

# Directors' and Officers' Liability Insurance, Managerial Ability and Digital Transformation of Enterprises

## -- Evidence from China

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### Abstract

At present, we are in the era of rapid development of the digital economy. Promoting digital transformation is the way for enterprises to survive and also the core strategy to promote the high-quality development of the national economy. Taking China a-share listed companies from 2011 to 2021 as the research sample, and the paper analyzes the impact and function mechanism of director and executive liability insurance on the digital transformation of enterprises. Empirical found that purchasing directors' and officers' liability insurance can significantly promote the digital transformation of enterprises, and the managerial ability plays a positive regulatory role in it. Further research found that purchasing directors' and officers' liability insurance mainly promotes the digital transformation of enterprises by reducing managerial myopia. The research conclusion provides a new perspective for exploring the role of directors' and officers' liability insurance on corporate governance. Also, it provides some theoretical reference for the government to formulate the relevant digital transformation policies of enterprises.

### Keywords

Directors' and Officers' Liability Insurance; Managerial Ability; Digital Transformation of Enterprises; Managerial Myopia.

## 1. Introduction

In the face of the severe international situation, accelerating digital transformation has become an essential means to transform and upgrade traditional growth drivers and cultivate new development drivers. It not only promotes the sustainable development of micro subjects, but also promotes the high-quality development of macroeconomy. It is an important strategic decision for China to gain more competitive advantages. The Chinese government attaches great importance to the digital transformation. In 2020, the Central Committee of the Communist Party of China and The State Council issued the "Opinions on Building a Perfect System and Mechanism for Market-based Allocation of Factors", which listed data as one of the five core elements for the first time, emphasizing that data plays an essential role in promoting economic transformation and upgrading and improving total factor productivity. China's 2021 "Government Work Report" pointed out that we should accelerate digital development, jointly promote digital industrialization and industrial digital transformation, improve the level of digital government construction, create an excellent digital ecology, and build a digital China. In 2022, the Central Committee of the Communist Party of China and The State Council issued the "Opinions on Building a Data Basic System to Better Play the Role of Data Factors", which shows that to comply with the development trend of economic and social digital transformation, strengthen the supply incentive of data elements, and enable the digital transformation of micro, small and medium-sized enterprises. Thus, the promotion of digital transformation is an

inevitable requirement for China to realize supply-side reform and industrial structure upgrading.

The digital transformation of enterprises refers to triggering significant changes in entity properties through the combination of information, computing, communication and connection technologies [1]. At present, the research on the influencing factors of the digital transformation of enterprises is mainly divided into internal and external factors. Internal level factors include organizational form, organizational culture, digital technology, Etc., while external level factors include national system, industrial technology and industry environment [2]. However, most existing studies on enterprises' digital transformation are qualitative studies and less often use actual economic data to study its influencing factors empirically. Directors' and officers' liability insurance aims to protect corporate director executives from the legal liabilities and property losses that may arise from decisions and actions made within the scope of their daily responsibilities. It plays a vital role in the behaviour and decisions of managers. Nevertheless, about the influence of director executive liability insurance on corporate governance, there is some controversy: On the one hand, based on the incentive and supervision effect, directors' and officers' liability insurance promotes the enterprise risk level [3], improves the efficiency of enterprise investment [4] and promotes the enterprise innovation [4], on the other hand, based on the moral hazard hypothesis, directors' and officers' liability insurance overprotects management, increasing opportunistic management behaviour and adverse selection [6]. Therefore, it is not clear about the role of directors' and officers' liability insurance on enterprises, and directors' and officers' liability insurance has developed late in China, and few studies have found whether directors' and officers' liability insurance has a positive impact on the digital transformation of enterprises.

Based on this, this paper takes the impact of China's A-share listed companies from 2011 to 2021 as A sample to analyze the impact of directors' and officers' liability insurance on the digital transformation of enterprises. The results show that purchasing directors' and officers' liability insurance can promote the digital transformation of enterprises. At the same time, considering that managers are an essential part of enterprise human resources and the direct helmsman of enterprise decision-making and operation, this paper, the managerial ability is taken as the adjustment variable. The study finds that the managerial ability plays a positive regulating role between the directors' and officers' liability insurance and the digital transformation of enterprises. Further research shows that purchasing directors' and officers' liability insurance will reduce managerial myopia, thus promoting the digital transformation of enterprises.

