



Does Directors' and Officers' Liability Insurance improve corporate governance of Chinese listed firms? The moderating role of insider ownership

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ABSTRACT

China has introduced several governance practices to guide the healthy development of the capital market, which have prompted the development of Directors' and Officers' liability insurance (D&O insurance). This study finds that purchase of D&O insurance can significantly reduce corporate overinvestment, and insider ownership suppresses the monitoring effect of D&O insurance. Further research finds that the monitoring effect and the moderating effect are more pronounced in companies whose management team has a higher proportion of female members, with financial backgrounds or overseas backgrounds. After discussing endogeneity issues and robustness checks, our conclusions still hold.

1. Introduction

To guide the healthy development of the capital market, in the past three decades, China has introduced a number of governance practices. The Chinese Company Law (issued in 1994) and Securities Law (revised in 2005) stipulate that corporate shareholders and other stakeholders can protect their legitimate rights and interests by seeking civil damages against corporate executives and directors, leading to an increase of securities lawsuits in China. Considering the possible adverse impacts of these litigations, the Code of Corporate Governance suggests that listed companies may protect executives and directors against liability by purchasing Directors' and Officers' liability insurance (D&O insurance) and transferring the risks to the insurer (Jia et al., 2019).

D&O insurance, regarded as one of the most controversial and least understood governance tools (Li et al., 2022), was introduced in China in 2002 and has gradually become popular in public companies. It has experienced rapid development since 2019, due to the new Securities Law (revised in 2019 and implemented in 2020) and the "Opinions of the State Council on Further Improving the Quality of Listed Companies" released in October 2020, which have greatly increased litigation risk for companies and management (Li et al., 2022). Fig. 1 shows the number and growth rate of listed companies in Shanghai and Shenzhen exchanges that have purchased D&O insurance since 2002. It shows that D&O insurance developed slowly at the beginning but has experienced rather rapid expansion since 2020, with the growth rate reaching approximately 58% and 31% in 2020 and 2021 respectively. Therefore, D&O insurance has attracted much attention and become an important topic in Chinese capital market.

However, the development of D&O insurance in China is still at a relatively low level (Wang et al., 2020) compared to the high

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insurance coverage rates of over 80% in mature capital markets. This is due to the late introduction of D&O insurance, the relatively low litigation risk faced by companies and limited regulation (Wynn, 2008).

As a result, literature studying the corporate governance role of D&O insurance in China is limited. One important issue in corporate governance is to invest properly and avoid improper investment. Overinvestment, the practice of investing in too many projects, especially those with negative net present value, is a type of inefficient investment (Richardson, 2006). In this paper, we use firms' overinvestment to reflect corporate governance. Using data of Chinese listed companies from 2002 to 2020, this paper finds that the purchase of D&O insurance can significantly reduce firms' overinvestment, and this monitoring effect is moderated by insider ownership, with heterogeneity across companies with different management.

The main contributions of this study are as follows. First, according to existing literature, the governance role of D&O insurance varies across different legal environments (Chung and Wynn, 2008), and prior studies mainly focus on developed capital markets, this paper empirically re-examines this problem in the case of China, providing new evidence from emerging markets with different policy and legal systems. For researchers and practitioners in emerging markets, this research enables them to have a better understanding of the governance role of D&O insurance, and further help to improve the quality of corporate governance and achieve sustainable development of emerging markets. Secondly, most of the existing literatures examine the impact of D&O insurance on firm performance, M&A, and loan spread (Chalmers et al., 2002; Chung and Wynn, 2008; Lin et al., 2011), while this paper examines the impact of D&O insurance on a firm's investment decision from an intra-firm perspective by considering the moderating role of insider ownership, enriching the literature on D&O insurance's governance role. Thirdly, we conducted a heterogeneity analysis regarding individual characteristics of the management and found that the governance role exhibited by D&O insurance and the moderating effect of ownership varied significantly across subsamples.

The remainder of the paper is organized as follows: Section 2 reviews the literature and develops the hypotheses. Section 3 describes the data, variables, and research design. Section 4 reports the main empirical results, and an additional test on heterogeneity across characteristics and the backgrounds of management. Section 5 conducts robustness checks using Heckman two-stage and Propensity Score Matching methods. Section 6 concludes the paper.

