THE IMPACT OF DIRECTORS' LIABILITY INSURANCE ON BOARD MEETING ATTENDANCE

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Abstract

We study the relationship between directors' liability insurance and board meeting attendance. We find that directors' liability insurance and board meeting attendance are positively associated. This suggests that directors' liability insurance may actually serve a governance role because an insurer definitely has incentives to thoroughly scrutinize the insured. As a result, director's board meeting attendance rate increases because more monitoring of directors leads to more responsible behaviors of directors. With 98,524 yearly observations at the director level and 8,968 yearly observations at the firm level of listed firms in Taiwan during the period from 2008 to 2015, our empirical findings suggest that, on average, the board meeting attendance rate of insured firms is 2.9 percent higher than that of uninsured firms.

Keywords: Directors' Liability Insurance, Board Meeting Attendance, D&O Insurance, Firm Value, Taiwan

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1. INTRODUCTION

Directors' liability insurance has been rigorously studied in recent years to examine its wealth effect on shareholders[1]. Although developed countries are requiring firms to be insured by this insurance, its value is still debatable based on empirical research. For instance, earlier studies including Holderness (1990) and O'Sullivan (1997) propose that directors' liability insurance would provide external monitoring and, therefore, prevent managerial wrongdoing. On the other hand, Chalmers, Dann, and Harford (2002) report a negative relation between long-term post-offering firm performance and insurance coverage. Zou, Wong, Shum, Xiong, and Yan (2008) suggest the announcement of directors' liability insurance decisions may have a negative wealth effect, particularly in firms with severe agency conflict.

Lately, Lin, Officer, and Zou (2011) reveal that acquirers with a higher level of directors' liability insurance coverage would be more likely to experience lower announcement-period abnormal stock returns and lower synergies. Furthermore, Lin, Officer, Wang, and Zou (2013), and Chen, Li, and Zou (2016) find a positive association between this insurance and the costs of debt and equity. It seems that while firms hope to attract valuable outside directors to join the board with the protection of directors' liability insurance in order to reduce conservatism or lower litigation risk (Core, 1997; O'Sullivan, 2002), unfortunately, moral hazard would also be induced. Because there is very little

[1] Directors' liability insurance in this paper is interchangeable with directors' and officers' (D&O) liability insurance. We use the term "directors' liability insurance" because the focus of this paper is on board meeting attendance. Also, information about officers' liability insurance is not available in Taiwan although in most cases D&O insurance covers both directors and officers. Board members in Taiwan contain both directors and supervisors in most firms. Therefore, in this paper, directors refer to directors and supervisors, or all board members.

evidence that shows directors' liability insurance may not necessarily harm shareholder wealth (Bhagat, Brickley, & Coles, 1987; Boyer, 2004), it appears that this insurance may influence directors' behaviors in the insured firms.

Most studies in the literature, to the best of our knowledge, use proxies for firm performance, shareholder wealth or managerial behavior to indirectly analyze the effect of directors' liability insurance. In this paper, we reexamine this insurance from a different angle, which directly investigates the difference in behaviors between insured and uninsured directors.

If the protection of directors' liability insurance would affect shareholder wealth, it is possible that the insurance may cause changes in directors' behavior. In other words, if there is indeed a linkage between directors' liability insurance and shareholder wealth, it is likely that this insurance may change directors' behaviors, eventually causing the influence on shareholder wealth. Therefore, it would help us better understand the wealth effect of directors' liability insurance to examine if insured directors would perform their duty differently.

We study directors' behavior by examining their meeting attendance rate using a unique data set of listed firms in Taiwan. While board meeting attendance rate could be easily measured to show a director's involvement, it is not easy to know his/her actual participation level. Nonetheless, the attendance rate does show how much the director is willing to serve. Therefore, if directors' liability insurance serves as a positive (negative) incentive for directors, their attendance rate of board meetings should be higher (lower) for the insured firms.

Our sample has 98,524 yearly observations at the director level from Taiwan during the period from 2008 to 2015, our empirical findings suggest that directors' board meeting attendance rates are significantly higher for firms insured with directors' liability insurance. Our results are robust to various measures of director's board meeting attendance rate, directors' liability insurance, different regression models, firms' corporate governance quality, firm size, firm risk, industry characteristics and year fixed effect, director's education level, and different sample selections. This suggests that directors' liability insurance may actually serve a governance role because an insurer definitely has incentives to thoroughly scrutinize the insured. As a result, director's board meeting attendance rate increases because more monitoring of directors leads to more responsible behaviors of directors.