The possible main contributions of this paper are as follows. First, it broadens the influencing factors of the digital transformation of enterprises. Most of the existing literature focuses on definition research. This paper examines the impact of directors' and officers' liability insurance on the digital transformation of enterprises through empirical research. Second, it enriches the economic consequences of directors' and officers' liability insurance. The governance effect of the directors' and officers' liability insurance on the company is controversial. This paper proves its positive influence on the enterprise and provides empirical evidence for the dispute. Third, it broadens the role boundary of directors' and officers' liability insurance and the digital transformation of enterprises. This paper studies the adjustment effect of managerial ability and the intermediary transmission effect of managerial myopia in the directors' and officers' liability insurance and the digital transformation of enterprises.

## 2. Theoretical Analysis and Research Hypothesis

### 2.1. Directors' and Officers' Liability Insurance and Digital Transformation of Enterprises

Based on the theory of a high ladder team, the cognitive structure and values of the management play an essential role in the business management decision [7]. As a strategic change of an enterprise, digital transformation will also be affected by the personal characteristics of the management. First, because small and medium shareholders can reduce financial risk through diversified investment and enterprise management for professional pursuit through diversification to alleviate risk, therefore, managers in order to maintain their interests, personal reputation and stability will produce severe risk aversion in the decision-making process of risk aversion [8]. Furthermore, digital transformation has the characteristics of a long cycle, high risk and intense uncertainty, which is a subversive organizational change of the enterprise. In order to avoid risks, the management will have short-sighted behaviour and is unwilling to carry out the enterprise' digital transformation. Directors' and officers' liability insurance can transfer the liability of the business operators to the insurance company, prompting enterprise management "disclaimer" [9], alleviating the management of litigation risk and personal reputation decline, career decline, to reduce the short-sighted management, make it more attention to the long-term interests of the enterprise, more willing to implement risky decisions, it helps to promote enterprise digital transformation [10]. Second, directors' and officers' liability insurance can improve the risk-bearing level and optimize the human capital. Directors' and officers' liability insurance has the function of risk hedging. Management can buy the insurance and give full play to the insurance leverage effect due to objective reasons such as decision error of litigation costs spread to insurance costs, high insurance compensation to a certain extent, make up for the management performance losses caused by the project investment failure, thus reduces the potential enterprise practice risk, improve the risk tolerance of management [6]. Therefore, directors' and officers' liability insurance provides risk compensation and guarantee role for the failure of enterprise management, improves the level of the enterprise risk-taking [10], alleviates the pressure of the risk of enterprise transformation, prompting management in the face of high uncertainty of digital innovation, can seize the opportunity to promote the development of enterprise, increase investment in digital technology research and development. In addition, the protective effect of the director executive liability insurance on the enterprise management behaviour and decision is also conducive to the enterprise recruiting more high-level managers and director members, as well as the retention of the existing excellent management of the enterprise [11]. Based on the perspective of resource effect, the development of enterprise digital transformation needs to be supported by solid resources. Human resources are the most critical resource in an organization, and the competition between enterprises is the competition of human resources which determines the fate of enterprises. Excellent management can grasp the opportunities of the development of the digital economy and can clear away the obstacles on the development path of digital transformation and then accelerate the digital transformation of enterprises.

Finally, directors' and officers' liability insurance encourages the insurance institutions to act as the external supervisors of enterprises and strengthen the supervision of enterprises, which helps to improve the governance level of enterprises. When an enterprise buys the directors' and officers' liability insurance, the insurance company will assess the operating conditions and future development level of the enterprise and charge the premium according to the evaluation results. The greater the risk of the enterprise, the higher the premium [12]. On the one hand, the premium pressure to strengthen the supervision of the insurance enterprise. On the other hand, the insurance institutions to reduce the loss rate will strengthen the comprehensive

review of management. These prompted enterprises to improve the internal operation mechanism and commit to sustainable development, further improve the enterprise governance ability, reduce the management of opportunistic behaviour, makes the management tend to consider the interests of other stakeholders. In addition, the digital transformation of enterprises is an essential means to make the economy towards high-quality development, which can increase the expected profits of enterprises in the future. In order to long-term development of the enterprise, the management will increase the motivation of digital transformation and realize the upgrading of the industrial structure of the enterprise. From the above analysis, H1 is proposed.

