

# How does Directors' and Officers' Liability Insurance Impact Corporate Social Responsibility

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**Abstract:** The financial fraud incident of Luckin Coffee has caused more and more attention to directors' and officers' liability insurance in China. This study investigates how does directors' and officers' liability insurance (D&O insurance) impact corporate social responsibility. With the data of listed firms in the China stock market from 2010 to 2017, it can be found that companies purchasing D&O insurance performed better on corporate social responsibility than those without D&O insurance, which plays an important role in the long-term development of the company. Moreover, corporate social responsibility information is conducive to the impact of D&O insurance in reducing future stock price crash risk.

## 1. Introduction

Directors' and officers' liability insurance ("D&O insurance") is a liability cover for company directors and managers to protect them from claims, which may arise from the decisions and actions taken within the scope of their regular duties. As a critical component of corporate governance for public companies, D&O insurance has gained increasing popularity around the world. However, compared to North America and Europe where the coverage is prevalent, the demand for D&O insurance in emerging markets, in general, is substantially lower [1].

Corporate social responsibility (CSR) means that while creating profits and assuming legal responsibilities to shareholders and employees, companies must also assume responsibilities to consumers, communities and the environment. CSR requires companies to go beyond the traditional concept of making profits as the only goal, and emphasizes the focus on human value in the production process emphasizes the contribution to the environment, consumers and society.

The implementation of CSR can establish a good reputation and image for the company's competitiveness and social responsibility, thereby enhancing the company's brand image, obtaining a good impression of the company from all stakeholders, enhancing investor confidence, and attracting companies more easily. Excellent talents are needed, and retaining talents, is conducive to the long-term development of the company. D&O insurance is to protect a firm's directors and officers from personal liability that may stem from litigation brought by shareholders or other stakeholders (e.g., creditors) [2]. First, from the corporate governance perspective, governance quality can be strengthened and improved by D&O insurance. Moreover, the proactive monitoring function of D&O insurance can further reduce agency costs, enhance stakeholder protection mechanisms, and thus improve corporate governance [3].

## 2. Hypotheses development

We relate this study to D&O insurance and CSR. Based on the legitimacy theory, firms that engage CSR activities are more likely to meet the public expectations of the community. They are more likely to address the long-run value creation with low firm risk, which can increase market confidence and trading volume [4]. As such, we posit that D&O insurance can help implement CSR and therefore state the first hypothesis as follows:

H1: The participation of D&O insurance can improve the CSR of a given firm.

H2: CSR information can help directors' liability insurance reduces stock price crash risk.

## 3. Data selection, analysis and research design

### 3.1 Sample selection and variables

To test the above hypothesis, we choose a series of endogenous variables for the analysis.

We select the Chinese A-share listed companies in the Shanghai Stock Exchange and Shenzhen Stock Exchange from 2010 to 2017 as the initial research samples. To ensure the accuracy of the data, we exclude the samples of the financial and insurance industry and companies with CSR score less than 0 or with deficiencies. After the overhead screening, 10,209 valid samples are obtained, as shown in Table 1.

Table 1. The number of observations in each year.

Overall year	Between	Within			
	Freq.	Percent	Freq.	Percent	Percent
2010	1242	12.17	1242	75.41	15.06
2011	1405	13.76	1405	85.31	15.29
2012	1487	14.57	1487	90.29	15.61
2013	1485	14.55	1485	90.16	15.65
2014	1475	14.45	1475	89.56	16.10
2015	1511	14.80	1511	91.74	17.06
2016	1494	14.63	1494	90.71	17.75
2017	110	1.080	110	6.680	18.32
Total	10209	100	10209	619.9	16.13
(n	=	1647)			

### 3.2 Model specification

In order to control the influence of outliers, we adopt 1% and 99% subdivisions of continuous variables, and process upper and lower 1% extreme value with winsorise. Winsorise replaces a value that is outside a variable's specific percentile range with its specific percentile value. The data for this article come from multiple databases. D&O insurance data are compiled and sorted manually by using Stata. CSR data is obtained from the HeXun website, and alternative indicators are from Guotai'an database.

