

# Litigation Risk, Judicial Transparency and Directors' and Officers' Liability Insurance

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## Abstract

Using a sample of listed companies in China from 2009 to 2014, this paper investigates relation between litigation risk and the directors' and officers' liability insurance (D&O insurance). The research results show that the higher the risk of litigation, the stronger motivation of the company to buy the D&O insurance, and the judicial transparency has positive moderating effect on the above relationship. It is found that the demand of D&O is influenced by the previous company's litigation risk and the continuous purchase of the D&O insurance could be promoted by the company's litigation. Our study enriched the D&O insurance demand motive theory, the research conclusion for the D&O insurance in the development of our country and popularity to provide policy and suggestions for reference.

## Keywords

Litigation Risk, Judicial Transparency, Directors' and Officers' Liability Insurance

## 1. Introduction

In the developed capital market, the operation and management of the enterprises being increasingly complex make the board of directors gradually become the core of the company's daily management, and it also increases the operational risk of the directors and officers. In 1934, SEC (Securities and Exchange Commission) established the civil compensation system, which further increased the risk of practical management. Afterwards, the directors' and officers' liability insurance (here after referred to as "D&O insurance") arises at the historic moment as a kind of hedging tool for companies and executives. D&O insurance is rapidly developing in western countries and it has a relatively higher coverage. Towers-Watson company's statistics in 2014 showed that 95% of

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listed companies in the United States bought D&O insurance while this proportion in Canada was 75%. D&O insurance was introduced into our country at the beginning of the 21st century; Chinese Pingan insurance cooperated with American Chubs insurance group to launch “directors and senior officers liability insurance”, which was the D&O insurance’s first practice in China. In 2006, the new “securities law” made a regulation for five kinds of tort and the corresponding civil liability to pay compensation, which made the civil compensation system in our country gradually perfect, and it increased the directors of listed companies and senior managers’ practicing risk. By the end of 2014, about 10% of A-share listed companies in China had been mentioned in the articles of incorporation or documents to have bought D&O insurance. At present, D&O insurance has been introduced for more than ten years, but the purchasing rate of the listed companies’ D&O insurance in our country is still far lower than that of European and American countries.

The purpose of D&O insurance is to prevent litigation risk and transfer the risk of enterprises and senior managers in whole or in part to a third party insurers (Griffith, 2006). Foreign scholars studied D&O insurance from the angle of governance effect (Mayers & Smith, 1982), the signal transmission effect (Core, 2000; Griffith, 2006), and the risk of moral hazard effect (Chalmers et al., 2002). The evaluation of D&O insurance was mixed; domestic scholars analyzed from the angle of corporate governance, investment efficiency, corporate performance, and the share price volatility. In general, compared with foreign scholars’ study of D&O insurance, and ignoring the discussion of D&O insurance’s demand motivation, the fundamental purpose of D&O insurance’s being introduced lies in that the enterprise managers’ guarding against the risk of litigation which can cause property damage. The level of litigation risk will make a difference to the demand of the D&O insurance. However, the judicial transparency level of a country or a region may affect the deterrent effect that the risk of litigation has on the enterprise managers, thus weakening the demand of D&O insurance. In view of this, this paper was written from the perspective of D&O insurance’s demand motivation, drawing lessons from the related research “law and finance” (La Porta et al., 1997) and using 2009-2014 listed companies after the financial crisis as the research object to explore the influence that litigation risk of enterprise has on the demand of D&O insurance. In addition, this paper also studies the mechanism of action that litigation risk has on the demand of D&O insurance under the different judicial transparency. The study found that the higher the risk of litigation is, the stronger motivation companies would have to buy D&O insurance; judicial transparency has a positive effect on above-mentioned relationship, which means that the higher the judicial transparency in the area where the company is located is, the stronger the positive correlation between litigation risk and the demand of D&O insurance is. In addition, this paper also found that the companies’ demand for D&O insurance is also affected by the previous companies’ litigation risk, and litigation risk will produce certain promoting effects on persistently purchasing of D&O insurance.

