The Promoting Effect or Inhibition Effect? Executives' Educational Level on Corporate Social Responsibility in Chemical Industry

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Chemical industry is the industrial foundation in China. The corporate social responsibility and executives' educational level are the hot topics in the field of chemical industry and accounting. Based on the upper echelons theory and stakeholder theory, this paper takes the A-share listed companies in the chemical industry disclosing social responsibility reports in Shanghai and Shenzhen stock markets in China during 2009-2015 as samples, and uses the system GMM method to carry out empirical analysis on the dynamic inter-temporal effects of executives' educational level on corporate social responsibility. The results show that the executives' educational level lagging two phases has a significant positive effect on the current corporate social responsibility, the executives' educational level of the listed companies in China's chemical industry plays a promoting effect on corporate social responsibility.

1. Introduction

With the rapid development of low-carbon economy and the acceleration of economic globalization, a number of social and natural problems such as corruption, employment difficulties, gap between the rich and the poor, terrorism, energy crisis, environmental pollution and global warming, etc., making enterprise and society increasingly intertwined and mutually influential. The business environment for enterprises has changed to a multiplex environment, where the society and the public are raising higher and higher requirements for enterprises. Based on the upper echelon theory, executives' decisions are influenced by the individual background of executives. Executives' education level and other unique backgrounds have contributed to the formation of their unique values, cultural concepts, etc. All these complex factors affect the decision-making and behaviors of senior executives, thus affecting the corporate social responsibility. Recently, a paradox has emerged in the studies of executives' education level and corporate social responsibility: executives' education level in chemical industry is to promote corporate social responsibility or inhibit corporate social responsibility? Chemical industry belongs to the basic raw material production industry in China, and there is a current situation of low efficiency of resource consumption, serious environmental pollution and frequent safety accidents. The corporate social responsibility in the chemical industry is the most important of all the industries in China. The above paradox is particularly prominent in the listed companies of chemical industry, so we have important practical significance to study the impact of executives' education level on corporate social responsibility in chemical industry.

2. Theoretical Analysis and Research Hypotheses

According to the upper echelons theory, the higher the level of education is, the stronger the executives' adaptive capacity and handling capacity in a complicated environment is. The education level of an individual has an important effect on his/her values and cognitive competence, which will further affect his/her assumption of social responsibility in the chemical industry. The values of executives have an important influence on the managers' decisions (Hambrick, 1984). At present, both the government and the society are calling on enterprises in the chemical industry to fulfill their social responsibility. The requirements towards

enterprises in the chemical industry tend to be diversified. In the face of a more complex market environment, executives with higher education levels tend to be more capable of balancing interests of various parties in decision-making, and are more inclined to take on more corporate social responsibility.

The higher the education level of executives in the chemical industry is, the more likely they are to meet their own needs by assuming corporate social responsibility. Executives in the chemical industry with high level of education think about a problem more comprehensively. They will consider the long-term development of enterprises, not only focusing on short-term interests. Education and personal experience have a positive impact on corporate social responsibility (Manner, 2010).

The principal-agent theory holds that the performing of CSR is essentially the individual behavior of the manager relying on the power and resources entrusted by the principal (Friedman, 1970). Executives are keen to improve their social status by fulfilling social responsibilities, thus creating a favorable personal development outlook (Galaskiewiez and Burt, 1991). Executives with high education level in the chemical industry pay more attention to their social status and development prospects, so they will pay more attention to performing the corporate social responsibility. Even some enterprise system in the chemical industry clearly requires enterprises to fulfill and disclose their corporate social responsibility. Under this background, the executive's motivation of pursuing individual development has a big impact on the fulfillment of social responsibility in the chemical industry. Executives with low education level in the chemical industry tend to pursuit profits and other short-term economic benefits, so there is uncertainty for them to fulfill corporate social responsibility. Therefore, the executive's motivation of pursuing individual development has a minor impact on the fulfillment of social responsibility in the chemical industry. Accordingly, the following competitive hypothesis is proposed:

H1A: The executives' educational level in the chemical industry has a promoting effect on corporate social responsibility.

H1B: The executives' educational level in the chemical industry has an inhibition effect on corporate social responsibility.

3. Research Methods

3.1 Samples and data collection

This paper takes the A-share listed companies in the chemical industry that disclosed social responsibility information disclosure reports in Shanghai and Shenzhen stock markets from 2009 to 2015 as the research samples and screen them according to the following criteria: (1) excluding companies with significantly abnormal variable values; (2) excluding ST and * ST companies; (3) excluding companies whose financial data are unavailable. After screening, a total of 1736 observations over 7 years are obtained. Corporate social responsibility data are sourced from the Rankins CSR Ratings (RKS) MCT database and other variables are from the WIND financial database and the CSMAR database. Analysis tools are EXCEL2013 and Stata14 software.

