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AUTHORS

Hsiang-Tsai Chiang
Shu-Lin Lin

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Hsiang-Tsai Chiang (Taiwan), Shu-Lin Lin (Taiwan)

Implications of improved information disclosure and corporate governance for directors' and officers' liability insurance

Abstract

In this study, the authors examined the effect of improved information transparency and corporate governance on purchase decisions regarding directors' and officers' (D&O) liability insurance. The results showed that companies with greater transparent voluntary disclosure practices and those considered to be progressing were significantly and positively associated with the demand for insurance and the insured amount. Poor information disclosure increases the underwriting risk of insurers. The corporate governance of uninsured companies is superior to that of insured companies. To compensate for their weaker corporate governance mechanisms, insured companies tend to appoint Big 4 or industry experts. Companies with comparatively high operating risks exhibit greater demand for D&O liability insurance; moreover, the insured amount increases in conjunction with the degree of demand. The empirical results indicate that purchasing D&O liability insurance can not only strengthen external corporate governance practices, but it also encourages companies to voluntarily improve the transparency of the information they provide to shareholders.

Keywords: directors' and officers' liability insurance, information transparency, corporate governance, Big 4.

JEL Classifications: M10, G30, G34.

Introduction

Numerous corporate scandals have emerged since the Enron case in 2001, which has forced governments and enterprises to realize the need to constantly innovate the corporate governance environment by modifying economic situations in response to the manipulative behaviors of managers. Jensen and Meckling (1976) indicated that, under the separation of ownership and management, managers pursue self-interests, which conflicts with the profit maximization principle of corporations. The legal basis for third parties to request civil compensation from corporate directors and officers has become broadly and sufficiently. The necessity to build a mechanism to limit the personal liabilities of directors and officers to ensure effective risk management has led to the development of directors' and officers' liability insurance (here after D&O insurance).

Information disclosure is the most critical method for resolving information asymmetry and agency problems between management and external shareholders (Healy and Palepu, 2001). The Organization for Economic Cooperation and Development (OECD) has recognized the importance of information disclosure companies that disclose adequate and relevant information can mitigate information asymmetry and reduce losses incurred by investors during market crises. To realize the essence of corporate governance and improve the transparency of corporate information disclosure, in 2003, the Taiwan Stock Exchange Corporation (TSEC) commissioned the Securities and Futures Institute to evaluate the information disclosure practices of listed companies in Taiwan.

The implementation of corporate governance systems is closely related to the liabilities of a board of directors. D&O insurance can provide risk protection for directors and critical employees. Thus, the decision to purchase D&O insurance can exert a crucial effect on managers' attitudes toward risk management and corporate governance behavior. Numerous previous studies have examined the relationship between corporate governance structure and information transparency (Pound, 1988; El-Gazzar, 1998; Ho and Wong, 2001; Healy and Palepu, 2001; Fan and Wong, 2002; Chen and Hsu, 2007; Chiang and He, 2010). Holderness (1990), Core (1997) and O'Sullivan (2002) examined D&O insurance from a corporate governance perspective. Lin and Yang (2013) reported a significant and positive relationship among corporate governance, information transparency and D&O insurance. We extend the framework proposed in that study by incorporating operational risk factors to examine the relationships among corporate governance, information disclosure practices that is comparatively more transparent and progressive and corporate policy-making decisions regarding the decision to purchase D&O insurance.

Our results showed that the information transparency and corporate governance mechanisms affect the demand for D&O insurance. Employing a Big 4 to audit financial statements exerts a significant and positive effect on demand for D&O insurance and the insured amount. The status of an auditor as an industry expert exerts a significant and negative effect on insurance demand, although the effect is positive for the insured amounts. Further analysis of insured and uninsured subsamples showed that, compared with insured companies, uninsured companies implement superior corporate governance mechanisms, and have less demand for

D&O insurance. Although insured companies have weaker corporate governance structures, they tend to commission Big 4 firms or industry experts to compensate for their comparatively weaker corporate governance practices. Our findings show that purchasing D&O insurance can strengthen corporate governance mechanisms and encourage companies to voluntarily improve the transparency of the information they provide to shareholders.

The remainder of this paper is structured as follows: Sections 1 and 2 provide a review of literature and outline the development of our hypotheses, Section 3 details the empirical models and relevant variables, Section 4 presents the empirical results and discussions, and our conclusion and recommendations for future research are offered in the final section.

1. Literature review

1.1. Liability of directors and officers. Initially in Taiwan, only high-tech industries had raised capital from foreign investors by issuing depositary receipts and euro-convertible bonds. Because of increasing demand for foreign investment, these companies purchased D&O insurance to comply with the legal requirements of investing countries. In recent years, companies such as PROCOMP Informatics and China Rebar Co. have used directorships to manipulate company policies and drain company assets, resulting in substantial monetary losses to investors. Prior studies suggest that D&O insurance may be demanded for reducing a company's litigation or business risk (Core, 1997; O'Sullivan, 2002; Cao and Narayana-moorthy, 2014). The first D&O insurance policy in Taiwan was introduced in 1996. D&O insurance became popular following the PROCOMP incident in 2004; however, the purchase of D&O insurance is not compulsory. In December 2008, securities authorities required companies to declare their insurance status of directors and officers so that investors could determine the company management's attitude toward risk management.

1.2. Information transparency. Information transparency refers to the complete reporting of a company's operational strategies, financial status, and corporate governance mechanisms to the public. Strydom (2009) suggested that improved monitoring and disclosure could improve firm governance. Charitou et al. (2012) indicated that changes in the information content of earnings with a unique effect on expected stock returns. Chiyachantana et al. (2013) indicated that increasing corporate disclosure and transparency reduces the asymmetric information between informed and uninformed investors. Taiwan Securities and Futures Commission (TSFC) has adopted unofficial autonomous planning and designs for evaluating the transparency of information

disclosed by listed companies. The scope of evaluation of a company is based primarily on information comprising the following five metrics: (a) compliance with information disclosure regulations; (b) timeliness of information disclosure; (c) disclosure of forecasted financial information; (d) information disclosure in annual reports (including the transparency of financial and operational information, as well as the board and shareholding structure); and (e) publication of information disclosure on the company website. The rating metrics are augmented annually as required.

The company evaluation ratings have been expressed as grades since 2006; the five grades employed are A+, A, B, C, and C-. The Relatively Transparent Companies Voluntarily Disclose Information list was introduced to encourage companies to voluntarily disclose relevant information. Furthermore, the Progressing Companies list was added following an announcement by TSFC in 2008. Accordingly, the Information Disclosure Rating System has become a crucial reference index for the information transparency of domestic companies in Taiwan. Thus, this study adopted the evaluation results published by TSFC to measure information transparency to analyze the effect that various information evaluation results exert on the decision of companies to purchase of D&O insurance.

