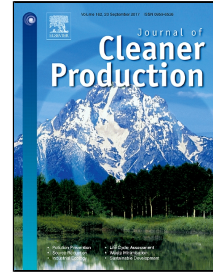


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Effects of corporate environmental responsibility on financial performance: the moderating role of government regulation and organizational slack



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## Title Page

**Title:**

Effects of corporate environmental responsibility on financial performance: the moderating role of government regulation and organizational slack

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**Effects of corporate environmental responsibility on financial performance: the moderating role of government regulation and organizational slack**

**Abstract** Accompanied with rapid economic growth in the emerging economies is the severe ecological deterioration. As major pollution makers and main energy consumers, enterprises are expected to be responsible to the natural environment. However, it's still in dispute whether and when it pays to be green. Based on institutional theory and agency theory, this paper explores the impact of corporate environmental responsibility (CER) on corporate financial performance (CFP) and studies the moderating effect, as well as the co-moderating effect, of external government regulation and internal organizational slack on the relationship. With the data of 1179 observations of Chinese energy-intensive listed companies in 2012-2014, empirical results show that CER significantly positively influences CFP, and that the moderating effect of government regulation is significantly positive, i.e., stringent government regulation significantly reinforces the positive influence of CER on CFP, while organizational slack has a negative moderating effect, i.e., the firms with abundant organization slack are less likely to gain a higher financial performance from undertaking environmental responsibility. In addition, the moderating effect of organizational slack also depends on the degree of government regulation, that is to say, stringent government regulation weakens the negative moderating effect of organizational slack between CER and CFP. The results demonstrate that it pays to be green, especially those lean firms with few slacks under stringent government regulation.

**Keywords** Corporate environmental responsibility, government regulation, organizational slack, corporate financial performance, environmental information disclosure, China

## 1. Introduction

In recent decades, the balance of environmental protection and economic development has attracted worldwide attention as environmental pollution problems break out constantly (Kock et al. 2012; Xu et al. 2016). China has become the largest and fastest-growing developing country in the world, but the rapid economic growth is at the cost of ecological deterioration. The PM<sub>2.5</sub> (particulate matters suspended in the atmosphere less than 2.5 microns in diameter, which could cause severe health problems) level had hit 1.4mg/m<sup>3</sup>, a record high in the north-eastern province of Liaoning in 2015, 56 times higher than the level considered safe by the WHO (Li et al. 2016a). As major pollution makers and important energy consumers, polluting enterprises in China are increasingly subject to environmental regulation and public concern and are required to be more environmentally responsible (Wong et al. 2016; Li et al. 2016b).

Corporate environmental responsibility (CER), a component of corporate social responsibility (CSR), is the commitment and practice of firms to adopt responsible actions to protect and improve the natural environment (Holtbrügge and Dögl 2012). It plays a crucial role in improving environmental quality through corporate design for environment, waste minimization, demand-side management, product stewardship and full-cost accounting, etc. (Flammer 2013; Holtbrügge and Dögl 2012; Shah et al. 2016; Wong et al. 2016). However, enterprises doubt whether it pays to initiate CER activities, since CER requires environmental investment which may reduce their profits. There is also no consensus in the literature with mixed results varying from positive, negative or insignificant (Clarkson et al. 2011; Meng et al. 2014; Wong et al. 2016). A reason may be that most of research does not consider the boundary conditions of the relationship. In fact, whether CER pays is affected by a series of factors, such as external environmental regulation and internal organizational slack.

Institutional theory considers that strict regulation can urge enterprises to actively participate in environmental practices and assume more CER (Berrone et al.

2013). The agency theory finds organizational slack plays an important role in corporate social responsibility (Shahzad et al. 2016). From this we argue that government regulation and organizational slack are likely to moderate the relationship between CER and CFP.

Similar studies are typically based on the developed world with well-organized regulatory systems and political mechanisms, while few research focus on the emerging economies with weaker policy implementation and enforcement (Li et al. 2016a). China is facing increasingly serious environmental problems with a distinct political and economic context, and understanding corporate environmental behavior and the role of government regulation in China is of great significance for global economic and environmental development. Moreover, due to China's important role in the developing world, studies based on a Chinese setting can provide theoretical and practical implications for formulating and implementing environmental policies in other emerging economies (Chang et al. 2015).

Based on the Chinese context, this paper uses content analysis and empirical analysis to study the relationship between CER and CFP of energy-intensive listed companies. It also probes into the moderating effect of external government regulation and internal organizational slack on the relationship, aiming to provide theoretical contribution and practical reference for active CER fulfilment and the formulation of related policies to solve China's environmental problems.

The reminder of this paper is structured as follows: The second section contains a literature review and hypotheses, the third section describes the research design, the fourth section presents our empirical analysis, the fifth section provides research discussions, and conclusions and implications follows in the final section.

## **2. Literature Review and Hypotheses**

### **2.1 Corporate environmental protection in China**

Since the introduction of reform and open door policy in 1978, China has

witnessed tremendous economic success. It has become the world's second largest economy and the largest developing country (Wu 2015). People worldwide have been enjoying abundant and cheap goods made in China (Du et al. 2014). However, the rapid economic development and industrialization have led China to the world's largest emitter of CO<sub>2</sub>, SO<sub>2</sub>, and COD (Li et al. 2016a). The economic growth has caused serious environmental problems such as severe air pollution, water shortage and contamination, soil erosion etc. An increasing number of environmental incidents have been reported in China in recent years, such as Zijin Mining Corporation acid leakage in 2010, aniline leakage in Changzhi city in 2013, and toxic running tracks in Beijing, Jiangsu and Guangdong in 2015. All of those have caused severe environmental and social consequences. For example, as reported by the Chinese Ministry of Environmental Protection (MEP), water pollution has caused 60,000 deaths every year (Qiu 2011), and soil contamination has contributed to the rise of numerous "cancer villages".

The Chinese government relies on environmental laws and regulations to address environmental issues and has enacted a number of measures concerning corporate environmental responsibility. For example, Measures for the Disclosure of Environmental Information, enacted by the MEP in 2008, mandated heavy-polluting firms to disclose certain environmental information. In 2010, the Guide of Environmental Information Disclosure of Listed Companies was published by the Shanghai stock exchanges, requiring listed companies to take environmental responsibility. The new Environmental Protection Law, which took effect at the beginning of 2015, was called "the most rigorous law in China's history": those who break the law would be heavily fined and even jailed.

However, the effects of these environmental laws and regulations are limited due to China's unique institutional background (Du et al. 2016; Li et al. 2015). First, the effectiveness of environmental regulations would be hampered by the fragmented and overlapping structure of environmental governance in China (Zhang and Cao 2015). Unlike the independent and unified environmental supervision in many Western countries, in China, the natural environment is overseen by several agencies,

including the MEP, the National Development and Reform Commission, the ministries of land and resources, water resources, and agriculture, etc. Moreover, there would be inconsistent requirements at different levels and regions of Chinese government with unclear and even conflicting standards (Wu 2015). Second, the promotion of local government officials depends not on how well they protect the environment but on how they develop the local economy, resulting in underdeveloped environmental responsibility (Li et al. 2015). Third, the enforcement of environmental laws and regulations may be foiled by a lack of capacity. China lacks an independent and efficient environmental judicial system, so the existing laws and regulations related to environmental conservation are performed poorly (Du et al. 2014). Specifically, environmental governance in China is mainly exercised locally by environmental bureaus, whose staffing and financing is determined by the local governments. The weak power and limited resources of local environmental bureaus lead to environmental protection only on paper (Wong et al. 2016). Finally, business ethics are still in infancy, and many companies lack the intrinsic consciousness of taking environmental responsibility (Du et al. 2016).