H1: Under certain other conditions, the purchase of directors' and officers' liability insurance can promote the digital transformation of enterprises.

## **2.2. Directors' and Officers' Liability Insurance, Managerial Ability and Digital Transformation of Enterprises**

Managerial ability refers to the ability of managers to use various enterprise resources to create effectual output for enterprises to achieve their business goals. On the one hand, based on the perspective of brand effect, competent managers have rich technical background and knowledge experience and have a clear understanding of the position and difficulties of the enterprise to find the positioning of the enterprise development and development formulate detailed business strategies. Promoting digital transformation can not only enhance the core competitive advantages of enterprises and strategic market share but also promote industrial upgrading and even high-quality development of a national economy. Therefore, high-ability managers tend to increase their investment in digital research and development by relying on the role of directors' and officers' liability insurance and use their skills and experience to selectively invest in digital research and development projects, thus reducing the risk of digital research and development, and ultimately increasing the possibility of digital transformation of enterprises. At the same time, high-ability managers have a clear understanding of the operating conditions of the enterprise, so they can know the problems existing in the investment and financing process of the enterprise, which can reduce the inefficient investment of the enterprise, improve the overall development efficiency of the enterprise, and create more profits for the enterprise. Moreover promoting the digital transformation of enterprises requires a large amount of resource investment, and the increase in enterprise income indicates that the enterprise has more resources. At this time, under the condition of enterprises purchasing directors' and officers' liability insurance, managers with higher risk-bearing levels can provide sufficient resources for digital transformation. In addition, competent managers have a clear understanding of the industry, and can accurately recruit unique digital technical talents, enhance the digital professional knowledge and skills of the overall members of the enterprise, and accelerate the pace of digital transformation of the enterprise [14].

On the other hand, based on the theory of signal transmission, for the enterprise internally, high-ability of managers are more likely to obtain the support of enterprise members and trust. The managers implement digital transformation strategy change, team members tend to believe that the future can realize digital transformation, which creates a positive atmosphere, and increase the enterprise digital research failure tolerance, help enterprise digital transformation and fully tap the development potential of the enterprise [15]. For the outside of the enterprise, highly competent managers will send a signal to the outside world that the enterprise has good development prospects. Managers will use industry resources to reduce the information asymmetry of the enterprise to find investment projects more suitable for the enterprise's development to improve the market share [16]. In addition, the directors' and officers' liability insurance will increase the insurance's institution supervision of underwriting enterprises, improve the internal control of the enterprise, reduce the agent cost of the

enterprise, and further establish the image of the sustainable development of the enterprise, which enhances the other stakeholders investment in the enterprise, alleviate the enterprise financing constraints, reduce the resistance of the digital transformation. From the above analysis, H2 is proposed.

H2: Under certain other conditions, managerial ability can strengthen the positive relationship between directors' and officers' liability insurance on the digital transformation of enterprises.

### 3. Research Design

#### 3.1. Data and Sample

Due to the international financial crisis in 2008 and the crisis lasted for nearly two years, this paper studies the Chinese A-share listed companies from 2011 to 2021, and the sample data handles the following: excluding the financial industry and ST samples; excluding the samples with missing or abnormal data; and shrinking all the continuous variables at 1% level. After data processing, a total of 15257 sample observations were obtained. The raw data were obtained from the CSMAR database and the above data were processed using stata16.0 software.

#### 3.2. Variable

##### 3.2.1. Dependent Variable

Digital transformation of enterprises (DCG). Following Wu et al. (2021), the key-word dictionary of digital transformation is constructed first, and then the number of management management and discussion keywords in the annual report is counted and the logarithm is added to measure the digital transformation of enterprises [17].

##### 3.2.2. Independent Variable

Directors' and officers' liability insurance (DO). Referring to Hu et al. (2017), directors' and officers' liability insurance is measured by virtual variables [9]. First search the announcement resolution of the listed company, and then through the keyword search to determine whether the listed company buys the directors' and officers' liability insurance, if the announcement resolution explains the purchase of the directors' and officers' liability insurance, and the shareholders' meeting passes, the value is 1, otherwise it is 0.

