Journal of Cleaner Production xxx (2016) 1–10

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Corporate governance, social responsibility information disclosure, and enterprise value in China

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A R T I C L E I N F O

Article history:
Received 19 January 2016
Received in revised form
11 August 2016
Accepted 14 September 2016
Available online xxx

Keywords:
Corporate governance
Heavy-pollution industry
Social responsibility information disclosure
Enterprise value

A B S T R A C T

Social responsibility information disclosure relates to the long-term development of enterprises. All social layers pay increasing attention to social responsibility of enterprises, especially those in heavy-pollution industries that are listed on stock exchanges. This study takes Chinese companies in heavy-pollution industries that were listed during 2008–2014 as objects of study to test the relationships among corporate governance, social responsibility information disclosure, and enterprise value. The study finds that there is a declining level of social responsibility information disclosure of listed enterprises in heavy-pollution industries. In addition, different corporate governance factors affect the social responsibility information disclosure of listed companies in heavy-pollution industries to a certain extent. Furthermore, we find that social responsibility information disclosure is not beneficial for the short-term profit of an enterprise but can increase its long-term value. Generally, a high level of corporate governance is favorable for legitimacy management as well as disclosure of social responsibility information.

1. Introduction

When enterprises create profits and act responsibly for shareholders, they also should act responsibly for stakeholders, society, and the environment. Responsibility includes compliance with business ethics, protecting the legitimate rights and interests of workers, and conserving resources. This amounts to corporate social responsibility. Social responsibility information disclosure is an important component of undertaking social responsibilities for companies listed on stock exchanges (Verrecchia, 2001; Kolk and Van Tulder, 2010). Disclosure of social responsibility by a company helps consumers' focus to extend from only caring about product quality to multiple aspects, such as environment, occupational health, and labor protection. Most countries have adopted the same principles of corporate social responsibility initiatives (Ortas et al., 2015). Along with social progress and economic growth, the contents of corporate social responsibility are increasing and become an important force to promote future sustainable development of companies (Sardinha et al., 2011). For listed companies in heavy-pollution industries, it is particularly important to pay close attention to corporate social responsibility, especially environmental protection. At present, the main problems with social responsibility information disclosure are lack of awareness about its importance, uneven disclosure levels, and weak initiative and timeliness. These problems are even worse in enterprises with serious environmental pollution (Song and Zhou, 2015). Especially in the era of big data, corporate social responsibility information presents different characteristics when it is created, transferred, and stored. Hence, against this background, research on social responsibility information disclosure of these enterprises is very important. On one hand, these enterprises will be urged to fulfill their social responsibilities better under the environment of big data (Kshetri, 2016; Zhu et al., 2016), and need to conduct an evaluation of environmental efficiency (Song et al., 2015; Song and Zheng, 2016); on the other hand, social responsibility information disclosure will help to improve the environment, promote the construction of ecological-centered civilization, and guarantee the sustainable development of China.

Corporate governance represents institutional arrangements, decision-making mechanisms, and organizational design. The core issue for corporate governance is the principal–agent problem (Jensen and Meckling, 1976), that is, how the principal party, represented by corporate owners, motivates and monitors the agent

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http://dx.doi.org/10.1016/j.jclepro.2016.09.102
0959-6526/

Please cite this article in press as: Liu, X., Zhang, C., Corporate governance, social responsibility information disclosure, and enterprise value in China, Journal of Cleaner Production (2016), http://dx.doi.org/10.1016/j.jclepro.2016.09.102

party, represented by management staff. In fact, corporate governance is ultimately a problem concerning "responsibility," and the agent party should bear the responsibility entrusted by the client (Hashim et al., 2015). Moreover, the objective of both corporate governance improvement and fulfillment of corporate social responsibility is to enhance corporate legitimacy. Suchman (1995) pointed out that legitimacy is the general understanding and assumption of whether corporate actions fulfill expectations and are suitable under existing social regulations, values, faith, and concepts. Undoubtedly, corporate governance and social responsibility information disclosure are methods for corporate legitimacy management. Corporate governance not only has the same core content as corporate social responsibility, but also affects the quality of social responsibility information disclosure (Spitzeck, 2009; Jo and Harjoto, 2012). The reason enterprises are willing to disclose social responsibility information is the generation of positive market responses, which would be helpful for the enhancement of corporate legitimacy management (Mathews, 1995). Furthermore, enterprises that voluntarily disclose their social responsibility information also acknowledge their moral obligations. Cho and Patten (2007) found that environmental disclosure is a tool for obtaining legitimacy. Actually, the fundamental objectives of disclosing social responsibility information are to enhance the competitive capacity of an enterprise and increase enterprise value (Dhaliwal et al., 2011). Then, the following questions arise: which corporate governance factor could affect the disclosure of social responsibility information? What influences corporate social responsibility information disclosure on enterprise value? In this study, we select listed companies in heavy-pollution industries and research the relationship among corporate governance, social responsibility information disclosure, and enterprise value.

The rest of this paper is organized as follows. Section 2 provides a literature review and presents the research hypotheses. Section 3 introduces the data, variables, and models for the empirical analysis. Section 4 presents and analyzes the empirical results. Finally, concluding remarks and recommendations are presented in Section 5.