As a result, compared with companies in developed countries, Chinese enterprises are still at preliminary stages in environmental practices, and many Chinese firms only passively assume environmental responsibility (Du et al. 2014; He et al. 2016). According to an inspection around Beijing by the MEP, there are about 77.5% of enterprises failed to obey to the environmental laws and regulations (MEP 2017). Thus, it is important to identify the outcomes of CER and see whether it pays to be green in China. As US President Donald Trump has pulled US out of the Paris agreement on Climate Change, [China is expected to play a more important than ever before, and the attitude and behavior of Chinese government and firms are attracting particular attention.](#)

## 2.2 Corporate Environmental Responsibility and its Impact on Financial Performance

The concept of corporate social responsibility (CSR) is widely discussed and well established in the literature, and research now is shifting from an aggregate concept to specific dimensions, especially the environmental aspect due to global climate change and environmental deterioration (Flammer 2013; Holtbrügge and Dögl 2012; Wang et al. 2016), making CER an important topic for both academic literature and the business world (Holtbrügge and Dögl 2012; Shah et al. 2016).

CER refers to firms' commitment and adoption of responsible actions targeting environmental protection and improvement while achieving economic performance (Holtbrügge and Dögl 2012; Wong et al. 2016). The natural-resource-based view (NRBV) argues that enterprises should pay attention to and profit from the increasing natural environmental challenges and protection through the virtuous relationship between natural resources and competitive advantages (Hart and Dowell 2011). According to the NRBV, pollution and emissions signal ineffective use of resources and are economically wasteful, and pollution prevention measures can reduce operating costs (Hart and Dowell 2011).

CER is an investment for future gains (Wong et al. 2016). The increased emphasis on corporate investment in green technologies and environmental management systems makes enterprises associated with greater environmental performance improvement (Shah and Rivera 2007; Darnall and Kim 2012). Also, CER can improve information transparency, strategies, and philanthropy, and to eventually reduce firm risk (Cai et al. 2016). Aiming at sustainable business by reducing the use of resources, CER leads to operating efficiency, higher stock prices, improved environmental reputation, potential reduction of legal expenses, increases in subsidies, and expanding environment-conscious customer and investor base and finally, financial performance and competitive advantage (Heinkel et al. 2001; Guenster et al. 2011; Cai and He 2014). For example, Surroca et al. (2010) argue that firms can benefit from CER through intangible resources such as innovation, human

capital, reputation and culture. Wong et al. (2016) demonstrate that CER can bolster operating performance. Flammer (2013) finds that firms reported to be environmentally responsible experience a significant increase of stock price, whereas those behaving irresponsibly face a significant decrease. Cai and He (2014) also argue that environmental responsibility is an intangible asset and exhibit long-horizon stock performance.

On the contrary, environmentally irresponsible firms often suffer from government penalties, negative media exposure and shareholder boycotts (Wong et al. 2016). For example, accused of the leakage of acidic wastewater containing copper in 2010, the share price of Zijin Mining Group fell dramatically. In June 2011, China's leading pharmaceutical company - Harbin Pharmaceutical Group was reported to exhaust excessive hydrogen sulfide gases which were 1000 times the maximum safe level. After the exposure, its revenue and profit fell 47.15% and 46.62%, respectively.

In sum, we argue that, firms should not simply focus on short-term profit, but also commit themselves to environmental protection and pollution control for long-term sustainability. Only in this way can they obtain the support of stakeholders who offer a variety of facilities and resources, which will help improve corporate financial performance. Accordingly, the following hypothesis is proposed:

**Hypothesis 1** Corporate environmental responsibility has a positive impact on financial performance in China.

### 2.3 Moderating Effect of Government Regulation

Corporations are embedded in a variety of political and economic institutions that influence their behaviour (Campbell 2007). Institutional theory addresses how social influence towards conformity shapes organizations' actions (Berrone et al. 2013). Institutionalists argue that institutions beyond the market are necessary to ensure firms to be responsive to their stakeholders besides themselves (Campbell 2007). One of the prevailing institutions affecting firms in Chinese-like emerging

economies is the government, whose regulatory pressure exerts powerful influence on firms, especially those energy-intensive and environmentally-sensitive ones (Li et al. 2016a).

Regulators formulate laws, regulations, and ordinances to supervise corporate environmental behaviour. Greater regulatory pressures make it more attractive for a firm to engage in environmental responsible activities (Berrone et al. 2013). Strict environmental regulation can force firms to take responsible initiatives such as actively participate in environmental practices, invest in green innovations (Berrone et al. 2013).

Due to the severe environmental pollution and ecological devastation in China over the last three decades, the Chinese government is enacting stricter environmental regulation, requiring listed companies to take environmental responsibility since these firms are always regarded as pioneers of state reform (Du et al. 2014; Li et al. 2017). A guidance of “Methods of Corporate Environmental Credit Rating” was issued in 2013 by the Ministry of Environmental Protection of China (MEPC), impelling enterprises to actively participate in environmental protection and management, to fulfil their environmental obligations consciously and bear environmental responsibility. Moreover, the new Environmental Protection Law of China implemented in 2015, which is called the toughest law in history (Wong et al. 2016; Li et al. 2016a), urges firms to be more aware of their environmental behaviour, or they would face harsh punishment.

With increasingly strict regulation, enterprises start to be concerned more about environment problems and take active initiatives to undertake environmental responsibilities and improve environmental performance, which help to establish good images and contribute to competitive advantage and financial performance. On the contrary, if enterprises do not take the initiative to bear the environmental responsibility and give rise to potential serious pollution accidents, they may face financing disapproval from government supervisors since the latter is paying great attention to environmental problems. That will impede enterprise development and decrease financial performance. Accordingly, the hypothesis is proposed:

**Hypothesis 2** Government regulation positively moderates the relationship between corporate environmental responsibility and financial performance.

#### **2.4 Moderating Effect of Organizational Slack**

Organizational slack is the pool of resources in an organization that is in excess of the minimum necessary for a certain level of organizational output (Nohria and Gulati 1996). According to the RBV, organizational slack is a potential resource of an enterprise, which enables the enterprise to adapt to internal and external environment changes and make strategic adjustments to achieve organizational goals (Daniel et al. 2004; George 2005; Vanacker et al. 2017). Organizational slack affects corporate environmental behavior that the more slack a firm has, the more likely the managers will regard it as a buffer and take environment issue as an opportunity rather than a threat (Sharma 2000), the more likely the firm will carry out environmentally responsible practices (Qi et al. 2014).

However, agency theory adopt a hostile view of slack and regard it as a form of waste, inefficiency, a reflection of managerial self-interest and an unnecessary cost (Jensen and Meckling 1976; Daniel et al. 2004). Although excess slack spurs environmental activities that lead to the pursuit of legitimacy, very few of these initiatives actually translate into value-added results for firms, because the loose controls placed on these activities allow managers to fulfill their own demands such as building reputation or an environmentally-friendly image of themselves rather than shareholders' profits (Nohria and Gulati 1996).

Managers become risk seeking when slack is abundant and risk averse when resources are scarce (Lungeanu et al. 2016). Firms with a high level of slack may invest it in dubious projects and environmental activities, such as unrelated acquisitions and window dressing initiatives, which are of no good, even harm to financial performance. While slack resources are limited, managers may reduce unnecessary investments and revert to environmental initiatives with more predictable

outcomes that limit potential losses (Vanacker et al. 2017). Also, managers who have too much slack may become overconfident and overly optimistic, and consequently, become less likely to take strategic actions (Vanacker et al. 2017). Thus, the positive relationship between corporate environmental responsibility and financial performance is weakened with organizational slack. Therefore, the following hypothesis is developed:

**Hypothesis 3** Organizational slack negatively moderates the relationship between corporate environmental responsibility and financial performance.