##### 3.2.3. Regulated Variable

Managerial ability (MA). Following Demerjian et al. (2012), the DEA two-stage model is used to calculate the enterprise performance (Score), then the enterprise performance is used as the explained variable for regression, and finally the residual difference of the regression results is used to measure the managerial ability [18]. The constructed model is shown below:

$$\text{Score}=\alpha_0+\alpha_1\text{Size}+\alpha_2\text{MS}+\alpha_3\text{FCF}+\alpha_4\text{AGE}+\alpha_5\text{FCI}+\alpha_6\text{DIV}+\sum\text{Year}+\varepsilon t$$

Among them, Size is the total asset size logarithmic; MS is the market share; FCF is the enterprise free cash flow state, if it is regular assigned to 1 and 0 otherwise; AGE is the age of enterprise establishment plus 1 logarithmic; FCI is the degree of enterprise internationalization measured by the proportion of overseas revenue; DIV is the business complexity, which is measured by the square sum of revenue ratio of each department.

##### 3.2.4. Control Variables

Among Drawing on Hu and Liu (2015), and Zhao et al. (2018), control other variables that may affect the digital transformation of enterprises, including asset-liability ratio (Lev), enterprise size (Size), enterprise age (Age), enterprise growth (Grow), profitability (Roa), executive

shareholding (Sr), independent directors (Rind), board size (Board), dual role of the board chairman (Dual). In addition, the annual variables (Year) and industry variables (Industry) are also controlled for [19] [20]. The variables are described in Table 1.

**Table 1.** Variable definition and description

Category	Variable name	Sign	Implication
Dependent variable	digital transformation of enterprises	DCG	Ln (digital transformation keyword disclosure times+1)
Independent variable	directors' and officers' liability insurance	DO	The value of the enterprise purchasing dong liability insurance is 1, otherwise it is 0.
Regulated variable	managerial ability	MA	Calculated in two stages using DEA and Tobit methods.
Control variables	asset-liability ratio	Lev	Total liabilities / total assets
	enterprise size	Size	Total assets at the end of the term are taken in a log of value.
	enterprise age	Age	Enterprise listing time + 1 to take the log.
	enterprise growth	Grow	Increase rate of business revenue.
	profitability	Roa	Net profit / total assets
	executive shareholding	Sr	Total number of executive holdings / total number of shares
	independent directors	Rind	Number of independent directors / total number of board of directors
	board size	Board	Natural logarithm of the board count.
	dual role of the board chairman	Dual	When the CEO is assigned 1 as the chairman, otherwise it is 0.

### 3.3. Model Construction

Based on the above theoretical analysis, the model (1) is constructed to test hypothesis 1:

$$DCG_{i,t} = \alpha_0 + \alpha_1 DO_{i,t} + \sum \alpha \times Controls + \sum Year + \sum Industry + \epsilon_{i,t} \tag{1}$$

Where,  $DCG_{i,t}$  is the digital transformation of enterprises;  $DO_{i,t}$  is the directors' and officers' liability insurance; Controls represents a series of control variables; Year and Industry are the year and industry fixed effects respectively;  $\epsilon_{i,t}$  is the random disturbance item. According to hypothesis 1, the symbol of coefficient  $\alpha_1$  in model (1) should be significantly positive. Further, the ability of managers is grouped by the median to test the regulatory effect of managerial ability on the directors' and officers' liability insurance and the digital transformation of enterprises.

## 4. Results

### 4.1. Descriptive Statistics

Table 2 reports the descriptive statistical results for the main variables. The average value of digital transformation of enterprises (DCG) is 1.2425, and the minimum and maximum values are 0 and 5.0304 respectively, indicating that there are great differences in digital transformation among enterprises. The average of directors' and officers' liability insurance (DO) is 0.0863 and the standard deviation is 0.2808, indicating that only about 8.6% of the sample enterprises involved in the institute have purchased directors' and officers' liability insurance, indicating that directors' and officers' liability insurance needs to be further promoted in China. The mean value of the managerial ability (MA) is -0.0159, the minimum

value is -0.3512, and the maximum value is 0.4158, indicating that the managerial ability of different enterprises varies greatly. The average asset-liability ratio (Lev) is 0.4482, the minimum and maximum values are 0.0506 and 0.9117 respectively, indicating that the overall debt level of China's A-share listed companies is high and the gap is large. Other variables were similar to the conclusions of existing studies and all in the reasonable interval.