1.3. Corporate governance. The majority of previous studies on corporate demand for D&O insurance have applied a corporate governance perspective. Mayers and Smith (1982, 1987, 1990) indicated that companies with comparatively high risk of bankruptcy, smaller companies, and those experiencing rapid growth with high management shareholding ratios have a greater demand for D&O insurance. Holderness (1990) showed that companies with D&O insurance have fewer agency conflicts compared with other enterprises. Particularly, companies listed on the New York Stock Exchange and American Stock Exchange have an apparent separation between ownership and management rights. Redington (2005) analyzed the implications of Section 404 of the 2002 Sarbanes-Oxley Act on D&O insurance, and indicated that insurers must take greater care when assessing the corporate governance and risks of a company during the insurance policy negotiation process. Alles et al. (2006) argued that governance-linked D&O insurance was used for market-based governance, and that process-based coverage facilitated superior governance risk management by motivating directors to exercise their fiduciary responsibilities.

Chen and Pang (2008) examined the factors affecting the decision to purchase D&O insurance among Taiwanese enterprises. Their empirical results

indicated that higher business risks incurred higher director rewards, which affected the decision to purchase D&O insurance, and was closely related to corporate governance. Chen and Li (2010) reported that the leading reason for enterprises to purchase D&O insurance was to minimize their litigation risks, followed by the intention to promote company growth and retain senior executives. Chiang and Cheng (2013) demonstrated that a good corporate governance structure can reduce the green technology industry's corporate credit risk and improve operational effectiveness.

2. Hypothesis development

2.1. Information transparency and D&O insurance. The adverse selection and agency problems resulting from information asymmetry cause increased demand for information disclosure among investors. This encourages managers to increase the frequency of information disclosure to minimize agency costs and investor lawsuits. Lang and Lundholm (1996) indicated that financial analysts are information mediators; moreover, the disclosure of complete and accurate information improves the forecasting efficacy of financial analyses. They also noted that various forms of information transparency exert markedly different effects on the forecasting behaviors of analysts. Previous studies have indicated that investors lack both professional competence and analytical capacity, and that they experience difficulty interpreting information released by companies. Thus, the majority of investors depend on financial analysts' forecasts as a reference for their investment decisions (Waymire, 1986; Hsu, 1993; Lang and Lundholm, 1996). However, the 2001 Enron scandal increased skepticism among investors regarding the reliability of information disclosure. Therefore, we contend that improving the transparency of corporate information to strengthen the trust of investors in that information incidentally results in an increase in the demand for D&O insurance. Accordingly, we propose the following hypothesis:

H1: Company information disclosures are positively related to the decision to purchase D&O insurance.

2.2. Corporate governance and D&O insurance. The organizational structure and role of a company board are key factors in the efficiency of corporate governance. Shleifer and Vishny (1997) indicated that the majority shareholders can use company resources for personal gain, thereby encroaching upon the equity of minority shareholders. In this study, we investigated the factors of ownership structure, responsibilities of directors and supervisors, role of managers, and corporate social responsibility (CSR) of companies, as well as how these factors relate to the demand for D&O insurance.

2.2.1. Ownership structure.

Director and supervisor shareholdings. A company's board of directors and its supervisors are respectively the executives and monitoring body of that company. The convergence of interest hypothesis purports that when the proportion of shares held by insider increases, their interests are more closely aligned with those of the shareholders, thereby decreasing any principal – agency problems (Crutchley and Hansen, 1989); consequently the insured amount and associated costs decrease. The entrenchment hypothesis stipulates that managers might endeavor to protect their position; consequently, they might oppose beneficial mergers and acquisitions or engage in antimonitoring behavior (Gordon and Pound, 1993). Such actions increase the risk of litigation, thereby reinforcing the need for D&O insurance. Therefore, we propose that a greater proportion of shares held by directors and supervisors is related to the decision to purchase D&O insurance.

Institutional investor shareholdings. Pound (1988) proposed active monitoring, conflict of interest, and strategic alignment hypotheses regarding corporate performance and institutional investor relationships. Moh'd et al. (1998) and Crutchley et al. (1999) showed that the shareholdings of institutional investors are positively correlated with the supervision role of that investor. According to the conflict of interest hypothesis and strategic alignment hypotheses, institutional investors might work with management for their own interests, and that they might make decisions that are detrimental to minority shareholders and creditors (Bhojraj and Sengupta, 2003). Moreover, the ability to transfer wealth from creditors and minority shareholders is strengthened by any increase in the shareholdings of institutional investors (Ashbaugh-Skaife et al. 2006). Accordingly, we propose that institutional investors might facilitate more stringent managerial discipline or strategic cooperation, which influences the decisions made by companies to purchase D&O insurance. Thus, we propose the following hypothesis:

H2-1: Director and supervisor shareholdings as well as institutional investor shareholdings are related to the decision to purchase D&O insurance.

2.2.2. Responsibilities of directors and supervisors. Taiwanese securities authorities require a minimal holdings ratio¹ and the reporting of any pledge of

¹ Article 26 of the Securities Trading Act: The total ownership of registered shares held by directors and supervisors should be above a certain percentage of the total sum of shares, with different ranges depending on the company's capital.

shares¹ held by the directors and supervisors of a company. Previous research has asserted that the agency problem arises when a high percentage of pledged shares attract considerable attention (Kao et al., 2004). During the 1997 Asian financial crisis, the directors and supervisors of Taiwanese companies were frequently characterized as owning an excessive percentage of pledged shares. Cheng et al. (2006) asserted that higher pledged shares held by directors and supervisors led to an increase in the purchase of treasury stock incentives as well as greater management risks. Fang et al. (2010) indicated that a higher percentage of pledged shares increases auditor uncertainty regarding accrued items, thereby increasing the probability of auditors issuing non-standard unqualified opinions. We infer that the combination of a higher percentage of pledged shares and shareholdings below the minimal requirement for regulators reinforces the agency problem and correlates positively with the demand for D&O insurance. Accordingly, we propose the following hypothesis:

H2-2 : The pledged shares of directors and supervisors and their shareholdings below the minimal requirement are positively correlated with the demand for D&O insurance.

2.2.3. Role of managers. Claessens et al. (2000) analyzed listed companies in East Asia and showed that two-thirds of these companies, particularly family and small enterprises, had ultimate controllers. Lin and Chang (2009) indicated that more than half of the listed companies in Taiwan were family enterprises. These results indicate that the interest combination effect between the ultimate controllers of the family and the shareholders is greater than the aggression effect.

Booth et al. (2002) showed that the dual role of board chairperson and CEO results in a power concentration that could cause a conflict of interest and reduce that board's monitoring efficiency. Imhoff (2003) indicated that the dual role of board chairperson and former or existing CEO affects the monitoring function of the board of directors. Grinstein and Hribar (2004) also argued that this dual role results in higher salaries for board members. We assumed that manager internalization and the demand for D&O insurance are inversely related. Furthermore, we anticipated that CEO duality would weaken the

board's monitoring function, thereby increasing the demand for D&O insurance. Therefore, we propose the following hypotheses:

H2-3: Manager internalization is negatively related to the demand for D&O insurance.