2. Literature review and hypotheses development

2.1. The governance role of D&O insurance

There are two competing hypotheses regarding the corporate governance role of D&O insurance, namely the managerial opportunism hypothesis and the monitoring hypothesis. The opportunism hypothesis argues that D&O insurance induces moral hazard by protecting directors and officers from the discipline of shareholder litigation. Chung and Wynn (2008) found a negative relationship between D&O insurance coverage and firms' accounting conservatism. Lin et al. (2011) showed that firms with higher D&O insurance coverage have weaker synergies after mergers and acquisitions. In addition, Lin et al. (2013) and Chen et al. (2016) showed that D&O insurance coverage is positively related to firms' loan spreads, while Huang, et al. (2022) found that firms that purchase D&O insurance have a higher default risk than firms without insurance.

In contrast, the monitoring hypothesis argues that the D&O insurer has information of potential loss risk and provides a monitoring service of the opportunism behavior of directors and officers. Cao and Narayanamoorthy (2014) showed that insurers adjust the price promptly according to the firm's risk profile by monitoring the court ruling on officers' fiduciary duties. Yermack (1996) pointed out that D&O insurance motivates the managers to focus on increasing firm value. Additionally, Boyer and Tennyson (2015) and Jia et al. (2019) discovered a positive impact of D&O insurance on corporate governance, while Lin et al. (2021) found that D&O insurance can

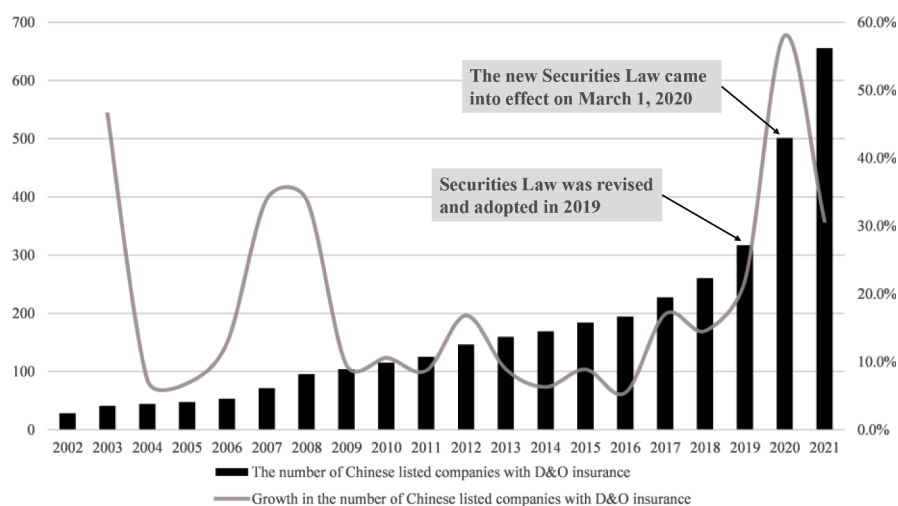


Fig 1. Number and growth rate of Chinese listed companies covered by D&O insurance.

improve operating performance by increasing managerial ability.

Currently, in China, the protection of investors is relatively weak under the current legal system and the governance abilities of companies are relatively undeveloped. The effect of D&O insurance on the overinvestment of firms is an empirical problem, therefore we propose the following hypotheses:

Hypothesis 1. (null) D&O insurance purchase has no statistically significant effect on the level of corporate overinvestment.

Hypothesis 1a D&O insurance purchase can significantly increase corporate overinvestment.

Hypothesis 1b D&O insurance purchase can significantly decrease corporate overinvestment.

