Original Article

Directors' & officers' insurance, corporate governance and firm performance

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ABSTRACT The purpose of this article is to investigate the effects of directors' and officers' liability insurance (D&O) on corporate governance and firm performance. D&O insurance demand reflects the firm's internal evaluation of its exposure to litigation risk. From the investors' point of view, the D&O insurance purchase data can provide valuable information to assess the underlying risk of the firm, corporate governance quality and its future performance. Thus, this article studies the information implications of D&O insurance on the following questions. (1) Does D&O insurance demand reflect the litigation risk and corporate governance? (2) Does D&O insurance create moral hazard or provide incentives of care to directors and officers, which subsequently affect the firm's performance? We empirically test the data by using companies listed in Taiwan Security Exchanges and find that (1) the demand for D&O insurance is positively related to the firm's litigation risk and the motivation of its board of directors; (2) there is no evidence supporting that D&O insurance does have a significant impact on the directors' care incentives and the subsequent firm's performance. We further provide some suggestions for corporate governance based on these empirical results.

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INTRODUCTION

The unexpected financial distress of several large public companies in recent years, for example Enron and WorldCom in 2002, has made the investors more concerned about the corporate governance and risk management in business operation. The importance of

corporate governance is a consequence of the expansion process of a firm that segregates the ownership and management. The delegation of management may raise some friction between the shareholders and the managers, which is so-called 'agency conflict' (Jensen and Meckling, 1976). That is, the agent (manager) may take business decisions with consideration of his own interests, as indicated by Wright *et al* (2007). It has become a trend that the investors sue the firms and their directors and officers when the investments are poor. To reduce liability risk and judgment-proof problem, directors' and officers' liability insurance (D&O insurance) is a primary tool used in modern society. Some countries, for example the United States and Canada, require the public companies to buy D&O insurance to provide protections for investors. Even without the regulatory requirement, many firms may voluntarily purchase D&O insurance to indemnify directors and officers for the potential loss arising from possible litigations. Especially after the Enron scandal, directors and officers face unprecedented scrutiny and liability exposure. On the other hand, some countries, for example Germany,[1] prohibit D&O insurance because of its possible negative impact on directors' and officers' moral hazard. The extreme viewpoints of D&O insurance in regulations suggest that a comprehensive study on D&O insurance is important to academic research. Especially the effect of D&O insurance on firm's corporate governance and performance is lacking in the literature.

Most of the D&O researches concentrate on the demand or determinants of D&O insurance, or its underwriting process. Core (1997) uses the data of Canadian firms to test three sources of demand: personal coverage, corporate and the use of D&O insurance to supplement corporate governance. Similar research can be found in O'Sullivan (2002). Besides, Redington (2005) discusses the underwriting implications of Section 404 of Sarbanes–Oxley Act of 2002 on D&O insurance.

Apparently the effect of D&O insurance on corporate performance does not exist in the literature, with Chalmers *et al* (2002) as an exception. Chalmers *et al* (2002) use 72 IPO firms and found a significant negative relation between the 3-year post-IPO stock price performance and the D&O insurance purchases in conjunction with the IPO. They conclude that D&O insurance decisions revealed managers' opportunistic behaviors. This type of research does provide policy implications for information disclosures on D&O insurance purchase details. Although it is an important accounting issue, almost no research can be found in the accounting literature.

The purposes of this study are: (1) to find the influential factors for the purchase of D&O insurance, (2) to test the relationship between D&O insurance demand and corporate governance, and (3) to analyze the incentive effect of D&O insurance on the performance of firms. We consider that the board of directors, corporate governance, firm performance, and its litigation risk are connected to each other, as shown by Figure 1. They are not independent items of business conducts. The litigation risk, in fact, should be directly related to the firm's corporate governance, such as insufficient duty of care, instead of performance outcomes that may be affected by other macroeconomic factors. However, corporate governance is hard to observe *ex ante,* and investors usually sue the directors after seeing bad performance. Investors can investigate the quality of corporate governance only through some indirect approaches or measures.

As the coverage of D&O insurance may have an impact on the firm's litigation risk, it may further influence its corporate governance strategies as well as performance. Therefore, this article tries to analyze the interactions between the D&O insurance and corporate governance, through the observation of firms' litigation risk and performance, so that the investors may refer to the firm's D&O insurance purchase as information for its corporate governance. The relation between D&O insurance and corporate governance is controversial in the previous literature. Thus, two competing
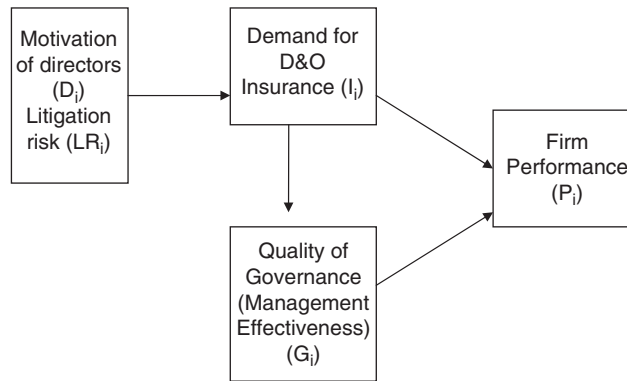
Figure 1: The relationship between litigation risk, D&O insurance, corporate governance and firm performance.

hypotheses are tested in this article: (1) the moral hazard hypothesis, and (2) the optimal incentive and monitor hypothesis.