The contribution of this paper is mainly embodied in the following three aspects: 1)

It expands the research category. Existing literature study for D&O insurance is mainly focused on the effect on corporate governance, there is little literature explaining the demand motivation of D&O insurance. This paper is connected with special legal environment in China, exploring the demand motivation of D&O insurance from the empirical perspective for the first time. The study found that the demand of D&O insurance was affected by the risk of litigation and legal environment play a positive role in regulating, which made the research content of D&O insurance richer and the theory more perfect. 2) It enriches the research field of litigation risk. The current litigation risk research is still at the early stage. Existing literature is mainly focused on the factors of litigation risk and lawsuit risk approach. Based on the different judicial transparency level and from the Angle of the demand of D&O insurance, this paper combined litigation risk with corporate governance and studied the mechanism of action of litigation risk. In addition, different from the measurement of the legal environment during the past time, this paper uses the latest judicial transparency index which was published by Chinese academy of social sciences to measure the regional differences of legal environment. This paper empirically studies the deep influence it has on the relationship between litigation risk and D&O insurance from the Angle of judicial transparency, which also enriches the research theory and contents of the “law and finance”. 3) D&O insurance has been quite popular in Europe and the United States and other western countries, becoming the important tool of enterprise to manage risk. However, compared with these countries, although the D&O insurance has been introduced into the capital market in China for more than ten years, enterprises’ enthusiasm is not high and attention degree is not enough. Combining with the judicial transparency, this paper explains the demand motivation of D&O insurance from the perspective of litigation risk. The conclusion of the research provides policy Suggestions for the development and popularization of D&O insurance in our country.

The rest of this paper is organized as follows. Section 2 provides the discussion of literature and the development of hypothesis, followed by a discussion of construction of sample and variables in Section 3. The results and discussion are presented in Section 4. Section 5 concludes.

## **2. Literature Review and Hypothesis Development**

Traditional insurance’s demanding theory regards enterprises as rational man, thinking that enterprise is risk averse and the purpose of buying the insurance is to avoid risk. In theory, the level of litigation risk can have deep influence on the demand of the D&O insurance.

### **2.1. Litigation Risk and D&O Insurance**

As a risk of accidental mechanism, D&O insurance has the general characteristics of insurance. The purpose of buying D&O insurance is to transfer risk, thus reducing the operating risk of the directors and senior managers of the enterprise, and increasing their risk tolerance, as a consequence of which they can make decisions more aggres-

sively. *Mayers & Smith (1982)* pointed out that the enterprises' purchasing insurance is under the influence of many factors about it, and the insurance can reduce the enterprises' bankruptcy costs. External litigation is the main factor leading to bankruptcy, the bankruptcy of the enterprise will be more or less involved in litigation. The purpose of buying enterprise D&O insurance is to dispersed shareholders' litigation risk, transferring all or part of the risk to a third party insurers (*Griffith, 2006*). *Noel O'Sullivan (2002)* studied the demand motivation of the British companies' D&O insurance, finding that companies that have greater probability of financial distress, high level of litigation risk and more opportunities for high-growth are more likely to buy D&O insurance.

The enterprise will take the D&O insurance as an entity to guard against external shocks which are aimed at enterprise and executives. As a kind of external shocks, enterprises become the important factor influencing the demand of D&O insurance. *Core (1997)* argued that companies which have higher external risk are more likely to possess the policy of D&O insurance. *Chen & Li (2008)* found that the relationship between the demand of the D&O insurance and litigation risk faced by the board of directors of the company was positively correlated, and the higher the risk of the companies' buying insurance was, the higher the premium rate, highest pay limitation, and franchise accordingly was. The possibility of insolvency was caused by disaster losses substantially decreased. *Donley & Kent (2008)* conclude that D&O liability insurance has become an integral part of corporate governance in Canada. Some prior studies have provided empirical support for this argument. Bankruptcy is only an extreme case, what takes up the major part is the losses to the enterprise, which will reduce the company's liquidity, and even make the enterprise into financial difficulties. External litigation will increase the practicing risk of the directors and officers. As a risk hedge mechanism, D&O insurance can reduce the risk of their practice.

## 2.2. Litigation Risk, Judicial Transparency and D&O Insurance

At present, China is on the particular stage where the emerging markets are in the transformation. Investors' legal protection is low and they are short of strict judicial system. In various areas, there are many differences between corporate governance and economic department, and there is no unified legal system construction, which means that the law is not balanced. *Lubman (1999)* argued that Chinese courts relatively lack of independence, and the case at the trial is not transparent so that it is easy to be affected by external factors and the application of the law and implementation would also be affected. *Wynn (2008)* pointed out whether the plaintiff and the court are located in the same place during the first instance plays a significant role in the plaintiff's obtaining favorable ruling, which shows that the regional differences among the legal environment in our country may affect the effects litigation risk has on the demand of D&O insurance.