3.2 Variable Measurement

3.2.1 Corporate Social Responsibility

Rankins CSR Ratings (RKS) is an authoritative third-party rating agency for corporate social responsibility in China. It independently developed the first social responsibility reporting evaluation tool in China and its ratings indirectly measure the performance and disclosure of corporate social responsibilities reflected in the corporate social responsibility report. Due to the independency, professionalism, authority and openness of the RKS rating, RKS has been widely accepted and applied by scholars in related research. This rating system has referred to the latest international authoritative social responsibility standard ISO26000. Considering the industry differences, it has set up an industry indicator - I value and classifies listed companies into 22 categories according to the CSR industry classification standards.

3.2.2 Executives' Education Level

The education level of executives can be divided into technical secondary education or below, post-secondary education, undergraduate education, master education, doctor education or above, which are assigned the value of 1-6. The mean value is calculated and taken as the variable of executive's education level.

3.2.3 Control variables

According to relevant research, this paper considers control variables such as company size, corporate value, financial risk, operational risk, financial resource, growth, P&L status, Audit cost, Audit opinion, controller type, independent directors, audit committee, Equity concentration, institutional ownership, executive compensation,

management shareholding.

3.3 Establishment of the empirical model

The lagged term of the dependent variable in the dynamic model can satisfy the integrity of information if it lags for just two phases (Glen et al., 2001; Gschwandtner, 2005; Wintoki et al., 2012; Zhang et al., 2013). According to their approach, in order to test the dynamic inter-temporal effect of executives' educational level on corporate social responsibility, this paper constructs a dynamic model, with two lag phases:

$$\begin{aligned}
\text{CSR}_{i,t} &= \alpha_0 + \alpha_1 \text{Edu}_{i,t} + \alpha_2 \text{CSR}_{i,t-1} + \alpha_3 \text{CSR}_{i,t-2} + \alpha_4 \text{Size}_{i,t} + \alpha_5 \text{TBQ}_{i,t} + \alpha_6 \text{Debt}_{i,t} + \alpha_7 \text{B\_risk}_{i,t} + \alpha_8 \text{Growth}_{i,t} \\
&+ \alpha_9 \text{earn}_{i,t} + \alpha_{10} \text{big\_4}_{i,t} + \alpha_{11} \text{Re p}_{i,t} + \alpha_{12} \text{controller}_{i,t} + \alpha_{13} \text{r\_Indepe}_{i,t} + \alpha_{14} \text{T\_O}_{i,t} + \alpha_{15} \text{Aud\_c}_{i,t} + \alpha_{16} \text{H\_l}_{i,t} \\
&+ \alpha_{17} \text{Ins}_{i,t} + \alpha_{18} \text{E\_com}_{i,t} + \alpha_{19} \text{ESR}_{i,t} + \alpha_{20} \varepsilon_{i,t}
\end{aligned} \tag{1}$$

4. Empirical Analysis

4.1 Descriptive statistics of variables

First, descriptive statistical analysis is performed on each variable in the model and the results are shown in Table 1, Figure 1and Figure 2. As can be seen, the mean value of the corporate social responsibility (CSR) is 38.1068 (total score is 100), indicating that the overall performance of the sample companies in social responsibility is not good and needs to be further strengthened; the maximum value is 87.9478 and the minimum value is 13.33, indicating that there are large differences in the awareness and behaviors of social responsibility among sample companies. The mean value of executive's education level is 3.5274, indicating fairly sound education level of executives with sample companies. The maximum value is 5 and minimum value is 1.43, suggesting great gap between sample companies in terms of the education level of executives. Regarding the main control variables, the average shareholding ratio of the largest shareholder is 38.6585%, which indicates that the equities of listed companies are relatively concentrated; the average asset-liability ratio is 49.5979%, indicating that the average debt level of listed companies is medium; loss making companies account for 14.02% of the total samples, indicating that about 86% of the sample companies are profitable; the average growth rate of companies is 13.0646%, indicating the average growth rate of the operating income of the companies is high; state-owned companies account for 63.71% of the total samples, indicating that more than two-thirds of the samples are state-owned. Among the control variables, financial risks, company growth, proportion of independent directors, equity concentration, proportion of shares held by organizations and shareholding ratio of senior executives have very large differences between the maximum and minimum values. In order to reduce the effects of abnormal values on the empirical results, this paper Winsorizes each continuous variable by 1% up and down.
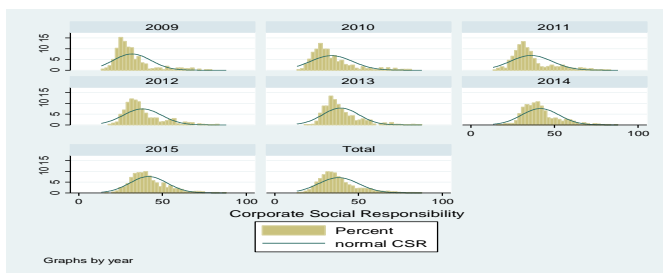