Our findings suggest that the firms purchasing D&O insurance are in a higher litigation risk measured with our estimation model, and the motivation of the board of directors is a critical factor for D&O insurance demand. The quality of corporate governance significantly and positively affects the future performance of the firm. However, the future performance is not significantly related to the D&O insurance coverage. Probably there are some other external/macroeconomic factors contributing to the firm's performance, and the impact of D&O insurance is relatively small among all the factors, or the governance structure itself is optimal so that insurance (risk management) has no impact on it.

The existing literature, such as Boyer (2005), has already provided numerous empirical evidence about D&O insurance. However, most of them are based on the data of North America or the United Kingdom where common law origin is used for tort liability. This study complements the literature by the data of Taiwanese firms in which civil law origin is applied. La Portta *et al* (2002) indicate that investor protections are usually lower in the civil law countries. Besides, the cultural environment for litigation in Taiwan is also different from

that in North America.[2] The evidence of this article can supplement the findings of previous research and confirm their results. Moreover, this article explores the effects of D&O insurance on firm performance that contributes to the limited current literature on this issue. Most of the papers are related to stock price (Bhagat *et al*, 1987; Brook and Rao, 1994; Chalmers *et al*, 2002). In contrast, this article takes a different approach by directly investigating the relationship between D&O insurance and the subsequent accounting and stock performance.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

It is a common notion that the firms with higher exposures to the litigations will have stronger incentives in buying D&O insurance to indemnify their board of directors and officers. Before the Enron era, D&O insurance made directors and officers immune from personal liability for corporate failure. Given the information asymmetry, firms determine the optimal purchase of D&O insurance based on their self-belief of the risk exposures and the estimated claims to be paid in case of loss in litigation. However, this practice is changed, according to Alles *et al* (2005), when Enron and WorldCom directors are forced by court to pay settlements out of their personal assets. Therefore, Redington

(2005) and Bailey (2005) both predict that the trend of D&O liability may cause the unavailability of adequate D&O coverage desired by the firms. Daniels and Hutton (1993) show that, in Canada and the United States, it is more difficult for those companies without D&O insurance to have capable independent directors. It is believed that the demand for D&O insurance may also result from the request of the board of directors.

Core (1997) argues that an efficient compensation contract requires other forms of payment to be substitutes for D&O insurance and thus he predicts a negative relationship between directors' compensation and D&O insurance demand. Besides, in reality, directors' compensation highly depends on the result of performance, and better firm performance results in greater directors' compensation (Chen, 2002). As better performance also causes less investors' litigation, it implies that directors' compensation is negatively related to D&O insurance demand. However, Core et al (1999) indicate that excessive directors' compensation may imply self-interest and more agency conflicts, which means worse corporate governance and more demand for D&O insurance.

Raheja (2005) suggests that directors' ownership may indeed connect with insiders' and shareholders' incentives. Stulz (1988) and Eckbo and Verma (1994) suggest that the inside directors may neglect the interests of other shareholders when they have more control on the firm. They probably raise their own benefits and reduce dividends to shareholders, which may result in more litigation risk and thus positively relate to D&O insurance demand. Linck et al (2008) show a negative relationship between directors' ownership and board independence, that is, a countervailing effect on the quality of corporate governance, which implies a higher demand for D&O insurance.

Finally, it is believed that outside directors can improve the quality of internal monitoring. Jensen (1993) suggests that firms with independent boards of directors and chief executive officers (CEOs) usually have better corporate governance. Hence, it supports a negative relation between the demand for D&O insurance and outside directors' shareholdings. In summary, we derive the following hypotheses to test the relation of D&O insurance demand and firm litigation risk as well as directors' motivation.

Hypothesis 1a: The firm's demand for D&O insurance is positively related to its litigation risk.

Hypothesis 1b: The firm's demand for D&O insurance is negatively related to directors' compensation, positively related to total directors' ownership, and negatively related to outside directors' ownership.

People are usually concerned over whether D&O insurance will result in moral hazard of the insured (directors and officers) in reducing their efforts on protecting investors, which eventually affects firm's performance. According to the agency theory of Jensen and Meckling (1976), there are conflicts of interests between shareholders and managers. Fama and Jensen (1983) further state that the board of directors has the fiduciary duty to exercise care in monitoring management on behalf of all shareholders under the separation of ownership and control. The lower the agency cost, the better is the corporate performance. Linck et al (2008) find that the board structure is consistent with the costs and benefits of the board's monitoring and advisory roles. One way to reduce the agency costs is to design the right managerial incentive contract. Does D&O insurance provide the right incentives to directors and officers and help to improve the firm's performance? Does D&O insurance, in contrast, reduce the incentives of directors and officers because it eliminates the personal liabilities of directors and officers and causes moral hazard to the board?

The academic studies about the impact of liability insurance on the insured's preventive

effort are controversial. Shavell (1982) suggests that the injurer's incentive of care is not affected by liability insurance once the insurer can observe the prevention activity, and thus governmental intervention in insurance market is not desirable. However, Sarath (1991) shows that liability insurance may dilute the incentive of care when there is uncertainty in litigation. The empirical study by Sloan *et al* (1995), on the other hand, shows that driver's automobile liability insurance, especially compulsory insurance, discourages binge drinking behavior. Gutierrez (2003) uses a principal-agent model and shows that the use of liability insurance could be optimal for a more efficient litigation strategy. Holderness (1990) suggests that the purchase of D&O insurance would result in the improvement of managerial behaviors because of the monitoring from the insurance company. Therefore, two competing hypotheses can be inferred from the literature:

Hypothesis 2a: *The moral hazard hypothesis*: The D&O insurance creates moral hazard problems and results in a poor performance.

Hypothesis 2b: *Optimal incentive and monitor hypothesis*: The D&O insurance aligns the incentives of directors and officers with shareholders and results in a better performance.