2. Literature review and research hypotheses

Corporate governance refers to the extensive relationships between the enterprise and stakeholders or between the enterprise and society. High levels of corporate governance could safeguard stakeholders' rights and ensure social responsibility. A standardized corporate governance structure is an important way to fulfill enterprise social responsibility and achieve sustainable development. With good governance structures, enterprises could avert unlawful acts or short-term behavior and would be more willing to disclose social responsibility information to the public, thereby disclosing corporate achievements and attracting more investors (Khan and Muttakin, 2013). Hence, the possession of an effective corporate governance structure is the basis for undertaking social responsibility. Certainly, various corporate governance factors have different influences on corporate social responsibility information disclosure.

2.1. Ownership and corporate social responsibility information disclosure

Ownership decides the formation and efficiency of the corporate governance structure, the distribution of corporate control rights, and the nature of the principal–agent relationship between owner and operator. The most significant feature of ownership in Chinese listed companies is that there is one single large shareholder. Shleifer and Vishny (1997) considered that under such a shareholding structure, the controlling shareholders could easily control the listed company. They always seek personal gains in legal or subtle ways and encroach on the interests of minority shareholders. La Porta et al. (2000) called this encroachment "tunneling." When controlling shareholders take high stakes, there is a lack of internal balance, internal oversight failure develops, and the controlling shareholders are more likely to obtain inside information. Because of cost limitations and lack of incentives, minority shareholders are unable to force the company to disclose more information. Thus, the controlling shareholders' willingness to disclose social responsibility information may not be strong, which is not conducive to improve corporate information transparency (Ghazali, 2007). Oh et al. (2011) found that shareholding by top managers is negatively associated with corporate social responsibility rating while outside director ownership is not significant. Thijssens et al. (2015) provided scarce empirical evidence that not only stakeholders, but also secondary stakeholders are influential with regard to management decision making and disclosure decisions.

We analyze corporate social responsibility information disclosure from the perspective of the nature of the dominant shareholder. State-owned enterprises are the pillars of China's national economy and have economic, political, and social responsibilities (Atkinson and Stiglitz, 1980). The government represents the public in its shareholding of state-owned enterprises. The objective of government supervision of enterprises is not only for the acquisition of profits, but also to satisfy the demands of employment, provide public services and facilities, maintain social stability, and achieve harmonious development among society, economy, and environment. Particular characteristics of state-owned enterprises make these enterprises obliged to undertake more social responsibility, which increases the probability of social responsibility information disclosure. Therefore, we propose the following hypotheses.

Hypothesis 1a. The level of social responsibility information disclosure of a listed company is low when the share of its largest shareholder is high.

Hypothesis 1b. The level of social responsibility information disclosure of a listed company is high when the company is state-owned.

2.2. Board of directors and corporate social responsibility information disclosure

Boards of directors can affect governance, operating efficiency, and corporate social responsibility information disclosure. Boards of directors are important for helping organizations, and their contributions could be considered as directors' roles in corporate social responsibility (Hung, 2011). When a board of directors is large, there might be an inclination to "free-ride" among board members and the benefits may be offset by increased costs resulting from more difficult communication and decision making (John and Senbet, 1998). Hence, large board of directors might lead to low operating efficiency and effectiveness of decision making, making enterprises indifferent toward corporate social responsibility, which is not favorable for them to fulfill their corporate social responsibilities and disclose relevant information.

Independent directors refer to those who do not hold posts other than directorships, and they should have no relationships with the listed companies on whose boards they sit or other main shareholders, which might interfere with their independent judgment. From the perspective of corporate legitimacy, independent directors are helpful for enhancing corporate reputation and credibility, and establishing and maintaining corporate legitimacy

(Pfeffer and Salancik, 1978). In addition, they can reduce the connivance between managerial staff and non-independent directors. Independent directors have more external expertise and knowhow; for example, they might be good at observing regulations for environmental protection or taking care of the interests of corporate stakeholders. They may improve the fulfillment of social responsibility and enhance information disclosure (Forker, 1992). For this reason, we propose the following hypotheses.

Hypothesis 2a. The level of social responsibility information disclosure of a listed company is low when the board size is large.

Hypothesis 2b. The level of social responsibility information disclosure of a listed company is high when the ratio of independent directors is high.

2.3. Supervisory board and corporate social responsibility information disclosure

Supervisory boards play an increasingly important role in companies. Different from the board of directors, the main functions of the supervisory board are to protect shareholders' rights and supervise the actions of directors and senior executives. Supervisory boards protect the interests of enterprises' employees, minority shareholders, and other stakeholders. These boards supervise the actions of strong shareholders and senior executives, and focus on all-around corporate development and the fulfillment of corporate social responsibility. Hence, larger supervisory boards may be more conducive to the disclosure of social responsibility information.

Most listed enterprises regularly hold meetings of boards of supervisors, which aids members' communication. The more frequent are the meetings of a supervisory board, the stronger is its members' willingness to supervise the actions of enterprises. In addition, full discussions are good for members to reach consensus. Hence, we propose the following hypotheses.

Hypothesis 3a. The level of social responsibility information disclosure of a listed company is high when the supervisory board is large.

Hypothesis 3b. The level of social responsibility information disclosure of a listed company is high when there are more meetings of its supervisory board.

2.4. Executive incentives and corporate social responsibility information disclosure

Agency theory deems that there is inconsistent information asymmetry and interest between senior executives and shareholders. The most effective way to reduce agency cost is to implement incentive remuneration in the form of incentive contracts with managerial staff. Remuneration incentives link the remuneration of managerial staff to corporate performance, which could reduce the possibility of moral risk and adverse selection of managerial staff. Haubrich (1994) indicated that proper incentives for CEOs could notably improve corporate performance. In addition, Kaplan (1994) found that the fortunes of CEOs in the United States and Japan were positively correlated to corporate performance. High remuneration levels might stimulate managerial staff to serve their enterprises and stakeholders better, and to pay more attention to social responsibilities and enhance information disclosure. Mahoney and Thorn (2006) found that executive compensation could be an effective tool for aligning executives' welfare with that of the “common good,” which results in more socially responsible firms.