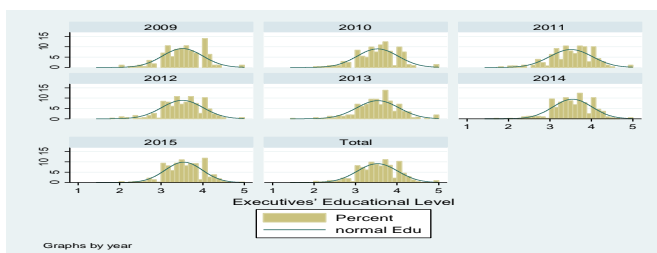Figure 1: Distribution of Corporate Social Responsibility

Figure 2: Distribution of Executives' Educational Level

Table 1: Descriptive statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
CSR	1736	38.1068	11.9702	13.33	87.9478
Edu	1736	3.5274	0.4873	1.43	5
Size	1736	22.9433	1.4363	19.5411	28.5087
TBQ	1736	1.9448	1.2962	0.6992	20.3643
Debt	1736	49.5979	20.1008	0.7969	134.4746
B_risk	1736	0.7265	0.5737	0.0015	7.8714
Growth	1736	13.0646	34.6130	-95.3214	729.2267
earn	1736	0.1402	0.3473	0	1
big_4	1736	0.1531	0.3601	0	1
Rep	1736	0.9905	0.0973	0	1
controller	1736	0.6371	0.4809	0	1
r_Indepe	1736	37.326	5.9855	9.0909	80
T_O	1736	0.1574	0.3643	0	1
Aud_c	1736	0.9318	0.2521	0	1
H_1	1736	38.6585	16.2991	0.502	86.35
Ins	1736	49.2583	22.6697	0	98.4892
E_com	1736	14.3919	0.7119	12.2096	17.3525
ESR	1736	2.748	9.059	0	84.325

4.2 Correlation analysis of major variables

Table 2 report the test results of the correlation between the executives' education level and corporate social responsibility. The executives' education level and corporate social responsibility are significantly positively correlated at the level of 1%, signifying the higher the education level of the executive is, the better the enterprise will perform its social responsibility. This preliminarily support H1A.

Table 2: Pearson correlation analysis of key variables

	CSR	Edu
CSR	1	
Edu	0.2659***	1

$^*p<0.1$, $^{**}p<0.05$, $^{***}p<0.01$

4.3 Regression analysis of the effect of executive's education level on corporate social responsibility

In order to test the inter-temporal effect of executive's education level on corporate social responsibility, we use system GMM method and take executive's education level in the current phase, executive's education level lagging by one phase and two phases as independent variables in model for regression analysis.

Table 3 shows the regression results of Model. After considering the inter-temporal influence of executive's education level on corporate social responsibility, this paper uses the system GMM method to perform regression analysis and finds that the executive's education level in the current phase and lagging by one phase has no significant influence on corporate social responsibility, and that the executive's education level lagging by two phases has a significant positive influence on corporate social responsibility at the significance level of 5%. This may be because it takes some time for the impact of executive's education level on the corporate social responsibility fulfillment to emerge and it also takes some time after the executive's decisions exert impact on the corporate social responsibility. Executives with higher education level in the chemical industry tend to assume more social responsibility, always lagging two phases, rather than lagging one phase or at current period. This is not consistent with the idea that the education level of top management team has no significant impact on corporate social responsibility (Wang, 2016), because her research does not consider the cross-time impact of the two. In the aspect of control variables, the surplus-deficit status, executives' shareholding ratio lagging one phase, and the audit committee are significantly negatively correlated to corporate social responsibility, and the correlation between other control variables and corporate social responsibility are not significant. This also preliminarily support H1A.

4.4 Robustness test

In order to test the reliability of the research conclusions, this paper performs robustness test in the following aspects: Considering domestic and foreign studies haven't found a relatively correct and consistent method for CSR measurement, in order to reduce the influence of variable metric to the research conclusion, this paper uses social contribution per share (Shen, 2011) to test the robustness of the CSR measurement. It is basically

consistent between the robustness testing result with system GMM regression method and the above regression result of RKS (Due to space limitation, this regression result is omitted herein).