SAMPLE AND RESEARCH DESIGN

Data and sample

The D&O insurance data are not available from the annual reports or any public database in Taiwan. As the public database is not available, survey is the only way to obtain this type of information. In this article, we have used a very simple survey form to increase the response rate and ensure the quality of the responding information. The survey provides data for purchase/non-purchase of D&O insurance and amount of insurance coverage. In addition to the survey data, we retrieve the public available data of financial statements and company reports to increase the reliability of this study, which include data from the *Taiwan Economic Journal* (*TEJ*), Taiwan Stock Exchange Corp. (TSEC) and Market Observation Post System (MOPS).

The sample companies for the empirical analysis are selected from the Top 500 businesses listed on the *Commonwealth magazine*, May 2004. If the companies do not have financial data on the public databases, or if the companies have more than 50 per cent of ownership held by foreigners, then they are deleted from the samples. To collect the primary data for D&O insurance demand in the year 2004, we survey those sample companies based on the questionnaire shown in Appendix B. Through the questionnaire, we obtain the data about whether the company is with D&O insurance and about the insurance amount covered for each company. Among the 422 questionnaires issued, 105 companies responded. The effective response rate is 24.88 per cent. 35 of these firms have D&O insurance and 70 firms do not have it.

In order to estimate the litigation risk, we require all sample firms to have all the required accounting variables for the year 2003. On the basis of this criterion, we further eliminate five companies and have 100 firms in the final testing sample. Among them, 35 sample firms have purchased the D&O insurance and 65 firms did not. The summary statistics of the sample companies is summarized in Table 1.

Then, we retrieve the financial data and company information for these 100 firms from the public databases TSEC, MOPS and *TEJ* for the years 2003–2005. Since D&O insurance is purchased at the beginning of the year 2004, we use the data of 2003 to estimate the motivation of the board of directors and the litigation risk. That is, the firm may refer previous-year operation to predict the potential litigation risk and it may purchase D&O insurance due to the request of the directors at the end of 2003.

Table 1: Summary statistics of the sample

Variable	N	Mean	SD	Minimum	Maximum
Insurance amount (US$)	99	2 959 598	5 793 942	0	30 000 000
D&O Premium (US$)	97	25 215	102 513	0	750 000
Total assets (NT$ billion)	100	14.76	25.88	1.11	153
Capitals (NT$ billion)	100	5.54	9.77	0.42	58.91
No. of shareholders	100	34 388.64	57 520.23	321	415 065
Directors' compensation (NT$ million)	100	11	17.83	0	114.26
Directors' shares %	100	27.07%	17.30%	5.73%	96.46%
Outside directors' share no.	100	372 990	3 097 863	0	30 895 437
Outside directors' share %	100	0.042%	0.166%	0	1.25%
Inside directors' share no.	100	127 044 152	337 339 874	8 061 028	2 616 388 087
Inside directors' share %	100	26.04%	18.04%	2.19%	96.46%

Note: There are one missing data for D&O insurance amount and three for premium expenditure.

For the quality of corporate governance, we extract from the firms' performance indexes, which include returns on asset (ROA), returns on equity (ROE), net income (NI) and stock return (STK), for the year 2004. As quality of corporate governance is not *ex ante* observable directly, but implicitly presented in the outcome of performance, we use the exploratory factor analysis (EFA) to extract it.

To study the impact of D&O insurance on the firms' future performance, we use data of the years 2004 and 2005 for ROA, ROE, NI and STK because insurance coverage extends from the beginning to the end of 2004 and may influence the performance of 2004 and 2005. The D&O insurance can directly affect performance in the year 2004, and its effect on governance quality can indirectly influence the performance of the subsequent year. As the data include the firms from different industries, we scale each performance measure by the industry level to make the performance comparison meaningful.

The construct of testing variables

The three measurements – corporation governance quality, firm's litigation risk and firm performance – used in this article are presented by single indexes because these measurements are combined results of several aspects of a firm. The construction of these measurements is based on statistical methods that compose all relevant variables identified in the literature for the discussed measurement. EFA is used to find the proxy for the quality of corporate governance through the firms' performance indexes, which include ROA, ROE, NI and STK, for the year 2004. As previous literature (for example, Chhaocharia and Grinstein, 2007) suggests that there is no conclusive relation between board structure and firm performance, we consider that there is a latent factor (quality of corporate governance G),[3] which has an impact on the firm's performance, instead of using board structure for governance proxy. That is, we calculate the factor score for G through the following system of equations, and the G score will be used as the estimate for corporate governance quality of firm i in the year 2004:

$$\begin{aligned} \mathrm{ROA}_i &= a_0 + l_1 G_i + \varepsilon_i \\ \mathrm{ROE}_i &= b_0 + l_2 G_i + \eta_i \\ \mathrm{NI}_i &= c_0 + l_3 G_i + \upsilon_i \\ \mathrm{STK}_i &= d_0 + l_4 G_i + \omega_i \end{aligned} \quad (1)$$

For the motivation of the board of directors, we draw information directly from the public

data of directors' compensation (C), the directors' shareholding % (D) and the outside directors' shareholding % (O) because these are the most relevant variables according the previous literature.[4] For litigation risk, we refine Core's (1997) litigation risk hypothesis test by using a summary measure of litigation risk based on Shu (2000). Shu constructed a summary measure to serve as a proxy for litigation risk faced by an auditor. In general, investors usually sue auditors, directors and officers at the same time. The litigation exposure of the auditor can be assumed to be equal to that of directors and officers. On the basis of the regression coefficients suggested by Shu (2000), we estimate the litigation risk measure (LR), which is the probability of being sued for each firm in the sample. The logistic regression is applied to estimate the probability of being sued for 2004 by using the variables in the year 2003, including firm size (ln assets), inventory/lagged assets, receivables/lagged assets, return on assets, current ratio, financial leverage, sale growth, stock volatility, STK, beta, stock turnover, qualified opinion, delist and technology. The estimation procedure is provided in Appendix C.