The embodiment of the legal environment is more as a kind of external guarantee mechanism, and judicial transparency is the real reflection of whether the level of legal environment is good or bad. The effect that judicial transparency has on litigation risk and D&O insurance can be analyzed from the following two angles. First of all, where

the judicial transparency is low, less information is published when cases are at the trial. The third party agencies such as media, industry associations can't play a necessary role in supervision, as a result of which the judge can easily biases in the judgment of the party. When justice is difficult to achieve, [Palmrose & Scholz \(2004\)](#) found that companies such as litigation risk can affect the enterprise's innovation, judicial protectionism can interfere with the results of litigation. The place where the level of judicial transparency is lower is more likely to produce local protectionism so that the threat of litigation risk to the enterprise would be weakened. Therefore, the impact litigation risk has on D&O insurance would be reduced. [Hoyt & Khang \(2000\)](#) pointed out that the person in charge will produce the problem that it is difficult to executive because of financial limitation in the civil compensation lawsuit. Judges tend to exempt from executive directors' liability to pay compensation in order to ensure cases are enforced, thus making their violation costs lower and let them indulge more illegal behaviors. Second, where the level of judicial transparency is high, government's behavior here is more regular, and the trial process is more transparent and the materials of cases' filing, and the related execution would be announced in the area where the level of judicial transparency is relatively higher. The public opinion and the media supervision make the judge's violation costs very high so that the judge will not risk partiality or hear a case not fairly. At this time, the cases in the trial process will be more just, independent, and enterprises' litigation won't be weakened. The impact that litigation risk has on the demand of D&O insurance will be stronger. [Boyer & Stern \(2014\)](#) showed that the regional efficiency of different legal system may eventually influence the execution of the law. The listed companies are likely to reach a compromise with the judicial department, making the costs of listed companies' encroaching the other shareholders' interests lower.

In summary, the research for D&O insurance demand motivation of the foreign scholars have been very rich, and Chinese scholars study D&O insurance focused on its effect on corporate governance, for the study of demand for empirical research of D&O insurance is less and less. As an important factor affecting the D&O insurance, what kind of role will corporate litigation produce in the special legal environment in China? We will discuss in this paper next.

### 2.3. Hypotheses Development

Enterprises follow the "cost-benefit" principle when buying D&O insurance. In particular, when faced with the low level of litigation risk, enterprises are less likely to be charged, even if the company was charged with litigation, the costs will be lower. Buying insurance can financially produce tax effect. However, relative to the higher costs of buying D&O insurance, enterprises generally don't make a decision to buy D&O insurance. With the promotion of litigation risk, which is faced by enterprises, the litigation risk which is burdened by enterprise managers increases, and the litigation rate they face also increases. Generally, the enterprises' managers are risk averse. When the level of litigation risk increases, the costs of litigation and civil compensation which are burdened by managers will rapidly increase, the pace of which will be higher than that

of the premium, the enterprises tend to buy D&O insurance at this time. Therefore, with the increase of the level of litigation risk, the demand of D&O insurance will also increase. Synthesizing the above analysis, we put forward the hypothesis 1:

**H1.** Under the same conditions, the enterprises whose litigation risk is higher are more likely to buy directors liability insurance.

As is shown in the preamble, litigation risk affects the decisions of D&O insurance's demand. However, the level of judicial transparency can influence the outcome of litigation. There is a perfect external supervision where the level of judicial transparency is high. The judiciary there is more independent. The prosecution can be better protected by law, thus the whole process of litigation goes more fairly and legally, as a consequence of which the promoting effect that litigation has on the decision of D&O insurance's demand will be stronger. Synthesizing the above analysis, the judicial transparency plays a regulating role in litigation risk and the demand of D&O insurance, which means if the level of enterprises' external judicial transparency is high, it will be easier for them to buy D&O insurance. Therefore, this paper puts forward the hypothesis 2:

**H2.** Under the same condition of litigation risk, the higher the level of judicial transparency is, the easier it will be for enterprises to buy D&O insurance.

