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Directors' and Officers' Liability Insurance, Risk Taking, and Corporate Strategic Deviation

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Abstract: Directors' and Officers' (D&O) liability insurance is a type of professional liability insurance that provides a safety net for corporate risks. This study, using data from Shanghai and Shenzhen A-share listed companies from 2010 to 2020, examines the impact of D&O Liability Insurance on corporate strategic deviation from the perspective of corporate risk-taking, providing evidence for corporate strategic decision-making and governance. Empirical research finds that the purchase of D&O Liability Insurance directly leads to an increase in strategic deviation. Furthermore, the act of purchasing D&O Liability Insurance significantly enhances the company's capability to take risks, thereby further increasing the degree of strategic deviation. This conclusion holds even after controlling for potential endogeneity issues and changing the measurement methods of core variables. Further analysis reveals that D&O liability insurance has a more significantly positive effect on the strategic deviation of non-state-owned enterprises and larger-sized companies. Compared to before purchasing the insurance, companies have significantly improved their risk-taking ability and strategic deviation after purchasing the insurance.

Keywords: Directors' and officers' (D&O) liability insurance; Corporate risk taking; Corporate strategic deviation

1. Introduction

D&O liability insurance, a specific type of professional liability insurance designed for directors, supervisors, and senior management, aims to protect corporate managers from personal liability and financial loss in case of managerial oversights or operational errors during contract fulfillment. The insured financial institution will bear the civil compensation responsibility and related legal fees.

In the 1930s, European and American countries began implementing D&O liability insurance systems, a significant measure to enhance corporate governance. Related literature mainly focuses on the impact of D&O liability insurance on corporate governance and management levels (Core, 2000; Holderness, 1990; Jia & Tang, 2018; O'Sullivan, 2002). By purchasing D&O liability insurance, businesses can transfer the transaction costs associated with potential bankruptcy to insurance companies, thus reducing expenses incurred during bankruptcy (Mayers & Smith, 1982). It also introduces insurance institutions with extensive risk control experience. These institutions not only have professional capabilities in business risk evaluation, data analysis, and risk response but also serve as independent third-party business risk assessors. They are motivated and able to identify operational risks in enterprise operations and can propose effective strategies for reducing economic losses and claim management (Baker & Griffith, 2007; Lin et al., 2011).

Typically, companies adopt conventional industry strategies due to concerns over their risk-taking levels (DiMaggio & Powell, 1983; Meyer & Rowan, 1977). However, due to different operating conditions of companies, strategic deviations may occur in response to intense competition, and the degree of this deviation, known as the degree of corporate strategic deviation, can be influenced by D&O liability insurance, which provides strategic decision-making security for senior management. This might affect the level of risk a company is willing to take,

leading to adjustments in its strategic deviation to enhance competitiveness. Yet, there is a lack of in-depth research on how D&O liability insurance affects the degree of corporate strategic deviation.

This paper examines from a risk-taking perspective how purchasing D&O insurance influences corporate strategic deviation and its mechanisms. This study enriches the research on the impact of D&O insurance on corporate governance, provides theoretical evidence for the field, and broadens the perspective of corporate strategic choice research. Furthermore, it clarifies how D&O insurance as an external governance mechanism drives corporate strategic choices, aiding companies in considering D&O insurance purchases and maximizing its positive effects to foster market development.

The remainder of the article is organized as follows: Section 2 reviews the related literature; Section 3 discusses the theoretical basis and research hypotheses; Section 4 covers research design and baseline regression analysis; Section 5 presents a heterogeneity analysis from the perspectives of property rights and company size; Section 6 examines the mediating effects and analyzes the mechanisms; Section 7 conducts further research and robustness tests; the final section concludes with research findings, suggestions, and future outlooks.

2. Literature Review

2.1 The Corporate Governance Effects of D&O Liability Insurance from a Risk Perspective

Research mainly focuses on whether the purchase of D&O liability insurance shares the company's risk, enhances innovation, or improves internal governance.

The risk-taking level of a company reflects the preferences of senior personnel like directors and executives towards risk in their strategic choices, which can influence the company's growth and development. According to empirical results by Faccio et al. (2016), a significant decrease in managers' risk propensity could lead to investment inefficiency, resulting in decisions that fail to allocate corporate resources rationally. D&O liability insurance is an effective risk hedging tool; studies show that it can enhance a company's ability to bear risks (Boyer & Tennyson, 2015). Choi (2017) analyzed that after Korean companies adopted director liability insurance, it protected managers from the risks of project failures, showing greater future stock return volatility and R&D intensity, thus enhancing the level of risk-taking. Wang et al. (2020) also indicated that companies with D&O liability insurance have stronger risk-taking and innovation capabilities.

Gillan & Panasian (2015) suggest that D&O liability insurance might increase a company's litigation risk as it could induce moral hazards in management, leading to more lawsuits against managerial misconduct by shareholders and other stakeholders, thereby increasing the company's litigation risks. Huang (2022) also believes that companies with D&O insurance have higher default risks than those without. Moreover, Yuan et al. (2016) found that after purchasing D&O liability insurance, introducing third-party insurance institutions to the insured company effectively supervises and restrains managers' self-interested and opportunistic behaviors. This improves the disclosure quality of company information, reasonably preventing drastic stock price drops, thus better protecting investors' interests. Peng et al. (2022) found that subscribing to D&O insurance affects managers' incentive constraints and risk preferences. By increasing risk-taking, easing financing constraints, and improving audit quality, it can promote the company's financialization behavior.

2.2 Corporate Strategic Deviation

Existing literature has studied the impact of D&O liability insurance on corporate mergers and acquisitions decisions (Lin et al., 2011), financing behavior (Lin et al., 2013), diversified investment (Chi et al., 2013), investment efficiency (Li & Liao, 2014), R&D innovation (Wang et al., 2020), and earnings management (Chueh & Chang, 2022). D&O liability insurance has varying impacts on corporate strategy. For instance, Choi (2017) examined whether earnings manipulation in Korean stock market companies from 2006-2008 affected D&O insurance purchase, finding that buying D&O insurance does not trigger earnings manipulation but rather alleviates opportunistic reporting behavior. Similar to Lin et al. (2011), Chi et al. (2013) showed that D&O liability insurance accelerates corporate diversification, especially in unrelated diversification strategies36. However, Li & Liao (2014) and Li et al. (2023) indicated that D&O insurance adversely affects corporate investment efficiency, with its coverage level positively correlated with overinvestment. Additionally, Kalelkar & Nwaeze (2015) analyzed the motivations behind abnormal purchases of D&O liability insurance, demonstrating a positive correlation with aggressive reporting, investment activities, and abnormal profit performance in U.S. companies from 2004-2008.

Strategic impacts on companies are global and long-term. Traditional industry-standard strategies can reduce business risks. If a company's chosen strategy deviates from the industry norm, it increases its operational risks (Denrell, 2005). Miller & Chen (1996) also showed that if a company's strategy diverges from the industry mainstream, it must explore and experiment more in daily management, increasing business risks. Higher corporate strategic deviation levels lead to more significant performance fluctuations and a greater likelihood of extreme performance (Tang et al., 2011). Adopting industry-standard strategies achieves average operational performance standards, so strategic deviation could yield above-average performance returns (Goll et al., 2007).

2.3 Review of Literature

Most related studies discuss how D&O liability insurance can increase a company's risk-taking level, impacting investment, financing, and innovation strategies. Research also shows that purchasing D&O liability insurance might increase the risks of litigation and default for companies or reduce business risks due to external supervision by insurance institutions. However, there is less research on the impact on corporate strategic deviation and its mediating mechanisms. Based on this, this paper, building on existing research, explores how a company's risk-taking level changes after purchasing D&O liability insurance and how this affects the degree of deviation in corporate strategic choices.