The proxy of performance measure is obtained by the method of principal component analysis based on four (industry-adjusted) variables: ROA, ROE, NI and STK of each firm in the years 2004 and 2005. For example, $ROA_{i,t} = ROA$ of firm i in year $t - ROA$ of the industry which firm i belonging to in year t. The overall performance indexes are:

$$P_{i,2004} = h_0 + k_1 ROA_{i,2004} + k_2 ROE_{i,2004} + k_3 NI_{i,2004} + k_4 STK_{i,2004} \quad (2a)$$

$$P_{i,2005} = h_0 + h_1 ROA_{i,2005} + h_2 ROE_{i,2005} + h_3 NI_{i,2005} + h_4 STK_{i,2005} \quad (2b)$$

The test regarding D&O insurance demand (Hypothesis 1)

To test Hypotheses 1a and 1b, we conduct regression analysis of D&O insurance demand

(I) with litigation risk (LR) and the motivation of directors (C, D and O). Two proxies of D&O insurance demand are applied. One is a dummy variable 1/0 for yes/no on purchasing D&O insurance, and the other is a natural logarithm of coverage amount of D&O insurance in the year 2004. Both are from the survey data. For the case with the dependent variable equal to yes/no on the insurance purchase, we apply the logistic regression model. For the case with the dependent variable equal to the insurance amount, we apply OLS regression first and then Tobit regression models to consider the possible effect of the censored data because the insurance amount is latent for those firms without insurance coverage. An additional control variable of capital is considered for the size effect when the dependent variable is the insurance amount. The testing model is:

$$I_i = \gamma_0 + \gamma_1 C_i + \gamma_2 D_i + \gamma_3 O_i + \gamma_4 LR_i + \eta_i \quad (3)$$

The test regarding D&O insurance incentive on performance (Hypothesis 2)

As the D&O purchase surveyed was conducted for the year 2004, we use performance measures of the years 2004–2005 in this study to test Hypothesis 2 regarding the incentive impact of D&O insurance, because the impact can emerge afterwards. As firm performance is highly related to its quality of corporate governance, we first conduct analysis on the determinants of governance quality and then on firm performance. Holderness (1990) finds that ownership structure of a firm has an impact on its corporate governance and business performance. In general, outside directors are more just and objective than the inside directors. Thus, outside directors may substitute for D&O insurance in terms of the monitoring function. Jensen (1993) suggests that the firms with independent board of directors and CEOs usually have better corporate governance.

Dechow *et al* (1996) also find that the firms with financial reports reviewed by SEC, as manipulated, usually have less number of outside directors.

In addition to the motivation of directors, the corporate governance may be driven by the risk of litigation. In both O'Sullivan (2002) and Core (2000) studies, they implicitly assume that weak corporate governance is equivalent to high litigation risk. Priest (1987) indicates that in Canada and the United States, it is more difficult for those companies without D&O insurance to have capable independent directors. Holderness (1990) shows that there are less agency conflicts for those companies with D&O insurance because of more significant segregation between ownership and management. Cadbury (1992) and Hampel (1998) consider that both the board of directors and D&O insurance have the monitoring function and may complement each other. Thus, the regression equation for governance quality is as follows:

$$G_i = \beta_0 + \beta_1 C_i + \beta_2 D_i + \beta_3 O_i + \beta_4 LR_i + \beta_5 I_i + \zeta_i \qquad (4)$$

Following the discussion of literature, the effect of D&O purchase on a firm's performance may be of two types. One is the direct effect, which simply reflects the risk characters of the firm and the underlying motivation of managers and directors. The other is the indirect effect, which D&O purchase first influences the governance behaviors, then the change of governance behaviors results in different performances. In order to meaningfully test the incentive effect of D&O insurance purchase, we conduct two regression analyses, respectively, according to the conceptual diagram of Figure 1. We can then draw the conclusion based on the results of two regressions. Again, two proxies for D&O insurance demand (yes/no and coverage amount) are applied to the analysis. The two regression models can be expressed as follows: where $t = 2004$ and 2005

because the effect of the insurance of 2004 may extend to the next year in addition to the current year.

$$P_{i,t} = \theta_0 + \theta_1 I_{i,2004} + \varepsilon_i \qquad (5)$$

$$P_{i,t} = \alpha_0 + \alpha_1 I_{i,2004} + \alpha_2 G_{i,2004} + \mu_i \qquad (6)$$

The regression model (4), $G_i = \beta_0 + \beta_1 C_i + \beta_2 D_i + \beta_3 O_i + \beta_4 LR_i + \beta_5 I_i + \zeta_i$, seems to have collinearity between the explanatory variables since insurance demand I_i in equation (3) also regresses on director motivation and litigation risk. However, the Pearson correlation analysis indicates that there is no significant correlation between D&O insurance and governance quality, even though the directors' motivation and litigation risk do have correlation with D&O insurance demand and governance quality, respectively.[5] Similarly, the collinearity between variables I and G are not significant in equation (6). According to probability theory, an intersection between events A and B and an intersection between B and C together do not imply the existence of intersection between A and C.

EMPIRICAL RESULTS
A simple comparison between firms with and without D&O insurance is provided in Table 2, which shows differences in the board structure between these two groups of firms. Particularly, we investigate two aspects of the board structure: proportion of independent board members and the shares collateral percentage of the board of directors. In accounting literature, a high proportion of independent board members implies better corporate governance. On the other hand, a high percentage of shares of the board members being collateralized by the bank to secure the personal borrowings usually implies more conflict of interests to the shareholders who are not on the board.