H2-4: CEO duality is positively related to the demand for D&O insurance.

CEOs and CFOs are senior managers who typically possess a greater familiarity with a company's operations and financial performance; they also play critical roles in corporate governance. Warner et al. (1988) showed that a company's stock market performance has a significant and inverse relationship with CEO turnover. Farrell and Whidbee (2002) reported that CEOs are more likely to be replaced when their performance deviates considerably from expectations. Frequent turnover among senior managers such as CEOs and CFOs could mask operational risks, which we anticipate to have a positive relationship with demand for D&O insurance. Therefore, we propose the following hypothesis:

H2-5: Replacement of the CEO and CFO is positively related to the demand for D&O insurance.

2.2.4. Corporate social responsibility. If an enterprise is unconcerned about social problems resulting from its behaviors, a government is more likely to intervene in the activities of that enterprise and impose further legal restrictions. Any CSR event during the operational process can result in the payment of compensation for losses and declines in stock prices, which affects shareholder equities. Hence, we assumed that a positive relationship exists between CSR occurrences and demand for D&O insurance, and propose the following hypothesis:

H2-6: A positive correlation exists between social responsibility and the demand for D&O insurance.

3. Research design

3.1. Empirical model. Core (2000) indicated that litigation risks are related to corporate governance, which implies they affect the decision to purchase D&O insurance. When companies anticipate a greater risk of litigation losses, they tend to purchase a greater amount of insurance. Accordingly, we applied whether a company has purchased D&O insurance (Equation 1) and the insured amount (Equation 2) as dependent variables for the regression analysis to assess the effect that the transparency of information disclosure and corporate governance exert on the decision to purchase D&O insurance:

¹ Article 25 of the Securities Trading Act: Directors or supervisors who pledge their shares should immediately notify the company of that pledge; the company should report to the authorities and announce the information publicly within 5 days.

$$D \& O = \beta_0 + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 + \beta_5 D_5 + \beta_6 Dshare + \beta_7 Ishare + \beta_8 Pledge + \beta_9 Insufy + \beta_{10} MgInsid + \beta_{11} Concure + \beta_{12} CEO + \beta_{13} CFO + \beta_{14} CSR + \beta_{15} Big4 + \beta_{16} Spec + \beta_{17} R \& D + \beta_{18} AssTun + \beta_{19} ColEq + \beta_{20} Crisis + \beta_{21} Loss + \beta_{22} Size + \varepsilon, \quad (1)$$

where the dummy variable $D \& O = 1$ for companies that have purchased D&O liability insurance; otherwise, $D \& O = 0$. The dummy variables D_1, D_2, D_3, D_4 and D_5 represent whether

a company's information transparency has been rated A+, A, B, C, or C-, respectively. If a company's information transparency is rated A+, $D_1 = 1$; otherwise, it is 0.

$$Ins_Amt = \beta_0 + \beta_1 D_1 + \beta_2 D_2 + \beta_3 D_3 + \beta_4 D_4 + \beta_5 D_5 + \beta_6 Dshare + \beta_7 Ishare + \beta_8 Pledge + \beta_9 Insufy + \beta_{10} MgInsid + \beta_{11} Concure + \beta_{12} CEO + \beta_{13} CFO + \beta_{14} CSR + \beta_{15} Big4 + \beta_{16} Spec + \beta_{17} R \& D + \beta_{18} AssTun + \beta_{19} ColEq + \beta_{20} Crisis + \beta_{21} Loss + \beta_{22} Size + \varepsilon, \quad (2)$$

where Ins_Amt represents the natural logarithm of D&O insurance coverage, and the other variables are identical to those in Equation 1. Because the information ratings published by the Securities and Futures Commission identify “Relatively Transparent Companies Voluntarily Disclose

Information” and “Progressing Companies” to encourage companies to increase the voluntary disclosure of information, we applied Equations 3 and 4 to analyze the relationship between relatively transparent or progressing companies and D&O insurance:

$$D \& O = \beta_0 + \beta_1 D_p + \beta_2 Dshare + \beta_3 Ishare + \beta_4 Pledge + \beta_5 Insufy + \beta_6 MgInsid + \beta_7 Concure + \beta_8 CEO + \beta_9 CFO + \beta_{10} CSR + \beta_{11} Big4 + \beta_{12} Spec + \beta_{13} R \& D + \beta_{14} AssTun + \beta_{15} ColEq + \beta_{16} Crisis + \beta_{17} Loss + \beta_{18} Size + \varepsilon, \quad (3)$$

$$Ins_Amt = \beta_0 + \beta_1 D_p + \beta_2 Dshare + \beta_3 Ishare + \beta_4 Pledge + \beta_5 Insufy + \beta_6 MgInsid + \beta_7 Concure + \beta_8 CEO + \beta_9 CFO + \beta_{10} CSR + \beta_{11} Big4 + \beta_{12} Spec + \beta_{13} R \& D + \beta_{14} AssTun + \beta_{15} ColEq + \beta_{16} Crisis + \beta_{17} Loss + \beta_{18} Size + \varepsilon, \quad (4)$$

where the dummy variable $D_p = 1$ for companies considered within the “Relatively Transparent Companies Voluntarily Disclose Information” or “Progressing Companies” criteria; otherwise, $D_p = 0$. The other variables are identical to those in Equations 1 and 2.

3.2. Variable definitions.

Director and supervisor shareholdings ratio. The variable $Dshare$ denotes proportion of shares held by directors and supervisors.

Institutional investor shareholdings ratio. The variable $Ishare$ represents the proportion of shares held by the three external institutions constituting the majority of institutional investors in Taiwan; specifically, investment trust funds, securities dealers, and foreign capital in Taiwan's securities market.

Director and supervisor shareholding pledge ratio. The variable $Pledge$ denotes the proportion of shares pledged by a company's directors and supervisors.

Total shares of directors and supervisors less than the minimum required proportion. The variable $Insufy = 1$ where the shares owned by directors and supervisors are less than the minimum legal threshold; otherwise, $Insufy = 0$.

Manager internalization. The variable $MgInsid = 1$ if (a) the CEO is the ultimate controller of a company, or (b) the CEO is a family member of the ultimate controller of a company; otherwise, $MgInsid = 0$.

CEO duality. The variable $Concure$ value is 1 in cases where the board chairperson is also the CEO of the company; otherwise, it is 0.

CEO turnover. The variable CEO represents the number of times a CEO has been replaced during the previous 3 years.

CFO turnover. The variable CFO represents the number of times a CFO has been replaced in the previous 3 years.

Corporate social responsibility events. We employed the dummy variable CSR to indicate a company's CSR, where $CSR = 1$ for any company previously involved in events such as labor disputes or violations of information-publication obligations, as well as those punished by authorities, or those defending claims that would increase the premium and management costs in the subsequent year; otherwise, $CSR = 0$.