### 3. Research Design

#### 3.1. Sample

Our sample initially comprised all firms listed on the SHSE and SZSE from 2009-2014, and the initial sample was treated as following: 1) Eliminate the listed companies of the financial insurance industry because they are generally the insurance provider. Therefore, they are likely to be the provider of D&O insurance and the demand side at the same time, which has significant difference in the motivation of purchasing. 2) Eliminate ST, PT companies, because they are specially monitored by the supervision department so that they cannot properly reflect the general situation of listed companies in the capital market. 3) Eliminate the sample whose data is missing or blank. 4) As for the influence of extreme value in the data, this paper, at the same time, on the basis of manual processing, carried the continuous variable between 1% and 99%, Winsorize treatment was conducted on the quantile. After the sample processing, 10,736 groups of observed values were obtained, 962 set of which had bought D&O insurance. The data on D&O insurance are manually collected from annual reports and disclosed minutes of boards' and shareholders' meetings, as the China's Securities and Regulatory Commission(CSRC) requires that any purchase of D&O insurance should be proposed by the board of directors and approved at shareholders' meetings. The financial data used in this study are obtained from China Stock Market Accounting Research (CSMAR) system and Wind database. We use Stata 13.0 to process and analyze the data.

#### 3.2. Models

This paper embarks from the judicial transparency to study the influence that litigation risk has on D&O insurance demand. Based on the above theoretical analysis and as-

sumptions, we construct the following models:

$$\text{Ins}_{i,t} = \alpha_0 + \alpha_1 \text{Liticount}_{i,t-1} / \text{Litiamount}_{i,t-1} + \text{Controls}_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$\begin{aligned} \text{Ins}_{i,t} = \beta_0 + \beta_1 \text{Liticount}_{i,t-1} / \text{Litiamount}_{i,t-1} + \beta_2 \text{Liticount}_{i,t-1} / \text{Litiamount}_{i,t-1} \\ * \text{Traindex}_{i,t-1} + \text{Controls}_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

Considering the purchasing policy of enterprises' D&O insurance is an important matter for the company, and it needs to pass the approval of the board of directors or the general meeting of shareholders so that there is a certain time span. Therefore, this paper mainly considered the impact in the model that the previous enterprises' litigation risk had on the demand of current D&O insurance. At the same time, this paper respectively centralized processed a number of lawsuits (Liticount), litigation costs (Litiamount) and judicial transparency index (Traindex) which uses the original value of the data to subtract the average value in the group in order to eliminate the influence of sample differences.

### 3.3. Variables

#### 3.3.1. The Index of D&O Insurance

If the listed companies have information about D&O insurance, they will publish it in the listed company's articles of association or the statement of the shareholders' meeting. There is no complete information about D&O insurance in the current database. This paper can be searched by the keywords in the tide of information network (e.g.: liability insurance, board, etc.). The paper retrieves and sorts data about D&O insurance in the statement that the listed companies have issued. When sorting data, this paper found that the listed companies in China don't have a uniform standard to reveal the D&O insurance's subscription fees, coverage and such detailed information about guarantee slip, and the data partly misses to a certain extent. Following prior studies (e.g., Zou et al., 2008), we adopt a dummy variable (Ins) to measure D&O insurance, which equals 1 if a firm purchases D&O insurance in year t, and 0 otherwise. We also use variable (LIns) to measure the number of continuous years of buying D&O insurance. The first year of the company announced the purchase of D&O insurance equals 1, and after by year accumulation.

#### 3.3.2. The Indicators of Litigation Risk

We select the companies' accused involved amount as the measurement of companies' litigation risk. The companies' accused involved amount is replaced by Liticount, which uses the accumulative total number of litigation to measure this year, If the enterprise is not involved in litigation, the Liticount = 0, enterprises involved in litigation have a increasing liticount according to the number of involved cases. The amounts involved in litigation amount that year is the cumulative size which can be replaced by litiamount. This paper uses the specific value in which litiamount divide the total assets at the beginning of this year to multiply 100 as the index to measure the litigation risk in order to eliminate sale effect.

### 3.3.3. The Judicial Transparency

Judicial transparency's index adopted the "Annual Report on China's Rule of Law", which was published by Li Lin and Tian He, two schoolers who are working at CASS (Chinese Academy of Social Sciences institute). The judicial transparency index of all provinces, autonomous regions and municipalities directly under the higher people's court are published in this book. The index is formed by four indicators including trial opening, register trial opening, referee documents opening and executive information opening. Finally, the index of the provincial court's judicial transparency is calculated. This paper takes provincial senior court's judicial Transparency index to represent a certain province's level of judicial Transparency. The higher the index is, the better the judicial Transparency index is. The judicial transparency index can be replaced by Traindex.

### 3.3.4. The Control Variables

In order to control other possible influence on D&O insurance requirements and more accurately know the relationship between the litigation risk and D&O insurance, this paper introduces control variables respectively from the perspective of firm characteristics and corporate governance. This paper selects market forces, firm age, equity concentration, state-controlled, cash flow, company size, profitability, debt level, operational efficiency, growth, financial difficulties as control variables. At the same time, in order to distinguish the influence that different industries and different years have on the listed companies, this paper also controls the industry and year. Variable design and specification are shown in **Table 1**.