Moreover, equity incentives are also an effective kind of incentive mode. Berle and Means (1932) pointed out that managerial staff should be given certain stock rights to make their benefits accord with those of shareholders. Jensen and Murphy (1990) considered that the most effective way to coordinate the benefits of CEOs and shareholders was to allow the CEO to hold shares. Compared with remuneration incentives, equity incentives are long-term incentives and are good for restraining the short-term actions of managerial staff (Joyce and Rasoul, 2005). Finally, equity incentives could bring the benefits of managerial staff in line with the benefits of shareholders through incentive objects and enterprises jointly sharing profits and risks. In that case, managerial staff would make all-out efforts to operate and manage the enterprise in the interests of shareholders. Hence, the possibility of corporate social responsibility information disclosure would increase, and the level of disclosure would increase. Accordingly, the following hypotheses are proposed.

Hypothesis 4a. The level of social responsibility information disclosure of a listed company is high when the remuneration of managerial staff is high.

Hypothesis 4b. The level of social responsibility information disclosure of a listed company is high when the management equity level is high.

2.5. Corporate social responsibility information disclosure and enterprise value

The objective of corporates fully disclosing social responsibility information is to protect the interests of investors, to promote information exchange between enterprises and society, and to eliminate information asymmetry and enhance corporate transparency (Reverte, 2009). Comprehensive social responsibility information disclosure enables investors to assess the states of business and risk factors of listed enterprises fully and effectively, and furthermore, to make the right judgments. In this case, transparency and effectiveness of capital markets can be enhanced (Maretno and Hoje, 2015). If a listed company were to disclose its social responsibility information to the public honestly, the market would demonstrate that the enterprise was legally valid, honest, trustworthy, and diligent in doing business. It is helpful to infuse social responsibility into enterprises' strategies, decision-making, operations, and management to bring non-financial premiums to the enterprise. Undertaking corporate social responsibility is a kind of mutually beneficial action that maintains long-term enterprise interest and meets the requirements of social development. From a financial perspective, Lambert et al. (2007) constructed a model showing that the quality of information disclosure affected capital cost. In their study, they found that the capital costs of enterprises could be reduced by improving the quality of information disclosure. Moreover, enterprises undertaking social responsibility and fully disclosing relevant information would boost corporate reputation (Antunovich et al., 2000), establish good images of enterprises, and increase intangible corporate assets, which would bring long-term potential benefits to enterprises. Jin and Drozdenko (2010) found that corporate social responsibility is positively correlated to markets and profits and that there is a positive relationship between corporate social responsibility and other non-financial outcome measures, such as system implementation success and organizational commitment. Ye and Zhang (2011) found that improved corporate social responsibility could reduce debt-financing costs when firms' corporate social responsibility investment is lower than optimum. In summary, we propose the

Please cite this article in press as: Liu, X., Zhang, C., Corporate governance, social responsibility information disclosure, and enterprise value in China, Journal of Cleaner Production (2016), http://dx.doi.org/10.1016/j.jclepro.2016.09.102

following hypothesis.

Hypothesis 5. The level of corporate social responsibility information disclosure is positively correlated to enterprise value.

3. Data, variables, and models

3.1. Sample and data

This study uses Chinese listed companies in heavy-pollution industries as samples to research the relationship between corporate governance structure and social responsibility information disclosure and furthermore, to research the effects of this relationship on enterprise value. Because of many particular aspects, such as environmental protection, social relations, and employee working conditions, listed companies in heavy-pollution industries need to spend more on undertaking social responsibility. Therefore, heavy-pollution industries provide a representative sample for researching corporate social responsibility information disclosure compared with other industries. According to the "Guidelines for listed enterprises on environmental information disclosure" published by the Chinese Ministry of Environmental Protection in September 2010, 16 industries are classified as heavy-pollution industries, namely, thermal power, steel, cement, electrolytic aluminum, coal, metallurgy, chemical engineering, petrification, building materials, paper-making, brewing, pharmaceuticals, fermentation, textiles, tanning, and mining.

This study selects listed companies in heavy-pollution industries during 2008–2014 as research objects through the guidelines for listed enterprises on environmental information disclosure. To control the influence of extreme values, quantiles of continuous variables below 1% or above 99% are winsorized and other samples with incomplete data are deleted. Finally, 77 samples are obtained for 2008, 81 samples for 2009, 181 samples for 2010, 217 samples for 2011, 214 samples for 2012, 71 samples for 2013, and 127 samples for 2014 are obtained, giving a total of 968 samples. Model (2) is constructed to observe the influence of corporate social responsibility information disclosure on enterprise value. When investigating Model (2), data collected are for the period 2008 and 2009 because partial control variables are quoted from the book *China Marketization Index* compiled by Fan et al. (2010), in which the calculations of relevant indexes proceed up to 2009. All the relevant data in this study are obtained from the China Stock Market and Accounting Research (CSMAR) and index values in *China Marketization Index*.