Table 3: Regression Result of Executive's Education Level on CSR

Dependent Variable	CSR	CSR	CSR
Edu	-1.764		
	(-1.24)		
Edu_{t-1}		1.055	
		(1.22)	
Edu_{t-2}			2.56**
			(2.32)
TBQ	-1.241**	-0.5	-0.168
	(-2.05)	(-0.87)	(-0.33)
TBQ_{t-1}	0.707	0.356	-0.369
	(0.68)	(0.38)	(-0.41)
TBQ_{t-2}	-0.787	-0.748	-0.68
	(-1.38)	(-1.46)	(-1.46)
E_com	1.774	0.317	-2.868
	(0.57)	(0.10)	(-1.00)
E_com_{t-1}	-4.945	-4.627	-2.050
	(-1.57)	(-1.62)	(-0.82)
E_com_{t-2}	3.002	2.869	2.946
	(1.35)	(1.43)	(1.52)
ESR	0.556*	0.200	0.312
	(1.80)	(0.74)	(1.16)
ESR_{t-1}	-0.637**	-0.541*	-0.596**
	(-2.02)	(-1.93)	(-2.09)
ESR_{t-2}	0.0268	0.174	0.233
	(0.21)	(1.62)	(1.39)
Size	-0.229	-0.215	-0.161
	(-0.16)	(-0.17)	(-0.14)
Debt	-0.057	-0.038	-0.058
	(-1.31)	(-0.92)	(-1.43)
B_risk	2.186	1.489	2.227
	(0.86)	(0.65)	(0.99)
Growth	-0.015	-0.006	0.004
	(-1.41)	(-0.62)	(0.39)
earn	-1.445*	-1.968***	-1.365**
	(-1.76)	(-2.62)	(-1.99)
big_4	0.337	1.101	0.112
	(0.19)	(0.74)	(0.08)
Rep	-1.036	-0.723	-0.581
	(-0.99)	(-0.81)	(-0.65)
controller	1.171	1.490	2.675
	(0.26)	(0.38)	(0.76)
r_Indepe	-0.08	-0.074	-0.03
	(-1.24)	(-1.24)	(-0.50)
T_O	-1.399	-0.639	-1.692
	(-0.81)	(-0.43)	(-1.25)
Aud_c	-0.97	-1.505**	-1.078**
	(-1.49)	(-2.54)	(-1.97)
H_1	-0.033	-0.036	-0.025
	(-0.56)	(-0.65)	(-0.46)
Ins	-0.017	-0.021	-0.025
	(-0.75)	(-0.97)	(-1.22)
Constant	35.36	44.04*	42.69*
	(1.55)	(1.86)	(1.72)
CSR_{t-1}	0.758***	0.721***	0.726***
	(12.91)	(12.94)	(12.16)
CSR_{t-2}	0.029	0.019	0.015
	(0.61)	(0.46)	(0.38)
Wald(p value)	285.36	233.65	240.59
	(0.0000)	(0.0000)	(0.0000)
AR(1)(p value)	0.0000	0.0000	0.0000
AR(2)(p value)	0.8786	0.9701	0.7665
Sargan(p value)	0.2681	0.141	0.0578
N	1138	1105	1099

t statistics in parentheses; *p<0.1, **p<0.05, ***p<0.01

5. Conclusions

Based on the upper echelons theory and stakeholder theory, and applying the System GMM method, this paper empirically analyzes the dynamic inter-temporal effects of executives' educational level on corporate social responsibility., with the research samples collected from the A-share listed companies in the chemical industry on the Shanghai and Shenzhen Stock Exchanges that disclosed their social responsibility information reports within the period of 2009 to 2015. Research results show that the executives' educational level lagging two phases has a significant positive effect on the current corporate social responsibility, the executives' educational level of the listed companies in China's chemical industry plays a promoting effect on corporate social responsibility. These results show that in the study of the impact of executives' education level on corporate social responsibility in the chemical industry, the inter-temporal effect between the two must be taken into consideration respectively, otherwise, it will be difficult to draw reliable conclusions. At the same time, these research conclusions help us deeply understand the impact of executives' education level on corporate social responsibility and are of enlightening significance for the enterprise in the chemical industry to understand the function of executive education, to raise the sense of social responsibility and to fulfill the social responsibility consciously.

On final note, the samples selected in this paper are listed companies in the chemical industry which disclose their social responsibility information reports to the public, which may have some limitations. Regarding this problem, we will try to include listed companies in the chemical industry which do not disclose their social responsibility information reports for more comprehensive analysis in our future research.

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