Control variables. Dye (1993) indicated that “deep pocket” auditors also serve as insurers, which results

in auditors becoming easy targets for claims when the companies they audit are declared bankrupt. Menon and Williams (1994), Baber et al. (1995), and Willenborg (1999) have also supported the assertion that auditors play the role of an insurer. Accordingly, besides the liability for audit failure, they also bear partial liability for any business failure resulting from poor managerial decisions. Therefore, in this study, whether a company is audited by a Big 4 firm or industry expert is a control variable for analyzing their relationship with their clients' purchase of D&O insurance.

Business environments involve uncertainties such as financial and operational risks. In this study, we measured financial risks based on (a) whether a company has experienced a crisis, (b) whether a company reported a loss in previous year, and (c) a company's contingent liabilities-to-equity ratio. We measured operational risks based on (a) the costs ratio for research and development (R&D), and (b) the total asset turnover ratio. We anticipated that these variables would be positively correlated with a company's demand for D&O liability insurance.

Big 4. The dummy variable *Big4*=1 if a company is audited by one of the Big 4 firms; otherwise, *Big4*=0.

Industry specialist. We applied a company's sales revenue to calculate the market share of the auditor in a specific industry (Casterella et al. 2004; Krishnan, 2003), and set a 10% threshold to determine whether an auditor was an industry specialist. The variable *Spec*=1 for any company audited by an industrial specialist; otherwise, *Spec*=0.

R&D ratio. The variable *R&D* represents a company's R&D costs ratio.

Total assets turnover. The variable *AssTurn* represents the ratio of a company's sales revenue to its total assets ratio.

Contingent liabilities-to-owner equity ratio. The variable *ColEq* represents the ratio of contingent liabilities-to-owner equity.

Crisis. The variable *Crisis*=1 for any company that had experienced a financial or operational crisis; otherwise, *Crisis*=0.

Loss. The variable *Loss*=1 for any company that reported a loss in previous year; otherwise, *Loss*=0.

Company size. Becker et al. (1998) indicated that company scale can be measured using proxies for various missing variables. To reduce measurement errors in the models, we employed the variable *Size* as the natural logarithm of total company assets to measure company scale.

3.3. Research sample and data collection. Because it is not compulsory for companies to purchase D&O insurance in Taiwan, it was only widely purchased following the PROCOM incident in 2004. Since December 2008, the Taiwan Securities Exchange required companies to declare their insurance status within 15 days of the end of each year, thereby enabling investors to determine a company's attitudes toward risk management.

The information disclosure evaluation system uses unofficial and voluntary designs and plans to rate all listed companies. To encourage companies to voluntarily disclose information, the Taiwan Stock Exchange not only announced the "Relatively Transparent Companies Voluntarily Disclose Information" list, but further announced an additional "Progressing Companies" list in 2008. Thus, the sample period for this study was 2008-2010. The corporate governance and financial information of companies listed on the Taiwan Stock Exchange and GreTai Securities Market from 2008 to 2010 were obtained from the *Taiwan Economic Journal* (TEJ) database, and we obtained the ratings information from the Market Observation Post System. Industry classification was performed based on the industry definitions of the TEJ database (Table 1). Initially, we obtained 4,342 samples, although after excluding those with missing corporate governance and financial variables and other data, our final sample comprised 3,627 observations.

Table 1. Insurance ratio of industry group

Industry group	2008			2009			2010		
	Obs.	Insurance No.	Insurance ratio (%)	Obs.	Insurance No.	Insurance ratio (%)	Obs.	Insurance No.	Insurance ratio (%)
Cement	11	4	36.36	11	4	36.36	11	4	36.36
Food	23	6	26.09	23	7	30.43	23	7	30.43
Plastic	31	14	45.16	31	14	45.16	31	13	41.94
Textile	64	5	7.81	63	7	11.11	62	7	11.29
Electrical machinery	66	20	30.30	66	23	34.85	67	26	38.81
Electrical cable	10	1	10.00	10	2	20.00	10	2	20.00
IM medical	74	26	35.14	74	29	39.19	74	32	43.24
Glass ceramics	7	1	14.29	7	1	14.29	6	1	16.67
Paper	7	2	28.57	7	2	28.57	7	2	28.57
Steel	47	17	36.17	47	18	38.30	47	19	40.43
Rubber	11	2	18.18	11	2	18.18	11	3	27.27

Table 1 (cont.). Insurance ratio of industry group

Industry group	2008			2009			2010		
	Obs.	Insurance No.	Insurance ratio (%)	Obs.	Insurance No.	Insurance ratio (%)	Obs.	Insurance No.	Insurance ratio (%)
Automobile	6	1	16.67	6	2	33.33	6	2	33.33
Electronics	664	424	63.86	665	446	67.07	659	454	68.89
Building materials	57	9	15.79	57	12	21.05	63	18	28.57
Shipping	21	7	33.33	21	7	33.33	21	7	33.33
Tourism	13	2	15.38	13	2	15.38	13	3	23.08
Bank/Insurance	34	20	58.82	34	22	64.71	34	25	73.53
Trading	14	3	21.43	14	3	21.43	15	3	20.00
Securities/Futures	10	7	70.00	10	7	70.00	10	7	70.00
Others	39	16	41.03	39	18	46.15	39	18	46.15
Total	1,209	587	48.55	1,209	628	51.94	1,209	653	54.01

Source: *Taiwan Economics Journal database*.

4. Empirical results

4.1. Descriptive statistics. Table 2 shows the circumstances of corporate governance under each rating of information transparency, and Table 3 shows the descriptive statistics for each variable. A comparison of the data in Tables 2 and 3 indicates that companies with comparatively high information transparency ratings also have higher insured amounts and institutional investor shareholdings, and were more likely to have been audited by a Big 4 firm or industry specialist, and scale were larger than companies with poor information transparency ratings. Conversely, companies with poor information transparency ratings tended to have higher proportions of director and supervisor shareholdings, manager internalization, CEO duality and CFO turnover. These results indicate that companies with highly transparent information also tend to implement superior corporate governance mechanisms. In addition, companies with high ratings for transparent disclosure or those considered to be progressing exhibited higher corporate governance indicators and exhibited clear improvements and progress.

The descriptive statistics in Table 3 shows that the mean value for *Dshare* was 23.36%, which supports the findings of Lin and Chang (2009), who reported that family-owned companies and group enterprises were the most common corporate models in Taiwan. More than half of the listed companies were family-owned, and they tended to have higher insider

shareholdings. The mean value for *Ishare* was 8.32%, indicating that external investors do not typically hold a high proportion of shares for listed companies in Taiwan.

Regarding director and supervisor responsibilities, the mean values *Pledge* and *Insufy* were 9.23% and 0.06, respectively. These data show that shareholdings pledges by directors and supervisors constitute individual financial behaviors; thus, they do not exert a notable effect on company operations.

Regarding the role of manager, the mean values for *MgInsid*, *Concure*, *CEO* and *CFO* were 0.44, 0.29, 0.52 and 0.58, respectively. These results indicated that family and group member shareholders were likely to act as CEOs or concurrent chairpersons or CEOs.