In order to identify variables that could explain the relationship between CSR performance, D&O, and others, following the previous study [5], we design a linear multiple regression model. This model illustrates the relationship between the dependent variable CRS and the independent variables, where  $\beta_i$  represents regression coefficients;  $\varepsilon$  is an error term. The detailed explanations for each variable are provided in Table 2.

Table 2. Independent Variables.

Variable Name	Variable description	Comment
CSR	Corporate Social Responsibility Index	
Shareholder	Shareholders responsibility	
Employee	Employees responsibility	
Suppliersc	Supplier customer and consumer rights	
Environment	Environmental responsibility	
Social	Social responsibility	
Do	Directors' liability insurance	Purchased D&O 1; otherwise 0
Size	Company's total assets	Log of total assets
Board	Board size	
Supervisor	Supervisory board size	
Independent	Proportion of independent directors	
Dum gender	Gender	
In age	Age	Take the natural log of the company years +1
Isduality	Controlled by director or CEO	Director or CEO 1; otherwise 0
Lev	Financial risk	Total liabilities at the end divided by total assets
ROA	Profitability	Company's EBIT divided by its total assets
Tobinq	Ability to grow the company	Company's total market value divided by the total assets
CAPEX	Capital expenditure	Capital expenditure divided by total assets
PPE	Property, plant and equipment	
Sale	Sale	
CashSD	CashSD	
In Cage	In Cage	
Instown	Shareholding ratio of institutional investors	
Govown	State shareholding share	
QFII	Qualified foreign institutions responsibility for investment and shareholding	
EXEOWN	Executive shareholding ratio	
Big4	Big Four accounting firms	Big Four accounting firms 1; otherwise 0
SOE	State-Owned Enterprise	State-owned enterprise 1; otherwise 0
Cross list	Cross-Listed Enterprise	Cross-Listed Enterprise 1; otherwise 0
IsRelatedTrading	IsRelatedTrading	Is Related Trading 1; otherwise 0

The linear multiple regression model is constructed as follows:

$$\begin{aligned}
 & CSR_i \\
 &= \beta_0 + \beta_1 Shareholder_i + \beta_2 Employee_i + \beta_3 Suppliersc_i \\
 &+ \beta_4 environment_i + \beta_5 Social_i + \beta_6 doi + \beta_7 size_i \\
 &+ \beta_8 board_i + \beta_9 supervisor_i + \beta_{10} independent_i + \beta_{11} dum\ gender_i \\
 &+ \beta_{12} in\ age_i + \beta_{13} isduality_i + \beta_{14} Levi + \beta_{15} ROA_i \\
 &+ \beta_{16} tobinq_i + \beta_{17} CAPEX_i + \beta_{18} PPE_i \\
 &+ \beta_{19} Sale_i + \beta_{20} CashSD_i + \beta_{21} In\ Cage_i + \beta_{22} Instown_i \\
 &+ \beta_{23} govown_i + \beta_{24} QFII_i + \beta_{25} EXEOWN_i + \beta_{26} big4_i \\
 &+ \beta_{27} SOE_i + \beta_{28} cross\ list_i + \beta_{29} IsRelatedTrading_i + \epsilon_i
 \end{aligned}$$

### 3.3 Descriptive Analysis before Winsor zing

Table 3 reports the results of a descriptive statistical analysis of the main variables. It can be observed that the mean value of CRS is 26.86. This indicates that the overall performance of CSR is relatively low, although CSR scores are widely distributed, with a maximum of 90.87 and a minimum of -17.19. CSR's standard deviation is 19.07, which indicates that there are significant differences in CSR performance. D&O insurance purchase rate is 6% in China. There is a huge difference comparing with the United States 95% and Canada 75% [6]. Size mean is 22.04. A larger board size may make board decisions more professional and representative [5]. Lev is 47%. Profitability (Roa) has mean 4%. The maximum and minimum values are respectively 108.4 and -43.82. This shows that the earnings level of these companies uneven with a huge gap. Standard Deviation in tobinq is 19.35, and it is not a stable value. The firms in our data have an average big4 ratio of 0.0500, an average SOE of 0.140, an average cross list ratio of 0.0400, and an average related trading ratio of 0.520.