The contribution of this study is to reveal the role of D&O liability insurance in corporate strategic deviation and its impact mechanism. By using corporate risk-taking as a mediator, it adds empirical evidence to the external governance effects produced by D&O liability insurance on companies, enriching and perfecting the research on D&O liability insurance and corporate strategy.

3. Theoretical Basis and Research Hypotheses

3.1 The Governance Effect of D&O Liability Insurance

The governance effect of D&O liability insurance is manifested in two aspects: the positive impact on corporate governance, including management incentive effects and external supervision effects, and the negative impact, namely the opportunistic effect.

3.1.1 Management incentive effect

Agrawal & Mandelker (1987) pointed out that when corporate managers' decision-making mistakes harm shareholder interests, they not only suffer personal equity losses but also face the risk of shareholder lawsuits, which can seriously affect their careers, even casting them into troubles. Therefore, managers often exhibit risk aversion and a tendency to protect their positions. The management incentive effect hypothesis suggests that by purchasing D&O liability insurance, the risks that management might face in the decision-making process can be effectively dispersed and transferred. This prevents them from facing substantial claims in case of decision-making errors, encouraging them to make decisions in the interest of the company and owners, thereby improving corporate governance levels.

Baker & Griffith (2007) believed that senior company officials tend to avoid risk, hence their inclination to purchase D&O liability insurance. Priest (1987) considered D&O liability insurance a good incentive for attracting excellent senior management talent, promoting positive company development. D&O liability insurance primarily enhances a company's risk-taking capacity through the "incentive effect" (Boyer & Tennyson, 2015; Kim, 2016), with risk-taking behavior and company value increase being significant for companies with greater growth opportunities (Hwang & Kim, 2018). Wang et al. (2020) also believe that the incentive role of D&O liability insurance increases the management and company's tolerance for risk, enhancing governance effects and providing a clear impetus for corporate innovation.

3.1.2 External supervision effect

According to the external supervision hypothesis, D&O liability insurance promotes the involvement of third-party insurance institutions in corporate governance. Insurance companies intensify their supervision of the insured company's management activities and operations to protect their interests from harm, preventing directors and senior management from infringing on the interests of minority shareholders. This effectively prevents, warns against, and punishes possible self-interested behaviors by the management. Moreover, unlike other corporate transaction parties, insurance companies can price their policies based on specific company risks and have extensive experience in risk assessment and pricing. They use this pricing to draft different contracts for different insured companies, a process that is a result of external supervision.

O'Sullivan (1997) pointed out that this special professional liability insurance effectively motivates insurance companies to act as qualified external supervisors to protect their interests. Insurance companies conduct detailed and comprehensive investigations and assessments of the insured company in every aspect of the underwriting process to determine the potential risks they might assume. Therefore, D&O liability insurance can play an external supervisory role, reduce agency costs, lessen financial pressures and difficulties for the company (Jia & Tang, 2018), improve the quality of internal controls, optimize the internal control environment, mitigate agency conflicts, and lower default risks (Huang, 2022).

3.1.3 Opportunistic effect

According to the opportunistic effect hypothesis, by purchasing D&O liability insurance, a company transfers the risk of management being sued to a third-party insurance institution. This reduces the cost of managerial

misconduct and weakens the deterrent effect of the law. However, it also brings about moral hazards in the management, meaning that directors and senior executives might engage in speculative behaviors that harm the interests of shareholders or the company.

In situations of severe information asymmetry, D&O liability insurance can induce more opportunistic behaviors by the top management, increasing the company's litigation risk, i.e., an increase in the number of lawsuits or the amount involved, thereby increasing audit costs (Gillan & Panasian, 2015). Boubakri et al. (2008) found that D&O liability insurance, by transferring the personal liability of managers and reducing their self-interest costs, inadvertently induces or exacerbates moral hazards and opportunistic behaviors by managers, supporting the opportunistic effect hypothesis.

In summary, due to the lack of a comprehensive institutional environment and regulatory measures, company executives can exploit these loopholes for personal benefit. Research supporting the opportunistic effect hypothesis believes that D&O liability insurance alleviates the concerns of directors and senior personnel, helping management reduce risks. This enables them to evade responsibilities, thereby increasing the company's litigation risk, increasing the self-interest of corporate executives, and thus increasing the risk of corporate bankruptcy.

3.2 Hypothesis Proposal

3.2.1 D&O liability insurance and corporate strategic deviation

From an incentive perspective, D&O liability insurance can effectively motivate management, reducing their aversion to operational risks and encouraging them to actively take on risks, thereby implementing differentiated and diversified business strategies. By purchasing such insurance, companies can provide a platform for management to showcase their talents and offer a certain level of protection for their risk decision-making, alleviating the professional risks of management personnel (Core, 1997). As purchasing D&O liability insurance can provide more motivation for management personnel to increase their ability to bear risks, it enables them to implement innovative and economically beneficial strategic management decisions. D&O liability insurance acts as a safety tool for protecting directors and executives, offering a backstop for their potential loss of interest. It shifts the majority of litigation compensation pressure and costs to the insurance company, alleviating their worries and increasing their tolerance for risk. This, in turn, influences senior management's choices regarding corporate strategy, making it more likely for companies to deviate from traditional industry strategies. To avoid low-level competition with peers and innovate their business methods, companies expand their business scope and gain greater benefits.

Based on the above analysis, the following hypothesis is proposed:

H1: Controlling for other factors, the behavior of listed companies purchasing D&O liability insurance will incline them to choose strategies that deviate from industry norms, increasing the degree of corporate strategic deviation.

3.2.2 D&O liability insurance and corporate risk bearing

The risk-taking level of a company reflects the preferences for risk among directors and senior management in their strategic choices, affecting the company's growth and development. According to Faccio et al. (2016), a significant decline in managers' risk preference may lead to inefficient investment, resulting in decisions that fail to allocate corporate resources rationally. Thus, to improve investment efficiency, it is necessary to enhance managers' ability to bear risk.

Jensen & Meckling (1976) noted that the pursuit of interests and career planning by executives might prevent them from effectively optimizing investment risks through diversified investments. Therefore, senior managers with a lower capacity for operational risk often have a risk-averse mentality and tendency, choosing to ignore some higher-risk but more lucrative investment opportunities, leading them to deviate from the goal of maximizing benefits for the company and shareholders. The presence of the principal-agent problem significantly impacts the company's capacity to bear risks, affecting corporate decision-making and formulation.

The specificity of senior management's human capital means that their personal gains largely depend on the company they work for. Unlike small and medium shareholders, they cannot diversify investments to reduce loss risks during their tenure. If they make significant decision-making mistakes, they may face lawsuits, dismissal, reputation loss, and subsequent career damage. The agent status of senior management in the principal-agent relationship determines their tendency to avoid risk in decision-making (Holmstrom, 1982).

D&O liability insurance can enhance a company's ability to bear risk, reflected in two aspects. On the one hand, it protects managers from the adverse risks of project failure, reduces the tendency of senior management to avoid risks, and improves their ability to bear risks of potential company innovation failures, positively impacting the company's operational risk-taking capacity (Wang et al., 2020). On the other hand, the "incentive effect" of the insurance encourages senior personnel to challenge and bear potential loss risks, acting proactively with the company's best interest in mind. This adjusts their risk propensity, relieves their worries, and fully unleashes their management talents (Priest, 1987). Core (2000) suggests that compared to traditional executive incentives, D&O

liability insurance is an external governance mechanism that effectively shares the litigation risk caused by executive errors, significantly enhancing the company's ability to bear risks.

In summary, subscribing to D&O liability insurance promotes a company's capacity to bear risks. Specifically, D&O liability insurance reduces the potential risks faced by senior personnel in their practice through risk dispersion and transfer, enhancing the protection of their financial interests. Therefore, D&O liability insurance can motivate risk-averse executives, encouraging them to bear the risks of innovative and investment activities, and proactively achieve the maximized benefit value goals aligned with the company and shareholders. This allows for the selection of higher-risk yet more rewarding investments, bringing real value enhancement to the company.