2.2. Moderation effect of insider ownership

One view of the relationship between insider ownership and corporate governance is the managerial entrenchment effect (Cho, 1998) and another is the convergence of managerial and owner interests (Pindado and De La Torre, 2009). The management could have opposite attitudes towards D&O insurance. Some studies find that the management tends to purchase D&O insurance due to managerial entrenchment and self-interest (Lin et al., 2011). In contrast, Boyer et al. (2012) point out that there is a negative relationship between D&O insurance purchases and the percentage of insider ownership in the firm. More specifically, if the effect of D&O insurance on corporate overinvestment supports the opportunistic hypothesis, it may be amplified by the management entrenchment effect of insider ownership. Additionally, if D&O insurance manifests more as a monitoring role, then an increase in ownership would weaken this monitoring effect. Based on this, we further argue that there is a moderating role of ownership between firms' overinvestment and D&O insurance purchases as follows:

Hypothesis 2. Insider ownership moderates the relationship between overinvestment in firms and D&O insurance purchases.

2.3. Characteristics and backgrounds of management

D&O insurance purchases might be affected by the characteristics and backgrounds of management, as well as different incentives for insider ownership. For example, management with financial backgrounds may choose to (or not to) purchase D&O insurance based on a better understanding of it. Similarly, the effects of D&O insurance might also be affected. More specifically, as shown in the vast majority of empirical works, women are more risk averse than men (Croson and Gneezy, 2009). Therefore, given the risk management role of insurance, we hypothesize that the governance role of D&O insurance and the moderating role of ownership are more pronounced in firms with a higher proportion of women in management. Moreover, as a kind of financial product which has high penetration rate in developed countries, the terms, mechanisms, and effects of D&O insurance may be better understood by management with financial backgrounds and overseas backgrounds, thus we hypothesize that the above effects are more pronounced in firms with financial backgrounds and overseas backgrounds in management.

Hypothesis 3. The effect of D&O insurance on overinvestment, and the moderating role of insider ownership between D&O insurance and overinvestment are more pronounced in firms with a higher proportion of women in management.

Hypothesis 4. The effect of D&O insurance on overinvestment, and the moderating role of insider ownership between D&O insurance and overinvestment are more pronounced in firms with financial backgrounds in management.

Hypothesis 5. The effect of D&O insurance on overinvestment, and the moderating role of insider ownership between D&O insurance and overinvestment are more pronounced in firms with overseas backgrounds in management.

3. Data and method

3.1. Data and sample

Our sample consists of Shanghai and Shenzhen A-share listed companies. Our sample period is from 2002 to 2020. The year 2002 is chosen as the starting year because it is the year when China promulgated the Code of Governance for Listed Companies, which specifies the civil liability of listed company executives and introduced D&O insurance in China. The D&O insurance information is manually collected and compiled based on company announcements, and the financial information is obtained from the China Stock Market and Accounting Research Database. The sample includes 29,099 firm-year observations of 2695 unique firms, with 10,752 overinvestment observations. We exclude financial firms, ST/PT firms and observations with missing values for key variables. We also winsorize all continuous variables at the 1% and 99% levels.

3.2. Variables

To measure the overinvestment of a company, we follow Richardson (2006) and first estimate the expected investment by regression model (1):

$$Investment_{it} = \alpha_0 + \alpha_1 Q_{it-1} + \alpha_2 Cash_{it-1} + \alpha_3 Size_{it-1} + \alpha_4 StockReturn_{it-1} + \alpha_5 Leverage_{it-1} + \alpha_6 Investment_{it-1} + Year + Industry + \varepsilon_{it} \quad (1)$$

where *Investment* represents capital expenditure, *Q* is Tobin's *Q*, *Cash*, *StockReturn*, *Size* and *Leverage* are defined as in Table A1 (Appendix). The residual ε_{it} represents the difference between actual and expected investment. Following Richardson (2006), overinvestment equals the residual if it is greater than zero, and equals zero otherwise.

To investigate the effects of D&O insurance, we use dummy variable *DOIns* to indicate whether a company has purchased D&O insurance in a certain year. To study the effect of insider ownership on board's investment decisions, we follow Chiang and Chang (2022): the variable of insider ownership is chosen to be the proportion of shares held by the board of directors (*BoardShare*). In addition, we use dummy variables *FemaleBG*, *FinancialBG* and *OverseasBG* to specify the characteristics of the management and conduct heterogeneity analysis.