### **2.5 Co-Moderating Effect of Government Regulation and Organizational Slack**

The contingent CER-CFP relationship may not be adequately interpreted from a single external or internal perspective. The effect of government regulation depends on firm resources and capabilities, while the role of organizational slack is also contingent on external environment (Shah 2011). So in this section, we integrate the external and internal contingent factors by exploring the co-moderating effects of government regulation and organization slack.

When faced with more stringent government regulation, firms need to invest more efficiently and make full use of every penny to better cope with environmental issues, making organizational slack to be an unnecessary cost and a waste. When slack is high, firms can afford to adopt strategies and structures that do not match their regulatory environment, because the excess resources can be used to pay the price of the mismatch, which further weakens the positive effect CER on CFP. However, firms with limited slack cannot afford to be unresponsive to regulatory demands, thus making firms to take more efficient environmental initiatives to make more money (Cheng and Kesner 1997).

While government regulation is looser, the effect of CER of firms with low organizational slack on CFP is still more significant than firms with high organizational slack, but the difference of moderating effects between firms with high

or low organizational slack may be narrowed. That is because, due to the less governmental regulatory pressures, firms may not value much about their environmental performance and be reluctant to take CER (Arora and Dharwadkar 2011). Under the circumstance of looser government regulation, on the one hand, firms with high organizational slack may reduce the environmental investment and save the costs of CER, on the other hand, firms with low organizational slack lack the stress and motivation to invest in CER efficiently. To sum up, the co-moderating effect of government regulation and organizational slack is proposed as follows:

**Hypothesis 4** The moderating effect of organizational slack on the relationship between CER on CFP also depends on the degree of government regulation: in the case of more stringent government regulation, there is a more significant positive effect of CER on CFP for firms with low organizational slack; in the case of looser government regulation, the difference of moderating effects between firms with high and low organizational slack may be narrowed.

Figure 1 depicts the conceptual model and research hypotheses of this paper, and reveals the influence of CER on CFP and the moderating effects of government regulation and organizational slack.

Figure 1 here

### 3. Research Design

#### 3.1 Samples and Data Source

The data was collected from Chinese listed firms in energy-intensive industries since they were the major sources of China's pollution and were most relevant to corporate environmental responsibility that matched the aim and scope of our research (Wang et al. 2015; Wong et al. 2016). According to National Bureau of Statistics of China, energy-intensive industries were high-energy-consuming industries, namely, manufacture of raw chemical materials and chemical products, manufacture of non-

metallic mineral products, smelting and pressing of ferrous metals, smelting and pressing of non-ferrous metals, petroleum processing, coking and nuclear fuel processing, as well as production and supply of electric power and heat power.

The sample period of this research was 2012-2014. The Chinese leaders have become more concerned about environmental protection and sustainable development since Xi Jinping's election of general secretary of the Communist Party of China (CPC) in 2012 in 18<sup>th</sup> CPC National Congress, which pushed the enterprises to be more active in taking environmental responsibility. The end of our sample period was 2014 since the latest available data of the lagged CFP was in 2015, while CFP in 2016 was not available yet.

This study selected A-share companies in energy-intensive industries listed in Shanghai and Shenzhen stock exchanges. The initial sample consisted of 451 firms for 3 years, namely 1353 observations. The observations were screened according to the following criteria: excluding firms with special treatment (ST) or particular transfer (PT), due to their continuous losses over the past two years (141 observations); excluding companies with incomplete data (33 observations). After screening, the final sample consisted of 1179 observations. The industry composition of the samples was shown in Table 1.

Table 1 here

The data sources were as follows. Corporate environmental responsibility was manually collected from corporate annual reports. Financial data, ownership, and other corporate information of sample companies were obtained from the China Stock Market and Accounting Research (CSMAR) database. Political connection data came from Wind Database and corporate annual report.

## 3.2 Variable Measurement

### 3.2.1 Dependent Variable: Corporate Financial Performance (CFP)

Return on Assets (ROA) was regarded as an authentic measure of CFP and was widely used (Mishra and Suar, 2010; Clarkson et al. 2013). For example, Mishra and

Suar (2010) used ROA as a proxy for financial performance when studying the effects of CSR. Clarkson et al. (2013) employed ROA to measure financial performance and found a positive impact of corporate environmental disclosure on ROA. Thus, [this study](#) applied the lagged ROA (data from 2013 to 2015) as a proxy for future CFP to reflect the impact of CER (Aras et al. 2010, Delmas et al. 2015). Lagged ROE [was employed](#) to measure CFP for robustness test.

### 3.2.2 Explanatory Variable: Corporate Environmental Responsibility (CER)

Most empirical research on CER obtained data from Kinder, Lydenberg, Domini Research & Analytics (KLD) database. Other databases frequently employed to measure CER are TRI (Toxic Release Inventory), the Business Ethics “100 Best Corporate Citizens” and CEP (Council on Economic Priorities) (Clarkson et al. 2008). However, all these databases only included firms in developed countries, while no relevant database in China for the unavailability of data. As an alternative, scholars adopted content analysis to measure CER by analyzing environmental information disclosed in corporate annual reports (Meng et al. 2013; Du et al. 2014; Wong et al. 2016). Clarkson et al. (2008) developed a content analysis index based on Global Reporting Initiatives (GRI) sustainability reporting guidelines, which could be a proper proxy for CER (Clarkson et al. 2008; Du et al. 2014; Wong et al. 2016).

To measure CER, first, the items of environmental information [was identified](#) based on the GRI framework and Meng et al. (2014). 38 items [were selected](#) as scoring basis to measure the level of environmental information disclosure, as specified in Appendix 1. The 38 items could be assigned into four parts of an “environmental practices matrix” (Montabon et al. 2007), i.e., operational environmental management practice, environmental policy decisions, corporate strategy, and environmental performance measurement. Secondly each item [was scored](#) according to the following standards: 0 for no relevant information disclosed; 1 for general description; 2 for items specifically described; 3 for items quantitatively or monetarily described (Zeng et al. 2010), and all the 38 items were weighted equally.

Finally, summing up the score of each item, [this study](#) got the value of CER of each observation.

### 3.2.3 Moderating Variables

*Government Regulation* The Pollution Information Transparency Index (“PITI” Index hereinafter), developed and published by the Natural Resources Defense Council (NRDC) and the Institute of Public and Environmental Affairs (IPEA) since 2008, was aimed at evaluating the status of environmental information disclosure of 113 major Chinese cities. It was scored and ranked based on the systematics, integrity, timeliness, and user-friendliness of eight indicators announced by local governments (such as the firms’ violation records, inquiry suits, etc.). PITI Index not only reflected environmental transparency of local governments, but also reflected government regulation on environmental responsibility (Li et al. 2016a). Therefore, PITI Index [was employed](#) as a measure of government regulation (noted as GR).

*Organizational Slack* Organizational slack was divided into absorbed slack (repair funds, inventory, payables etc.) and unabsorbed slack (depreciation funds, reserve funds, corporate retention, sales costs etc.). As the unabsorbed slack played a more important role in corporate performance and behaviors (Tan and Peng 2003), [this research](#) employed the natural logarithm of the current assets/current liabilities ratio (noted as SL) to measure organizational slack (Graves and Waddock 1994; King and Lenox 2001; Peng et al. 2010; Qi et al. 2014). Firms with lower ratio had less organizational slack, which meant the lower ability to obtain additional funds through bearing debt, thus, the firms would be restricted in reallocating resources or raising additional debt for alternative uses or urgent needs (George 2005).