## 4. The Empirical Results and Analysis

### 4.1. Descriptive Statistics

Returning to descriptive statistical results of the sample data such as **Table 2**, the average value of D&O insurance requirements is 0.0896, which shows that 8.96% of the listed companies in the sample have bought D&O insurances liability insurance and we can know that the rate of purchasing in our country is relatively lower while it is 95% in USA and 75% in Canada (Towers-Watson, 2014), showing that the level of D&O insurance purchasing rate is still at a lower stage in China. The average value of litcount is 0.189 and themed-value is zero, which means that many companies were not influenced by litigation during 2008-2014. Different listed companies have different litcount, the maximum and the minimum value of which are respectively twelve and zero. Some enterprises are charged many times during a year, the most of which have twelve times. The average value of litamount is 0.217, the maximum value is 14.51 and the minimum value is 0, which means that there are many differences in listed companies' litamount. The average value of judicial transparency is 0.697, which shows that the judicial efficiency environment of the sample is integrally good. At the same time, the other variables' descriptive statistical analysis is shown in **Table 2**. In view of the space limitation, we didn't describe here one by one.

## 4.2. Correlations

The analysis of correlation shows that there is a certain correlation among the main variables in this paper. According to Pearson related coefficient, the litigation risk index means the positive correlation between litcount and D&O insurances(Ins), whose coefficient is 0.037, and on the significant level of 1%. The correlation coefficient of litiamount and traindex is 0.011 and 0.016, but not significant. According to Spearman correlation coefficient, the two indexes which can measure litigation risk and D&O insurances liability insurance also show a certain significance. The correlation between judicial transparency and D&O insurances liability insurance is not significant. Correlation analysis of main variables has carried on the simple summary, now we will test the hypothesis that the article by regression analysis.

## 4.3. Regression Results Analysis

**Table 3** reports the model regression results of judicial transparency, litigation risk and

**Table 1.** List of variables.

Variable	Variable definitions and calculation
Ins	If the D&O insurance is bought, the assignment will be 1, instead of 0
LIns	The number of continuous years of buying D&O insurance
Liticount	The number of listed companies involved in litigation of the previous period
Litiamount	Listed companies involved in the litigation amount of the previous period divided by the ratio of total assets at the beginning of multiplied by 100
Traindex	The judicial transparency index which was released in "Annual Report on China's Rule of Law"
Tra	If the judicial transparency index is more than the national average value, its value will be 1, otherwise it would be 0
Hhi	The listed companies' industry, the fender's index
Age	The listed company listed age take logarithm
Top10	The top 10 shareholders of the sum of the proportion
So	State-controlled so = 1, so other = 0
Cfe	The listed companies' operating activities cash flow is divided by total assets
Size	At the end of year, the total assets of the exponential
Roe	Return on equity of listed companies
Lev	Asset-liability ratio of listed companies
Laz	The listed companies' current assets turnover
Tbq	Tobin' Q value of listed companies
Loss	Recently two fiscal year consecutive loss is 1, otherwise it would be 0
Foccur	If companies illegally make the irregularities, its value will be 1, otherwise it would be 0
Audit	If companies' audit opinion is the standard unqualified opinion, its value will be 1, otherwise it would be 0
Industry	Industry virtual variable
Year	Year virtual variable

**Table 2.** The main variables of descriptive statistics.

variable	N	Mean	Std	Min	Median	Max	Range
Ins	10,736	0.0896	0.286	0	0	1	1
Liticount	10,736	0.1890	0.711	0	0	12	12
Litiamount	10,736	0.2170	1.273	0	0	14.510	14.510
Traindex	10,736	0.6970	0.132	0.319	0.713	0.849	0.529
Hhi	10,736	0.0587	0.106	0.006	0.009	1	0.993
Age	10,736	2.0470	0.747	0.693	2.303	3.045	2.351
Top10	10,736	0.5600	0.158	0.221	0.565	0.960	0.739
So	10,736	0.4700	0.499	0	0	1	1
Cfe	10,736	0.0506	0.100	-0.297	0.046	0.528	0.825
Size	10,736	21.9300	1.280	18.360	21.780	25.52	7.162
Roe	10,736	0.0779	0.114	-0.421	0.074	0.600	1.022
Lev	10,736	0.4620	0.218	0.045	0.465	1.037	0.992
Laz	10,736	1.4430	1.107	0.122	1.162	6.064	5.941
Tbq	10,736	1.9470	1.670	0.204	1.484	9.988	9.784
Loss	10,736	0.0351	0.184	0	0	1	1