The mean value for *CSR* was 0.12. The development of corporate organizations not only depends on profits generated through operations, but it is also determined by their public image. The data show that the majority of companies fulfilled their duties and operated prudently while avoiding CSR incidents. The mean values for *Big 4*, *Spec*, *R&D*, *AsstTun*, *ColEq*, *Crisis*, *Loss*, and company assets were 0.83, 0.10, 4.21%, 86.12%, 9.60%, .02 times, 0.35, and NT\$37 billion, respectively; indicating that business involves higher financial and operational risks result higher demand for D&O insurance.

Table 2. The mean of corporate governance variables in different transparency ratings

Corporate governance variables	Information transparency rating					
	A+	A	B	C	C-	Progressive
Obs.	113	1052	1686	426	50	490
Insured amount (Million NTD)	417.67	205.42	111.81	56.37	48.09	300.25
Director and supervisor shareholdings (%)	23.44	23.22	22.71	24.78	23.91	24.41
Institutional investor shareholdings (%)	11.94	8.62	8.05	6.94	6.13	10.80
Pledge of D&S shareholdings (%)	12.84	9.45	9.31	7.34	12.92	11.04
Insufficiency of D&S shareholdings	.13	.06	.05	.03	.04	.13
Manager's internalization	.22	.41	.45	.51	.48	.33
CEO duality	.10	.26	.30	.30	.32	.24

Table 2 (cont.). The mean of corporate governance variables in different transparency ratings

Corporate governance variables	Information transparency rating					
	A+	A	B	C	C-	Progressive
CEO turnover	.75	.44	.49	.45	.64	.69
CFO turnover	.52	.50	.55	.53	.78	.78
CSR events	.24	.10	.10	.11	.28	.20
Big 4 firms	.90	.88	.85	.80	.58	.84
Industry specialist	.31	.13	.10	.05	.06	.17
R&D ratio (%)	1.47	3.40	4.64	3.20	.94	5.56
Total assets turnover (%)	86.45	9.03	86.04	79.05	61.74	92.25
Contingent liabilities to owner equity ratio (%)	7.73	10.72	9.62	6.82	11.18	8.56
Crisis events	.00	.00	.00	.01	.06	.08
losses in previous year	.19	.26	.33	.41	.46	.34
Company size (Billion NTD)	309.00	71.63	11.17	4.49	4.78	142.00

Table 3. Descriptive statistics

Variables	n = 3,627				
	Mean	Median	S.D.	Min	Max
<i>D & O</i>	.52	1.00	.50	.00	1.00
<i>Ins_Amt</i>	5.21	5.20	.47	2.06	6.82
Transparency rating					
<i>D₁_A+</i>	.03	.00	.17	.00	1.00
<i>D₂_A</i>	.29	.00	.45	.00	1.00
<i>D₃_B</i>	.46	.00	.50	.00	1.00
<i>D₄_C</i>	.12	.00	.32	.00	1.00
<i>D₅_C-</i>	.01	.00	.12	.00	1.00
<i>D_p_Progressive</i>	.14	.00	.34	.00	1.00
Ownership structure					
<i>Dshare</i> (%)	23.36	19.50	14.38	.00	94.95
<i>Ishare</i> (%)	8.32	5.82	8.82	.00	77.61
Responsibilities of D&S					
<i>Pledge</i> (%)	9.23	.00	18.35	.00	100.00
<i>Insufy</i>	.06	.00	.24	.00	1.00
Role of managers					
<i>MgInsid</i>	.44	.00	.50	.00	1.00
<i>Concure</i>	.29	.00	.45	.00	1.00
<i>CEO</i>	.52	.00	.81	.00	8.00
<i>CFO</i>	.58	.00	.93	.00	8.00
<i>CSR</i>	.12	.00	.32	.00	1.00
Control variables					
<i>Big4</i>	.83	1.00	.37	.00	1.00
<i>Spec</i>	.10	.00	.30	.00	1.00
<i>R&D</i> (%)	4.21	1.24	21.25	.00	997.30
<i>AssTun</i> (%)	86.12	70.00	71.29	.00	824.00
<i>ColEq</i> (%)	9.60	.00	21.36	.00	477.27
<i>Crisis</i>	.02	.00	.15	.00	1.00
<i>Loss</i>	.35	.00	.48	.00	1.00
<i>Size</i>	6.62	6.51	.68	4.51	9.67

Notes: Variable definitions: *D&O* = 1 if the company purchases D&O insurance, 0 otherwise; *Ins_Amt* = The nature logarithm of D&O insurance coverage; *D₁ ~ D₅* = A company's information transparency has been rated A+, A, B, C, or C-, respectively. 1 if the company's information transparency is rated A+~C-, 0 otherwise; *D_p_Progressive* = 1 if the company is relatively transparent and progressive, 0 otherwise; *Dshare* = The proportion of shares held by directors and supervisors; *Ishare* = The proportion of institutional investor shareholdings; *Pledge* = Ratio of pledged shares held by directors and supervisors; *Insufy* = 1 if the shares held by directors and supervisors below the legal minimum number, 0 otherwise; *MgInsid* = 1 if the manager internalization, 0 otherwise; *Concure* = 1 if the manager concurrent board chairperson and CEO, 0 otherwise; *CEO* = The number of times a CEO has been replaced in the previous three years; *CFO* = The number of times a CFO has been replaced in the previous three years; *CSR* = 1 if the occurrence of corporate social responsibility events in previous year, 0 otherwise; *Big4* = 1 if the company is audited by Big 4 firms, 0 otherwise; *Spec* = 1 if the company is audited by industry specialist, 0 otherwise; *R&D* (%) = The research and development costs ratio; *AssTun* (%) = The sales revenue to total assets ratio; *ColEq* (%) = The ratio of contingent liabilities to owner equity; *Crisis* = 1 if the company had experienced a crisis event, 0 otherwise; *Loss* = 1 if a company has occurred loss in previous year, 0 otherwise; *Size* = Company size, natural logarithm of total assets.

4.2. Correlation analysis. Table 4 (see Appendix) shows the Pearson correlation coefficient matrix. The results indicated that higher transparency ratings are significantly and positively associated with the demand for D&O insurance; conversely, poor transparency ratings are significantly and inversely related to D&O insurance. Among the corporate governance variables, *Dshare* and *MgInsid* exhibited a significant inverse correlation, whereas the other variables showed a significant and positive relationship with D&O insurance. In this study, we applied variance inflation factors (VIFs) to test for collinearity between variables. The empirical results showed that VIF values (1.00–4.05) did not exceed 10, indicating that the collinearity between variables was weak.

4.3. Regression analysis. 4.3.1. *Insured and uninsured sample t-test.* We determined the mean difference between the insured and uninsured

companies to determine the difference in information transparency and corporate governance (Table 5). The information transparency of the insured companies was superior to that of the uninsured companies. The insured companies exhibited superior performance regarding voluntary information disclosure transparency and progress.