Based on this, the following hypothesis is proposed:

H2: Purchasing D&O liability insurance increases the company's level of risk-taking.

3.2.3 The mediating role of corporate risk bearing

There is a close connection between senior management and a company's ability to bear risk. To some extent, the attitude and acceptance level of risk by top-level personnel determine the threshold of corporate risk-taking. Therefore, as the risk-taking level of executives increases, the level of risk undertaken by the company correspondingly rises. Existing research indicates that the stronger the ability of senior personnel to bear risk, the better the company's innovation performance (Wang et al., 2020).

Kim (2016) suggests that D&O insurance increases a company's risk-taking behavior, leading to higher stock return volatility and greater R&D intensity. Core (1997) argues that the main purpose of listed companies introducing D&O liability insurance is to alleviate overly conservative investment activities by top management, increase their tolerance for risk, encourage them to fully utilize their talents, actively face various business challenges, and be willing to take on more risks. This could potentially promote companies to make strategic choices that deviate from industry norms.

Based on the above analysis, the following hypothesis is proposed:

H3: The level of corporate risk-taking plays a mediating role in the impact of D&O liability insurance on corporate strategic deviation.

4. Research Design and Baseline Regression Analysis

4.1 Sample Selection and Data Source

This study uses data from Chinese A-share companies listed on the Shanghai and Shenzhen stock exchanges from 2010 to 2020. The data of listed companies is chosen for its accessibility and because the Chinese regulatory authorities have provided policy guidance for listed companies to establish D&O liability insurance. The data was processed as follows: (1) Exclude financial and insurance industries and companies marked as ST or *ST; (2) Exclude samples with missing data. A total of 22,956 observations are obtained. Additionally, the D&O liability insurance data required for this study is manually collected and organized, and other variables are sourced from the CSMAR and Wind databases, with Winsorizing at the 1% and 99% levels.

4.2 Variable Definitions

4.2.1 D&O liability insurance

Since listed companies must obtain shareholder representative assembly approval and voting to purchase D&O liability insurance, ensuring its legality and effectiveness, they must explicitly disclose whether they have purchased such insurance in announcements or annual reports. Detailed information like insurance premium amounts is difficult to obtain and incomplete. Following the research methods of Yuan et al. (2016), Zou et al. (2008), a binary dummy variable "0/1" is used to measure this indicator, where 1 indicates that the company has disclosed the purchase of D&O liability insurance in its announcement or annual report, and 0 otherwise. If a company does not disclose the cancellation of such insurance in subsequent years, it is assumed to continue purchasing the insurance.

4.2.2 Corporate risk taking

The higher the level of risk a company bears, the more it invests in higher-risk projects, leading to greater volatility in corporate performance. Existing studies often use corporate earnings volatility to measure the level of risk-taking. This paper follows the methods of Boubakri et al. (2013); Faccio et al. (2011), and John et al. (2008), measuring it with the volatility of the return on assets (Roa). The first step is to calculate Roa by dividing earnings before interest and taxes (EBIT) by total assets (ASSET). The second step uses a three-year observation period to calculate the standard deviation of industry-adjusted Roa (AdRoa) within each observation period, yielding the volatility of Roa (Risk). The specific calculation formulas are as follows:

$$Adj\_Roa_{i,t} = \frac{EBIT_{i,t}}{ASSET_{i,t}} - \frac{1}{X}\sum_{k=1}^{X}\frac{EBIT_{i,t}}{ASSET_{i,t}} \quad (1)$$

$$\text{Risk}_i = \sqrt{\frac{1}{T-1}\sum_{t=1}^{T}\left(\text{Adj\_Roa}_{i,t} - \frac{1}{T}\sum_{t=1}^{T}\text{Adj\_Roa}_{i,t}\right)^2} \quad (2)$$

4.2.3 Corporate Strategic Deviation (DSD)

This study adopts the research method of Tang et al. (2011) to construct a proxy variable for Corporate Strategic Deviation, measuring the degree of deviation from the traditional conventional strategies in the industry across six dimensions of strategic resource allocation differences among companies.

Firstly, the allocation of enterprise resources is calculated in six dimensions: Inventory to Revenue Ratio (= Net Inventory / Operating Revenue); Fixed Asset Renewal Rate (= Net Fixed Assets / Original Value of Fixed Assets); Capital Intensity (= Net Fixed Assets / Number of Employees of the Company); Non-production Expense Rate (= Administrative Expenses / Operating Revenue); R&D Intensity (= Net Value of Intangible Assets / Operating Revenue); Financial Leverage (= Total Liabilities / Shareholder Equity). Due to the limited disclosure of relevant R&D investment information by Chinese A-share listed companies in previous years, this study uses the net value of intangible assets as a measure of a company's R&D intensity. Secondly, the data of these six dimensions are standardized by industry and year, and then their absolute values are taken. Finally, the standardized data are averaged arithmetically to obtain the Corporate Strategic Deviation (DSD). The higher the value of this indicator, the greater the degree of deviation of the company's strategy from the traditional strategy of the industry.

Table 1. Variable definition

Variable Category	Variable Name	Variable Content
Dependent Variable	Corporate Strategic Deviation (DSD)	Measured by the industry diversity of strategic resource allocation across six dimensions as the degree of deviation of corporate strategy from industry norms.
Independent Variable	D&O liability insurance (Doins)	D&O liability insurance, 1 if purchased, 0 otherwise.
Mediating Variable	Corporate Risk Bearing (Risk)	Measured by the volatility of profitability as the level of corporate risk bearing.
Control Variables		
Company Characteristics Variables	Company Size (Size)	Logarithm of the total assets at the end of the period for the company.
	Return on Assets (Roa)	Profitability of the company, Roa = Return on Total Assets for company *i* in year *t*.
	Capital Structure (Lev)	Debt-to-Asset Ratio = Total Liabilities / Total Assets.
	Free Cash Flow (Cashflow)	Cashflow = Net Cash Flow from Operating Activities / Total Assets at the End of the Period.
Company Characteristics Variables	Company Age (FirmAge)	Natural logarithm of the number of years the company has been listed, LnAge = Ln (Number of years in year t - Year company i was listed + 1).
	Growth (Growth)	Growth = Revenue growth rate of main business for company i in year t.
Board Characteristics Variables	Equity Balance (Balance)	Equity Balance = Shareholding Proportion of the 2nd to Nth largest shareholders / Shareholding Proportion of the largest shareholder.
	Equity Concentration (Top1)	Equity Concentration = Shareholding Proportion of the largest shareholder.
	Board Size (Board)	Logarithm of the number of board members.
	Independent Director Ratio (Indep)	Number of independent directors divided by the total number of board members.
	CEO-Chairman Duality (Dual)	1 if the Chairman and CEO positions are combined, otherwise 0.
	Management Shareholding (Mshare)	Management's shareholding data divided by total capital stock.
Other Variables	Audit (Big4)	1 if audited by one of the Big Four accounting firms, otherwise 0.
	Property Nature (SOE)	1 if state-owned holding, otherwise 0 for other holdings.

4.2.4 Control variables

Based on the research by Faccio et al. (2011), Jia & Tang (2018), John et al. (2008), the following variables are selected as control variables: Company Size (Size); Return on Assets (Roa); Capital Structure (Lev); Free Cash

Flow (Cashflow); Firm Age (FirmAge); Growth (Growth); Equity Balance (Balance); Equity Concentration (Top1); Board Size (Board); Proportion of Independent Directors (Indep); CEO-Chairman Duality (Dual); Management Shareholding (Mshare); Audit (Big4); Property Rights (SOE). In addition, the study controls for year fixed effects and firm fixed effects to control the impact of other unobserved factors on corporate strategic deviation.