Descriptive statistics for other variables are also listed in Table 3.

Table 3. Summary statistics before winsorizing.

variable	N	mean	sd	p50	min	max
CSR	10209	26.86	19.07	21.81	-17.19	90.87
Shareholder	10209	13.34	6.340	13.91	-13.12	28.19
Employee	10209	3.270	3.700	1.740	-0.0200	15
Suppliersc	10209	2.660	5.650	0	0	20
environment	10209	2.700	6.050	0	0	30
Social	10209	4.900	4.740	4.390	-15	30
do	10209	0.0600	0.240	0	0	1
size	10209	22.04	1.270	21.88	13.76	28.04
board	10209	8.820	1.770	9	3	18
supervisor	10209	3.640	1.120	3	1	14
independent	10209	0.370	0.0500	0.330	0.180	0.750
dum gender	10209	0.850	0.360	1	0	1
ln age	10209	3.900	0.170	3.910	3.040	4.450
isduality	10209	0.0400	0.180	0	0	1
Lev	10209	0.470	0.720	0.450	-0.190	63.97
ROA	10209	0.0400	1.200	0.0300	-48.32	108.4
tobinq	10209	2.640	19.35	1.680	0.150	1753
CAPEX	10209	0.0500	0.0500	0.0400	0	0.640
PPE	10209	0.240	0.170	0.200	0	0.950
sale	10209	0.660	0.540	0.540	0	8.790
CashSD	10209	0.0600	0.0900	0.0500	0	3.540
ln Cage	10209	2.650	0.430	2.710	0	3.890
lnstown	10209	0.0300	0.0500	0.0200	0	0.610
govown	10209	0.120	0.490	0	0	13.80
QFII	10209	0	0	0	0	0.120
EXEOWN	10209	0.210	0.530	0	0	8.060
big4	10209	0.0500	0.210	0	0	1
SOE	10209	0.140	0.340	0	0	1
cross list	10209	0.0400	0.210	0	0	1
IsRelatedTrading	10209	0.520	0.500	1	0	1

### 3.4 Descriptive Analysis after Winsorizing

Table 4 shows the data after we do winsorize processing. Winsorize stabilizes most of the data after removing some extreme values. The influence of extreme value on peak skewness

Variables with a significance level above 0.1 in logit regression are deleted, and samples with a significance level below 0.1 are retained. In some of the variables, we find significant differences between Table 3. There are no changes in the CSR and D&O insurance purchase rate. Size mean number has little change that increases to 22.05. Lev decreases to 45%. Profitability (Roa) has mean 4%. However, the maximum and minimum values in Roa change to -0.180 and 0.200. After Winsorize, the gap between these companies narrowed significantly. Standard Deviation in tobinq decreases to 1.610, which shows a stable value. The firms in data have an average big4 ratio of 0.0500, an average SOE of 0.140 (It reflects that under the current institutional background of China, state-owned enterprises do not play an important role in CSR). Nonetheless, recent empirical evidence from other studies suggests that most corporate environmental disclosures in China are still government-oriented, rather than satisfying creditors, consumers or other shareholders [7]. If the government reduces the state-owned shareholding of state-owned enterprises, the supervision and influence of state-owned enterprises on enterprise management will also be reduced, so the contribution rate of enterprises to social responsibility is not high [8]. An average cross list ratio is 0.0400. An average related trading ratio is 0.520, which is the same data as before Winsorize.