Table 2 shows that the firms with D&O insurance have a significantly higher proportion of independent board members and a lower percentage of shares collateralized. These

Table 2: Comparison of the board of directors of the firms with and without D&O insurance

	Mean-yes (SD)	Mean-no (SD)	t-test (prob. > |t|)	Wilcoxon test (prob. > |z|)
% of independent directors in the board in 2004	21.8 (15.3)	12.4 (17.1)	−2.7 (0.008)★★★	2.801 (0.005)★★★
% of shares of the directors collateralized in 2004	4.178 (8.701)	9.851 (17.761)	2.14 (0.035)★★	−2.002 (0.045)★★
Industry-adjusted ROA in 2004	0.013 (0.150)	0.010 (0.118)	−0.14 (0.889)	0.467 (0.634)
Directors' compensation (NT$ million) in 2003	19.9 (25.5)	6.2 (8.9)	−3.07 (0.0039)★★★	3.1102 (0.002)★★★
Inside directors' shareholding % in 2003	26.95 (0.194)	25.56 (0.174)	−0.37 (0.714)	0.462 (0.644)
Outside directors' shareholding % in 2003	0.06 (0.22)	0.03 (0.13)	−0.63 (0.529)	1.464 (0.143)
Firm size (total assets) (NT$ billion) in 2003	22.3 (35.8)	10.7 (17.5)	−1.80 (0.078)★	0.759 (0.448)
Sample size: N	35	65	—	—

Significance levels: ★$P < 0.10$; ★★$P < 0.05$; ★★★$P < 0.01$.

Notes: Mean-yes is the mean for the firms with D&O insurance, and mean–no is the mean for those without D&O insurance. *t*-test and Wilcoxon test are for means and medians. The data of 2003 are the determinants for purchasing D&O insurance and the data of 2004 is the effect after insurance purchase.

evidence seem to suggest that firms with D&O insurance have better governance. On the other hand, Table 2 also shows that the director's compensation of the firms with D&O insurance is significantly higher than those without insurance. As excessive compensation also implies more potential liability risk, the total effect of D&O insurance on governance and consequent performance is mixed. In fact, ROA of these two groups do not exhibit significant difference. Further investigations according to the research methodology discussed in the previous section are provided below.

The component coefficients for summary measures

The coefficients of the proxies (summary measures) for quality of corporate governance (*G*) and the performance indexes (*P*) are shown in Table 3. EFA extracts the factor of corporate governance from the firm's industry-adjusted ROA, ROE, NI and STK. The factor can explain 52 per cent of the variation of these

variables. The coefficients of factor score, which is the proxy for corporate governance quality, show that all these four variables are positively related to the quality of corporate governance. The performance index is the principal component with the combination of industry-adjusted ROA, ROE, NI and STK. Each of the four variables is positively related to the performance index and contributes a similar weight.

The determinants of D&O insurance purchase

The empirical results for the determinants in buying D&O insurance are presented in Table 4. The regression analyses, using purchasing decision dummy or insurance amount for dependent variable, both show that D&O insurance demand is positively related to litigation risk and the compensation of directors. The findings are consistent with the previous literature that litigation risk will provoke the demand for D&O insurance. The firm with higher litigation risk will purchase more insurance

Table 3: Proxies for governance quality and firm performance

	Governance quality (2004)	Performance index (2004)	Performance index (2005)
Industry–adj. ROA_{2004}	0.417[a]	0.604[b]	—
Industry–adj. ROE_{2004}	0.317	0.452	—
Industry–adj. NI_{2004}	0.269	0.384	—
Industry–adj. STK_{2004}	0.370	0.533	—
Industry–adj. ROA_{2005}	—	—	0.624[b]
Industry–adj. ROE_{2005}	—	—	0.507
Industry–adj. NI_{2005}	—	—	0.406
Industry–adj. STK_{2005}	—	—	0.435
Cumulative % of total variance explained	52.23%	51.73%	50.55%

[a]Standardized scoring coefficients for calculating factor score.

[b]Coefficients of the first principal component.

Table 4: Regression analyses of the demand for D&O insurance

	Model 3a[a] yes/no	Model 3b[b] Ins. amount	Model 3b[b] Ins. amount	Model 3c[c] Ins. amount	Model 3c[c] Ins. amount
Intercept	−2.302★★★	0.557	2.030	−16.851★★★	−11.3452
	(<0.001)	(0.743)	(0.446)	(0.003)	(0.142)
Directors' compensation	0.055★★★	0.131★★★	0.140★★★	0.259★★	0.2961★★★
	(0.007)	(0.002)	(0.002)	(0.011)	(0.007)
Directors' shareholding %	0.009	0.024	0.021	0.066	0.0524
	(0.511)	(0.553)	(0.610)	(0.547)	(0.637)
Outside directors' shareholding %	−107.2	−174.173	−166.486	−646.162	−560.281
	(0.510)	(0.689)	(0.703)	(0.571)	(0.621)
Litigation risk	7.322★★	23.438★★	24.910★★	62.220★★	67.4634★★
	(0.022)	(0.016)	(0.012)	(0.019)	(0.013)
Ln (capital)	—	—	−0.507	—	−1.8959
			(0.471)		(0.329)
Adjusted R^2	—	0.171	0.167	—	—
Logistic R^2	0.257	—	—	—	—
Log likelihood	—	—	—	−174.935	−174.448
Sample size: N	100	99	99	98	98

[a]Logistic regression model with dependent variable=yes/no (1/0).