The definitions of these variables are shown in Table 1.

4.3 Model Construction

This study aims to explore how the level of corporate risk-taking affects the relationship between D&O liability insurance and corporate strategic deviation. Drawing on the research of Tian & Wang (2011) and Yuan et al. (2016), the following models are constructed to examine these relationships.

Model (3) tests the relationship between the purchase of D&O liability insurance and corporate strategic deviation. The significance of the regression coefficient α_1 is used to validate the hypothesis. If the coefficient is significantly positive, then hypothesis H1 is supported.

$$\mathrm{DSD}_{i,t} = \alpha_0 + \alpha_1\ \mathrm{Doins}_i + \sum_j \alpha_j \mathrm{Cvs}_j + \sum \mathrm{Firm}\ + \sum \mathrm{year}\ + \varepsilon_{it} \tag{3}$$

where, $DSD_{i,t}$ represents corporate strategic deviation, $Doins_i$ indicates whether the company has purchased D&O liability insurance, and $\sum_j \beta_j Cvs_j$ represents a series of control variables, including the log of total assets at the end of the period, return on assets, debt-to-asset ratio, free cash flow, log of firm age, revenue growth rate, equity balance, equity concentration, board size, independent director ratio, CEO-chairman duality, management shareholding, Big Four accounting firm audit, property nature. $\sum Firm$ represents the company-fixed effects; $\sum year$ represents the year-fixed effects; ε_{it} is a random disturbance term.

Model (4) explores the impact of purchasing D&O liability insurance on the level of corporate risk-taking. If the coefficient β_1 in this test is significantly positive, then hypothesis H2 can be considered validated.

$$\mathrm{Risk}_{i,t} = \beta_0 + \beta_1 \mathrm{Doins}_i + \sum_j \beta_j \mathrm{Cvs}_j + \sum \mathrm{Firm}\ + \sum \mathrm{year}\ + \varepsilon_{it} \tag{4}$$

where, $Risk_{i,t}$ represents the risk-taking capability of company i in year t. The other variable definitions remain consistent with Model (3).

Model (5) examines whether corporate risk-taking level plays a mediating role in the relationship between the purchase of D&O liability insurance and corporate strategic deviation. Combining Models (3), (4), and (5) can verify whether corporate risk-taking level has a mediating effect. According to the criteria for judging mediating effects by Wen & Ye (2014), if both coefficients β_1 and γ_2 are significant, it can be determined that corporate risk-taking level indeed has an indirect impact between the two. Next, by observing the sign and significance of γ_1, if γ_1 is not significant, then there is only a mediating effect; if γ_1 is significant and the direction is consistent with that of β_1*γ_2, then it indicates a partial mediating effect, thus supporting hypothesis H3. Otherwise, it presents a masking effect.

$$\mathrm{DSD}_{it} = \gamma_0 + \gamma_1 \mathrm{Doins}_i + \gamma_2\ \mathrm{Risk}_{it} + \sum_j \gamma_j \mathrm{Cvs}_j + \sum \mathrm{Firm} + \sum \mathrm{year} + \varepsilon_{it} \tag{5}$$

The variable definitions in Model (5) are consistent with those in Models (3) and (4).

4.4 Descriptive Statistical Analysis

The results of the descriptive statistics for the key variables are presented in Table 2.

From Table 2, it can be seen that the average value of the DSD index measuring corporate strategic deviation is 0.903, with a standard deviation of 0.458. The minimum value is 0.055, and the maximum value is 2.633. This indicates that there are differences in the corporate strategic deviation index among different companies in the sample, and each company has different preferences for choosing to deviate from the conventional industry strategy.

Table 2. Descriptive statistical analysis

Variable	Obs	Mean	Std.Dev.	Min	Max
DSD	22,956	0.903	0.458	0.055	2.633
Doins	22,956	0.099	0.299	0	1
Risk	22,956	0.029	0.038	0	0.452
Size	22,956	22.283	1.258	20.009	25.966
Lev	22,956	0.439	0.201	0.061	0.875
ROA	22,956	0.040	0.057	-0.175	0.207
Cashflow	22,956	0.048	0.067	-0.147	0.230
FirmAge	22,956	2.878	0.334	1.386	3.555
Growth	22,956	0.167	0.385	-0.530	2.213
Balance	22,956	0.706	0.599	0.030	2.714
Top1	22,956	0.341	0.147	0.090	0.726
Board	22,956	2.135	0.196	1.609	2.639
Indep	22,956	0.375	0.053	0.333	0.571
Dual	22,956	0.481	0.500	0.000	1.000
Mshare	22,956	0.119	0.186	0	0.709
Big4	22,956	0.059	0.236	0	1
SOE	22,956	0.386	0.487	0	1

Table 3. Baseline regression results

Variables	Adding Company Characteristics	Adding Board Characteristics	Adding Other Variables
	DSD	DSD	DSD
Doins	0.083***	0.078***	0.075***
	(8.955)	(8.402)	(8.102)
Size	0.064***	0.056***	0.054***
	(24.063)	(19.263)	(17.917)
Lev	0.424***	0.440***	0.437***
	(23.939)	(24.809)	(24.601)
ROA	-0.977***	-1.024***	-1.006***
	(-16.796)	(-17.553)	(-17.245)
Cashflow	-0.616***	-0.649***	-0.647***
	(-13.809)	(-14.603)	(-14.544)
FirmAge	0.167***	0.186***	0.179***
	(18.355)	(19.726)	(18.803)
Growth	0.005	0.001	0.002
	(0.636)	(0.085)	(0.318)
Balance		0.073***	0.075***
		(11.111)	(11.481)
Top1		0.436***	0.421***
		(16.296)	(15.641)
Board		-0.051***	-0.066***
		(-2.912)	(-3.717)
Indep		0.181***	0.163***
		(2.989)	(2.685)
Dual		0.018***	0.023***
		(3.197)	(4.074)
Mshare		-0.049***	-0.019
		(-2.842)	(-1.072)
Big4			-0.003
			(-0.251)
SOE			0.040***
			(5.714)
Company-fixed	Yes	Yes	Yes
Year-fixed	Yes	Yes	Yes
_cons	-1.135***	-1.162***	-1.086***
	(-18.948)	(-15.424)	(-13.737)
N	22956	22956	22956
R^2	0.196	0.206	0.208

Note: Parentheses contain t-values; *, **, *** indicate significance at 10%, 5%, 1% levels respectively.

The average value of the Doins index, measuring whether a company purchases D&O liability insurance, is 0.099. This suggests that about 9.9% of the total sample companies choose to purchase this insurance. This proportion is roughly consistent with other studies in China, but it is lower compared to the over 90% insurance rate of overseas companies, indicating that this insurance has not yet gained broader recognition and development in China, and the market potential is substantial. The average value for the corporate risk-taking level (Risk) is 0.029, with a standard deviation of 0.038, indicating differences in risk-taking levels among different listed companies.

The average value of the property nature index is 0.386, showing that 38.6% of the listed companies in the Shanghai and Shenzhen A-share sample are state-owned enterprises. The fluctuation range of company size is [20.009, 25.966], with a standard deviation of 1.258, indicating differences in individual company sizes. The fluctuation range for the debt-to-asset ratio is [0.061, 0.857], showing significant variation in the debt undertaken by different listed companies. The descriptive statistical data of all variables in this paper do not contain extreme values, and each variable's value is within a reasonable range, which is relatively consistent with existing research results.

4.5 Regression Results Analysis

4.5.1 D&O liability insurance and Corporate Strategic Deviation

First, a stepwise regression is applied to the overall sample using Model (1). The first step involves only adding company characteristic variables; the second step includes board characteristic variables, and finally, other control variables are added. The regression results are shown in Table 3. It is found that as control variables are gradually introduced, the adjusted R^2 also increases, indicating the effectiveness of the selected control variables and the continuous improvement of the model's goodness of fit.