D&O insurance. Model (1a) in **Table 3** listed the impact liticount has on the companies' D&O insurance demand and the regression coefficient of liticount is 0.0800, and on the significant level of 1%, indicating that the companies' liticount last year produces positive influence on purchasing of D&O insurance. Model (1b) in **Table 3** listed the impact litiamount has on the companies' D&O insurance. In the table, we can be seen that litiamount is on the significant positive correlation of 1%, the regression coefficient is 0.0318, the value is 2.40, showing that the companies' liticount last year produces positive influence on purchasing of D&O insurance. Synthesizing above litigation risk's regression results for D&O insurance, this paper explains that companies' litigation risk can promote the listed companies' purchasing D&O insurance, thus verifying the first hypothesis of this paper.

Model (2a) and Model (2b) in **Table 3** listed the impact the judicial transparency has on the companies' D&O insurance demand and litigation risk. In model (2a), Liticount coefficient is 0.0613, and keep the significant level at 5%, Liticount and Traindex are at the significant level of 10%, and regression coefficient is 0.4478, showing that the judicial transparency played a positive role in regulating the relationship between litigation risk and D&O insurance demand, which means that the judicial transparency's turning better will strengthen the effects enterprise litigation has on the demand of D&O insurance. In the model (2b), Liticount and Traindex are at the significance level of 5%, and regression coefficient is 0.2712, which also shows the positive regulatory role of judicial transparency, verifying the second hypothesis of this paper. Above all, judicial transparency can positively regulate the influence litigation risk has on D&O insurance

**Table 3.** Empirical results of judicial transparency, litigation risk and D&O insurance.

	Model (1a)	Model (1b)	Model (2a)	Model (2b)
	Ins	Ins	Ins	Ins
Liticount	0.0800*** (3.64)		0.0613** (2.52)	
Litiamount		0.0318** (2.40)		0.0367*** (2.65)
Traindex			0.5231*** (3.60)	0.5455*** (3.75)
Liticount*Traindex			0.4478* (1.88)	
Litiamount*Traindex				0.2712** (2.00)
Hhi	-6.4445*** (-3.08)	-6.5326*** (-3.13)	-6.4468*** (-3.08)	-6.4839*** (-3.10)
Age	0.2823*** (8.26)	0.2821*** (8.26)	0.2903*** (8.47)	0.2891*** (8.43)
Top10	0.1095 (0.83)	0.1136 (0.86)	0.0988 (0.75)	0.1047 (0.79)
So	0.0406 (0.93)	0.0396 (0.91)	0.0479 (1.09)	0.0465 (1.06)
Cfe	-0.1361 (-0.67)	-0.1420 (-0.70)	-0.1305 (-0.64)	-0.1414 (-0.70)
Size	0.1076*** (5.39)	0.1093*** (5.44)	0.1052*** (5.26)	0.1085*** (5.39)
Roe	-0.4145** (-2.18)	-0.4024** (-2.12)	-0.4209** (-2.21)	-0.4064** (-2.13)
Lev	-0.0203 (-0.18)	-0.0114 (-0.10)	0.0248 (0.22)	0.0271 (0.24)
Laz	0.0574*** (3.26)	0.0563*** (3.20)	0.0550*** (3.11)	0.0535*** (3.03)
Tbq	0.0474*** (3.22)	0.0457*** (3.10)	0.0488*** (3.31)	0.0472*** (3.19)
Loss	-0.1405 (-1.25)	-0.1328 (-1.18)	-0.1496 (-1.32)	-0.1440 (-1.27)
_Cons	-3.7549*** (-7.01)	-3.7632*** (-7.01)	-4.1029*** (-7.50)	-4.1720*** (-7.61)
Industry/Year	Yes	Yes	Yes	Yes
N	10,736	10,736	10,736	10,736
Pseudo-R2	0.0937	0.0925	0.0961	0.0953
LR-chi2	604.48	597.19	620.21	615.25

Note: Figures in parenthesis are t-statistics, \*\*\*, \*\* and \* denote the significance at the level of 1%, 5% and 10%, respectively.

demand, which means that the better judicial transparency is, the easier it will be for enterprises to buy directors liability insurance under the same litigation risk conditions.