### 3.2.4 Control Variables

*Firm Size* Larger firms received greater attention from the public, so the stress from the government and the media pushed them to avoid environmental irresponsibility

activities (Liu and Anbumozhi 2009). This paper employed the logarithm of total assets (noted as SIZE ) to measure firm size.

*Ownership* Firms in China could be divided into state-owned enterprises (SOEs) and private owned enterprises (POEs). Different ownership types had different political connections (Li et al. 2015), which brought about different responses to government regulation and policies on CER (Wong et al. 2016). In general, SOEs got more support and were inclined to take more CER (Zeng et al. 2003) compared to other firms. A dummy variable OWNER was thus introduced here, 1 for SOEs, 0 for others.

*Shareholder Concentration* If the largest shareholder had higher shareholding proportion, they would have more impacts on corporate decision-making and environmental behavior, even on the level of information disclosure. Thus, shareholder concentration affected corporate environmental behavior and financial performance significantly (McConnell and Servaes 1990; Shleifer and Vishny 1997). This paper adopted the shareholding proportion of the largest shareholder (noted as TOP1) to measure shareholder concentration.

*Political Connection* Firms whose CEOs with political background were supposed to disclose more environmental information and shouldered more environmental responsibility under high political pressures (Chang et al. 2015b). Moreover, according to prior empirical studies (Lin et al. 2015), firms with political connections had better environmental performance than others. In this paper, a dummy variable Political Connection (noted as PC) was introduced. This [research](#) checked the resumes of corporate board members and CEO listed in annual reports, and then distinguished whether the chairmen or CEOs of the sample companies had served or were serving as members of the National People's Congress (the NPC), Chinese People's Political Consultative Conference (the CPPCC), Party representatives or government officials. 1 for firms had political connections, 0 otherwise.

*Regions* In China, the levels of economic development and industrialization in Eastern China was significant different from those in Central and Western China. Furthermore, for the enforcement of environmental regulations, local governments in

Eastern and Western China showed different attitudes and provide different institutional contexts. Wong et al.(2016) found that Eastern China has the advantages of economic development, industry structure, and absorption of foreign capital compared to other regions of the country. It was measured as a dummy variable (noted as Reg), i.e., 1 for firms that located in Eastern China, and 0 otherwise.

*Environmental Regulation* Voluminous literature studied the impact of environmental regulation on corporate environmental responsibility and competitiveness (Wong et al. 2016; Zhao and Sun 2016). Smarzynska and Wei (2001) used pollutant emission reduction as a measure of the intensity of environmental regulation. In China, SO<sub>2</sub> removal was widely used by Chinese governments for environmental protection since 2000. So [this study](#) used SO<sub>2</sub> removal (noted as ER) , measured as (SO<sub>2</sub> produced - SO<sub>2</sub> discharged)/SO<sub>2</sub> produced, to measure environmental regulation. The data of these indicators could be directly obtained from China Yearbook on Environment.

*Past violations records* Corporate illegality had not only short-terms effects on market reaction but also long-terms effects on financial performance (Baucus and Baucus 1997). China Securities Regulatory Commission disclosed all kinds of violation records of list companies, including false records, major omissions, inflated income, inflated profits and insider trading. A dummy variable Violation was introduced, 1 for those with past violations records, 0 otherwise.

### 3.3 Model

To test the hypotheses above, five multiple regression models were constructed:

$$CFP_{t+1} = \alpha_1 + \beta_1 Control_t + \varepsilon_1 \quad (1)$$

$$CFP_{t+1} = \alpha_2 + \beta_1 CER_t + \beta_2 Control_t + \varepsilon_2 \quad (2)$$

$$CFP_{t+1} = \alpha_3 + \beta_1 CER_t + \beta_2 GR_t + \beta_3 SL_t + \beta_4 Control_t + \varepsilon_3 \quad (3)$$

$$CFP_{t+1} = \alpha_4 + \beta_1 CER_t + \beta_2 GR_t + \beta_3 SL_t + \beta_4 CER_t \times GR_t + \beta_5 CER_t \times SL_t + \beta_6 Control_t + \varepsilon_4 \quad (4)$$

$$CFP_{t+1} = \alpha_5 + \beta_1 CER_t + \beta_2 GR_t + \beta_3 SL_t + \beta_4 CER_t \times GR_t + \beta_5 CER_t \times SL_t + \beta_6 CER_t \times GR_t \times SL_t + \beta_7 Control_t + \varepsilon_5 \quad (5)$$

where  $CFP_{t+1}$  was for corporate financial performance lagged one year,  $CER_t$  for corporate environmental responsibility in that year,  $GR_t$  for government regulation in that year,  $SL_t$  for organizational slack in that year,  $CER_t \times GR_t$  for interaction between CER and government regulation,  $CER_t \times SL_t$  for interaction between CER and organizational slack,  $CER_t \times GR_t \times SL_t$  as the 3-way interaction of CER, government regulation and organizational slack.  $Control_t$  for control variables,  $\alpha_1 - \alpha_5$  for intercept,  $\beta_1 - \beta_5$  for regression coefficient,  $\varepsilon_1 - \varepsilon_5$  for error term.

## 4. Results

### 4.1 Descriptive Statistics and Correlation Analysis

Table 2 presents the descriptive statistics and correlation analysis of variables. It shows that the maximum value of CFP is 4.84, the minimum value is -0.51, and the mean value is 0.03, which indicates large differences in financial performance among sample firms. The maximum value of CER is 78, the minimum value is 0, and the mean value is only 13.52, indicating that the level of corporate environmental information disclosure is uneven, and CER fulfilment of China's enterprises is not optimistic, which is consistent with Zeng et al. (2010). The maximum value of GR is 85, the minimum value is 11, and the mean value is 39.93, indicating that government regulation varies greatly with locations. The maximum value of SL is 4.23, the

minimum value is -2.70, and the mean value is 0.19, showing that slack resources vary significantly among enterprises.

Table 2 also presents correlations of the variables. The maximum correlation coefficient is 0.50, and the VIF values (variance inflation factor) are between 0.104-0.990, indicating no significant multicollinearity problems (Anderson et al. 2013).

Table 2 here

## 4.2 Hypotheses Testing

This paper uses a multiple regression model to test the proposed hypotheses. The results are shown in Table 3. Model 1 tests the relationship between control variables and the dependent variable. Model 2 includes the independent variable, CER. Moderating variables, i.e., government regulation and organizational slack, are added in Model 3. Then, the 2-way interaction terms between CER and the moderating variables (government regulation and organizational slack) are added in Model 4. Model 5 tests the co-moderating effects by adding a 3-way interaction term of CER and government regulation and organizational slack. To eliminate potential problems caused by multicollinearity, variables are centralized before generating interaction terms.

Table 3 here

As shown in Table 3, Model 1 indicates that only firm's size have negative correlation with CFP. Model 2 shows that CER has a significant positive correlation with CFP ( $\beta = 0.21$ ,  $p < 0.01$ ), so H1 is supported. Therefore, the fulfilment of CER will help improve CFP.

Model 3 reveals that government regulation and CFP are significantly positively correlated ( $\beta = 0.12$ ,  $p < 0.01$ ), and organizational slack and CFP are significantly negatively correlated ( $\beta = -0.06$ ,  $p < 0.1$ ).

In Model 4, the interaction coefficient between CER and government regulation is positive and significant ( $\beta = 0.19$ ,  $p < 0.01$ ), so government regulation has positive

moderating effect on the relationship between CER and CFP. Thus, H2 is supported. The interaction between CER and organizational slack is significantly negatively correlated with CFP ( $\beta = -0.34, p < 0.01$ ), suggesting a negative moderating effect of organizational slack on the relationship between CER and CFP. So H3 is supported.