3.2. Variable and model

The variable for corporate social responsibility, *CSR*, generally refers to corporate operating mode reaching or surpassing standards required by morality, laws, and the public. When enterprises make profits and have legal liabilities, they need to consider the influence on each stakeholder, and these influences are mainly on the social and natural environment. This study selects the conditions of social responsibility information disclosure from 11 aspects stated in the "Basic information of social responsibility reports of listed enterprises" in the CSMAR to measure the quality standard of corporations' social responsibility information disclosure. The 11 aspects are as follows: whether the disclosure uses the Global Reporting Initiative's "Sustainability reporting guidelines" as a reference; whether it discloses the protection of rights and interests of shareholders; whether it discloses the protection of rights and interests of creditors; whether it discloses the protection of rights and interests of employees; whether it discloses the protection of rights and interests of suppliers; whether it discloses the protection of rights and interests of customers and consumers; whether it discloses environmental and sustainable development; whether it discloses public relationships and public welfare undertakings; whether it discloses the construction of a social responsibility system and improvement measures; whether it discloses the contents of safety production; and whether it discloses the shortcomings of the enterprise. Disclosure of social responsibility information in these 11 aspects takes a value of 0 for no disclosure and 1 for the existence of disclosure. Thus, the *CSR* score range is [0, 11]. Thereafter, standardization treatment is given to scores of different enterprises by dividing them by the total 11 points to determine the value of *CSR*.

Enterprise value (*EV*) generally reflects an enterprise's ability to give all corporate stakeholders (including shareholders, creditors, managerial staff, common employees, and government) satisfying returns under value-centered management and rule of law. Tobin's Q refers to the ratio of enterprise market value to its asset replacement cost. It reflects the specific value of two different value assessments of one enterprise. The numerator is the market value on the financial market, while the denominator is the "basic value"—the replacement cost of an enterprise. This study selects Tobin's Q to reflect enterprise value. The main variables used in this study are shown in Table 1.

Based on the variables in Table 1, Model (1) is constructed first to investigate the influence of corporate governance factors on corporate social responsibility information disclosure. Then, Model (2) is constructed to observe the influence of corporate social responsibility information disclosure on enterprise value. In Model (2), interaction terms are set to investigate different influences of social responsibility information disclosure on enterprise value under different types of ownership and in different areas. Furthermore, in order to distinguish the influence on enterprise value of the marketization process, degree of intermediary market development, degree of producer rights protection, and degree of consumer rights protection in different areas, this study selects relevant indexes in *China Marketization Index* and takes them as macro controlling variables influencing the effects of social responsibility information disclosure on enterprise value. Moreover, the asset–liability ratio and enterprise size are chosen as micro controlling variables.

$$\begin{aligned}\mathrm{CSR}_{i,t} = \alpha + \beta_1\mathrm{LSP}_{i,t} + \beta_2\mathrm{SOSP}_{i,t} + \beta_3\mathrm{ND}_{i,t} + \beta_4\mathrm{IDP}_{i,t} + \beta_5\mathrm{NS}_{i,t} \\ + \beta_6\mathrm{NMBS}_{i,t} + \beta_7\mathrm{MS}_{i,t} + \beta_8\mathrm{ME}_{i,t} + \beta_9\mathrm{Lev}_{i,t} + \beta_{10}\mathrm{Size}_{i,t} \\ + \varepsilon\end{aligned} \qquad \text{Model (1)}$$

$$\begin{aligned}\mathrm{EV}_{i,t} = \alpha + \beta_1\mathrm{CSR}_{i,t} + \beta_2\mathrm{CSR}_{i,t}{*}\mathrm{SOE}_{i,t} + \beta_3\mathrm{CSR}_{i,t}{*}\mathrm{AREA}_{i,t} \\ + \beta_4\mathrm{MP}_{i,t} + \beta_5\mathrm{IMD}_{i,t} + \beta_6\mathrm{PRP}_{i,t} + \beta_7\mathrm{CRP}_{i,t} + \beta_8\mathrm{Lev}_{i,t} \\ + \beta_9\mathrm{Size}_{i,t} + \varepsilon\end{aligned} \qquad \text{Model (2)}$$

4. Empirical test

4.1. Descriptive statistical analysis

First, the general situation of social responsibility information disclosure during 2008–2014 is analyzed and the results are shown in Table 2, which gives the average *CSR* scores of state-owned enterprises, non-state-owned enterprises, listed enterprises in Eastern areas, and listed enterprises in Central and Western areas. Eastern areas comprise 11 provinces (cities): Beijing, Tianjin, Hebei,

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Table 1
Main variables.

Name of variable	Calculation of variable
Corporate social responsibility information disclosure (*CSR*)	Sum of relevant information of social responsibility information disclosure in CSMAR and standardization treatment
Enterprise value (*EV*)	Total asset market value/Total asset replacement cost
Largest shareholder proportion (*LSP*)	Number of shares held by the largest shareholder/Total number of shares
State-owned shares proportion (*SOSP*)	Number of state-owned shares/Total number of shares
Number of directors (*ND*)	Total number of director board members
Independent director proportion (*IDP*)	Number of independent directors/Total number of director board members
Number of supervisors (*NS*)	Total number of supervisors
Number of meetings of board of supervisors (*NMBS*)	Number of meetings of board of supervisors in a year
Managerial salary level (*MS*)	Logarithm of total managerial salaries
Managerial equity level (*ME*)	Total number of shares held by managerial staff/Total number of shares
Asset–liability ratio (*Lev*)	Total liabilities/Total assets
Enterprise size (*Size*)	Logarithm of total assets
State-owned enterprises (*SOE*)	1 for state-owned enterprises; 0 for others
Enterprises in Eastern areas (*AREA*)	1 for enterprises in Eastern areas; 0 for others
Marketization process (*MP*)	Index values in *China Marketization Index*
Intermediary market development (*IMD*)	Index values in *China Marketization Index*
Producer rights protection (*PRP*)	Index values in *China Marketization Index*
Consumer rights protection (*CRP*)	Index values in *China Marketization Index*

Table 2
Situations of social responsibility information disclosure during 2008–2014.