According to existing literature on overinvestment, the control variables in this paper are the shareholding ratio of institutional investors (*InstRatio*), the number of directors on the board of directors (*BoardSize*), the free cash flow (*FCF*) as in Fu (2010) and Harford et al. (2008), cash-to-dividend ratio (*DividRatio*) (Pindado and De La Torre, 2009), firm *Size* (Chung and Wynn, 2008), and *Leverage*. A detailed explanation of all the variables is given in Table A1 and the descriptive statistics of all variables are given in Table 1.

3.3. Econometric models

The variable *OverInvest* is censored at 0, which means *OverInvest* equals 0 for negative residuals. To avoid the risk that too many overinvestments have been pushed to zero, we only use observations with positive *OverInvest* (10,752 observations) and use truncated regression estimated by the maximum likelihood method, to study the relationship between overinvestment and D&O insurance as follows:

$$OverInvest_{it} = \beta_0 + \beta_1 DOIns_{it} + \beta_2 Control\ variables_{it} + Year + Industry + \varepsilon_{it} \quad (2)$$

Further we investigate the moderating role of ownership structure (*BoardShare*) between overinvestment and purchases of D&O insurance, by adding the interaction term as follows:

$$OverInvest_{it} = \gamma_0 + \gamma_1 DOIns_{it} + \gamma_2 BoardShare_{it} + \gamma_3 (DOIns_{it} * BoardShare_{it}) + \gamma_4 Control\ variables_{it} + Year + Industry + \varepsilon_{it} \quad (3)$$

4. Empirical results

4.1. Baseline regression and moderation analysis

Results of baseline regression and moderation analysis are presented in Table 2. The coefficient of *DOIns* in column (1) indicates that purchasing D&O insurance can significantly decrease firms' overinvestment. The estimate is economically significant: the overinvestment of companies that purchase D&O insurance is reduced by 0.006, which accounts for 11% (0.006/0.055) of the average overinvestment, implying that D&O insurance has a monitoring effect, which supports Hypothesis 1b and is consistent with Jia et al. (2019) and Boyer and Tennyson (2015).

Column (2) shows that the coefficient of *BoardShare* is significantly positive, indicating the existence of managerial entrenchment effect. Additionally, the coefficient of the interaction term in column (3) is positively significant, which verifies the moderating role of ownership and supports Hypothesis 2. Particularly, the opposite signs of *DOIns* and the interaction term imply that, when the shareholding of the board increases, the monitoring effect of D&O insurance weakens. This can be understood as the effect of managerial entrenchment: the board may want to increase investment to get greater economic benefits. When the board has a higher level of ownership, they will have stronger motivation and ability to invest in more projects, which might increase overinvestment and suppress the monitoring of the insurance company.

Table 1

Descriptive statistics of variables used in our analysis.

variable	N	mean	sd	min	max	p25	p50	p75
<i>OverInvest</i>	10,752	0.055	0.064	0	0.268	0.011	0.0310	0.073
<i>DOIns</i>	10,752	0.069	0.254	0	1	0	0	0
<i>BoardShare</i>	10,752	0.097	0.169	0	0.672	0	0	0.130
<i>InstRatio</i>	10,752	0.469	0.243	0.002	0.921	0.290	0.504	0.659
<i>BoardSize</i>	10,752	8.890	1.863	5	15	8	9	9
<i>FCF</i>	10,752	-0.011	0.114	-0.625	0.267	-0.056	0.007	0.051
<i>DividRatio</i>	10,752	0.012	0.017	0	0.089	0	0.007	0.016
<i>Size</i>	10,752	22.28	1.274	19.22	25.95	21.38	22.11	23.01
<i>Leverage</i>	10,752	0.475	0.191	0.052	1.054	0.331	0.482	0.618
<i>FemaleBG</i>	10,752	0.490	0.500	0	1	0	0	1
<i>FinancialBG</i>	10,752	0.598	0.490	0	1	0	1	1
<i>OverseasBG</i>	10,752	0.501	0.500	0	1	0	1	1

Table 2
Relationship between D&O insurance, BoardShare and Overinvestment.