**Table 2. Descriptive statistics**

Variables	Sample	Mean	SD	Min.	Max.
DCG	15257	1.2425	1.3313	0.0000	5.0304
DO	15257	0.0863	0.2808	0.0000	1.0000
MA	15257	-0.0159	0.1668	-0.3512	0.4158
Lev	15257	0.4482	0.2102	0.0506	0.9117
Size	15257	22.4215	1.2914	19.8424	26.2067
Age	15257	2.4385	0.6713	0.0000	3.3322
Grow	15257	0.3596	0.9563	-0.6745	6.7314
Roa	15257	0.0326	0.0613	-0.2606	0.2006
Sr	15257	0.0681	0.1365	0.0000	0.6655
Rind	15257	0.3746	0.0540	0.3333	0.5714
Board	15257	2.1441	0.1927	1.6094	2.6391
Dual	15257	0.2402	0.4272	0.0000	1.0000

## 4.2. Correlation Analysis

**Table 3. Correlation analysis**

Variables	DCG	DO	MA	Lev	Size	Age	Grow	Roa	Sr	Rind	Board	Dual
DCG	1											
DO	0.0477* **	1										
MA	0.0175* *	0.0154* *	1									
Lev	-0.0637* **	0.1024* **	0.0824* **	1								
Size	0.0953* **	0.2264* **	-0.0253* **	0.4814* **	1							
Age	0.0698* **	0.1682* **	0.0716* **	0.3543* **	0.3544* **	1						
Grow	0.0294* **	0.0022	0.0553* **	0.0939* **	0.0183* *	0.0573* **	1					
Roa	-0.0005	-0.0278* **	0.1671* **	-0.3334* **	0.0435* **	-0.1255* **	-0.0006	1				
Sr	0.0581* **	-0.1227* **	-0.0883* **	-0.3149* **	-0.2992* **	-0.5808* **	-0.0158* *	0.0991* **	1			
Rind	0.0801* **	0.0521* **	0.0124	0.0089	0.0421* **	-0.0039	0.0246* **	-0.0320* **	0.0443* **	1		
Board	-0.0797* **	0.0274* **	-0.0234* **	0.1257* **	0.2239* **	0.0784* **	-0.0302* **	0.0462* **	-0.1331* **	-0.5259* **	1	
Dual	0.0951* **	-0.0705* **	-0.0584* **	-0.0948* **	-0.1201* **	-0.1792* **	-0.0103	0.0053	0.1975* **	0.1009* **	-0.1688* **	1

\*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

Table 3 reports the results of the Pearson correlation coefficient test. As can be seen from Table 3, the coefficient of directors' and officers' liability insurance (DO) and digital transformation of enterprises (DCG) is 0.0477, which is significant at the 1% level, indicating that the purchase of directors' and officers' liability insurance can promote the digital transformation of enterprises, which initially supports hypothesis 1. In addition, the VIF test was also performed, and its VIF values were all below 10, indicating that there is no serious multicollinearity problem.

### 4.3. Regression Analysis

Table 4 reports the regression results of the model. Column (1) is the empirical result of controlling time and industry but not adding control variables. The coefficient of directors' and officers' liability insurance (DO) and digital transformation of enterprises (DCG) is 0.1413, which is significant at the 1% level, indicating a significant positive relationship between the two. After the addition of control variables, as shown in column (2), the adjusted R2 gradually rises, indicating that the model fit is good. At this time, the coefficient between the two is 0.0874, which is still significant at the 1% level. In the economic sense, when the purchase rate of directors' and officers' liability insurance increases by 1%, the digital transformation of enterprises increases by 8.74%. This result shows that the positive relationship between directors' and officers' liability insurance and the digital transformation of enterprises is still established. According to the comprehensive columns (1) and columns (2), the purchase of directors' and officers' liability insurance will significantly promote the digital transformation of enterprises, and H1 is verified.

The different ability of managers means the different strategic decisions implemented by enterprises, and the digital transformation of enterprises will also be affected. The sample enterprises are grouped according to the median value of the manager ability, and the columns (3) and columns (4) in Table 4 are the regression results of the different manager ability groups. Column (3) is the regression result of the group with high executive ability, the coefficient of directors' and officers' liability insurance (DO) and digital transformation of enterprises (DCG) is 0.1241, significantly at the 1% level; Column (4) is the regression result of the group with low executive ability, the coefficient of the two is positive but not significant, indicating that the managerial ability has a regulatory effect between the directors' and officers' liability insurance and the digital transformation of enterprises. That is, the higher the ability of managers, the more obvious the purchase of directors' and officers' liability insurance promotes the digital transformation of enterprises, and H2 is supported.