Table 3 regression results validate the impact of D&O liability insurance (Doins) on Corporate Strategic Deviation (DSD). The regression results show that Doins has a regression coefficient of 0.083 with Corporate Strategic Deviation (DSD), significantly positive at the 1% level. This indicates a positive correlation between D&O liability insurance and Corporate Strategic Deviation, significantly promoting companies to make strategic choices that deviate from industry norms. After introducing a series of control variables, the regression coefficient of Doins remains significantly positive at the 1% level, implying a significant positive correlation between the purchase of D&O liability insurance and corporate strategic deviation. Companies purchasing this insurance tend to have a higher propensity for strategic deviation, supporting hypothesis H1. This finding aligns with studies like Core (1997) and could be due to the motivational effect of D&O liability insurance, where top management's risk preference is increased, leading them to choose unconventional corporate strategies to achieve higher returns or competitive advantages.

Regarding control variables, Size, Lev, FirmAge, Balance, Top1, Dual, and SOE show significant positive correlations with Corporate Strategic Deviation. This suggests that larger companies, those with higher debt ratios, longer lifespans, and higher equity balance, are more likely to choose strategies that deviate from industry norms. Companies with these characteristics usually have stronger capabilities and risk resistance and can afford the cost of deviating from conventional strategies, thus tending to choose such strategies after weighing pros and cons. Equity concentration, CEO-chairman duality, and state-owned enterprise property nature can also increase the likelihood of strategic deviation. These characteristics may give controlling shareholders more say, enabling them to decide the company's strategic direction, possibly opting for strategic deviation for their own benefit. ROA, Cashflow, and Board have significantly negative coefficients, indicating that higher asset returns, larger cash flows, and larger board sizes are associated with lower strategic deviation. This may be because companies with high asset returns and cash flows can sustain stable earnings without needing to deviate from current strategies to achieve business objectives. Larger board sizes imply less concentrated power, stronger checks and balances, and supervision on executives, leading to more conservative strategic choices and a lower likelihood of strategic deviation.

5. Heterogeneity Analysis

The analysis explores differences in the impact of D&O liability insurance on corporate strategic deviation among enterprises with varying property rights and sizes.

5.1 Impact of D&O Liability Insurance on Corporate Strategic Deviation under Property Rights Heterogeneity

Due to resource scarcity, businesses of different natures differ in operation modes and strategic decision-making, which ultimately influence the strategies they adopt. Given that non-state-owned enterprises are typically more flexible, structurally simpler, and more adaptable, they might be better suited for dynamic and competitive

market environments than state-owned enterprises. The nature of enterprise property rights affects the risk judgments of corporate executives and directors, leading to distinct business styles. Thus, the study groups data based on property rights to test the influence of enterprise property rights on the purchase of D&O liability insurance and corporate strategic deviation. The results are shown in Table 4.

Table 4. Equity heterogeneity

Variable	State-Owned Enterprise	Non-State-Owned Enterprise
	DSD	DSD
Doins	0.035***	0.104***
	(2.741)	(7.431)
Size	0.055***	0.047***
	(10.980)	(12.611)
Lev	0.685***	0.287***
	(21.912)	(13.563)
ROA	-0.883***	-1.005***
	(-7.394)	(-15.609)
Cashflow	-0.443***	-0.769***
	(-5.644)	(-14.698)
FirmAge	0.319***	0.135***
	(16.000)	(12.998)
Growth	-0.025*	0.017*
	(-1.803)	(1.955)
Balance	0.089***	0.057***
	(6.523)	(7.934)
Top1	0.585***	0.282***
	(12.483)	(8.560)
Board	-0.059**	-0.053**
	(-2.052)	(-2.371)
Indep	-0.124	0.344***
	(-1.253)	(4.474)
Dual	-0.008	0.037***
	(-0.753)	(5.767)
Mshare	0.099	-0.073***
	(0.663)	(-4.298)
Big4	-0.017	0.024
	(-0.936)	(1.339)
Company-fixed	Yes	Yes
Year-fixed	Yes	Yes
_cons	-1.582***	-0.792***
	(-11.833)	(-7.759)
	DSD	DSD
N	8851	14105
R^2	0.219	0.165

Note: Parentheses contain t-values; *, **, *** indicate significance at 10%, 5%, 1% levels respectively.

According to Table 4, both state-owned and non-state-owned enterprises show a significant positive correlation between D&O liability insurance (Doins) and Corporate Strategic Deviation (DSD). This indicates that the purchase of this insurance plays a significant role in promoting strategic deviation in both types of enterprises. In state-owned enterprises, the coefficient is 0.035, significantly positive at the 1% level, whereas in non-state-owned enterprises, it is 0.104 at the 1% significance level. This suggests that the impact of purchasing D&O liability insurance on strategic deviation is relatively smaller in state-owned enterprises. The introduction of D&O liability insurance in non-state-owned enterprises has a more active and significant motivational effect, providing a safety net for bold innovations, attracting investments, breaking out of homogeneous competition, and seeking new development, thus strengthening the role of non-state-owned enterprises in the market economy, enhancing the national economy, optimizing the market economic structure, and maintaining continuous, rapid, and stable development of the national economy.

5.2 Impact of D&O Liability Insurance on Corporate Strategic Deviation under Size Heterogeneity

The size of an enterprise also influences its resource acquisition methods and decision-making style. Large

companies with substantial operating scales, high market shares, strong financial capabilities, well-developed management systems, strong risk resistance, and advantageous resources and talent are more likely to make aggressive or innovative decisions. Therefore, this study logs enterprise size and divides companies into large and small-scale enterprises based on the median, examining the heterogeneity of enterprise size on the impact of purchasing D&O liability insurance on corporate strategic deviation. The results are shown in Table 5.

Table 5. Size heterogeneity

Variable	Large Scale	Small Scale
	DSD	DSD
Doins	0.081***	0.034**
	(6.527)	(2.460)
Size	0.083***	-0.055***
	(15.066)	(-8.729)
Lev	0.788***	0.164***
	(26.989)	(8.030)
ROA	-0.703***	-0.934***
	(-7.091)	(-14.276)
Cashflow	-0.687***	-0.547***
	(-9.810)	(-10.469)
FirmAge	0.246***	0.095***
	(16.101)	(8.545)
Growth	0.022**	-0.024**
	(1.972)	(-2.543)
Balance	0.124***	-0.002
	(11.900)	(-0.246)
Top1	0.694***	-0.057
	(17.422)	(-1.634)
Board	-0.057**	-0.035
	(-2.238)	(-1.515)
Indep	-0.000	0.205***
	(-0.000)	(2.577)
Dual	0.035***	0.002
	(3.972)	(0.293)
Mshare	-0.048	-0.061***
	(-1.331)	(-3.280)
Big4	-0.062***	0.098***
	(-4.216)	(2.990)
SOE	0.036***	0.026***
	(3.546)	(2.904)
Company-fixed	Yes	Yes
Year-fixed	Yes	Yes
_cons	-2.264***	1.744***
	(-16.506)	(11.584)
N	11478	11478
R^2	0.271	0.116

Note: Parentheses contain t-values; *, **, *** indicate significance at 10%, 5%, 1% levels respectively.

The regression results indicate that in large-scale enterprises, the coefficient of the impact of D&O liability insurance (Doins) on Corporate Strategic Deviation (DSD) is 0.081, significant at the 1% level. In contrast, in small-scale enterprises, the impact coefficient of Doins on DSD is only significant at the 5% level. This suggests that in larger companies, the purchase of D&O liability insurance has a more noticeable impact on the degree of corporate strategic deviation, but in smaller enterprises, this impact may not be as pronounced. Therefore, large-scale enterprises can act as "leaders" within their industries, with the introduction of D&O liability insurance playing a more apparent safety-net effect, leading them to make decisions that deviate from conventional industry strategies and are more likely to achieve innovation.