	Year 2008	Year 2009	Year 2010	Year 2011	Year 2012	Year 2013	Year 2014
Average *CSR* score	8.2297	8.0126	7.8839	7.9816	7.9626	7.7000	7.7349
State-owned enterprises average *CSR* score	8.4091	8.1093	7.4848	8.1500	8.2656	7.7463	7.9866
Non-state-owned enterprises average *CSR* score	8.1538	7.7058	7.9729	7.9644	6.6875	6.9861	7.2317
Enterprises in Eastern areas average *CSR* score	8.3413	8.1250	7.9736	8.1238	7.9950	7.9878	7.9913
Enterprises in Central and Western areas average *CSR* score	7.9314	7.8651	7.5628	7.7154	7.9161	7.5900	7.5862

Notes: The data are from CSMAR database.

Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan. Central and Western areas comprise all other provinces except those mentioned above.

From Table 2, we can observe that the average *CSR* scores of listed enterprises in heavy-pollution industries within the 7 years of the sample were declining overall, although all sectors of society paid increasing attention to enterprises, especially those in heavy-pollution industries undertaking their social responsibilities. Enterprises were constrained by the high cost of undertaking social responsibilities. Nonetheless, statistical data showed some positive aspects, indicating that enterprises still paid attention to disclosure of environmental protection information. All sample enterprises disclosed their environmental protection and sustainable development information within the 7 years except Lihegufen (stock code: 000532) and Dongbeizhiyao (stock code: 000597). Average *CSR* scores of state-owned enterprises were higher than that of non-state-owned enterprises, because the former operated national assets and had to pay more attention to fulfilling their social responsibilities, especially state-owned enterprises in heavy-pollution industries. On the other hand, a key motive for the operations of non-state-owned enterprises was creating profits and it would take some time to shift their emphasis from profits to social responsibilities.

Then, we undertake descriptive statistical analysis on the main variables and the results are presented in Table 3.

4.2. Regression analysis

Regression analysis is conducted on Model (1) to investigate the influence of corporate governance factor on social responsibility information disclosure and the results are presented in Table 4. Variables that reflect features of shareholding, board of director, board of supervisors, and senior executive are regressed first and thereafter, all variables are regressed.

Judging from the results of the regression analysis, *LSP* is negatively correlated to *CSR* and passes the 10% significance test. Hypothesis 1a passes the test, indicating that there really is an infringement of interests of minority shareholders by the largest shareholder in enterprises with high *LSP*. Large shareholders use their power to control and manipulate listed companies. The largest shareholders may take advantage of multiple channels to occupy corporate resources and maximize their own benefits. The occupation is not conducive to the performance of corporate social responsibility, and the willingness to disclose social responsibility information is not strong. *SOSP* and *CSR* are positively correlated and pass the 10% significance test. Hypothesis 1b passes the test, proving that stronger national ownership in a heavy-pollution enterprise is correlated with stronger willingness to undertake higher social responsibility of enterprises. However, non-state-owned enterprises show stronger profit orientation, which is unfavorable for social responsibility information disclosure. *ND* and *CSR* are positively correlated and pass the 10% significance test. Hypothesis 2a does not pass the test, indicating that large boards include directors who have more comprehensive perspectives and a stronger sense of responsibility to urge enterprises to meet their social responsibilities. Although *IDP* has a positive correlation with *CSR*, it does not pass the significance test, and thus, Hypothesis 2b is false, which means that the functions of independent directors on social responsibility information disclosure in China are limited. We consider that the independence of independent director in China is not strong and service quality in not high, making the supervision effect limited. *NS* and *CSR* are negatively correlated, rendering Hypothesis 3a false, and indicating that supervisory boards have weak discourse power in listed enterprises in China. We consider that the establishment of the supervisory board meets the need for improving corporate governance structure, but the actual role they

Table 3
Descriptive statistics of main variables.

Variable	Maximum value	Minimum value	Average value	Median	Standard error
CSR	11.0000	1.0000	7.9284	8.0000	1.4997
EV	10.9153	0.2832	1.7664	1.3813	1.1213
LSP	0.8635	0.0362	0.4045	0.4017	0.1631
SOSP	0.8512	0.0000	0.1078	0.0231	0.2001
ND	18.0000	5.0000	9.6515	9.0000	2.1176
IDP	0.6000	0.1804	0.3659	0.3333	0.0513
NS	9.0000	2.0000	4.2145	4.0000	1.4415
NMBS	14.000	1.0000	5.1095	5.0000	1.7654
MS	17.1459	12.1548	14.3145	14.1987	0.7241
ME	0.8651	0.0000	0.0167	0.0001	0.0714
MP	11.8000	0.3800	8.5406	8.7700	1.9356
IMD	10.0000	−8.7500	6.1435	5.9700	1.7694
PRP	9.0100	−1.9100	5.0984	5.2500	1.3652
CRP	11.1700	3.9700	9.9283	10.1100	1.0285

Notes: The data are from the CSMAR database and the book *China Marketization Index*.