**Table 4.** Regression analysis

Variables	(1) DCG	(2) DCG	(3) DCG	(4) DCG
DO	0.1413*** (4.7605)	0.0874*** (2.9399)	0.1241*** (2.9771)	0.0571 (1.3202)
Controlled variable	No control	Control	Control	Control
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	15257	15257	7628	7629
Adj.R <sup>2</sup>	0.4543	0.4732	0.4888	0.4653

Robust t-statistics in parentheses; \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

### 4.4. Robustness Tests

First, we replace sample intervals. Due to the serious stock market crash in China's financial market in 2015, it is difficult to measure the systemic risk with variables. In order to ensure the



robustness of the regression results, this paper excluded the years of 2015 and later, and regressed the sample data from 2011-2014. The regression results are shown in column (1) of Table 5, and the coefficient of directors' and officers' liability insurance (DO) and digital transformation of enterprises (DCG) is 0.1218, which is significant at the 5% level, proving that H1 is robust.

Second, we examine the time-lag effect of the explanatory variables. The digital transformation of enterprises is a long-term activity, and the purchase of directors' and officers' liability insurance cannot have an impact on the digital transformation of enterprises in the current period. Therefore, this paper for t+1, t+2 and t+3 lag of digital transformation of enterprises (DCG), and the lag variables into model (1) regression, the results are shown in columns (2), (3), and (4) of Table 5, the coefficient of directors' and officers' liability insurance (DO) are significantly positive correlation at 1% level, H1 is further supported.

Third, we examine the joint higher-order fixed effects. Considering that during the sample period, some industries have experienced large changes, and the annual environment changes will also have different effects on the digital transformation of enterprises in different industries, all these factors may have an impact on the regression results. Therefore, in order to mitigate the influence of other factors on the regression results, this paper refers to the practice of Moser and Voena (2012), and controls the fixed effect of annual times industry on the basis of model (1) [21]. The results are shown in Table 5 in column (5), which is basically consistent with the main regression results, and H1 is supported.

Fourth, we use the propensity score matching method (PSM). To avoid endogeneity caused by sample self-selection problems, the propensity score matching method was used for testing. First, the Logit model is adopted, taking 1 when the digital finance is greater than the median, otherwise 0, and taking the dummy variable as the explained variable and the control variable as the covariate. Then, the 1:1 nearest neighbor matching is adopted, and the model (1) is regression with the matching sample. As shown in column (6) in Table 5, the coefficient of directors' and officers' liability insurance (DO) is 0.1036, which is significant at the 1% level, indicating that there is no endogenous problem caused by sample self-selection, and the conclusion is still robust.

**Table 5. Robustness tests**

Variables	(1) DCG	(2) DCG <sub>t+1</sub>	(3) DCG <sub>t+2</sub>	(4) DCG <sub>t+3</sub>	(5) DCG	(6) DCG
DO	0.1218** (2.3903)	0.0918*** (2.7530)	0.1184*** (3.1897)	0.1359*** (3.2763)	0.0911*** (3.0296)	0.1036*** (2.6135)
Controlled variable	Control	Control	Control	Control	Control	Control
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Year×Industry	No	No	No	No	Yes	No
N	5548	13870	12483	11096	15257	2645
Adj.R <sup>2</sup>	0.4178	0.4567	0.4357	0.4113	0.4741	0.4556

Robust t-statistics in parentheses; \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

## 4.5. Regulation Effect Test

### 4.5.1. Managerial Myopia

First, the digital transformation of enterprises is an organizational change behaviour with a long periodicity and large capital consumption. Enterprises cannot generate profits in a short period, and even make the possibility of short-term performance of enterprises decline. However, the management of enterprises is limited and rational. In the face of an uncertain