[b]OLS multiple regression model with dependent variable=ln(insurance amount).

[c]Tobit regression model with dependent variable=ln(insurance amount).

Significance levels: ★$P<0.10$; ★★$P<0.05$; ★★★$P<0.01$.

Regression coefficient with the probability of significance in the parentheses.

coverage to reduce the loss for liability damages, which is consistent with Romano (1991). The compensation for directors is also a significantly positive factor for D&O insurance demand. It means that directors with more compensation will encounter more pressure from the shareholders because more compensation implies higher expectation from shareholders, which

may result in a higher probability of litigation and consequent demand for D&O insurance. This result contradicts the hypothesis that D&O insurance is a substitute of compensation. Probably, directors with higher compensation must face higher expectation from investors and thus request more D&O insurance protection.

The regression analyses for insurance amount, OLS and Tobit with consideration of the effect of censored data, also supports the hypotheses that litigation risk and compensation of directors both have a positive impact on the D&O insurance demand. The shareholdings of directors and control variable, capital, are not major factors for D&O insurance demand.

The effect of D&O insurance purchase on firm performance

Table 5, the regression analysis result of equation (4), shows a significant positive relationship between corporate governance quality and directors' compensation. This result supports Chen (2002) that better corporate governance result in better directors' compensation. In business practice, compensation is one of the major incentive tools usually applied to motivate directors' performance. This result does not support Core *et al* (1999), which indicate that excessive directors' compensation may imply self-interest and worse corporate governance. Although Shleifer and Vishny (1986) suggest that outside directors are helpful in protecting investors' interests and may have contribution to the shareholders, the empirical result does not find significant relationship between outside directors' shareholding and governance quality. The relationship between governance quality and litigation risk is significantly negative as expected. The impact of D&O insurance, either purchase decision or insurance amount, on the quality of corporate governance is not significant.

Table 5: The influential factors for the quality of corporate governance

	Model 4a	Model 4b	Model 4c	Model 4d	Model 4e
Intercept	−0.334★	0.00670	0.006	−0.050	−0.270
	(0.086)	(0.977)	(0.980)	(0.828)	(0.452)
Directors' compensation	0.016★★★	0.02019★★★	0.020★★★	0.0207★★★	0.019★★★
	(0.005)	(<0.001)	(0.001)	(<0.001)	(0.002)
Directors' shareholding %	0.006	0.00581	0.008	0.007	0.007
	(0.257)	(0.296)	(0.301)	(0.229)	(0.203)
Outside directors' shareholding %	−38.868	−4.43294	−4.250	−3.707	−4.707
	(0.518)	(0.941)	(0.944)	(0.949)	(0.936)
Litigation risk	—	−3.21190★★	−3.233★★	−2.911★★	−3.150★★
		(0.017)	(0.019)	(0.030)	(0.022)
D&O insurance (yes/no)	—	—	0.015	—	—
			(0.947)		
Ln(insurance amount)	—	—	—	−0.006	−0.005
				(0.688)	(0.734)
Ln(capital)	—	—	—	—	0.076
					(0.425)
Adjusted R^2	0.059	0.106	0.096	0.104	0.101
Sample size: N	100	100	100	99	99

Significance levels: ★$P<0.10$; ★★$P<0.05$; ★★★$P<0.01$.

Regression coefficients with the probability of significance in the parentheses.

Table 6: Regression analyses for firm performance

	Model 5a	Model 6a	Model 5b	Model 6b
Panel A. Firm performance (2004)				
Intercept	−0.083	−0.077	−0.089	−0.031
	(0.648)	(0.501)	(0.596)	(0.7756)
D&O insurance (yes/no)	0.234	0.205	0.011	—
	(0.442)	(0.284)	(0.586)	
Ln(D&O insurance amount)	—	—	0.011	0.004
			(0.586)	(0.778)
Governance quality	—	1.114	—	1.087
		(<0.001)★★★		(<0.001)★★★
Adjusted R^2	−0.0042	0.6033	−0.0073	0.5718
Panel B. Firm performance (2005)				
Intercept	−0.091	−0.025	−0.094	−0.026
	(0.614)	(0.863)	(0.594)	(0.859)
D&O insurance (yes/no)	0.257	0.126	—	—
	(0.393)	(0.612)		
Ln(D&O insurance amount)	—	—	0.014	0.009
			(0.481)	(0.859)
Governance quality	—	0.832	—	0.838
		(<0.001)★★★		(<0.001)★★★
Adjusted R^2	−0.003	0.319	−0.008	0.304
Sample size: N	99	99	98	98

Significance levels: ★$P<0.10$; ★★$P<0.05$; ★★★$P<0.01$.

Model a is for D&O insurance purchase decision (Yes/No), and Model b is for insurance amount.

Regression coefficient with the probability of significance in the parentheses.

The tests of moral hazard effect and monitoring effect of D&O insurance are shown in Table 6 for both measurements of D&O insurance. On the basis of the data of performance indexes in the years 2004 and 2005, the regression analyses indicate that performance is not significantly related to the D&O insurance. The hypothesis that D&O insurance might create moral hazard problem and result in a poor performance is rejected. Although the D&O insurance could provide the coverage for liability indemnity, the directors still have motivation to work hard because of reputation or/and monetary rewards. On the other hand, the hypothesis that D&O insurance underwriting process might supplement monitoring incentive and generate a better performance is also rejected. There is no significant evidence that the firms with D&O insurance present a better performance. These results do not support the arguments in the previous literature. Bhagat *et al* (1987) and Brook and Rao (1994) suggest that D&O insurance can encourage excellent people to work for the shareholders, which implies better performance.