In the process of regression analysis, this paper controls the market forces (Hhi), Age (Age), ownership concentration (need), and other variables at the same time, in which market forces (Hhi), Age (Age), company Size (Size) and profitability (Roe), operating efficiency (Laz) and growth (Tbq) are significant on different significant level, showing that all these factors have impacts on the demand of D&O insurance, which is consistent with the research of Core (1999). We control the year and industry of the company. Consistent with the enterprise traditional insurance theory, the purpose of enterprises' buying D&O insurance is to protect against the risk of executives in the process of profession. Litigation risk can significantly affect the purchasing of D&O insurance, which is also the value of buying D&O insurance.

#### 4.4. Further Analyses

##### 4.4.1. The Early Stage of the Litigation Risk's Impact

In reality, the cycle of litigation case is long, the case inter-temporal case is commonly easy to happen. Settlement information's releasing tends to have great influence on the enterprises, which will also affect the purchasing of D&O insurance. So the demand of the D&O insurance is affected by the previous litigation risk, and previous litigation may affect its being purchased. Based on this, this paper puts ahead litigation risk index (Litiamount and Liticount) respectively for two periods and three phases. Studying the influence previous litigation has on the current demand of D&O insurance. The regression results are shown in Table 4. Through it can be seen in the table, the first two periods have significant positive effect, which means that the purchasing of D&O insurance is affected by the early action, and the first two periods may also affect it. In Table 4, Liticount and Litiamount's significance is reducing, which shows that effect that litigation risk has on D&O insurance is down with time stretching. We continue to test the third period of its influence on D&O insurance demand, Liticount and Litiamount are no longer significant, suggesting that the risk of litigation's affecting in the first three periods on D&O insurance demand is not big.

##### 4.4.2. The Impact on D&O Insurance Continuous Purchase

In this section, we tested the litigation risk's impact on D&O insurance continuous purchase. Linus is selected to measure the purchasing of D&O insurance. It can be seen in Table 5 that Liticount and Litiamount have positive influence on the purchasing of D&O insurance, and at the significant level of 1%, which shows that the higher the risk of litigation is, the easier it is for enterprises to buy D&O insurance. On this basis, this paper has carried on the grouping test, dividing groups according to the average value of judicial transparency index. If the index is higher than the average level in a given area, the judicial transparency index is 1 ( $Tra = 1$ ), otherwise it would be 0. Groups' regression results indicate that the better the judicial transparency is, the stronger impact litigation risk has on the purchasing of D&O insurance is, and companies are more likely to continuously buy D&O insurance.

**Table 4.** Early action effects on D&O insurance requirements.

	Liticount early effects		Litiamount early effects	
	Ins	Ins	Ins	Ins
F2. Liticount	0.0705** (2.54)			
F3. Liticount		0.0155 (0.39)		
F2. Litiamount			0.0344** (2.07)	
F3. Litiamount				0.0324 (1.21)
_Cons	-8.4308*** (-11.96)	-8.2476*** (-10.59)	-8.5563*** (-12.08)	-8.3789*** (-10.73)
Control Variable	Yes	Yes	Yes	Yes
Industry/Year	Yes	Yes	Yes	Yes
N	8075	5772	8075	5772
Pseudo-R2	0.1090	0.1472	0.1085	0.1477
LR-chi2	461.06	361.51	458.89	362.74

Note: Figures in parenthesis are t-statistics, \*\*\*, \*\* and \* denote the significance at the level of 1%, 5% and 10%, respectively.

**Table 5.** Litigation risk's impact on directors' and officers' liability insurance for purchase.

	All the samples		Tra = 1 (Judicial transparency is good)		Tra = 0 (Judicial transparency is bad)	
	LIns	LIns	Model (1a)	Model (1b)	Model (1a)	Model (1b)
			LIns	LIns	LIns	LIns
Liticount	0.0959*** (4.07)		0.1129*** (4.35)		-0.0002 (-0.00)	
Litiamount		0.0436*** (3.26)		0.0766*** (4.66)		-0.0154 (-0.70)
_Cons	-3.6793** (-7.37)	-3.7234*** (-7.44)	-4.1521*** (-7.45)	-4.2725*** (-7.65)	-1.3618 (-1.14)	-1.3074 (-1.10)
Control Variable	Yes	Yes	Yes	Yes	Yes	Yes
Industry/Year	Yes	Yes	Yes	Yes	Yes	Yes
N	10,736	10,736	8635	8635	2101	2101
R-squared	0.0526	0.052	0.065	0.065	0.073	0.073
F-value	17.99	17.80	18.1719	18.2631	5.4062	5.4236

## 4.5. Robustness Test

In order to improve the robustness of this conclusion, this paper adopted the following robustness test method.