6. Mediation Effect Test

To test the impact of the purchase of D&O liability insurance on Corporate Strategic Deviation (Hypothesis H2), and whether the level of corporate risk-taking plays a mediating role and what kind of mediating effect it has (Hypothesis H3), regression analyses of empirical Models (2) and (3) are conducted. The results are shown in Table 6.

Table 6. Mechanism test - mediating effect of corporate risk bearing

Variable	Risk	DSD
Doins	0.002***	0.074***
	(2.699)	(7.960)
Risk		0.666***
		(8.627)
Size	-0.004***	0.057***
	(-17.240)	(18.807)
Lev	-0.006***	0.441***
	(-3.951)	(24.857)
ROA	-0.228***	-0.854***
	(-45.829)	(-14.033)
Cashflow	0.047***	-0.678***
	(12.493)	(-15.227)
FirmAge	0.002**	0.178***
	(1.978)	(18.719)
Growth	0.006***	-0.001
	(8.874)	(-0.186)
Balance	0.003***	0.073***
	(5.749)	(11.164)
Top1	-0.001	0.422***
	(-0.349)	(15.686)
Board	-0.003**	-0.063***
	(-2.315)	(-3.590)
Indep	0.002	0.162***
	(0.352)	(2.670)
Dual	0.003***	0.021***
	(5.315)	(3.776)
Mshare	-0.013***	-0.010
	(-8.594)	(-0.583)
Big4	0.003**	-0.005
	(2.463)	(-0.392)
SOE	-0.005***	0.043***
	(-8.790)	(6.213)
Company-fixed	Yes	Yes
Year-fixed	Yes	Yes
_cons	0.139***	-1.178***
	(20.567)	(-14.795)
N	22956	22956
R^2	0.161	0.210

Note: Parentheses contain t-values; *, **, *** indicate significance at 10%, 5%, 1% levels respectively.

The first column shows the regression results between the purchase behavior of D&O liability insurance and the level of corporate risk-taking. The results show that the impact coefficient of D&O liability insurance (Doins) on corporate risk-taking level (Risk) is 0.002, significant at the 1% level. This indicates a clear positive correlation between the purchase of D&O liability insurance (Doins) and the level of corporate risk-taking (Risk), meaning that purchasing D&O liability insurance helps to enhance a company's ability to bear risk, confirming Hypothesis H2. This finding is consistent with the conclusions of studies by Boyer & Tennyson (2015), Kim (2016), Hwang & Kim (2018), Wang et al. (2020), and others.

The regression results confirm that D&O liability insurance can provide certain protection to senior management, enabling them to boldly seize high-risk but high-return investment opportunities and bravely face various potential risks, threats, and uncertainties in the strategic decision-making process, thereby significantly enhancing the risk-taking level of senior management and even the enterprise as a whole. If a company faces litigation risk when making aggressive or industry-deviating strategic decisions, D&O liability insurance on the one hand can effectively mitigate their legal risks and compensation liabilities. It also encourages them to break free from traditional low-level competition within the industry, tolerate higher failure rates, make decisions more confidently, and pursue bold actions, active innovation, and alternative management goals. On the other hand, after introducing D&O liability insurance, insurance companies can provide legal protection for the company, assume compensation costs, and reduce the substantial litigation expenses resulting from failed strategic decisions, effectively improving the company's financing conditions. Therefore, D&O liability insurance plays a good motivational and safety-net role, raising the company's level of risk-taking.

In the second column, according to the regression results, under the mediating effect of corporate risk-taking level, the regression result of D&O liability insurance on corporate strategic deviation shows that Doins has an

impact coefficient of 0.074 with DSD, significant at the 1% level. This indicates that under the mediating role of corporate risk-taking level, purchasing D&O liability insurance significantly and positively promotes corporate strategic deviation. The mediating variable corporate risk-taking level (Risk) has an impact coefficient of 0.666 with DSD, significant at the 1% level, indicating a positive effect between corporate risk-taking level and corporate strategic deviation. The indirect role of the corporate risk-taking level can be validated by significant $\beta 1\gamma 2$ coefficients in both Models (2) and (3). Since coefficients in Models (1), (2), and (3) are all significant, this verifies a partial mediating effect, proving that part of the impact of D&O liability insurance on corporate strategic deviation is realized through the corporate risk-taking level. Hypothesis H3 is partially confirmed.

In summary, the purchase of D&O liability insurance significantly promotes the degree of strategic deviation in enterprises. The level of corporate risk-taking plays a partial mediating role in the impact mechanism of D&O liability insurance on corporate strategic deviation. By purchasing this insurance, it can directly lead to an increase in the extent of corporate strategic deviation. Concurrently, the act of purchasing D&O liability insurance enhances the company's capacity for risk-taking, thereby further increasing the level of corporate strategic deviation. Through D&O liability insurance, part of the risks faced by executives and directors can be effectively transferred to the insurance company, mitigating their tendency to solely avoid risks. This significantly strengthens the risk-taking capacity of both the executives and the company, inspiring the enthusiasm and innovation of senior management and providing robust support for the company's innovative and investment activities.

7. Further Research

7.1 DID Model Test

Table 7. DID model regression results

Variable	DSD
Doins	0.083***
	(4.337)
Size	0.054***
	(17.540)
Lev	0.422***
	(23.376)
ROA	-1.008***
	(-17.103)
Cashflow	-0.664***
	(-14.713)
FirmAge	0.183***
	(18.874)
Growth	0.001
	(0.171)
Balance	0.078***
	(11.705)
Top1	0.438***
	(16.005)
Board	-0.071***
	(-3.922)
Indep	0.187***
	(3.027)
Dual	0.031***
	(5.343)
Mshare	-0.026
	(-1.478)
Big4	0.010
	(0.734)
SOE	0.035***
	(5.028)
Company-fixed	Yes
Year-fixed	Yes
_cons	-1.104***
	(-13.598)
N	21788
R^2	0.200

Note: Parentheses contain t-values; *, **, *** indicate significance at 10%, 5%, 1% levels respectively.

Considering that purchasing D&O liability insurance might impact the degree of corporate strategic deviation,

and to eliminate changes in corporate strategic deviation caused by factors other than D&O liability insurance, this study constructs a DID (Difference-in-Differences) Model (6) to further investigate the impact of D&O liability insurance on the degree of corporate strategic deviation.

$$DSD_{i,t} = \beta_0 + \beta_1 \, Doins_{i,t} + \sum_i \beta_{jCvs_j} + \sum Ind + \sum year + \varepsilon_{it} \quad (6)$$

In the DID model, $Doins_{i,t}$ is the interaction term of the model and defined such that companies purchasing D&O liability insurance are assigned a value of 1, while others are assigned 0. The remaining variables are the same as in Model (1). To perform a parallel trend test, the study excludes companies that purchased D&O liability insurance between 2010 and 2014 (the experimental group). The years 2010 to 2014 are set as the "pre-policy" period to better observe the economic impact of purchasing D&O liability insurance. Regression results are shown in Table 7.

The regression results of the DID model show that the Doins coefficient is 0.083, significant at the 1% level. This indicates that purchasing D&O liability insurance significantly increases the degree of corporate strategic deviation (Hypothesis H1 is validated), consistent with the conclusions of the previous sections.

