)**	-0.227595 (-1.51)	-7.7117755 (-1.86)	-6.355749 (-1.51)
SIZE	170.4978 (5.28)***	220.178 (7.77)***	127.5457 (3.53)***	11.20666 (11.26)***	167.0401 (5.17)***	164.9280 (5.10)***
Constant c	-205 (-4.91)***	-312.6254 (-8.33)***	-113.0548 (-2.37)**	-14.16284 (-10.79)***	-200.4370 (-4.78)***	-233.2650 (-5.33)***
N	340	340	340	340	340	340
Adj R-squared	0.306428	0.293049	0.0811844	0.378172	0.309512	0.317793
F Value	19.7218***	16.6138***	5.31690***	30.4524***	17.8841***	15.3560***

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