Model 5 shows that the 3-way interaction of CER, government regulation and slack is significantly negative ( $\beta = -0.28, p < 0.01$ ). It reveals that the moderating effect of organizational slack on the relationship between CER on CFP also depends on the degree of government regulation. So H4 is supported.

In order to demonstrate the moderating effects of government regulation and organizational slack, [this study](#) plotted the interaction effects using one standard deviation above and below the mean to represent high and low levels of the moderating variables (Hoetker 2007; Li and Tang 2010). Figures 2 - 4 present these plots.

Figure 2 gives a more clear evidence for the moderating effect of government regulation. It displays that a high level of government regulation actually gives a strong positive relationship between CER and CFP, but at a low level of government regulation, there is a negative relationship between CER and CFP, indicating that the more stringent control of government, the more positive effects CER has on CFP.

Figure 2 here

Figure 3 gives a more clear evidence for the moderating effect of organization slack. At the low level of organizational slack, CER is significantly positively correlated with CFP. While at a high level of organizational slack, there is a negative relationship between CER and CFP, indicating that the more slack resources an enterprise has, the less positive influence CER has on CFP.

Figure 3 here

Figure 4 and Figure 5 picture the co-moderating effect of government regulation and organizational slack. In Figure 4, we can see that when government regulation is high and organizational slack is low, CFP increases from -0.134 to 0.169 and the slope is the steepest. While government regulation and organizational slack are both

high, CER and CFP are significantly negatively correlated. That's to say, at high level of government regulation, there is a more significant positive effect of CER on CFP for firms with low organizational slack. While at the low level of government regulation, the difference of moderating effects between firms with high and low organizational slack is narrowed, and the CER of both kinds of firms are positively correlated with CFP, as shown in Figure 5.

Figure 4 here

Figure 5 here

### 4.3 Robustness Tests

This study undertook further robustness tests by adopting alternative operationalization of variables.

Firstly, another measure of organizational slack is employed. It includes both absorbed slack and unabsorbed slack, which is measured by equity (current asset – current liabilities)/assets and assets/liabilities respectively. According to Peng et al. (2010), these two ratios can be aggregated into a factor to measure organizational slack. Thus, for robustness test, this study employ the mean of equity/assets ratio and liability/assets ratio (SL1) and re-run the regression separately to test the main effect, moderating effect and the co-moderating effect as shown in Model 6 ,Model 7 and Model 8 of Table 4.

Moreover, as ROE (Return of Equity) is another widely used measure of CFP, Model 8 replaced the  $ROA_{t+1}$  with  $ROE_{t+1}$  as the dependent variable. The results of the robustness tests are shown in Table 4, which indicates that when adopting alternatives, the magnitude and significance of the coefficients are similar to the prior regression model results shown in Table 3. Therefore, the results are robust to alternative measures.

Table 4 here

#### 4.4 Endogeneity Controls

To address endogeneity due to simultaneity, reverse causality, and omitted variables, an instrument variable (IV) by two-stage least square method was introduced. According to the paper about the choice and construction of IV published in *Econometrica* (Lewbel 1997),  $(CFP - \text{the mean of CFP}) * (CER - \text{the mean of CER})$  was used as the IV of CER.

A variety of statistical tests was used to verify the validity of the IV. Anderson canon. corr. LM statistic is to test whether the IV and the endogenous variables are relevant. The null hypothesis that the equation is underidentified, the results reject the null hypothesis at the level of 1%. The results of Anderson-Rubin test also reject the null hypothesis that the sum of the endogenous regression coefficients is equal to zero at the 1% level, which further suggests that there is a strong correlation between the IV and endogenous variables. The Cragg-Donald Wald F statistic is to test whether the IV is weak. In general, if the F value is greater than 10, the weak instrument problem can be eliminated. The results are all greater than 29, so the IV is not weak. Last but not least, Hausman test is employed to test whether all the variables are external. The null hypothesis is that there is no difference between OLS and 2SLS, the results reject the null hypothesis at the 1% level, suggesting that the 2SLS is efficient and valid.

The results of 2SLS for the endogeneity controls are show in Table 5, which indicates that when controlling endogenous, the magnitude and significance of the coefficients are similar to the prior regression model results shown in Table 3. Therefore, the results also support H1-H4.

Table 5 here

## 5. Discussion

First, CER has a positive effect on financial performance, which is consistent

with the findings of most scholars such as Clarkson (2011) and Wong et al. (2016), while contrary to Zhao and Murrell (2016) and Testa et al. (2017), who find that doing good may not necessarily lead to doing well. According to Zhao and Murrell (2016) and Testa (2017), engaging in CER leads to the allocation of resources for environmental purpose and reduces the resources invested in the production process, which has a negative impact on profit. However, Jo et al. (2015) suggest that the costs of CER can be offset by long-term revenue. The reason lies in the finding may be that active engagement of CER will help establish a good reputation, meet the needs of stakeholders, attract more investors, thus improving financial performance. It is also an echo of whether it pays to be green in the Chinese-like emerging economies.

Second, the moderating effect of government regulation on the relationship between CER and CFP is significantly positive. Chinese government plays a crucial role in deterring polluters through laws and legislation. Though frequently criticized for compliance problems with these laws and regulations, such as weak enforcement, frequent and unpredictable changes to laws and regulations, leaving environmental laws and regulations only on paper (Du et al. 2014), this research find that government regulation is acting as what it should be, at least since 2012 with the inauguration of the new government, whose leaders, President Xi Jinping and Premier Li Keqiang, commit to strive for a “beautiful China”. If corporate environmentally responsible behaviors are supported by the government, firms may have a stronger awareness that the return on the environmental investment is clear, thus pay more attention to environmental projects to eliminate waste so as to meet the requirements of regulation and even make profit (Harrison and Coombs 2012). Moreover, under stricter environmental regulation, the first mover firms are allowed to gain the price premiums and obtain the access to the new environmentally sensitive markets (Rivera and Oh 2013).

Third, organizational slack has a negative moderating effect on the relationship between CER and CFP, which is in support of agency theory and is in line with the findings of Vanacker et al. (2017), who demonstrate that firms may not allocate slacks efficiently to implement CER. Contrary to the resource-based view, agency theory

hold a hostile view of slack and regard it as a reflection of managerial self-interest and an unnecessary cost (Daniel et al. 2004). From the perspective of agency theory, organizational slack may be used to fulfil the managers' goals such as occupational reputation, closer governmental and media ties, but not the focal firm's profitability. This study also clarifies whether slack is good or bad to CSR.

Fourth, the moderating effect of organizational slack on the relationship between CER and CFP also depends on the degree of government regulation, and stringent government regulation weakens the negative moderating effect of organizational slack between CER and CFP. When government regulation is looser, firms may be reluctant to carry out environmental activities completely on their own, because the competitive pressures always force them to focus primarily on maximizing profits or minimizing costs (Arora and Dharwadkar 2011). But with the enhancement of government regulation, firms, especially those with high organizational slack, do have more pressures and motivation to make efficient use of corporate resources for good environmental performance. Therefore, the advantage of firms with low organizational slack by undertaking CER to improve CFP is weakened.

## **6. Conclusions and Implications**

To explore whether and when it pays to be green in emerging economies, this paper studied the influence of CER on CFP, and explored the moderating effect, as well as the co-moderating effect, of external government regulation and internal organizational slack on the relationship. Selecting 1179 energy-intensive listed companies from 2012 to 2014 in China as observations, it was found that there is a significant positive correlation between CER and CFP, and that the moderating effect of government regulation is significantly positive, while organizational slack has a negative moderating role on the relationship between CER and CFP. Besides, the moderating effect of organizational slack also depends on the degree of government regulation.