Table 4. Summary statistics after winsorizing.

variable	N	mean	sd	p50	min	max
CSR	10209	26.86	18.90	21.81	-4.090	76.96
Shareholder	10209	13.36	6.230	13.91	-2.970	25.03
Employee	10209	3.270	3.700	1.740	0	15
Suppliersc	10209	2.660	5.650	0	0	20
environment	10209	2.680	5.980	0	0	23
Social	10209	4.880	4.440	4.390	-7.890	17.45
do	10209	0.0600	0.240	0	0	1
size	10209	22.05	1.220	21.88	19.51	25.69
board	10209	8.810	1.740	9	5	15
supervisor	10209	3.640	1.060	3	3	7
independent	10209	0.370	0.0500	0.330	0.330	0.570
dum gender	10209	0.850	0.360	1	0	1
ln age	10209	3.900	0.170	3.910	3.430	4.290
isduality	10209	0.0400	0.180	0	0	1
Lev	10209	0.450	0.220	0.450	0.0500	0.940
ROA	10209	0.0400	0.0500	0.0300	-0.180	0.200
tobinq	10209	2.220	1.610	1.680	0.920	10.99
CAPEX	10209	0.0500	0.0500	0.0400	0	0.250
PPE	10209	0.230	0.170	0.200	0	0.730
sale	10209	0.640	0.450	0.540	0.0600	2.610
CashSD	10209	0.0600	0.0400	0.0500	0.0100	0.220
ln Cage	10209	2.650	0.420	2.710	1.100	3.330
Instown	10209	0.0300	0.0400	0.0200	0	0.210
govown	10209	0.100	0.340	0	0	2.200
QFII	10209	0	0	0	0	0.0200
EXEOWN	10209	0.200	0.490	0	0	2.640
big4	10209	0.0500	0.210	0	0	1
SOE	10209	0.140	0.340	0	0	1
cross list	10209	0.0400	0.210	0	0	1
IsRelatedTrading	10209	0.520	0.500	1	0	1

### 3.5 Correlation Analysis

We calculate the Pearson Correlation Coefficients among five different groups of dependent variables and other independent variables.

Among all five groups, the first group of the correlation coefficient matrix has the maximum Pearson correlation coefficient of 0.874 between suppliers and CSR. We think it could generally consider a correlation effect. In addition, in terms of popularity and public supervision, a large number of studies have shown that consumer brands are more susceptible to CSR pressure than enterprises that do not directly face consumers, and that relative brand value affects CSR performance [5, 9].

We believe that corporate social responsibility is hierarchical. It can become more prominent over time. For general enterprises, investors belong to the primary stakeholders, while employees, suppliers, and customers belong to the main stakeholders. The priority of suppliers and customers is stronger than employee protection, while the environment and the community are secondary stakeholders.

### 3.6 Regression Analysis

Table 5 reports the data of regression analysis between D&O insurance and corporate social responsibility. We regress the dependent variable CSR to against the test variable is D&O. The t values reported in brackets are based on robust standard errors, clustered by company and year. In addition, we include year and industry dummies to control for the year and industry fixed effects. The empirical results show the coefficient of D&O is significantly and negatively related to CSR at the 5% level [5], which illustrates that D&O insurance purchase can increase the role in CSR. This plays a positive role for the company and society. These findings suggest that an increase in D&O increases the level of corporate responsibility to a certain extent, which confirms our H1.

Table 5. Regression Analysis.