Table 4
Influences of corporate governance factor on social responsibility information disclosure.

	Features of shareholding	Features of board of directors	Features of board of supervisors	Features of senior executives	All variables
Cons	6.836***	6.943***	6.887***	7.045***	6.931***
	(6.65)	(6.72)	(6.70)	(6.91)	(6.71)
LSP	−0.054*				−0.059*
	(-1.83)				(-1.90)
SOSP	0.141*				0.188*
	(1.41)				(1.51)
ND		0.005*			0.004*
		(1.94)			(1.91)
IDP		0.401			0.411
		(0.29)			(0.31)
NS			−0.007		−0.001
			(-0.12)		(-0.01)
NMBS			0.019*		0.021**
			(2.56)		(3.15)
MS				−0.044	−0.109
				(-0.56)	(-1.11)
ME				0.317*	0.210*
				(2.22)	(1.88)
Lev	−0.177	−0.102	−0.106	−0.119	−0.239
	(−1.04)	(−0.81)	(−0.82)	(−0.95)	(−0.87)
Size	0.044**	0.025*	0.021*	0.046**	0.065**
	(2.87)	(2.04)	(2.11)	(3.37)	(4.05)
Adjusted R^2	0.043	0.013	0.010	0.032	0.101
F	2.73	1.90	1.92	2.94	7.18
N	968	968	968	968	968

Notes: *, **, and *** refer to significance at the 10%, 5%, and 1% levels, respectively. The data are from CSMAR database.

play is limited. *NMBS* is positively correlated to *CSR* and passes the 10% significance test. Hypothesis 3b passes the test. *MS* is negatively correlated to *CSR* and Hypothesis 4a does not pass the test, indicating that salary incentives have no useful effects on corporate social responsibility information disclosure. However, stock ownership incentives are positively correlated to *CSR* and this passes the 10% significance test, indicating that long-term performance of stock ownership incentives is more likely than that of salary incentives to encourage senior executives to focus on fulfilling corporate social responsibilities, and finally, to achieve incentive compatibility. Hypothesis 4b is correct. When combining all variables into models for regression analysis, the results are essentially in accordance with those of the single-feature analysis, indicating that each feature of corporate governance really is correlated with social responsibility information disclosure. Moreover, we find that in all the regression analysis results, enterprise size is positively correlated to social responsibility information disclosure, demonstrating that large enterprises are more willing to disclose social responsibility performance.

Furthermore, regression analysis is undertaken on Model (2) to investigate the influence of social responsibility information disclosure on enterprise value. Judging from the results shown in Table 5, the coefficients of *CSR* and enterprise value are −0.103 and −0.099, respectively, and both pass the 10% significance test. Social responsibility information disclosure unexpectedly lowers enterprise value. Hence, Hypothesis 5 cannot stand. This may be because, in order to attract investors, enterprises need to undertake a lot of social responsibility to make information more attractive. During the accounting period of the current year, undertaking social responsibility consumes resources and costs by enterprises, especially enterprises in heavy-pollution industries that need to spend significantly on costs and energy for environmental protection and on public relations because of their particular production characteristics. However, favorable relationships with stakeholders resulting from undertaking social responsibility can bring positive effects to enterprises only after a certain period. Hence, it is reasonable that undertaking social reasonability would lower enterprise value in the current period. *SOE* stimulates this kind of relationship while *AREA* hinders it, and we consider that it would cost state-owned enterprises and enterprises in Central and

Table 5
Influences of social responsibility information disclosure on enterprise value.

	Model 2-1	Model 2-2
Cons	7.507***	7.367**
	(3.570)	(3.320)
CSR	−0.103*	−0.099*
	(-2.010)	(-1.980)
SOE	1.376	
	(0.980)	
*CSR*SOE*	−0.214*	
	(-1.850)	
AREA		1.890*
		(2.430)
*CSR*AREA*		0.243**
		(2.670)
MP	0.043	0.032
	(0.380)	(0.410)
IMD	0.115*	0.098*
	(1.940)	(1.870)
PRP	0.015	0.016
	(0.110)	(0.130)
CRP	0.152*	0.150*
	(1.860)	(1.820)
Lev	−1.942***	−1.829***
	(−4.210)	(−4.010)
Size	−0.157*	−0.163*
	(-2.090)	(-2.270)
Adjusted R^2	0.226	0.258
F	15.030	16.260
N	158	158

Notes: *, **, and *** refer to significance at the 10%, 5%, and 1% levels, respectively. The data are from the CSMAR database and the book *China Marketization Index*.

Western areas more to undertake social responsibilities. Moreover, the degrees of intermediary market development and consumer rights protection are both positively correlated to enterprise value.

To prove that there are long-term positive influences of social responsibility information disclosure on enterprise value, this study selects lag phase of enterprise value as the explained variable to test. The results are presented in Table 6. When enterprise value lags one phase, the coefficient of *CSR* is 0.077 and correlation is not significant. When enterprise value lags two phases, the coefficient of *CSR* is 0.173, passing the 10% significance test. This demonstrates that for listed enterprises in heavy-pollution industries, in the long run, it is good for establishing positive images of enterprises, obtaining favorable reputations, and attracting more investors and customers to undertake social responsibilities, such as paying attention to environmental protection, maintaining harmonious community relations, providing comfortable and healthy working conditions, and protecting consumer rights. Proper disclosure of social responsibility information could help listed companies in heavy-pollution industries establish normative institutional arrangements to ensure scientific decision making and legitimate operations, increase long-term enterprise value, and realize sustainable development. Moreover, the results indicate that the interactive term of *SOE* is positive while that of *AREA* is negative, which means that the influences of social responsibility information disclosure in state-owned enterprises and enterprises in Central and Western areas are more significant for improving long-term enterprise value.