VARIABLES	(1) <i>OverInvest</i>	(2) <i>OverInvest</i>	(3) <i>OverInvest</i>
<i>DOIns</i>	−0.006** (−2.30)	−0.005** (−1.97)	−0.008*** (−2.62)
<i>BoardShare</i>		0.062*** (11.00)	0.061*** (10.86)
<i>DOIns*BoardShare</i>			0.064** (2.31)
Constant	0.067*** (4.13)	0.066*** (4.04)	0.065*** (3.94)
Control variables	YES	YES	YES
Industry fixed effect	YES	YES	YES
Year fixed effect	YES	YES	YES
Observations	10,752	10,752	10,752
Wald chi2	736.3	869.6	875.2

t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

4.2. Heterogeneity analysis

We further investigate heterogeneity in characteristics and backgrounds of management, as given in Hypotheses 3–5. The regression results are given in Table 3.

For Hypothesis 3, we first define *FemaleBG* as a dummy variable indicating whether the percentage of female directors, supervisors and senior management of a company is above the median of the year. Then we add interaction terms *FemaleBG*DOIns* and *FemaleBG*DOIns*BoardShare* to model (3) and the estimated truncated regression model is reported in column (1) of Table 3. The corresponding coefficients are both significant at the 10% level and have the same signs as the coefficients of *DOIns* and *DOIns*BoardShare* respectively. This indicate that, in firms with a higher female ratio in management, the monitoring effect of D&O insurance on overinvestment is more pronounced, and so is the moderating role of insider ownership between D&O insurance and overinvestment, supporting Hypothesis 3. It is in line with the results in Olsen and Cox (2001), stating that female managers are more risk averse.

Similarly, we define *FinancialBG* (*OverseasBG*) as a dummy variable indicating whether the management has financial (overseas) background for Hypothesis 4 (Hypothesis 5). The coefficient of *FinancialBG*DOIns* (*OverseasBG*DOIns*) in column 2 (column 3) show that the monitoring effect of D&O insurance on overinvestment is more pronounced for firms with financial background (overseas background) in management than firms without such backgrounds, and so is the moderating role of insider ownership between D&O insurance and overinvestment, supporting Hypothesis 4 (Hypothesis 5).

Table 3
Heterogeneity analysis results.

VARIABLES	(1) <i>OverInvest</i>	(2) <i>OverInvest</i>	(3) <i>OverInvest</i>
<i>DOIns</i>	−0.004 (−1.05)	0.003 (0.49)	−0.003 (−0.58)
<i>BoardShare</i>	0.047*** (9.55)	0.062*** (11.21)	0.062*** (11.15)
<i>DOIns*BoardShare</i>	0.153 (0.04)	−2.889 (−0.65)	−0.610 (−0.15)
<i>FemaleBG*DOIns</i>	−0.010* (−1.68)		
<i>FemaleBG*DOIns*BoardShare</i>	7.428* (1.65)		
<i>FinancialBG*DOIns</i>		−0.017*** (−2.60)	
<i>FinancialBG*DOIns*BoardShare</i>		10.774** (2.13)	
<i>OverseasBG*DOIns</i>			−0.010* (−1.67)
<i>OverseasBG*DOIns*BoardShare</i>			8.193* (1.69)
Constant	0.066*** (4.25)	0.095*** (5.87)	0.099*** (6.07)
Observations	10,752	10,752	10,752
Control variables	YES	YES	YES
Industry fixed effect	YES	YES	YES
Year fixed effect	YES	YES	YES
Wald chi2	871.5	903.6	882.6

t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

5. Robustness checks

5.1. Alternative sample and variables

For robustness check, we estimate models (2) and (3) by Tobit regression using the whole 29,099 observations, and results are reported in columns (1) and (2) in Table 4. Additionally, we replace *BoardShare* with management shareholding (*MShare*) and the shareholding of directors and senior management (*BMSHare*), and estimate the models again. The results are presented in columns (3)–(6) in Table 4. The signs and significance of the estimated coefficients remain the same as in Table 2.