	(1) CSR_t	(2) CSR_t	(3) CSR_t	(4) CSR_t
do	6.426*** (3.13)	0.512 (0.22)	-0.042 (-0.02)	2.291 (1.49)
size			4.515*** (9.75)	6.946*** (19.55)
board			0.217 (0.88)	0.172 (0.85)
supervisor			-0.448 (-1.11)	0.313 (1.00)
independent			6.379 (1.23)	8.115 (1.38)
dum_gender			-0.117 (-0.33)	-0.322 (-0.65)
ln_age			-1.230* (-1.68)	-2.278** (-2.15)
isduality			-0.908 (-1.24)	-1.034 (-1.23)
Lev			-5.630*** (-3.96)	-10.163*** (-6.55)
ROA			94.350*** (24.34)	112.923*** (24.14)
tobinq			0.330** (2.15)	0.930*** (5.35)
CAPEX			7.885** (2.50)	5.599 (1.23)
PPE			-2.489 (-1.44)	-2.682 (-1.27)
sale			0.716 (0.80)	0.772 (1.06)
CashSD			0.000	-15.217**

			(.)	(-2.06)
In_Cage			3.448**	1.007
			(2.11)	(1.31)
Instown			0.414	-0.873
			(0.11)	(-0.18)
govown			-0.917	-2.146**
			(-1.47)	(-2.49)
QFII			28.751	168.493**
			(0.55)	(2.23)
EXEOWN			-0.102	0.309
			(-0.23)	(0.67)
big4			3.506*	2.658
			(1.83)	(1.53)
SOE			0.473	0.549
			(0.61)	(0.56)
cross_list			-7.093	-0.803
			(-1.25)	(-0.50)
IsRelatedTrading			0.460	-1.592**
			(0.75)	(-2.36)
Constant	23.695***	27.314***	-79.876***	-123.389***
	(8.91)	(88.02)	(-7.03)	(-12.92)
N	10209	10209	10209	10209
r2	0.062	0.080	0.211	0.356
r2_a	0.059	0.079	0.208	0.353
Industry fixed effect	Yes	Yes	Yes	Yes
Year_ fixedeffect	Yes	Yes	Yes	Yes

### 3.7 CSR Multiple Regression Analysis

We further regress the D&O data for each variable regarding CSR. We separate the dependent variable into its components: shareholders, employees, suppliers and customers, environment and social responsibility. The t values report in brackets are based on robust standard errors, clustered by company and year. It also includes r squared values of the models to assess their predictive power, and adjusted R-squared values to compare the differences between them. It is clear from these results that different aspects of CSR have different combinations of driving factors [5].

In terms of shareholder's responsibility, we find that profitability (ROA) is positively correlated with CSR performance, and the coefficient is 82.065 at 1% level, as one of the symbols that the return on equity is shareholder responsibility. Therefore, our H2 is verified. ROA can improve CSR. Furthermore, according to the definition in Hexun, companies with higher returns on equity may also have more cash flow for other aspects of shareholder responsibility.

The media attention around the globe to labor issues in China, leading to employee responsibility be a key concern for boards of directors in China. In terms of employee responsibility and according to research, a correlation between the board of directors' size and CSR reports performance in other countries, including Malaysia and the United States [10, 11].

Surprisingly, we indeed find such a correlation in the regression model. In Table 6, both the size of the board (Directors) and supervisor are positively correlated to employee responsibility. The excessive dependence of China's economic development on the labor force, environment and other resources has not only brought a series of negative effects to China's economy and society, but also caused a certain degree of impact on the normal pattern of international economic operation with the help of free trade in the context of economic globalization.

At the end of Table 6, we find shareholders, employees, suppliers and customers, environment and social responsibility model be the greatest explanatory power of all of the disaggregated regression models, as shown by the R-squared of 0.714 (shareholders), 0.227 (employees), 0.180 (suppliers and

customers), 0.182 (environment) and 0.319 (social) and adjusted R-squared of 0.712 (shareholders), 0.223 (employees), 0.176 (suppliers and customers), 0.178 (environment) and 0.316 (social).

Table 6. Multiple Regression Analysis.