### 4.5.1. The Influence of Sample Selection

In order to test whether there is any deviation in samples selection, this paper adopted the Heckman two-phase model to solve the problem. The first stage, according to whether the enterprise in the sample period is affected by litigation (Liti) structure, two variables whether the companies go out of the line and whether certified public accountants have shown their standard unqualified Audit opinion (Audit). According to which the inverse mills ratio (IMR) can be calculated, and then bring them into the original model to start the second stage regression.

Heckman regression results in the first stage show that the company age, the company size, company profitability, debt level, operational efficiency, growth and audit opinion litigation risk have significant correlation with the company, the regression results in the second stage show that there is no sample selection bias of this article, the inverse mills ratio (IMR) and the company's directors' and officers' liability insurance is not relevant, and after joining the inverse mills ratio, litigation risk's influence on the directors' and officers' liability insurance demand is still a significant positive effect.

### 4.5.2. Judicial Transparency Packet Inspection

The level of Judicial transparency's high or low play a regulatory role in adjusting litigation risk and the demand of directors' and officers' liability insurance. This paper chooses the average packet judicial transparency index to test the differences between groups under different judicial transparency. If the index is higher than the national average, the region judicial transparency index assignment is 1 ( $Tra = 1$ ), otherwise it would be 0. Regression results show that litigation risk has significant positive effect on the demand of directors' and officers' liability insurance in the higher judicial transparency area, while litigation risk's impact on directors' and officers' liability insurance demand is no longer significant in the lower judicial transparency area, illustrating the impact litigation risk has on directors' and officers' liability insurance is down, which further proves the conclusion of the paper.

### 4.5.3. The Tendency of Sample Test Score Matching (PSM)

Litigation risk can affect the enterprises' buying directors' and officers' liability insurance, while a lot of samples are not affected by the lawsuit. This article adopted the method of score matching, selecting the probability of each sample in litigation among samples without the risk of litigation, and choose out the samples with the same probability but no litigation to compare the difference between the two groups, actually testing the potential litigation risk's influence on enterprises' demand for directors' and officers' liability insurance. Through the way of one-on-one sample matching, the value of ATT T statistic is 1.93, at the significance level of 10%, showing that there exist certain differences between samples, further showing that litigation risk do influence the directors' and officers' liability insurance's purchasing situation, which verifies the con-

clusion of the paper.

Through above robustness test, it did not have a great correction to the above conclusions, this shows that the conclusion of this paper is robust.

## 5. Conclusion

Different from existing literatures researching the management of D&O insurance, this paper tries to test the influence that litigation risk has on D&O insurance demand from the perspective of D&O insurance requirements and under different levels of judicial transparency. We found that the company lawsuit risk can promote the purchasing of D&O insurance, and the higher the judicial transparency is, the stronger impact litigation risk has on D&O insurance demand is. Further research shows that the companies' D&O insurance is affected by the current litigation risk, and previous litigation risk can also promote the purchasing of D&O insurance. At the same time, litigation risk also has a certain role in promoting the purchasing of D&O insurance. After a robustness test, the conclusion of this paper is still reasonable.

Research conclusion of this paper shows that the discretion of the enterprises' legal risk can affect the purchasing of D&O insurance, and the level of judicial transparency plays an important role in it. High level of judicial transparency can strengthen litigation risk's impact on D&O insurance requirements. The research in this paper seeks the conclusion for the impact that litigation risk has on the demand of D&O insurance. The external lawsuit is one of the important factors affecting the D&O insurance. After being introduced into D&O insurance for more than ten years, less listed companies still purchase liability insurance for directors and senior managers. Judicial opaque plays a big role in it. On the one hand, it needs to reform the judicial administration system and ensure judicial impartiality and independence, and to overcome the judicial protection to make civil compensation system perfect. On the other hand, it needs to improve executive directors' consciousness of risk prevention at the same time in order to promote the popularization of D&O insurance in our country as well as providing institutional guarantee for promoting the rule of law. Companies in China rarely disclose the details of the D&O insurance purchase (e.g., fees), which is one of the limitations of this article. Future research can focus on the demand of D&O insurance, so as to seek answers that D&O insurance is low buying enthusiasm in China.

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