## 6.1 Theoretical Contributions

This research offers important contributions to the literature. First, this study echoes to the debate on the association between CER and CFP, in support of a positive relationship, indicating that CER enables firms to be more profitable and “it pays to be green”.

Second, to our knowledge, this is one of very few studies to examine not only the single moderating effect of external government regulation and internal organization slack, but also the joint contingency effects of both the external and internal variables.

Third, this study focuses on Chinese context. Most prior research has been based on developed countries and few explore the relationship of CER and CFP in the Chinese context. China is facing increasingly serious environmental problems with a distinct political and economic context, which is of significant importance to test the generalizability of the western-based theories, and provides additional evidence on CER in emerging economies where environmental protection and regulation enforcement are much weaker than those of developed countries.

## 6.2 Practical Implications

First, the results confirm that “it pays to be green”, indicating firms can achieve both environmental performance and financial performance simultaneously. Thus, enterprises should take environmental protection into consideration while pursuing economic development. They should take the initiative to assume environmental responsibility, perfect corporate environmental management system and environmental governance mechanism, and introduce environmental performance evaluation system. Enterprises can set up environment-related department which specializes in environmental protection and governance.

Second, organizational slack can weaken the relationship between CER and CFP, indicating firms should keep lean and make full use of every penny in environmental protection. They should flatten organizational hierarchies, eliminate duplicate resources across departments, lay off surplus personnel, and restructure debt

obligations to improve operational efficiency.

Third, government regulation is an important approach to ensure CER. The Chinese government should further improve environmental laws and regulations, strengthen government supervision, urging enterprises to undertake more CER. The policy-makers should not only look beyond stringency of environmental regulations but also attach more importance to enacting more stable environmental regulations. Except for fining environmental wrong-doers, the Chinese government should also increase support for those good boys and lower their environmental costs.

Fourth, the co-moderating result indicates that it is necessary to seek a combination of high government regulation and low organizational slack, rather than depending on government action or organizational slack alone. Firms are supposed to arrange appropriate low organizational slack according to the environmental demands from government regulation. The Chinese government should not only highlight the in-depth engagement in corporate environmental operations, but also be more inclined to the proactive environmental firms which devote the slack resources to CER activities more efficiently when providing policy assistance.

### **6.3 Limitations and Future Research Prospects**

This study contains some limitations. First, [this study](#) only explored the relationships between CER and financial performance, with external regulation and internal slack as moderators, but neglecting many other mediating and moderating factors such as industry competition and CEO characteristics. Future research could study deep into the mechanisms and boundaries between CER and CFP. Second, this study adopts data with A-share listed energy-intensive companies for only three years, which is unable to reflect the evolution of CER and its consequences. The use of long-time panel data would be a future direction of following-up studies.

## **Compliance with Ethical Standards**

### **Ethical approval**

This article does not contain any studies with human participants or animals performed by any of the authors.

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**Table 1** Industry Composition of Sampled Firms

Year	2012	2013	2014	Total	Percentage
Manufacture of Raw Chemical Materials and Chemical Products	159	160	166	183	15.52%
Manufacture of Non-metallic Mineral Products	69	69	75	213	18.07%
Smelting and Pressing of Ferrous Metals	28	28	28	84	7.12%
Smelting and Pressing of Non-ferrous Metals	53	54	55	485	41.14%
Petroleum Processing, Coking and Nuclear Fuel Processing	17	17	18	52	4.41%
Production and Supply of Electric Power and Heat Power	60	61	62	162	13.74%
<b>Total</b>	<b>386</b>	<b>389</b>	<b>404</b>	<b>1179</b>	<b>100%</b>

**Table 2** Descriptive statistics and correlations

	Mean	SD	Min	Max	1	2	3	4	5	6	7	8	9	10	11
1.CFP	0.03	0.16	-0.51	4.84	1										
2.CER	13.52	12.10	0	78	0.14***	1									
3.GR	39.93	15.99	11	85	0.10***	-0.05*	1								
4.SL	0.19	0.88	-2.70	4.23	-0.01	-0.20***	0.19***	1							
5.SIZE	22.20	1.54	0.28	26.44	-0.07**	0.36***	-0.09***	-0.45***	1						
6.TOP1	0.37	0.16	0.02	1.95	-0.05*	0.25***	0.01	-0.13***	0.19***	1					
7.OWNER	0.53	0.50	0	1	-0.05*	0.26***	-0.16***	-0.43***	0.42***	0.19***	1				
8.PC	0.44	0.50	0	1	0.01	-0.01	0.06*	0.09***	-0.02	-0.03	-0.15***	1			
9.Violation	0.18	0.38	0	1	-0.03	-0.09***	-0.00	-0.02	-0.09***	-0.09***	-0.05	0.01	1		
10.Reg	0.52	0.50	0	1	0.05	0	0.50***	0.20***	-0.08***	0.02	-0.25***	0.08**	-0.08***	1	
11.ER	0.70	0.10	0.01	0.96	0.04	-0.03	0.06**	0.07**	0.02	0.03	-0.09***	0.06**	-0.04	0.09***	1

Notes: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$  (Two-tailed).  $N = 1179$ .

**Table 3** Regression results

Variables	CFP <sub>t+1</sub>				
	Model1	Model2	Model3	Model4	Model5
CER		0.21***	0.22***	0.17***	0.23***
GR			0.12***	0.10***	0.01
SL			-0.06*	-0.09***	-0.10***
GR×CER				0.19***	0.12***
SL×CER				-0.34***	-0.29***
GR×CER×SL					-0.28***
SIZE	-0.06*	-0.12***	-0.14***	-0.18***	-0.18***
TOP1	-0.05	-0.08***	-0.09***	-0.09***	-0.09***
OWNER	-0.00	-0.03	-0.04	-0.04	-0.05*
PC	0.00	-0.00	-0.00	0.00	0.01
Violation	-0.04	-0.03	-0.03	-0.04	-0.04
Reg	0.04	0.03	-0.03	-0.03	-0.02
ER	0.03	0.04	0.04	0.04	0.05*
Adjusted R <sup>2</sup>	0.01	0.04	0.05	0.18	0.24
F value	1.87	7.35	7.38	22.11	29.49

Notes: \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01 (Two-tailed). N = 1179.

**Table 4** Robustness test

Variables	ROA <sub>t+1</sub>			ROE <sub>t+1</sub>		
	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11
CER	0.22***	0.21***	0.22***	0.07**	0.06*	0.07**
GR	0.11***	0.10***	0.09***	0.08**	0.07**	0.05
SL				-0.01	-0.02	-0.03
SL1	0.01	-0.01	-0.02			
GR×CER		0.14***	0.13***		0.05*	0.03
SL×CER					-0.10***	-0.09***
SL1×CER		-0.10***	-0.07**			
GR×CER×SL						-0.08**
GR×CER×SL1			-0.08**			
SIZE	-0.12***	-0.14***	-0.14***	-0.02	-0.04	-0.04
TOP1	-0.09***	-0.08**	-0.07**	-0.05	-0.05*	-0.05
OT	-0.03	-0.03	-0.03	-0.03	-0.03	-0.04
PC	-0.01	-0.01	-0.00	0.01	0.01	0.01
Violation	-0.03	-0.03	-0.03	-0.05*	-0.05*	-0.05*
Reg	-0.03	-0.03	-0.03	-0.01	-0.02	-0.01
ER	0.04	0.04	0.05	0.10***	0.10***	0.10***
Adjusted R <sup>2</sup>	0.05	0.07	0.08	0.02	0.02	0.03
F value	7.09	8.87	8.73	2.81	3.44	3.69

Notes: \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01 (Two-tailed). N = 1179.