	(1) Shareholder_t	(2) Employee_t	(3) Suppliers&customers_t	(4) environment_t	(5) Social_t
do	0.166 (0.68)	0.488 (1.44)	0.938* (1.69)	0.290 (0.56)	0.511* (1.73)
size	1.069*** (13.58)	1.396*** (17.35)	1.897*** (16.18)	2.075*** (15.78)	0.475*** (6.19)
board	0.059 (1.58)	0.050 (1.06)	0.049 (0.75)	0.034 (0.46)	-0.020 (-0.50)
supervisor	0.009 (0.16)	0.101 (1.42)	0.124 (1.16)	0.099 (0.87)	-0.007 (-0.12)
independent	-1.708 (-1.54)	2.113 (1.61)	3.504* (1.75)	2.424 (1.12)	1.615 (1.32)
dum_gender	-0.178* (-1.68)	0.055 (0.51)	0.032 (0.19)	0.053 (0.31)	-0.302*** (-2.62)
ln_age	0.144 (0.65)	-0.692*** (-3.04)	-1.038*** (-2.89)	-0.973** (-2.57)	0.262 (1.09)
isduality	-0.013 (-0.07)	-0.336* (-1.95)	-0.412 (-1.37)	-0.457 (-1.56)	0.121 (0.50)
Lev	-3.796*** (-11.10)	-1.535*** (-4.50)	-2.339*** (-4.59)	-2.481*** (-4.62)	-0.076 (-0.20)
ROA	82.065*** (54.48)	3.068*** (3.15)	5.807*** (3.75)	4.236*** (2.69)	17.190*** (14.88)
tobinq	-0.269*** (-5.68)	0.372*** (9.91)	0.474*** (8.28)	0.472*** (8.40)	-0.119** (-2.48)
CAPEX	3.723*** (4.08)	-0.732 (-0.75)	1.252 (0.80)	1.189 (0.70)	0.417 (0.44)
PPE	-2.776*** (-6.82)	-0.213 (-0.47)	0.259 (0.38)	2.109*** (2.59)	-2.094*** (-5.17)
sale	-0.037 (-0.26)	0.115 (0.71)	0.158 (0.63)	0.211 (0.80)	0.374** (2.39)
CashSD	-10.409*** (-6.01)	0.390 (0.24)	-2.578 (-1.01)	-0.969 (-0.39)	-1.203 (-0.62)
ln_Cage	-0.504*** (-3.49)	0.240 (1.48)	0.404 (1.57)	0.468* (1.71)	0.407*** (2.62)
Instown	2.488** (2.35)	-1.607 (-1.49)	-0.276 (-0.16)	-2.745 (-1.63)	1.196 (1.12)
govown	0.105 (0.60)	-0.295 (-1.59)	-0.885*** (-3.10)	-0.812** (-2.56)	-0.259 (-1.58)
QFII	65.249*** (5.41)	11.695 (0.69)	44.519 (1.53)	26.511 (0.94)	27.329** (2.08)
EXEOWN	0.724*** (7.87)	-0.075 (-0.74)	-0.153 (-0.96)	-0.049 (-0.29)	-0.135 (-1.37)
big4	0.185 (0.63)	0.499 (1.30)	1.068* (1.77)	0.841 (1.29)	0.116 (0.38)
SOE	-0.352* (-1.79)	0.101 (0.45)	0.400 (1.24)	0.496 (1.35)	-0.100 (-0.51)
cross_list	0.034 (0.12)	-0.072 (-0.20)	-0.150 (-0.27)	-0.302 (-0.52)	-0.232 (-0.68)
IsRelatedTrading	0.050 (0.39)	-0.614*** (-4.09)	-0.373* (-1.65)	-0.544** (-2.32)	-0.128 (-0.89)
_cons	-10.962*** (-5.72)	-26.160*** (-12.40)	-35.839*** (-11.16)	-40.693*** (-11.67)	-9.021*** (-4.52)