4.3. Further testing

In Subsection 4.2, we selected four factors of corporate governance—shareholding features, board of directors, supervisory board, and executive incentive—to investigate their independent influences on corporate social responsibility information disclosure. Corporate governance is a system guiding and controlling an enterprise (Cadbury Committee, 1992) whose objective is to satisfy the demands of shareholders and respond to their rights. Corporate governance coordinates relationships among groups or individuals whose interests might conflict to prevent abuses of powers and illegal behavior through a series of governance structures and mechanisms. In that way, the quality and efficiency of decision making of enterprises will be improved, the costs of transactions and agency will be lowered or brought under control, the interests of investors or related stakeholders can be protected, and maximum corporate value can be realized. Hence, this study selects a single variable to represent the level of corporate governance to investigate its relationship with social responsibility information

Table 6
Influences of social responsibility information disclosure on enterprise value (lagging one phase and lagging two phases).

	Model 2 (*EV* lagging one phase)	Model 2 (*EV* lagging two phases)
Cons	12.102***	8.436**
	(4.770)	(3.020)
CSR	0.077	0.173*
	(0.840)	(1.910)
*CSR*SOE*	0.013	0.038
	(0.380)	(1.050)
*CSR*AREA*	−0.087*	−0.072
	(-2.160)	(-1.390)
MP	0.191	0.117
	(1.310)	(1.080)
IMD	0.176	0.113
	(1.540)	(1.170)
PRP	0.026	0.004
	(0.170)	(0.030)
CRP	0.177*	0.126
	(1.940)	(1.180)
Lev	−2.829***	−1.683**
	(-5.540)	(-3.000)
Size	−0.322***	−0.268**
	(-3.750)	(-2.840)
Adjusted R^2	0.358	0.244
F	26.860	22.670
N	158	158

Notes: *, **, and *** refer to significance at the 10%, 5%, and 1% levels, respectively. The data are from the CSMAR database and the book *China Marketization Index*.

Please cite this article in press as: Liu, X., Zhang, C., Corporate governance, social responsibility information disclosure, and enterprise value in China, Journal of Cleaner Production (2016), http://dx.doi.org/10.1016/j.jclepro.2016.09.102

disclosure.

Furthermore, a comprehensive index of corporate governance level is compiled by means of principal component factor analysis—*G-index* is used to measure the corporate governance level. Based on comprehensive analysis of both the internal and external mechanisms of corporate governance, we propose eight variables that mainly affect corporate governance level, including whether the positions of chairman and general manager are combined (*Dual*), the proportion of independent directors (*ID*), the proportion of shareholding by managerial staff (*MS*), the share proportion of the largest shareholder (*Top1*), the share proportion of the second to tenth largest shareholders (*Top2_10*), whether there is a parent company (*Parent*), whether the enterprise is listed on both B or H stock markets simultaneously (*BH_share*), and whether it is state owned (*SOE*). Relevant data are from the CSMAR. Then, linear combination of these eight variables is constructed to obtain the first main component, which is defined as corporate governance level (*G-index*). The larger is the *G-index*, the higher is the corporate governance level. Finally, we insert the *G-index* in Model (3) for investigation.

$$\begin{aligned}\mathrm{CSR}_{i,t} = \alpha + \beta_1 \mathrm{G-index}_{i,t} + \beta_2 \mathrm{G-index} * \mathrm{SOE}_{i,t} \\ + \beta_3 \mathrm{G-index} * \mathrm{AREA}_{i,t} + \beta_4 \mathrm{Lev}_{i,t} + \beta_5 \mathrm{Size}_{i,t} + \varepsilon\end{aligned} \qquad \text{Model (3)}$$

The regression results of Model (3) are provided in Table 7. The coefficients of *G-index* are 0.173, 0.166, and 0.215 and all pass the 10% significance test. This indicates that the higher is the corporate governance level, the more favorable it is to disclose social responsibility information. The objective of corporate governance is to ensure scientific decision making and legitimate operations, and disclosure of social responsibility information is exactly a measure for corporate legitimacy management. In addition, thorough disclosure of social responsibility information reflects a high level of corporate legitimacy. The coefficient of *G-index*SOE* is 0.221 and it passes the 10% significance test, indicating that in state-owned enterprises, such a relationship between corporate governance level and disclosure of social responsibility information is more significant than in private enterprises. Judging from the calculated *G-index* data, the *G-index* of state-owned enterprises is notably higher than that of non-state-owned enterprises. Corporate governance level in state-owned enterprises is higher and more complete. Hence, in state-owned enterprises, corporate governance level can play its role better and be more favorable for social responsibility information disclosure. The coefficient of *G-index*AREA* is 0.015, which means that where a listed company is located has no effect on its relationship between corporate governance level and social responsibility information disclosure.

Table 7
Influences of corporate governance level on social responsibility information disclosure.