The empirical results also show that the insured companies implemented corporate governance that were weaker than those of the uninsured companies. Furthermore, the shareholdings pledges and insufficient shareholdings of directors and supervisors were more serious for insured companies, and they exhibited higher CEO and CFO turnover. However, these companies compensated for their weaknesses with external monitoring mechanisms such as higher institutional shareholdings and appointing Big 4 firms and industry specialists to audit their financial statements.

Table 5. *t*-test of the insured and uninsured subsamples

Transparency rating	Insured mean	Uninsured mean	<i>t</i> -test	
			<i>t</i> -value	<i>p</i> -value
<i>D1_A+</i>	.04	.02	3.60	.000***
<i>D2_A</i>	.34	.23	7.39	.000***
<i>D3_B</i>	.46	.47	-1.16	.248
<i>D4_C</i>	.08	.16	-8.16	.000***
<i>D5_C-</i>	.01	.02	-4.50	.000***
<i>D_p Progressive</i>	.19	.07	10.93	.000***
Corporate governance				
<i>Dshare</i> (%)	22.01	24.79	-5.73	.000***
<i>Ishare</i> (%)	9.80	6.74	10.61	.000***
<i>Pledge</i> (%)	9.87	8.53	2.20	.028**
<i>Insufy</i>	.09	.03	7.67	.000***
<i>MgInsid</i>	.38	.49	-6.56	.000***
<i>Concure</i>	.28	.30	-1.49	.137
<i>CEO</i>	.59	.45	5.29	.000***
<i>CFO</i>	.65	.51	4.76	.000***
<i>CSR</i>	.13	.10	2.25	.025**
<i>Big4</i>	.89	.78	8.79	.000***
<i>Spec</i>	.11	.10	1.41	.158
<i>R&D</i> (%)	5.77	2.55	4.58	.000***
<i>AssTun</i> (%)	92.31	79.53	5.42	.000***
<i>ColEq</i> (%)	10.38	8.77	2.26	.024**
<i>Crisis</i>	.02	.02	.26	.796
<i>Loss</i>	.34	.36	-1.85	.064*
<i>Size</i>	6.69	6.54	6.88	.000***
<i>n</i>	1,868	1,759		

Notes: 1. This table shows the *t*-test estimates of the two subsamples: insured and uninsured. 2. All variables are defined in Table 3. 3. *, ** and *** denote significance at the 0.10, 0.05 and 0.01 levels (two-tailed), respectively.

4.3.2. *Regression analysis.* Table 6 shows the empirical results for the effect that various degrees of information transparency and corporate governance exerted on the demand for D&O insurance. Because the information ratings denote the degree of information transparency (Model 1),

superior information transparency (i.e., A+ and A) is significantly and positively related to the demand for D&O insurance, whereas the relationship is significant and negative for poor information transparency (i.e., C and C- grades). However, Model 2 shows that poor information transparency

is inversely related to the insured amount among the insured companies. These results indicated that company information transparency affects the decision to purchase D&O insurance, and that poor information transparency leads to comparatively lower insured amounts. This implies that the high risks associated with poor information transparency affect the willingness of insurers to provide the degree of protection.

Regarding corporate governance mechanisms, among the shareholding structure variables for Model 1, *Dshare* was significantly and negatively correlated with *D&O* (-1.32, $p < .01$), whereas the correlation with *Ishare* was positive and significant (3.44, $p < .01$). This indicates that increases in the ratio of insider shareholdings tend to align corporate interests with those of shareholders, reducing any agency conflict problems (Crutchley and Hansen, 1989), which consequently reduces the demand for D&O insurance. Conversely, the companies with a comparatively high ratio of institutional investors and higher D&O insurance, and with institutional investors who are not involved in the company's management tend to have higher D&O insurance, which is in agreement with the status of the Taiwanese securities market. However, regarding the insured companies with diversified risks in Model 2, the *Dshare* and *Ishare* coefficients were statistically nonsignificant.

Regarding the director and supervisor responsibility variables, the *Insufy* coefficients in Model 1 (.96, $p < .01$) and Model 2 (.13, $p < .01$) were significantly and positively related, indicating that long-term insufficient shareholdings by directors and officers implies a lack of confidence in the company's long-term development, thereby increasing the demand for D&O insurance. The *Pledge* coefficients were nonsignificant in Model 1, although they were significant and negative in Model 2 (-.11, $p < .05$). Directors' and supervisors' use of pledges can be considered personal financial behaviors; thus, they cannot be proven to be related to the decision to purchase D&O insurance, although they could affect the willingness of insurers to provide insurance.

Regarding the variables related to the role of managers, the coefficients for *MgInsid* in Model 1 (-.36, $p < .01$) and Model 2 (-.04, $p < .10$) were statistically significant and negative, indicating that the alignment of interests between members of a controlling family acting as CEOs and those of shareholders was more powerful than those of the aggression effects, thereby reducing both the demand for D&O insurance and the insured amount. The *Concure*, *CEO* and *CFO* coefficients were all positive and statistically significant, indicating that the chairperson concurrently weakens a company's monitoring function. Frequent CEO or CFO turnovers can lead to instability among senior management, thereby increasing the demand for D&O insurance.

The *CSR* variable did not reach statistical significance in Model 1, although it was significantly and inversely correlated with the insured amount in Model 2 (-.06, $p < .05$), which does not support our hypothesis (H2-6). This is possibly because the occurrence of CSR events increases the risk for insurers, thereby affecting their willingness to provide insurance.

The *Big4* coefficients were positive and significant in both models, indicating that the purchase of D&O insurance by audited clients spreads any auditing risks. Thus, companies audited by Big 4 firms have greater demand for D&O insurance as well as higher insured amounts. The *Spec* coefficient was inverse and significant in Model 1, although it was positive and nonsignificant in Model 2, indicating that experienced or reputable auditors can perform third-party monitoring functions, thereby reducing the need for D&O insurance. Clients that purchased D&O insurance tended to implement weaker corporate governance mechanisms and higher auditing risks, leading to higher insured amounts. The *R&D*, *Assturn*, *ColEq*, *Crisis* and *Size* coefficients were statistically significant and positive, indicating that the operational environment and a larger company scale leads to higher risks, thereby increasing the demand for D&O insurance and the insured amount.