N	10209	10209	10209	10209	10209
r2	0.714	0.227	0.180	0.182	0.319
r2_a	0.712	0.223	0.176	0.178	0.316
F	.	.	.	.	.
Industry fixed effect	Yes	Yes	Yes	Yes	Yes
Year_fixedeffect	Yes	Yes	Yes	Yes	Yes
Clusterbyfirm	Yes	Yes	Yes	Yes	Yes

### 3.8 D&O insurance and CSR

In order to better establish a good reputation and image for the company's competitiveness and social responsibility and play a role in corporate management, D&O insured firms may require to disclose more information, including financial and non-financial information. Previous studies have demonstrated that the disclosure of CSR information can improve information transparency [12, 13] and then reduce stock price crash risk [14]. Therefore, we predict that D&O insurance is more likely to disclose CSR reports.

So, Table 7 reports the data from a regression of the impact of D&O insurance on corporate social responsibility. The dependent variable is CSR, and the test variable is D&O. The t-values are based on robust standard errors, clustered by both company and year.

If a company discloses a separate CSR report within one year, the dummy variable is equal to 1. Otherwise, it is 0 [15]. We control several factors that may affect the disclosure of corporate social responsibility information: Size (firm size), ROA (profitability), Lev (leverage), Tobin's Q (growth opportunities), and Big4 (a dummy variable that equals 1 if the firm hires an international Big4 accounting firm in year t and 0 otherwise).

The coefficient of D&O is significantly and negatively related to CSR at the 5% level showed in Table 7. This confirms our prediction that D & O insurance purchase can improve the disclosure of CSR information. Thus, reducing stock price crash risk.

Table 7. CSR long-term effect.

	(1)	(2)	(3)	(4)	(5)
	CSR_t	CSR_t+1	CSR_t+2	CSR_t+3	CSR_t+4
do	2.291 (1.49)	1.041 (0.65)	0.929 (0.55)	1.165 (0.66)	1.137 (0.60)
size	6.946*** (19.55)	6.886*** (18.24)	6.343*** (15.79)	5.610*** (13.21)	4.955*** (10.71)
board	0.172 (0.85)	0.176 (0.81)	0.164 (0.73)	0.069 (0.29)	-0.176 (-0.70)
supervisor	0.313 (1.00)	0.295 (0.89)	0.203 (0.60)	0.228 (0.65)	0.221 (0.60)
independent	8.115 (1.38)	7.699 (1.22)	3.550 (0.55)	0.321 (0.05)	-1.835 (-0.25)
dum_gender	-0.322 (-0.65)	-0.256 (-0.45)	-0.562 (-0.88)	-0.994 (-1.41)	-1.033 (-1.30)
ln_age	-2.278** (-2.15)	-2.531** (-2.08)	-2.234* (-1.69)	-0.624 (-0.45)	-2.700* (-1.75)
isduality	-1.034 (-1.23)	0.113 (0.09)	-1.890 (-1.33)	0.304 (0.18)	0.527 (0.32)
Lev	-10.163*** (-6.55)	-10.811*** (-6.13)	-9.224*** (-4.93)	-8.591*** (-4.40)	-8.612*** (-4.03)
ROA	112.923*** (24.14)	83.964*** (14.29)	80.567*** (11.98)	66.786*** (9.62)	43.494*** (5.56)