The possible reason is that the independent directors usually would request the firm to purchase the D&O insurance when they were invited to be the directors, which is consistent with the finding of Daniels and Hutton (1993). However, the monitoring power of independent directors is still small in Taiwan because they probably do not have the detailed information of the operations. Besides, in practice, many external macroeconomic factors also contribute to the outcome of business operations in

addition to the directors' capability. The premium expenditure is relatively small compared with other operation costs according to the survey data, and consequently unable to produce monitoring effect even if the D&O insurance premium rates provide price incentive for low-risk insured. An alternative explanation may be the optimal governance structure. According to Modigliani–Miller assumption of perfect market, insurance (risk management) has no effect in case of perfect market. If a firm has an optimal governance structure and has little agency conflict, it is reasonable to see no significant association between firm performance and D&O insurance.

A further analysis regarding the relevant factors for performance is conducted based on equation (6) and the results are also shown in Table 6. The results indicate that governance quality is a significant and positive influential factor for the performance. These results together suggest that D&O purchase has no direct effect on the firm's performance. However, the overall quality of corporate governance has a significant impact on the firm performance in the current and subsequent years. According to Table 5, in the previous paragraph, D&O insurance has no effect on the corporate governance quality. Therefore, it is not surprising to find that D&O insurance purchase has no association with the subsequent performance.

In addition, we also use individual variables ROA and ROE, respectively, as the alternative performance index to avoid the persistence effect of variables because of the same four measurements applied in governance quality index and performance index. The results are very close to those in Table 6 and indicate that ROA and ROE are primarily related to governance quality instead of D&O insurance.[6]

A further look of D&O insurance premium rate

D&O insurance demand implies a self-assessment by the firm for its litigation risk. Owing to the uncertainty of business operations and macroeconomics, the liability risk assessed by a firm itself is not the same as that by the insurer. Insurance premium rate, which is based on claims experience, is the insurer's view for the insured's litigation risk. As indicated above, the monitoring effect of D&O insurance comes from the insurer's underwriting process. Therefore, an analysis of insurance premium rate may help to explain the previous findings of insignificant relationship between D&O insurance and governance quality. The regression analyses for the determinants of premium rate are presented in Table 7.

The results show that premium rates are primarily related to the capital size of the firm. Directors' compensation and shareholding, litigation risk, and firm characteristics (for example, leverage ratio and stock return volatility) do not have a significant impact on premium rate. This result is probably because the D&O insurance market in Taiwan is quite small and the loss claims are few. Thus, insurers only use some simple variable such as capital to calculate premium rate, rather than theoretically sound measurements such as litigation risk. This finding implies that insurance underwriting process and premium rate in Taiwan cannot generate the monitoring incentive as expected in theory. This result supports the insignificant relationship between D&O insurance and governance quality found in Table 5. However, another possible reason for this insignificant relation is that the sample is too small to have reliable estimation.

CONCLUSIONS

D&O liability insurance is a popular risk management tool used in some countries to provide protections for investors as well as directors and officers. Many firms purchase D&O insurance to indemnify directors and officers for the potential loss arising from possible litigations. On the other hand, this type of insurance implies possible negative impacts on directors' and officers' moral hazard. However, the insurer's underwriting experience and

Table 7: Influential factors for insurance premium rate

	Model 7a	Model 7b	Model 7c	Model 7d
Intercept	0.007★★	0.006	−0.010★	−0.015★
	(0.013)	(0.177)	(0.099)	(0.068)
Directors' compensation	0.00005	0.00004	−0.00009	−0.00008
	(0.381)	(0.479)	(0.157)	(0.221)
Directors' shareholding %	−0.00008	−0.00007	0.00003	0.000004
	(0.297)	(0.370)	(0.717)	(0.953)
Outside directors' shareholding %	0.018	−0.117	−0.845	−0.854
	(0.977)	(0.876)	(0.201)	(0.167)
Litigation risk	—	0.007	0.010	—
		(0.727)	(0.561)	
Leverage ratio	—	—	—	0.0154
				(0.276)
Stock volatility	—	—	—	−0.029
				(0.911)
Ln(capital)	—	—	0.004★★★	0.005★★★
			(0.001)	0.002
Adjusted R^2	−0.0352	−0.0686	0.2789	0.2864
Sample size: N	32	32	32	32

Significance levels: ★$P<0.10$; ★★$P<0.05$; ★★★$P<0.01$.

Note: Premium rate=premiums/insurance coverage amount.

premium rating structure may provide monitoring effect and encourage loss control. The extreme viewpoints of D&O insurance in literature and in business practice suggest that a comprehensive study on D&O insurance is important to academic research.

This study analyzes the influential factors for the D&O insurance purchase, and then carefully tests the relationship between D&O insurance demand and corporate governance quality of firms, and the subsequent performance of business operations. The empirical results show that the directors' motivation significantly influences the demand for D&O insurance and the quality of corporate governance. The analyses suggest that D&O insurance has no significant effect on the quality of corporate governance and consequently on the performance of firm. The results also show a negative relationship between the corporate governance quality and litigation risk as literature predicted. These results indicate that directors'

compensation is the most important element of motivations that provoke the D&O insurance demand and influence the governance quality. This finding implies that a firm may raise the quality of corporate governance by providing more compensation to its directors. However, the D&O insurance serves only as a loss control tool for liability risk, but cannot provide direct incentive for corporate governance quality.