**Table 5** Endogeneity Controls

Variables	CFP <sub>t+1</sub>		
	Model 12	Model 13	Model 14
CER	6.38***	0.70***	1.55***
GR	0.37*	-0.01	-0.22***
SL	0.01	-0.16*	-0.17**
GR×CER		2.30***	0.77***
SL×CER		-1.55***	-0.91***
GR×CER×SL			-0.99***
SIZE	-1.84***	-0.68***	-0.67***
TOP1	-1.15***	-0.07	-0.27***
OT	-0.76***	-0.13	-0.23***
PC	-0.16	-0.03	-0.01
Violation	0.21	-0.01	0.00
Reg	-0.46**	-0.12	-0.09
ER	0.26	0.11	0.12**
Anderson canon. corr. LM statistic	29.52***	82.42***	123.09***
Anderson-Rubin Wald test	6943.19***	2326.84***	1746.19***
Cragg-Donald Wald F statistic	29.99	29.22	33.74
Hausman Chi statistic	28.67***	110.78***	165.35***

Notes: \* p < 0.1; \*\* p < 0.05; \*\*\* p < 0.01 (Two-tailed). N = 1179.

**Appendix 1: Components for measuring corporate environmental information disclosure**

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**A1) Environmental policy information**

1. Green policies, ideas and objectives
2. Environmental initiatives and other condition
3. Management's attitude to environmental behavior
4. The internal control system on environmental protection

**A2) Environmental management activities and initiatives**

1. Organization of environmental management and management regulation
2. Environmental system certification
3. Construction and implementation of CP (cleaner production)
4. Construction and operation of environmental protection facilities
5. Environmental honors or awards
6. Environmental education and training

**A3) Environmental issues and environmental impact**

1. Effects of corporate production and operation on environment
2. Environmental responsibility and potential environmental litigation
3. Information related to environmental accident
4. Pollution costs, such as sewage charges and pollution treatment fee
5. Influence that CER have on financial performance
6. The corporation is belong to a heavy polluting industry referring to the Ministry of

Environmental Protection

**A4) Environment related technology, investment and expenditure**

1. Award for effective environmental governance
  2. The implement of waste recovery and recycling and energy saving and emission reduction
  3. Fix for contaminated sites and treatment on pollutants
  4. Government subsidies and tax relief on environment
  5. Investment in environmental governance, such as green investment, the fund of
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environment recovery and management

**A5) Environmental consumption and pollutant control**

1. Annual consumption of resources (fuels, electricity et.)
2. Types, quantity, concentration, and goals of gas emission
3. Types, quantity, concentration, and goals of effluent
4. Types, quantity and goals of the disposal and governance of solid waste and toxicant

**A6) Corporate environmental performance improvement**

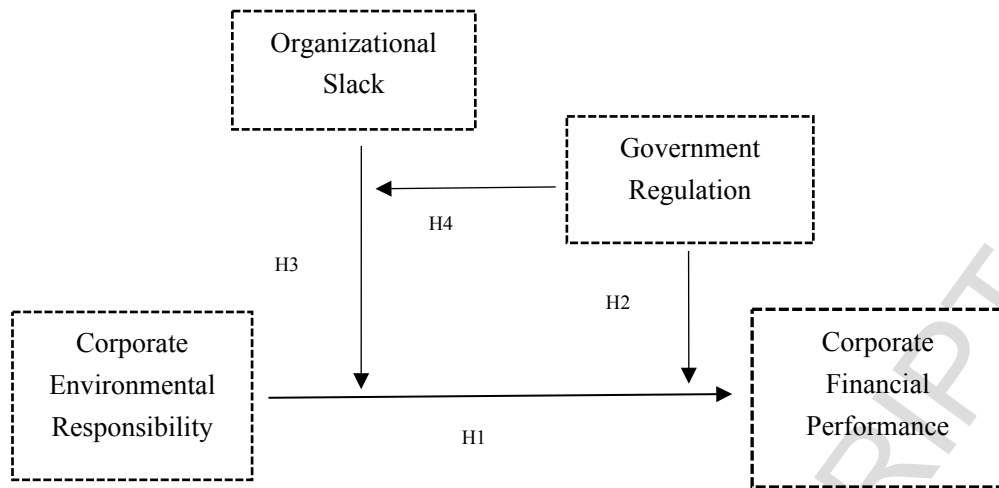
1. Reduction of resources (water, raw materials et.) consumption per product
2. Reduction of pollutant (effluent, exhaust et.) emission
3. Environmental benefits, like income from waste and environmental byproduct
4. Other social or environmental benefits from energy conservation, reduction of pollutant or resource utilization

**A7) Obedience of the environmental law**

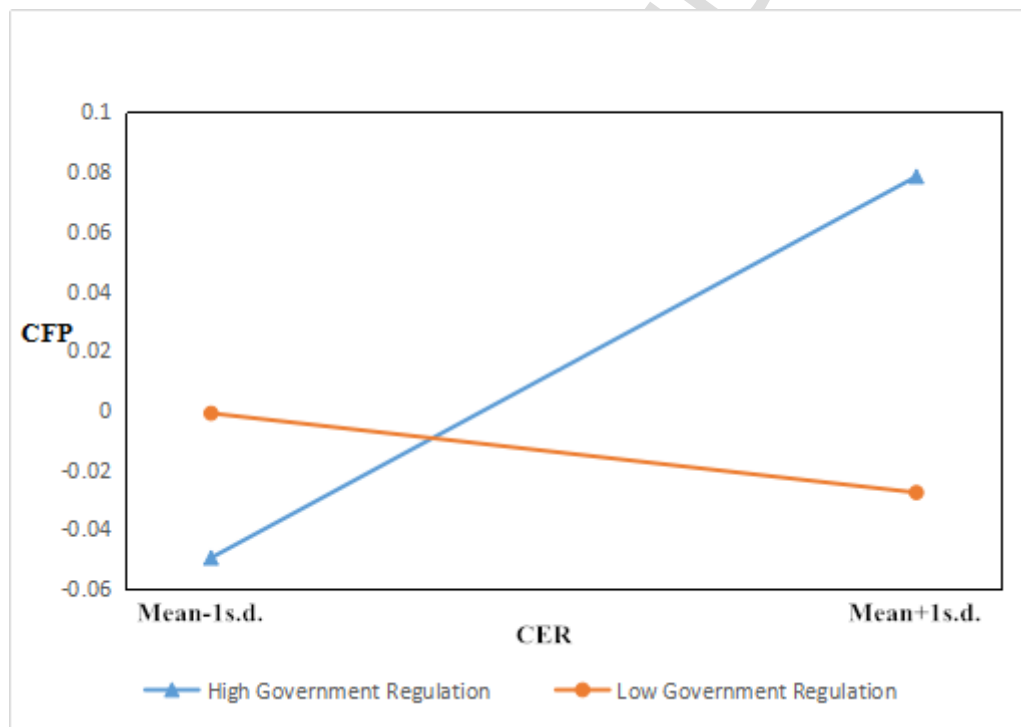
1. Corporate compliance with exhaust limits
2. Corporate compliance with effluent limits
3. Corporate compliance with noise limits
4. Whether or not the disposal of general industry solid waste and hazardous waste is legal
5. Whether or not the safe disposal of toxic substances or hazardous wastes is legal
6. Whether or not the charge of pollutant discharge permit is paid on time