environment, it usually chooses conservative investment projects and ignores the enterprise's long-term development [22]. Directors' and officers' liability insurance provides the guarantee for the management, reduces the litigation risk and violation cost of the management, plays an incentive effect, improves the risk-bearing level of the management and alleviates short-sighted behavior, and promotes it to be more willingness to consider the sustainable development of the enterprise to carry out digital transformation. Second, the digital transformation of enterprises takes a lot of work. In order to maintain a personal reputation, the management may have short-sighted behaviour, pay more attention to "short, flat and fast" projects, and even appear inefficient investment [23]. However, due to the premium pressure or reducing the loss ratio, the insurance institutions will strengthen the supervision of the enterprises that purchase the directors' and officers' liability insurance, thus reducing the short-sighted behaviour of the management and gradually focusing on the benefits brought by the digital transformation. Therefore, this paper uses the three-step method of hierarchical regression of Baron and Kenny (1986) [24] and builds the following model to test the mediation role of managerial myopia by model (1):

$$Myopia_{i,t} = \beta_0 + \beta_1 DO_{i,t} + \sum \beta \times Controls + \sum Year + \sum Industry + \epsilon_{i,t} \tag{2}$$

$$DCG_{i,t} = \beta_0 + \beta_1 DO_{i,t} + \beta_2 Myopia_{i,t} + \sum \beta \times Controls + \sum Year + \sum Industry + \epsilon_{i,t} \tag{3}$$

Following Hu et al. (2021), we measure the managerial myopia by the proportion of the total word frequency in the management discussion and analysis section in the annual financial report (Myopia) [25]. The regression results are shown in columns (1), (2) and (3) shown in Table 6, and the coefficient of directors' and officers' liability insurance (DO) and enterprise digital transformation (DCG) in column (1) is 0.0676, which is significant at the 1% level, satisfying the premise of the mediation effect. Column (2) and (3), the coefficient of directors' and officers' liability insurance (DO) and managerial myopia (Myopia) is 0.0001, at 10% level, the coefficient of managerial myopia (Myopia) and digital transformation of enterprises (DCG) is 37.4149, significant at the 1% level, the managerial myopia in directors' and officers' liability insurance and digital transformation of enterprises plays the role of the intermediary, namely the directors' and officers' liability insurance will reduce managerial myopia to promote digital transformation of enterprises.

**Table 6.** Regulation effect test

Variables	(1) DCG	(2) Myopia	(3) DCG
DO	0.0676*** (2.6368)	-0.0001* (-1.8954)	0.0650** (2.5365)
Myopia			-37.4149*** (-7.3592)
Controlled variable	Control	Control	Control
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
N	17887	17887	17887
Adj.R <sup>2</sup>	0.4640	0.0980	0.4654

Robust t-statistics in parentheses; \*\*\*p<0.01, \*\*p<0.05, \*p<0.1.

## 5. Results

This paper focuses on China's A-share listed companies from 2011 to 2021. It empirically tests the impact of directors' and officers' liability insurance on the digital transformation of enterprises, as well as the regulatory role of managerial ability in it. Research shows that the purchase of directors' and officers' liability insurance will significantly promote the digital transformation of enterprises. The ability of managers plays a positive role between the two, and after a series of robustness tests, the conclusion is still valid. Further research shows that managerial myopia plays a partial intermediary role between directors' and officers' liability insurance and the digital transformation of enterprises.

The research implications of this paper are as follows. First, for the government, it is necessary to strengthen the publicity and popularization of directors' and officers' liability insurance and improve the coverage of directors' and officers' liability insurance in the Chinese market. At the same time, the government should formulate relevant systems according to the institutional environment with Chinese characteristics to improve the laws and regulations of directors' and officers' liability insurance and give full play to the positive role of directors' and officers' liability insurance in corporate governance. In addition, the government should timely establish and improve the relevant policies related to the digital transformation of enterprises, strengthen the construction of digital infrastructure, provide institutional guarantee and financial support for enterprises to carry out the digital transformation, and encourage enterprises to accelerate the digital transformation. Second, for enterprises, on the one hand, it is necessary to strengthen the management's comprehensive understanding of directors' and officers' liability insurance, give full play to the role of directors' and officers' liability insurance to cover the bottom, reduce short-sighted behaviour, and pay attention to the long-term development of the enterprise. On the other hand, enterprises should follow the international development trend, seize the opportunity of digital development, and actively carry out digital transformation to obtain a higher competitive position. In addition, the high ability of management has rich professional skills and experience, and can efficiently digital innovation projects. Therefore, the enterprise should consider the management background when hiring, and in the late of the management ability training and improve the management assessment system to enhance the overall level of enterprise management.

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