Table 6. D&O = f (transparency, corporate governance, and control variables)

		Model 1			Model 2		
		$f(y)=D\&O$ - equation (1)			$f(y)= Ins_Amt$ - equation (2)		
Transparency rating	Exp.	Coefficient	Wald	p -value	Coefficient	t -value	p -value
<i>D1_A+</i>	+	.734	7.285	.007***	-.045	-.732	.464
<i>D2_A</i>	+	.623	13.728	.000***	-.053	-1.255	.210
<i>D3_B</i>	+	.236	2.219	.136	-.091	-2.237	.025**
<i>D4_C</i>	+	-.313	2.931	.087*	-.122	-2.416	.016**
<i>D5_C-</i>	+	-.901	5.085	.024**	.081	.622	.534
Corporate governance	+						
<i>Dshare</i>	+/-	-1.320	26.532	.000***	-.064	-.993	.321

Table 6 (cont.). $D\&O = f(\text{transparency, corporate governance, and control variables})$

		Model 1			Model 2		
		$f(y)=D\&O$ – equation (1)			$f(y)= Ins_Amt$ – equation (2)		
Transparency rating	Exp.	Coefficient	Wald	p-value	Coefficient	t-value	p-value
<i>Ishare</i>	+/-	3.441	59.819	.000***	.137	1.318	.188
<i>Pledge</i>	+	.225	1.171	.279	-.111	-2.218	.027**
<i>Insufy</i>	+	.964	30.538	.000***	.132	4.041	.000***
<i>Mglnsid</i>	-	-.357	16.803	.000***	-.040	-1.722	.085*
<i>Concure</i>	+	.142	2.295	.130	.030	1.227	.220
<i>CEO</i>	+	.125	8.635	.003***	.020	1.987	.047**
<i>CFO</i>	+	.204	17.103	.000***	.003	.247	.805
<i>CSR</i>	+	.112	.873	.350	-.062	-2.119	.034**
<i>Big 4</i>	+/-	.540	27.172	.000***	.171	5.798	.000***
<i>Spec</i>	+/-	-.277	4.606	.032**	.034	1.066	.287
<i>R&D (%)</i>	+	5.892	71.019	.000***	.091	2.826	.005***
<i>AssTun (%)</i>	+	.325	33.478	.000***	.042	3.436	.001***
<i>ColEq (%)</i>	+	.557	8.679	.003***	-.021	-.499	.618
<i>Crisis</i>	+	.264	.951	.329	.175	2.632	.009***
<i>Loss</i>	+	-.109	1.768	.184	.013	.604	.546
<i>Size</i>	+	.215	9.359	.002***	.318	20.461	.000***
<i>Constant</i>		-2.671	29.831	.000***	2.950	26.629	.000***
<i>n</i>		3,627			1,868		
<i>R²</i>					.309		
<i>Adj R²</i>					.301		
<i>Cox & Snell R</i>		.143					
<i>Nagelkerke R</i>		.190					

Notes: 1. This table shows the regression estimates of the equation (1) and (2). 2. All variables are defined in Table 3. 3. *, **, and *** denote significance at the 0.10, 0.05 and 0.01 levels (two-tailed), respectively.

Table 7 shows the results for the effects that “Relatively transparent companies voluntarily disclose information,” “Progressing companies,” and corporate governance mechanisms exert on the demand for D&O insurance. Table 7 shows both the Model 1 analysis of the insurance purchase decisions of all companies (Equation 3) and the Model 2 analysis of the factors influencing the insured amounts for the insured companies

(Equation 4). The empirical results showed that D_p was significantly and positively related to $D\&O$ (.95, $p < .01$) and Ins_Amt (.04, $p < .10$), indicating that the measures adopted by oversight agencies to encourage the voluntary disclosure of information by companies were effective in reducing information asymmetry. The regression results for the corporate governance variables were similar to those shown in Table 6.

Table 7. $D\&O = f(\text{progressive, corporate governance and control variables})$

		Model 1			Model 2		
		$f(y)=D\&O$ – equation (3)			$f(y)= Ins_Amt$ – equation (4)		
Transparency rating	Exp.	Coefficient	Wald	p-value	Coefficient	t-value	p-value
D_p	+	.947	62.531	.000**	.043	1.746	.081*
Corporate governance							
<i>Dshare</i>	+/-	-1.419	30.721	.000***	-.060	-.926	.354
<i>Ishare</i>	+/-	3.259	53.868	.000***	.135	1.301	.193
<i>Pledge</i>	+	.200	.926	.336	-.109	-2.194	.028**
<i>Insufy</i>	+	.893	26.112	.000***	.137	4.173	.000***
<i>Mglnsid</i>	-	-.367	17.864	.000***	-.042	-1.805	.071*
<i>Concure</i>	+	.167	3.191	.074*	.031	1.245	.213
<i>CEO</i>	+	.103	5.864	.015**	.022	2.173	.030**
<i>CFO</i>	+	.189	14.745	.000***	.003	.266	.790
<i>CSR</i>	+	.003	.001	.979	-.060	-2.066	.039**
<i>Big 4</i>	+/-	.607	34.664	.000***	.172	5.810	.000***
<i>Spec</i>	+/-	-.324	6.183	.013**	.035	1.129	.259
<i>R&D (%)</i>	+	6.607	73.498	.000***	.091	2.837	.005***
<i>AssTun (%)</i>	+	.347	38.635	.000***	.043	3.555	.000***

Table 7 (cont.). D&O = $f(\text{progressive, corporate governance and control variables})$

		Model 1			Model 2		
		$f(y)=D\&O - \text{equation (3)}$			$f(y)= \text{Ins_Amt} - \text{equation (4)}$		
Transparency rating	Exp.	Coefficient	Wald	p-value	Coefficient	t-value	p-value
ColEq (%)	+	.650	11.499	.001***	-.022	-.512	.609
Crisis	+	-.152	.345	.557	.201	3.190	.001***
Loss	+	-.144	3.126	.077*	.014	.683	.495
Size	+	.280	16.468	.000***	.317	21.227	.000***
Constant		-2.939	37.443	.000***	2.870	26.990	.000***
n		3,627			1,868		
R ²					.306		
Adj R ²					.299		
Cox & Snell R		.142					
Nagelkerke R		.189					

Notes: 1. This table shows the regression estimates of the equation (3) and (4). 2. All variables are defined in Table 3. 3. *, ** and *** denote significance at the 0.10, 0.05 and 0.01 levels (two-tailed), respectively.

4.4. Sensitivity analysis. *4.4.1. Increasing the industry specialist threshold.* To confirm the stability of these findings, we increased the industry specialist threshold to a 15% industry market share. In Equation 1, the *Spec* coefficient was negative and statistically significant (Cox & Snell $R^2=.14$, Nagelkerke $R^2=.19$, $\beta=-.29$, $p<.10$). In Equation 3, the *Spec* coefficient was negative and significant (Cox & Snell $R^2=.14$, Nagelkerke $R^2=.19$, $\beta=-.34$, $p<.01$). The results for the remaining independent variables were similar to those shown in Tables 6 and 7.

4.4.2. Incorporating the electronics industry variable. The research samples in this study comprised 3,627 observations from 2008 to 2010, among which 1,988 (54.81%) of the observations were for companies in the electronics industry. Because the results might have been influenced by the industry characteristics, we employed the dummy variable *Industry*, where *Industry*=1 if a company belonged to the electronics industry; otherwise, *Industry*=0. The empirical results showed that the *Industry* coefficient was positive and significant in Equation 1 (Cox and Snell $R^2=.21$, Nagelkerke $R^2=.28$, 1.37, $p < .01$). After including the industry variable, the adjusted $R^2=.30$ for Equation 2, and the *Industry* coefficient was positive and significant (.07, $p<.01$), indicating that the demand for D&O insurance in the electronics industry was higher than that in other industries. The empirical results for the other variables were similar to the results shown in Tables 6 and 7.