5.2. Endogeneity

The regression results in Table 2 may suffer from endogeneity problem because firms' decisions to purchase D&O insurance may be non-random. Therefore, we apply the Heckman two-stage test to address self-selection bias and the results are reported in Table 5. We employ the dummy of management's overseas background (*OverseasBG*) as the instrument, since the overseas background of management is likely to lead to the purchase of D&O insurance, but unlikely to be related to overinvestment. The first stage runs logistic regression of *DOIns* on *OverseasBG* and all control variables in Eq. (2) and the estimated coefficients of *OverseasBG* and most variables are significant. The second stage regresses *OverInvest* on *DOIns*, all control variables in Eq. (2), and the inverse Mills ratio (*IMR*) calculated from the first stage, and it is found that the estimated coefficient of *DOIns* is still negatively significant, consistent with the baseline regression results in Table 2.

In addition, to get the net effect of D&O insurance purchases rather than effects of possible firm characteristics on overinvestment, the Propensity Score Matching (PSM) method is adopted to match insured firms with firms that have similar characteristics. The regression results after nearest neighbor matching (columns (1) to (3)) and kernel matching (columns (4) to (6)) are presented in Table 6, which are consistent with our previous findings given in Table 2.

Furthermore, considering that companies that purchase D&O insurance might be less over-invested due to the higher litigation risks, we introduce an instrumental variable *LitcountIV* to measure the overall litigation risk of the industry, which is correlated with *DOIns*, but not with *OverInvest*. Then we conduct 2SLS regression and the results are displayed in Table 7. The coefficient of *DOIns* is significantly negative, which confirms the monitoring effect of D&O insurance.

6. Conclusion

This study uses data from 2002 to 2020 on Chinese listed companies to analyze the effects of D&O insurance on corporate governance. We find that D&O insurance plays a monitoring role, as purchasing D&O insurance will reduce overinvestment. Additionally, insider ownership has a managerial entrenchment effect on investment and weakens the monitoring effect of D&O insurance. Further, sub-sample research finds that the relationships between D&O insurance, ownership structure and overinvestment are more pronounced in firms with a higher proportion of female members, financial background, and overseas background in management. The results have important theoretical and practical significance for understanding the governance role of D&O insurance in emerging

Table 4
Robustness checks results.

VARIABLES	(1) <i>OverInvest</i>	(2) <i>OverInvest</i>	(3) <i>OverInvest</i>	(4) <i>OverInvest</i>	(5) <i>OverInvest</i>	(6) <i>OverInvest</i>
<i>DOIns</i>	−0.009*** (−2.70)	−0.012*** (−3.29)	−0.005** (−2.00)	−0.008*** (−2.72)	−0.006** (−2.17)	−0.009*** (−2.75)
<i>BoardShare</i>		0.130*** (20.54)				
<i>DOIns*BoardShare</i>		7.329*** (2.74)				
<i>MShare</i>			0.001*** (11.06)	0.001*** (10.90)		
<i>DOIns*MShare</i>				0.001*** (2.62)		
<i>BMSHare</i>					0.049*** (7.23)	0.048*** (7.26)
<i>DOIns*BMSHare</i>						8.301* (1.71)
Constant	0.067*** (4.13)	−0.168*** (−9.12)	0.066*** (4.09)	0.065*** (4.00)	0.065*** (4.00)	0.065*** (4.00)
Control variables	YES	YES	YES	YES	YES	YES
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Observations	29,099	29,099	10,752	10,752	10,752	10,752
Wald chi2	940.5	1360	867.4	875.1	791	795.9

t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 5
Heckman Two-Stage Test.