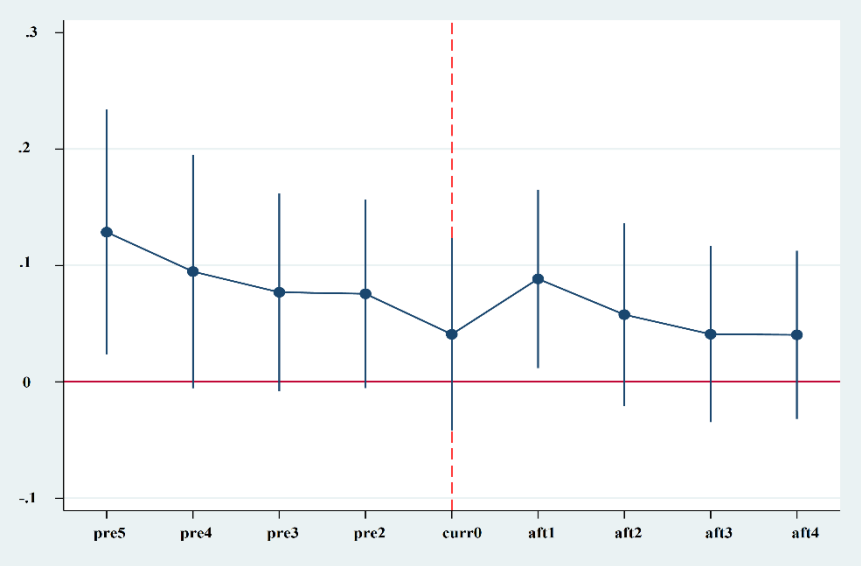

Figure 1. Parallel trend test

7.2 Parallel Trend Test

The validity of the DID results presupposes that the treatment and control groups follow the same trend, meaning that before 2014, the changes in the degree of strategic deviation among the sample companies were parallel. To confirm this, a parallel trend test is conducted for the treatment and control groups. The method involves generating 11 dummy variables for each year (2010 to 2020), with the dummy variables being 1 for that year and 0 for others. These dummy variables are interacted with whether D&O liability insurance (Doins) was purchased and regressed into the model. The regression coefficients and confidence intervals of the interaction terms are then plotted in the line chart as shown in Figure 1.

The results from Figure 1 show that before the first company purchased D&O liability insurance (before curr0), the confidence intervals of each constructed interaction term included 0. This indicates that between 2010-2014, there was no significant difference in the degree of strategic deviation between the companies in the treatment group and the control group, passing the parallel trend test.

7.3 Placebo Test

To verify whether the experimental results are influenced by factors other than D&O liability insurance, a sampling regression method is adopted. First, among the 3079 companies, including 145 in the treatment group and 2934 in the control group, 145 companies are randomly selected as the pseudo treatment group, with the rest forming the control group. A placebo test dummy variable, Doinsfake, is constructed, and the DID model regression is repeated. Since the treatment group is randomly selected, if the model does not omit some important factors, the interaction term of the placebo test should not significantly affect the dependent variable, corporate

strategic deviation, in the model, and hence its regression coefficient distribution should not significantly deviate from zero. Based on this, the regression process in the experiment is repeated 500 times to eliminate the interference of low-probability events on the estimation results. Figure 2 reports the kernel density graph of the interaction term estimation coefficients obtained from 500 randomly generated treatment groups and the corresponding p-value distribution.

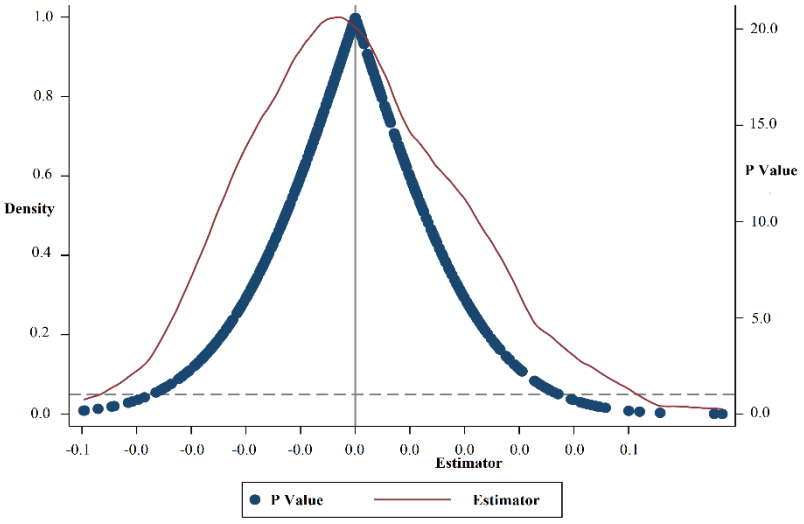

Figure 2. Placebo test

Table 8. Instrumental variable method regression results

Variable	DSD
Doins	0.074***
	(7.327)
Size	0.060***
	(18.137)
Lev	0.426***
	(21.711)
ROA	-1.051***
	(-16.587)
Cashflow	-0.607***
	(-12.269)
FirmAge	0.200***
	(18.451)
Growth	-0.007
	(-0.859)
Balance	0.071***
	(9.841)
Top1	0.441***
	(14.862)
Board	-0.059***
	(-3.045)
Indep	0.197***
	(2.977)
Dual	0.023***
	(3.733)
Mshare	-0.033
	(-1.627)
Big4	-0.014
	(-1.033)
SOE	0.035***
	(4.685)
Company-fixed	Yes
Year-fixed	Yes
N	19228
R^2	0.208

The results in Figure 2 show that the interaction term coefficients of the placebo test do not significantly deviate from β=0; the majority of the coefficients' p-values are greater than 0.1; the dashed vertical line indicates the actual estimated coefficient of 0.083, and no sampling coefficient falls to the right of the dashed line. Overall, the estimation results do not omit any significantly important variables, and the experimental results do not suffer from severe biases.

7.4 Robustness Test

Considering potential issues like endogeneity, to verify the reliability of the models in this study and the effectiveness of their structures, robustness tests are conducted using the instrumental variable method and substituting core variables.

7.4.1 Instrumental variable method

Considering that the impact of D&O liability insurance as a corporate decision might not be fully evident in the same year, the lagged term of D&O liability insurance is used as an instrumental variable, yielding the following regression results (as shown in Table 8).

The regression results show that D&O liability insurance (Doins) continues to have a significantly positive correlation with Corporate Strategic Deviation (DSD), validating the initial hypothesis H1 and the conclusions drawn previously.

Table 9. Replacing the dependent variable

Variable	Regression of D&O Liability Insurance on Strategic Deviation	Mediation Effect
	DSD1	DSD1
Doins	0.041***	0.040***
	(4.590)	(4.427)
Risk		0.713***
		(9.562)
Size	0.017***	0.020***
	(5.743)	(6.799)
Lev	0.458***	0.462***
	(26.741)	(27.034)
ROA	-0.990***	-0.827***
	(-17.576)	(-14.085)
Cashflow	-0.061	-0.095**
	(-1.424)	(-2.208)
FirmAge	0.032***	0.031***
	(3.532)	(3.414)
Growth	0.036***	0.032***
	(4.926)	(4.368)
Balance	0.048***	0.046***
	(7.543)	(7.190)
Top1	0.173***	0.173***
	(6.648)	(6.683)
Board	0.050***	0.053***
	(2.959)	(3.111)
Indep	0.235***	0.234***
	(4.014)	(3.999)
Dual	0.003	0.001
	(0.479)	(0.144)
Mshare	0.071***	0.080***
	(4.114)	(4.657)
Big4	-0.007	-0.008
	(-0.544)	(-0.701)
SOE	0.007	0.011
	(1.072)	(1.626)
Company-fixed	Yes	Yes
Year-fixed	Yes	Yes
_cons	-0.416***	-0.515***
	(-5.451)	(-6.699)
N	22956	22956
R^2	0.115	0.118

7.4.2 Replacing the dependent variable

Following the approach of Tang et al. (2011) and Qiu & Wang (2021), two of the six dimensions originally used to measure corporate strategic resources, namely inventory turnover ratio and R&D intensity, are removed. The remaining four dimensions are then used to recalculate a strategic deviation degree, denoted as DSD1, for robustness testing. The test results are presented in Table 9.