**A8) Environmental charity and other information**

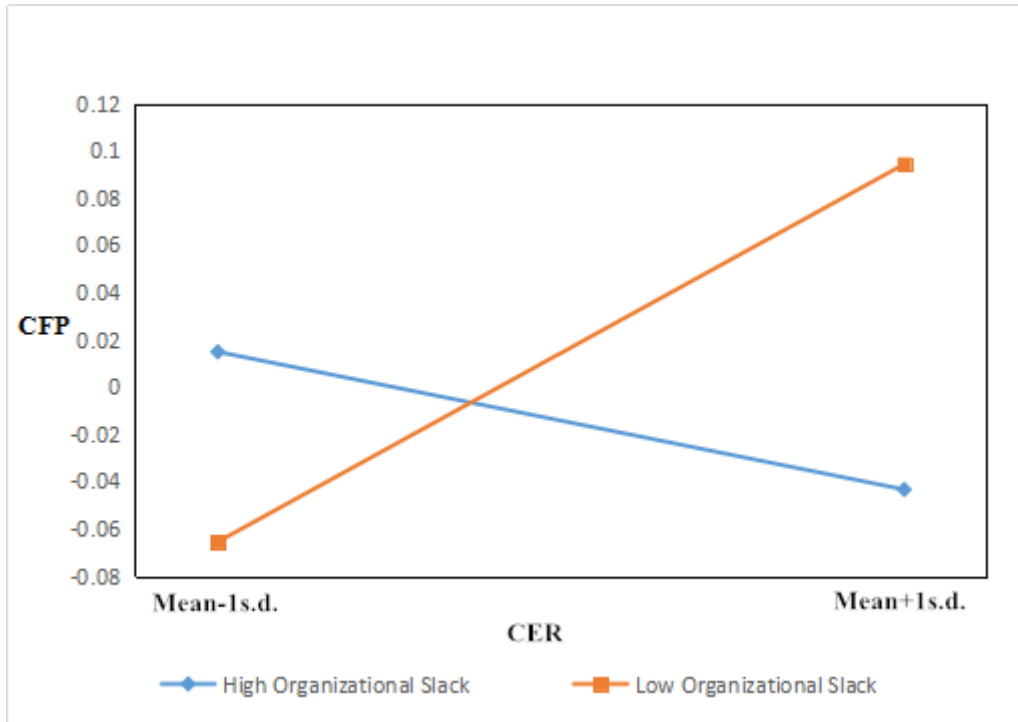
1. Environmental charity, for example, environmental education, afforestation
  2. Potential environmental impacts, such as global warming, acid rain, water eutrophication and so on
  3. Other environmental information
-



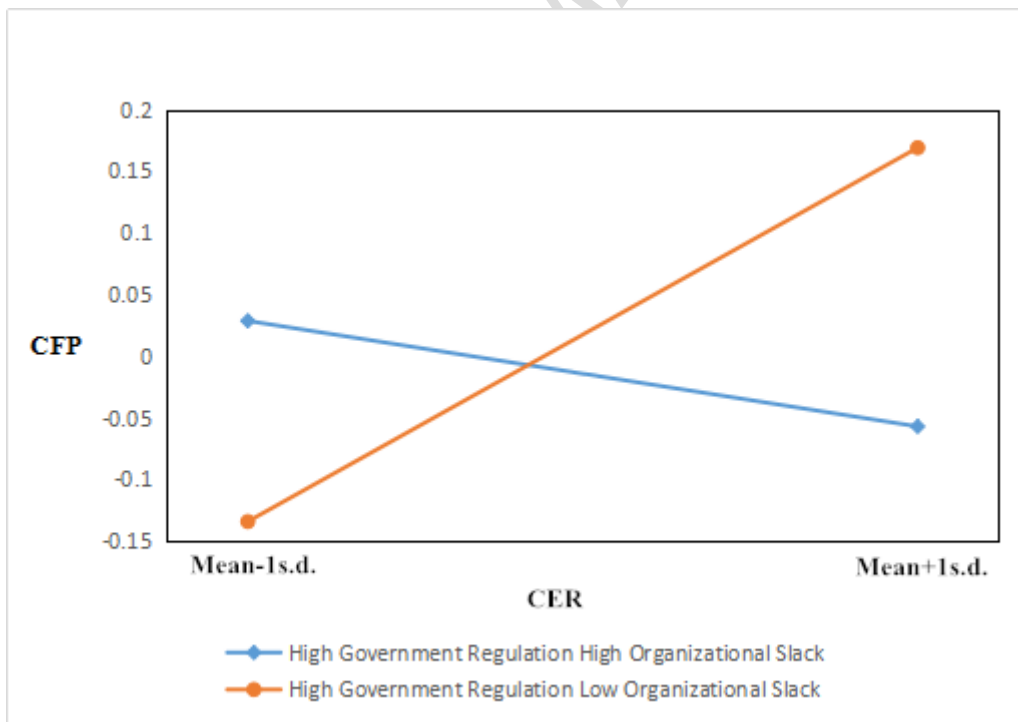
**Fig. 1** The conceptual model



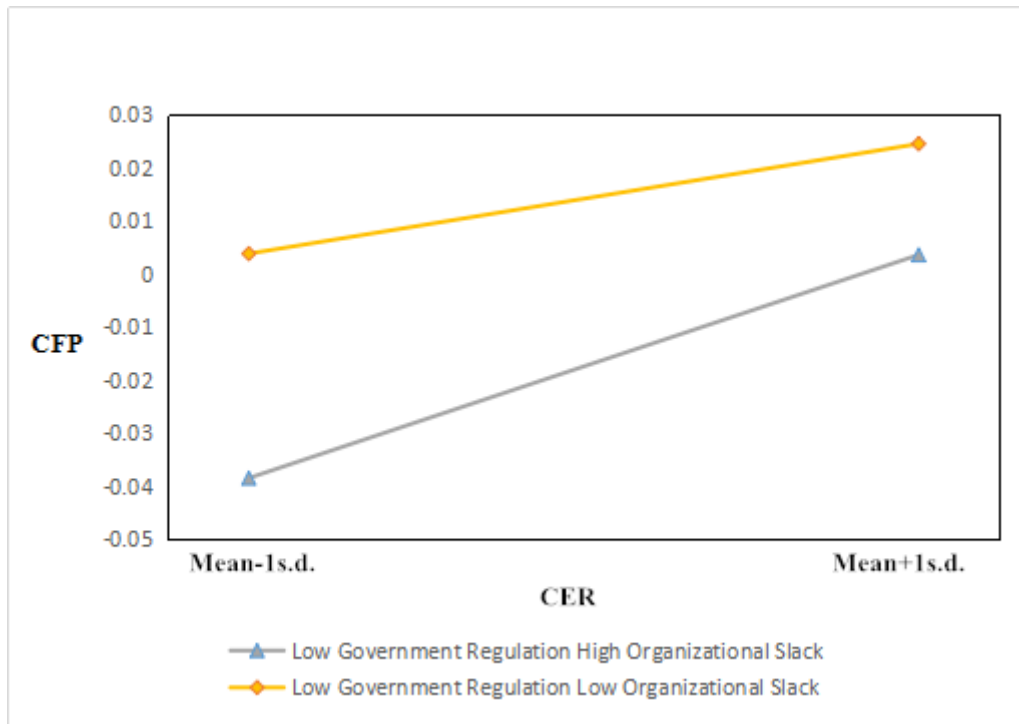
**Fig. 2** The moderating effect of government regulation



**Fig. 3** The moderating effect of organization slack



**Fig. 4** The co-moderating effect of government regulation and organization slack (High regulation)



**Fig. 5** The co-moderating effect of government regulation and organization slack (Low regulation)

## Highlights

The influencing mechanism of corporate environmental responsibility and corporate financial performance is explored in China.

Corporate environmental responsibility significantly positively influences corporate financial performance.

The moderating effect of government regulation on the relationship between corporate environmental responsibility and corporate financial performance is not significant.

Organization slack has a negative moderating effect on the relationship between corporate environmental responsibility and corporate financial performance.

The moderating effect of organizational slack also depends on the degree of government regulation.