Our empirical results also suggest that the incentives for buying D&O insurance are mainly from the request of directors in addition to litigation risk, which are consistent with the prediction in the literature. The analyses of moral hazard effect and monitoring incentive of D&O insurance on the business performance indicate that performance is not significantly related to the D&O insurance. Probably the career reputation or/and monetary rewards are more important incentives than the D&O insurance protection, as insurance is just an *ex post* tool for loss indemnification. Besides,

the excessive directors' compensation may reduce the firm's profit and offset the positive effect from better board structure for the firms with D&O insurance. The overall performance results from many factors, for example the external macroeconomic factors. The incentive from D&O insurance underwriting process to increase corporate governance quality and reduce litigation risk is relatively small compared with other business operational factors.

In summary, the results of this article suggest that the quality of corporate governance is much more influential than D&O insurance for firm performance. Corporate governance is an *ex ante* loss prevention tool, but the D&O insurance is an *ex post* loss reduction tool for litigation risk. To improve business performance, the firm may provide the incentives such as compensation to motivate the directors for better governance quality, instead of relying on the monitoring incentive of D&O insurance. The primary contribution of D&O insurance is providing indemnity to the victims. It does not have a significant impact on the corporate governance quality and the consequent business performance.

NOTES

1 Gutierrez (2003, p. 517).
2 Appendix A provides some information regarding the law related to directors' liability and litigation in Taiwan.
3 The name of latent factor may also be called 'effectiveness of management'.
4 The inside directors' shareholding % is highly correlated ($\rho = 0.8$) to the total directors' shareholding %, thus we omit this variable to avoid the collinearity.
5 The Pearson correlation analysis can be requested from the authors. In fact, when we conduct simple regression $G_i = \beta_0 + \beta_1 I_i + \zeta_i$, the regression coefficient β_1 is not significant either ($\beta_1 = 0.122$, P-value $= 0.563$, and adj-R^2 of model $= -0.067$).
6 The results can be requested from the authors.

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APPENDIX A

In Taiwan, directors' liability usually belongs to civil liability. The duties of directors and their torts liability are prescribed in Civil Law (§544 and §28) and Company Law (§226 and §23), which indicate that directors must indemnify the damages of victims if they do not fulfill their duty of care or duty of loyalty. Under the legal system of civil liability in Taiwan, the lawsuit is judged by judges instead of the jury. The damages awarded are based on some specified formula and the punitive damages are limited. As the chance to win a lawsuit and the amount of awards are low, in addition to cultural factors, the victims usually did not take litigation in the past. However, the situation is somewhat changed in the recent years because there are more regulatory protections for the investors. Table A1 shows the trend of class actions brought by investors to public firms. The data suggest that directors and firms encounter higher litigation risk than before.

Table A1: Class actions brought by investors to public firms

Year	No. of class actions	Claim amount (NT$1000)	No. of claimants
1998	1	69 824	334
1999	1	59 348	130
2000	3	437 337	906
2001	1	385	36
2002	2	29 541	81
2003	2	416 417	839
2004	7	6 612 581	13 226
2005	4	11 099 794	34 006
2006	9	2 859 394	7236
2007	10	1 805 456	5045
2008	20	1 727 962	3321
2009/08	10	4 668 217	7637

Source: Securities and Futures Investors Protection Center (www.sfipc.org.tw).

APPENDIX B

Questionnaire for D&O insurance

Q1. Does your company have D&O insurance for the year 2004?
☐ Yes
☐ No

Q2. If your company has D&O insurance, what is the insured amount and the premiums paid?

Insured amount (annually)   US$_____

Premiums paid (annually)   US$_____

Deductibles (annually)   US$_____

Q3. Do you think the D&O insurance coverage purchased by your company is sufficient?

☐ Yes   ☐ No

Q4. What is/are the reason(s) for your company to buy D&O insurance? (You may have multiple answers.)

☐ legal requirements in foreign countries

☐ to maintain the officers

☐ financial crime in the society

☐ to reduce litigation risk

☐ to promote the growth of firm

☐ other: _____

APPENDIX C

The litigation risk is calculated through the following steps:

(1) Shu (2000) uses a logit model to estimate the litigation risk and shows the regression coefficients in Table 3 of her paper (p. 188). As a logit model is:

$$\text{Probability}\,(Y=1) = (e^{\beta'x})/(1+e^{\beta'x})$$
$$= \Lambda(\beta'X) \quad \text{(C1)}$$

where $Y=1$ if the firm is sued, otherwise $Y=0$; $\Lambda=$ logistic cumulative distribution function.

(2) On the basis of the information of regression coefficients in Table 3 of Shu (2000) and logit model, we can calculate the estimate of dependent variable $\hat{Z}$, that is, the logistic estimate of Y.

$$\begin{aligned}
Z = {} & -10.049 + 0.276 \times \text{lnast} + 1.153 \\
& \times \text{invlna} + 2.075 \times \text{rvlna} + 1.251 \\
& \times \text{roa} - 0.088 \times \text{curr} + 1.501 \times \text{lev} \\
& + 0.301 \times \text{salesg} + 0.235 \times \text{beta} \\
& - 2.309 \times \text{stkvl} - 0.371 \times \text{stkrn} \\
& + 1.464 \times \text{stkov} + 0.463 \times \text{qlop} \\
& + 1.060 \times \text{delist} + 0.928 \times \text{tech} \\
= {} & \beta'X \quad \text{(C2)}
\end{aligned}$$

The definitions of explanatory variables are according to Shu (2000).

$$\hat{Y} = \exp(\hat{Z}) / [1 + \exp(\hat{Z})];$$

= estimate of probability being sued

= litigation risk (LR) in our article

(C3)

The descriptive statistics of litigation risk is shown as follows.

Table C1: Descriptive statistics of litigation risk

Variable	N	Mean	SD	Minimum	Maximum
Litigation risk LR (Y)	100	0.1196	0.0789	0.0187	0.3791