In the first column, the impact coefficient of D&O liability insurance (Doins) on Corporate Strategic Deviation (DSD) remains significantly positive, consistent with the conclusions of previous sections. This confirms the hypothesis H1, "Purchasing D&O liability insurance will increase the degree of corporate strategic deviation," passing the robustness test.

In the second column, with corporate risk-taking level (Risk) as the mediating variable, the coefficients of D&O liability insurance (Doins) and corporate risk-taking level (Risk) remain significantly positive. This indicates that the mediating effect persists and is consistent with previous conclusions. Specifically, the impact mechanism of D&O liability insurance on strategic deviation is a partial mediating effect (Hypothesis H3 partially validated). The purchasing of D&O liability insurance can directly lead to an increase in corporate strategic deviation and also causes an increase in the level of risk-sharing, thereby further increasing corporate strategic deviation. The robustness of the mediating effect is validated through testing.

8. Conclusions, Recommendations, and Outlook

8.1 Research Conclusions

Based on the empirical analysis of listed companies on the Shanghai and Shenzhen stock exchanges in China from 2010 to 2020, this study examines how the purchase of D&O liability insurance impacts corporate strategic deviation. The research also tests the mediating role of corporate risk-taking levels, yielding the following conclusions:

(1) The purchase of D&O liability insurance significantly increases the likelihood of enterprises deviating from conventional industry strategies. This encourages enterprises to venture beyond low-level competition within traditional industries, explore more development possibilities, innovate in products and development models, and choose strategies more beneficial to their growth, thereby enhancing corporate value and standing out in their respective industries. In this process, the ability to bear risks plays a critical intermediary role. This means companies purchasing D&O liability insurance tend to choose strategies slightly different from industry conventions. The reason enterprises dare to make such decisions is the bridge-like intermediary role played by corporate risk-taking levels. The insurance provides certain guarantees and encouragement to senior management, reducing the risks they might face due to decision-making errors. By increasing their risk-taking capacity, it motivates enterprises to make decisions that deviate from conventional strategies, break free from low-level internal industry competition, and pursue greater innovation and development. These conclusions remain reliable and robust even after considering endogeneity issues or changing the measurement methods of variables.

(2) The study's comparison between state-owned and non-state-owned enterprises reveals that the motivational effect of purchasing D&O liability insurance is more pronounced in non-state-owned enterprises. In comparison to smaller-scale companies, larger-scale enterprises are more proactive, further affirming the positive impact of this insurance on corporate strategic decision-making.

(3) Using the DID model to investigate the influence of D&O liability insurance on corporate strategic deviation, while also eliminating changes in strategic deviation due to factors other than the insurance, yields robust conclusions. It further substantiates that companies purchasing D&O liability insurance are more inclined to make strategic decisions that deviate from industry norms. The safeguarding role of D&O liability insurance significantly addresses the concerns of D&O about decision-making consequences for the enterprise, enhances the enterprise's risk-taking capacity, and thereby motivates continuous innovation and development.

This research can serve as a reference for the development of D&O liability insurance in emerging markets like China and provides empirical evidence to encourage listed companies to purchase such insurance. Additionally, because D&O liability insurance can enhance the risk-taking level of listed companies and promote the choice of unconventional strategies, it poses requirements for regulatory measures. This includes both internal and external corporate governance, to fully leverage the role of D&O liability insurance and aid in achieving the strategic objectives of listed companies.

8.2 Recommendations and Prospects

8.2.1 Recommendations

Based on the discussion in this paper on the relationship between D&O liability insurance, corporate risk-taking level, and corporate strategic deviation, in conjunction with current realities, the following policies and recommendations are proposed:

(1) Actively encourage and promote the application of D&O liability insurance in the Chinese capital market

Although there has been a slight increase in the number of companies purchasing D&O liability insurance in recent years, the overall proportion of Chinese listed companies that have purchased it is still low compared to foreign companies. This paper empirically demonstrates the positive role of D&O liability insurance in enhancing corporate risk-taking capacity and strategic decision-making, thus proving its motivational effect in corporate governance. Therefore, it is recommended to encourage and guide Chinese listed companies and companies holding significant positions in various industries to introduce D&O liability insurance. Meanwhile, insurance companies should also actively publicize and promote it, to further raise the awareness and importance of D&O liability insurance among Chinese entrepreneurs, enhance the enterprises' ability to bear risks, and encourage bold innovations and investment decisions. Additionally, in the process of introducing D&O liability insurance, it is important to avoid blindly copying foreign clauses and to develop insurance terms that are more suited to the actual conditions in China.

(2) Establish and perfect the legal system for D&O liability insurance to limit opportunistic behavior

Although empirical evidence has shown that D&O liability insurance has a good motivational effect on Chinese listed companies, in economic activities, aiming for self-interest maximization might lead to opportunistic behavior. Therefore, while encouraging the introduction of D&O liability insurance, it's also crucial to consider how to avoid such opportunistic behavior to the greatest extent. A comprehensive, clear, and mature legal or regulatory system should be established for the introduction, application, and subsequent compensation processes of D&O liability insurance. The legal responsibilities and compensation standards of insurance companies underwriting D&O liability insurance should be clearly defined, providing explicit and comprehensive compensation standards and clear protection policies for both the enterprises and the insurance institutions. Insurance organizations should conduct a thorough and effective assessment of the background and risk level of the insured companies and their managers, fully play the role of external supervision during the insurance period, and supervise and restrain the insured companies through terms and other forms.

(3) Companies fully utilize the beneficial effects of D&O liability insurance for breakthroughs

For companies, on one hand, D&O liability insurance provides a good safety net for corporate decision-making. Companies should seize the opportunity to fully utilize the positive effects of D&O liability insurance, leverage their maximum resources and capabilities, actively innovate and break through, continuously seek new opportunities, and bring new developments to the enterprise. On the other hand, in response to the negative impacts of potential ethical risks and opportunistic behavior at the management level, companies should improve their internal governance mechanisms and structures. They should enhance the supervisory and restraining roles of institutions such as the board of directors, shareholders' meeting, and supervisory board on management behavior. Additionally, companies should employ professional and loyal employees and management teams, constantly explore and establish long-term effective incentive mechanisms, clarify rights and responsibilities, enhance their sense of corporate responsibility and loyalty, and actively guide company directors, executives, and other talents to maximize the use of company resources for innovation and breakthroughs, thereby maximizing corporate value.

8.2.2 Future research prospects

This study has certain limitations, particularly regarding the measurement of D&O liability insurance. Due to the current lack of mandatory disclosure requirements for listed companies in China to reveal information related to D&O insurance, this empirical study could not use specific data such as the insurance amount of each company for statistical analysis. This study, following existing research, measures whether a company has purchased D&O insurance using a dummy variable. Although this can reflect to a certain extent the impact of purchasing D&O insurance on companies, the measurement of this variable should be more detailed, for instance, including precise data like premiums and coverage amounts. As disclosure of related information becomes more comprehensive and improved in the future, it will be possible to refine and improve this aspect in subsequent research.

Additionally, while this paper has demonstrated the impact of D&O insurance on corporate strategic deviation and its mechanism of effect, since the risk-taking level only played a partial mediating role, it implies that there might be other factors at play. Therefore, future studies could analyze the mediating effects of other factors such as financing constraints (Peng et al., 2022), information quality, and audit quality (Chen et al., 2016). The study by Chang et al. (2014) suggests that a balance needs to be struck between the governance enhancement effect and the moral hazard effect of D&O insurance, depending on the directors' level of information awareness. When directors are fully informed, the governance enhancement effect of D&O insurance predominates; otherwise, the moral hazard effect dominates. Building on this research, future studies could also explore under what conditions D&O insurance can fully exert its motivational effect while avoiding strategic deviations such as excessive investment by D&O, to achieve an optimal level of utilization.

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Data Availability

The data used to support the research findings are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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