Variables	First-stage <i>DOIns</i>	Second-stage <i>OverInvest</i>
<i>DOIns</i>		−0.005** (−1.97)
<i>BoardShare</i>	−4.926*** (−4.05)	0.062*** (6.54)
<i>InstRatio</i>	1.537** (2.16)	0.043*** (8.49)
<i>BoardSize</i>	0.161*** (2.75)	−0.001** (−2.33)
<i>Cash</i>	0.004* (1.83)	−0.000*** (−11.87)
<i>Size</i>	0.674*** (5.62)	0.000 (0.12)
<i>Leverage</i>	0.343 (0.47)	0.004 (0.92)
<i>DividRatio</i>	−21.843*** (−2.85)	−0.084 (−1.52)
<i>OverseasBG</i>	0.850*** (3.94)	
<i>IMR</i>		−0.000 (−0.03)
Constant	−36.174*** (−12.40)	0.068 (1.09)
Industry fixed effect	YES	YES
Year fixed effect	YES	YES
Observations	10,681	10,752
Wald chi2	475.7	875.3

t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 6
Regression results after deploying Propensity Score Matching (PSM).

VARIABLES	<i>OverInvest</i> Nearest Matching			Kernel Matching		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>DOIns</i>	−0.008* (−1.91)	−0.007* (−1.68)	−0.010** (−2.26)	−0.008** (−2.33)	−0.008** (−2.50)	−0.011*** (−3.08)
<i>BoardShare</i>		0.084*** (4.65)	0.073*** (3.88)		0.071*** (10.39)	0.070*** (10.25)
<i>DOIns*BoardShare</i>			0.080** (1.99)			0.076** (2.19)
Constant	0.099** (2.52)	0.097** (2.47)	0.094** (2.39)	0.065*** (3.28)	0.067*** (3.33)	0.065*** (3.23)
Observations	2966	2966	2966	10,710	10,710	10,710
Control variables	YES	YES	YES	YES	YES	YES
Industry fixed effect	YES	YES	YES	YES	YES	YES
Year fixed effect	YES	YES	YES	YES	YES	YES
Wald chi2	940.5	1351	1360	944.2	1373	1380

t-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 7
2SLS regression results.

VARIABLES	First-stage <i>DOIns</i>	Second- stage <i>OverInvest</i>
<i>LiticountIV</i>	0.015*** (1.82)	
<i>DOIns</i>		−0.874*** (−3.07)
Control variables	YES	YES
Industry fixed effect	YES	YES
Year fixed effect	YES	YES
Observations	10,288	10,288
R-squared	0.0486	−4.401

Robust z-statistics in parentheses, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

markets like China, with distinctive legal and institutional characteristics. Due to limited data access, some questions can be further investigated in the future. For example, does the effect of D&O insurance change when D&O insurance coverage increases? Do different incentives for insider ownership affect D&O insurance purchases?

CRedit authorship contribution statement

Man Wang: Conceptualization, Methodology, Validation, Writing – review & editing. **Lujia Sun:** Data curation, Software, Writing – original draft.

Data Availability

Data will be made available on request.

Appendix. Definition of the variables

Variable	Definition
<i>Investment</i>	(Capital expenditure -cash receipts from sale of property, plant, and equipment)/total assets
<i>Q</i>	Tobin's Q, Market value / total assets
<i>Cash</i>	Net cash flow from operating activities/ total assets
<i>Size</i>	Natural logarithm of total assets
<i>StockReturn</i>	Annualized stock return rate
<i>Leverage</i>	Total debt/total assets
<i>OverInvest</i>	Equals the residual in model (1) if it is greater than zero, equals zero otherwise.
<i>DOIns</i>	A dummy variable specifying whether a firm purchases D&O insurance
<i>BoardShare</i>	Shares held by the Board of Directors/ outstanding shares
<i>InstRatio</i>	Shares held by institutional investors/ outstanding shares
<i>BoardSize</i>	Number of board directors
<i>FCF</i>	(After-tax profit+depreciation-tax-interest expense-cash dividends)/ total assets
<i>DividRatio</i>	Cash dividends/total assets
<i>MShare</i>	Shares held by directors, supervisors, and executives/ outstanding shares
<i>BMSShare</i>	Shares held by directors & senior management/ outstanding shares
<i>FemaleBG</i>	A dummy variable indicating whether the percentage of female directors, supervisors and senior management is above the median of the year
<i>FinancialBG</i>	A dummy variable indicating whether the management has financial background
<i>OverseasBG</i>	A dummy variable indicating whether the management has overseas background
<i>LiticountIV</i>	The average annual number of lawsuits involved in the industry

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