tobinq	0.930*** (5.35)	1.201*** (5.81)	1.456*** (5.75)	1.416*** (4.97)	1.255*** (4.10)
CAPEX	5.599 (1.23)	1.199 (0.23)	-1.115 (-0.21)	-6.759 (-1.26)	-5.317 (-0.90)
PPE	-2.682 (-1.27)	-2.669 (-1.14)	-4.237* (-1.69)	-4.032 (-1.51)	-5.436* (-1.90)
sale	0.772 (1.06)	1.183 (1.45)	1.485* (1.81)	1.670** (2.01)	2.064** (2.40)
CashSD	-15.217** (-2.06)	-16.024** (-1.97)	-13.009 (-1.51)	-18.115** (-2.06)	-16.425* (-1.67)
ln_Cage	1.007 (1.31)	0.923 (1.14)	0.982 (1.18)	0.462 (0.55)	-0.156 (-0.18)
Instown	-0.873 (-0.18)	8.836 (1.58)	9.546 (1.47)	12.696 (1.63)	18.534** (2.03)
govown	-2.146** (-2.49)	-0.204 (-0.21)	0.169 (0.16)	0.069 (0.06)	1.085 (0.85)
QFII	168.493** (2.23)	256.569*** (2.84)	188.174* (1.89)	252.311** (2.04)	78.171 (0.63)
EXEOWN	0.309 (0.67)	0.705 (1.46)	0.764 (1.58)	0.659 (1.33)	0.222 (0.45)
big4	2.658 (1.53)	2.305 (1.28)	1.225 (0.64)	0.668 (0.35)	0.575 (0.28)
SOE	0.549 (0.56)	-0.413 (-0.38)	-0.651 (-0.56)	0.464 (0.37)	-0.119 (-0.09)
cross_list	-0.803 (-0.50)	0.817 (0.48)	2.004 (1.12)	3.206* (1.70)	3.920** (1.97)
IsRelatedTrading	-1.592**	-1.168*	-1.185	-0.515	-0.412
_cons	- 123.389*** (-12.92)	-119.429*** (-11.76)	-107.535*** (-9.99)	-94.207*** (-8.33)	-75.952*** (-6.23)
N	10209	8277	6789	5333	3904
r2	0.356	0.289	0.264	0.231	0.181
r2_a	0.353	0.285	0.258	0.224	0.171
F	.	33.047	26.241	21.226	12.896
Industry_fixedeffect	Yes	Yes	Yes	Yes	Yes
Firm_fixedeffect	Yes	Yes	Yes	Yes	Yes
Year_fixedeffect	Yes	Yes	Yes	Yes	Yes
Clusterbyfirm	Yes	Yes	Yes	Yes	Yes

### 3.9 Robust Check

To demonstrate that our results are robust, we conduct several robustness checks, including industry fixed effect, firm fixed effect, year fixed effect, and cluster by the firm.

And in all robustness checks, we use alternative instruments, and the results are consistent.

### 4. Conclusion

Overall, using the data of Directors' and officers' liability insurance ("D&O insurance") purchased by Chinese listed 10,209 companies from 2010 - 2017 after screening, we analyze how the D&O

insurance plays a certain role in corporate social responsibility (CSR). After analyzing the control variables and data, we find that there is a positive relationship between the purchase D&O insurance and CSR, indicating that the purchase D&O insurance can increase the benefits to CSR and improve corporate governance. We have successfully verified our hypotheses that the participation of D&O insurance has improved the effect of CSR, and CSR performance can improve profitability (ROA). In addition, we find that corporate social responsibility information can help directors' liability insurance reduces the risks of a stock price crash.

Our findings support the view that purchasing Directors' and officers' liability insurance can improve corporate social responsibility. At present, neither D&O insurance nor CRS in China is still in the development stage. Compared to the level of the United States, the United Kingdom and Canada, there is still a big gap. In this paper, we find that listed companies that purchase D&O insurance have a significantly higher impact on enterprise value than those that do not buy. This shows that D&O insurance has the function of improving enterprise value, which can effectively complete the incentive to directors and executives and supervise the development of enterprises. Purchasing D&O insurance on listed companies has a more positive effect than a negative effect. Therefore, D&O insurance plays a great role in both the development of CSR and the long-term development of the company.

At present, Chinese domestic enterprises regard CSR as a promotional tool for marketing, which greatly limits the influence of CSR. We suggest that in the future, China can promote corporate social responsibility. Carried out in China, the prompting enterprises will continuously improve the popularity of D&O insurance and CSR.

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