Conclusion

We examined the effect that information transparency and corporate governance variables exerted on company purchases of D&O insurance. The results showed that the demand for D&O insurance was greater among companies with superior information transparency than that among companies with poor information disclosure. Regarding the companies with D&O insurance, poor information transparency was significantly negatively associated with the insured

amounts. We assert that the insured amount indicates the degree of protection that insurers are willing to provide to their clients. This phenomenon shows that the higher risks of insuring clients with poor information transparency affects the degree of protection that insurers to provide. Companies with highly transparent voluntary disclosure practices and those considered to be progressing were significantly and positively associated with the demand for insurance and the insured amount, indicating that improving information disclosure practices can reduce information asymmetry for insurers, thereby increasing their willingness to provide greater protection.

A deeper analysis of the two subsamples (i.e., insured and uninsured companies) showed that uninsured companies implemented corporate governance mechanisms that were superior to those of insured companies; thus, their demand for D&O insurance was lower. Although the insured companies were characterized by weaker corporate governance structures, they compensated for this weakness by hiring industry specialist auditors or Big 4 firms for auditing. These empirical results indicated that the purchase of D&O insurance can strengthen external governance mechanisms, which increases companies' willingness to voluntarily improve the transparency of information they disclose.

The majority of listed companies in Taiwan tend to be owned by families or groups, and family members typically hold key positions as senior managers or directors. However, under these circumstances, the shareholdings of directors and supervisors and the internalization of managers tend to exert a more powerful effect than the encroachment effects in aligning the company interests with those of the shareholders reducing insurance. Institutional investors tended to exert a monitoring effect, thereby increasing the demand for D&O insurance and the insured amount. The demand for D&O insurance increased if the chairperson served as the CEO, and the CEO and

CFO turnover was high. This phenomenon indicates that providing key personnel with risk-sharing mechanisms might be crucial for recruiting competent talent to serve the interests of shareholders. The occurrence of CSR incidents affected the willingness of insurers to provide protection, as well as the degree of protection they were willing to provide, thereby encouraging company operators to address CSR.

The auditing of financial statements by Big 4 firms, “deep pockets” lead them to serve as quasi-insurers, thereby reducing the operational risks faced by audit firms. Industry specialists can assist companies in reducing their insurance premiums. Companies are confronted by higher operational and financial risks, both the demand for D&O insurance and insured amount increase.

We contend that insurance costs are critical factors considered by companies when deciding purchase D&O insurance. However, corporate financial reports do not clearly disclose information on insurance premiums, which is a limitation of this study and should be comprehensively assessed in future studies. The observation data indicated that the financial industries (i.e., banking, insurance and securities and futures) exhibited the highest insurance rates among all industries; thus, future studies should conduct a deeper examination of the relevant industry characteristics. The results of this study can provide a reference for investors and authorities when making insurance-related decisions, particularly because the current D&O insurance rates are low in Taiwan, pending continued promotion by authorities and insurers.

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Appendix

Table 4. Correlation matrix

	D&O	A+	A	B	C	C-	Dshare	Ishare	Plege	Insufy	Mglnsid	Concure	CEO	CFO	CSR	Big4	Spec	R&D	AssTun	ColEq	Crisis	Loss	Size		
D&O	1.00																								
D ₁ _A+	.06**	1.00																							
D ₂ _A	.12**	-.12**	1.00																						
D ₃ _B	-.02	-.17**	-.60**	1.00																					
D ₄ _C	-.13**	-.07**	-.23**	-.34**	1.00																				
D ₅ _C-	-.08**	-.02	-.08**	-.11**	-.04**	1.00																			
Dshare	-.09**	.00	-.01	-.04*	.04*	.00	1.00																		
Ishare	.17**	.07**	.02	-.03	-.06**	-.03	.05**	1.00																	
Plege	.04*	.04*	.01	.00	-.04*	.02	-.11**	.07**	1.00																
Insufy	.13**	.05**	.00	-.05**	-.04*	-.01	-.07**	.04*	.01	1.00															
Mglnsid	-.11**	-.08**	-.04*	.02	.06**	.01	-.10**	-.09**	-.06**	-.08**	1.00														
Concure	-.03	-.08**	-.04*	.02	.01	.01	-.08**	-.03	-.04*	-.00	.51**	1.00													
CEO	.09**	.05**	-.06**	-.04*	-.03	.02	.05**	.04*	-.00	.08**	-.18**	-.03	1.00												
CFO	.08**	-.01	-.06**	-.04*	-.02	.03	.03	.06**	.00	.08**	-.05**	.05**	.31**	1.00											
CSR	.04*	.07**	-.04*	-.06**	-.01	.06**	-.02	.04*	.15**	.03*	-.05**	-.01	.13**	.15**	1.00										
Big4	.15**	.03*	.09**	.05**	-.04*	-.08**	-.01	.11**	.00	-.01	-.06**	-.07**	-.04*	-.02	-.01	1.00									
Spec	.02	.12**	.06**	-.02	-.06**	-.02	-.02	.07**	.06**	.01	-.08**	-.04*	-.01	-.04*	.05**	.11**	1.00								
R&D	.08**	-.02	-0.02	.02	-.02	-.02	-.03*	-.01	-.04*	.00	.01	.03	.00	.02	.06**	-.02	-.03*	1.00							
AssTun	.09**	.00	.06**	-.00	-.04*	-.04*	-.06**	.07**	-.07**	.06**	-.01	-.02	-.03	-.01	-.05**	.06**	.06**	-.08**	1.00						
ColEq	.04*	-.02	.03*	.00	-.05**	.01	-.04*	-.02	.04*	-.02	-.01	.00	-.01	.04*	.01	.00	.03	-.04*	-.04*	1.00					
Crisis	.00	-.03	-.09**	-.12**	-.03	.03	.01	.02	-.03	.06**	.00	.04*	.13**	.15**	.07**	-.14**	-.04*	.02	-.02	-.03*	1.00				
Loss	-.03	-.06**	-.12**	-.05**	.05**	.03	-.04*	-.09**	.05**	.05**	-.01	.07**	.16**	.15**	.15**	-.12**	-.11**	.08**	-.13**	.05**	.18**	1.00			
Size	.11**	.24**	.21**	-.08**	-.12**	-.04*	-.09**	.17**	.26**	.06**	-.18**	-.17**	-.01	-.07**	.15**	.16**	.37**	-.09**	.00	.07**	-.13**	-.19**	1.00		

Note: All variables are defined in Table 3. **and * denote significance at the 0.01 and 0.05 levels, respectively.