	Model 3	Model 3 (*SOE*)	Model 3 (*AREA*)
Cons	6.443***	6.612***	6.409***
	(3.13)	(3.16)	(3.08)
G-index	0.173*	0.166*	0.215*
	(1.91)	(1.87)	(2.11)
SOE		0.235	
		(0.37)	
*G-index*SOE*		0.221*	
		(1.98)	
AREA			0.031
			(0.10)
*G-index*AREA*			0.015
			(0.07)
Lev	0.871*	0.861*	0.869*
	(1.92)	(1.86)	(1.90)
Size	0.043	0.039	0.048
	(0.51)	(0.46)	(0.53)
Adjusted R^2	0.172	0.246	0.201
F	19.14	23.01	21.45
N	968	968	968

Notes: *, **, and *** refer to significance at the 10%, 5%, and 1% levels, respectively. The data are from the CSMAR database.

4.4. Stability test

4.4.1. Influences of industry characteristics

The samples in this study are all from heavy-pollution industries. To highlight their particular aspects of social responsibility information disclosure, companies listed on the Shanghai and Shenzhen stock exchange markets in 2008 and 2009 are taken as samples for comparative study. However, listed companies in the financial industry, companies with both B and H shares issued simultaneously, and enterprises with special treatment (ST) or delisting warning (*ST) are eliminated as samples. Meanwhile, an industrial dummy variable (*Industry*) is developed as follows: if a listed company is in a heavy-pollution industry, *Industry* is 1 and 0 otherwise. In Model (2), an interactive term (*CSR*Industry*) is developed; in Model (3), an interactive term (*G-index*Industry*) is developed. Then, Models (2) and (3) are re-tested to investigate the particular aspects of listed companies in heavy-pollution industries. The results show that when the dependent variable is corporate value lagged by two phases, the coefficient of *CSR*Industry* is 0.275, the coefficient of *G-index*Industry* is 0.211, and both pass the 5% significance test. The results show that in heavy-pollution industries, improvement of corporate governance level and regularization of corporate legitimacy management are favorable to disclose corporate social responsibility, and an increase of future corporate value brought about by disclosing corporate social responsibility is more considerable in enterprises in heavy-pollution industries than in others.

4.4.2. Measurement of corporate value

Considering the uniqueness of Tobin's Q and that the Chinese capital market is not mature yet, it is not so convincing to measure corporate value by using Tobin's Q. Therefore, the price/book value ratio (*P/B*) and the rate of return on common stockholders' equity (*ROE*) are selected to reflect corporate value to test relevant models further. *P/B* refers to the ratio of net price per share to net asset per share and *ROE* refers to the ratio of after-tax profit to net assets. There is no significant difference between the results of the test this time and previously. Hence, the results are considered stable.

5. Conclusions

This study is the first to explore the relationships among corporate governance, social responsibility information disclosure, and value of these enterprises in heavy-pollution industries in China, using statistical data from the CSMAR Basic Information of Social Responsibility reports of listed enterprises to do so. The study finds as follows. (1) As a whole, the level of social responsibility information disclosure of listed companies in heavy-pollution industries is decreasing while environmental information disclosure is emphasized. (2) From the aspect of corporate governance, state-owned shareholding proportion, number of directors, number of meetings of the supervisory board, and proportion of managerial staff shareholding are all positively correlated with the level of social responsibility information disclosure while the share proportion of the largest shareholder is negative correlated. (3) Judging from data in the current period, corporate value will be lowered due to undertaking social responsibility; however, in the long run,

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good social responsibility information disclosure is helpful in enhancing corporate reputation and realizing sustainable development of enterprises. (4) It will cost state-owned enterprises and enterprises in Central and Western areas more to undertake social responsibility than those in Eastern areas, but increases of long-term corporate value will be significant. (5) Generally, a high level of corporate governance is favorable for legitimacy management and disclosure of social responsibility information. Such a relationship is more significant for state-owned listed companies.

In undertaking social responsibility, there is a link between enterprises and stakeholders as well as a bridge to create favorable public relations, especially in heavy-pollution industries. With regard to internal governance, it is necessary to improve corporate governance structure further, increase the efficiency of corporate governance, and ensure corporate legitimacy. In particular, during institutional designing, sustainable development of enterprises needs to be propagated to abandon the notion of short-term interest first; specifically, sustainable development of enterprises should improve the proportion of state-owned shares, and give full allowance to the functions of corporate governance from state-owned legal entities. Sustainable development of enterprises should increase the number of supervisory board meetings in order to strengthen their supervisory function. In addition, it should increase the proportion of executive shareholding and be compatible with executive incentives, which could help executives pay more attention to the long-term development of enterprises. With regard to external governance, government agencies that have direct contact with listed enterprises, such as the Ministry of Environmental Protection and the China Securities Regulatory Commission, need to formulate relevant laws and rules to guide and encourage listed companies in heavy-pollution industries to disclose their social responsibility information and improve the quality of their disclosure. In addition, disclosure mechanisms for multi-dimensional corporate social responsibility information should be established using big data. In these mechanisms, we could use the volume, variety, velocity, and value of big data to build a multi-dimensional data environment. Simultaneously, this mechanism could transform fragmented and diverse information into valuable and full information, and provide new value for the audience.

However, corporate governance factors in our empirical study are limited to internal governance and the research method uses only ordinary least squares. Therefore, for further work, we will consider the influence of external governance factors on social responsibility information disclosure. In addition, we will study how to achieve corporate social responsibility through enhancing corporate governance. This future research will use additional statistical methods, for example, propensity score matching, to study the influence of the disclosure of social responsibility information on enterprise value. In addition, with increasing information disclosure by listed companies, more data will be obtained. We will attempt to use the big data method to study related issues in the future.

Acknowledgement

This work was supported by National Natural Science Foundation of China (grant numbers 71172190 and 71572001).

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