The remainder of this paper is organized as follows. In Section 2, we summarize the relevant literature and develop the hypotheses. In Section 3, we describe our sample. In Section 4, we describe our variables. In Section 5, we present our empirical findings. In Section 6, we show our robustness checks. Section 7 concludes this paper.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

There are two opposing arguments about directors' liability insurance in the literature: the monitoring hypothesis and the managerial opportunism argument. On one hand, the monitoring hypothesis suggests that directors' liability insurance plays a governance role because of the additional external monitoring provided by the insurer. More monitoring would presumably lead to more responsible behaviors of directors. As a result, shareholder wealth may be increased through having a better-performing board. Holderness (1990) suggests that directors' liability insurance has an important governance role in publicly owned companies. O'Sullivan (1997) relates the directors' liability insurance purchase decisions of 366 firms in the United Kingdom to their corporate governance characteristics and concludes in favor of Holderness' (1990) view that this insurance serves as a form of monitoring of directors and officers. Brook and Rao (1994) argue that the protection of directors' liability insurance would reduce board members' suffering during litigations and hence provide incentive for experts to join the board. Bhagat et al. (1987), Romano (1991), and Boyer (2014) provide empirical evidence to show that shareholder wealth could be increased with directors' liability insurance. Therefore, there is evidence that shows directors' liability insurance not only would help firms reduce litigation costs, but also provide more monitoring from outside. With more protection and monitoring, board members of insured firms supposedly would do their job more diligently. As a result, the director's board meeting attendance rate may be increased.

On the other hand, some research has focused on the moral hazard effects of directors' liability insurance and argued that this type of insurance weakens the effectiveness of litigation as a managerial control device as suggested by the managerial opportunism argument. The protection of directors' liability insurance may provide incentives for insured board members to behave in an unethical way. For example, since directors' wealth is protected by insurance, they may choose to do their job passively to avoid conflicts and confrontations in order to keep their board seats in the next election. This may be more likely to happen in East Asian countries (Claessens, Djankov, & Lang, 2000) where not only concentrated ownership and family control are prevalent, but also board members are likely connected to or selected by control shareholders. An ineffective board may increase the likelihood of managerial wrongdoing as board oversight could be undermined due to insured directors' unwillingness to go against managerial intention.

In line with this notion, Chalmers et al. (2002), Zou et al. (2008), Lin et al. (2011) empirically show that the protection of directors' liability insurance appears to bring in negative market reaction during initial public offering (IPOs) and mergers and acquisitions (M&As). In the same vein, Chen et al. (2016), and Lin et al. (2013) show that costs of equity and debt are higher for firms with directors' liability insurance suggesting that investors and lenders tend to penalize firms covered with this insurance. Consistent with Chung and Wynn (2008) proposing that directors' liability insurance would reduce conservatism, Wynn (2008) finds that insured firms are less likely to report bad news forecasts. Furthermore, Wang and Chen (2016) show that although directors' compensation and firm performance are positively correlated, D&O insurance significantly weakens this positive relationship. Therefore, instead of providing a positive incentive to the board of directors, D&O insurance may actually worsen the agency

problem. Also, variability of firm performance is positively correlated with directors' liability insurance (Wang & Chen, 2014).

Combined with studies using samples from developed countries (Core, 1997; O'Sullivan, 2002; Boyer, 2004) and the other studies using samples from developing countries (Yamori, 1999; Regan & Hur, 2007), it is obvious that directors' liability insurance, in general, would affect directors' behavior. Nevertheless, prior studies focus only on firm performance or shareholder wealth to judge the merit of directors' liability insurance without looking at the possible change in directors' behavior resulting from it. Some people may think that directors' liability insurance would not significantly affect board meeting attendance if professional reputation is the directors' first concern. However, things may be different in developing countries such as Taiwan where equity ownerships are highly concentrated (Claessens et al., 2000; Fan & Wong, 2002), and independent directors are not required.

The monitoring hypothesis suggests that directors' liability insurance may alleviate the agency problem through external monitoring provided by insurers, while the managerial opportunism argument asserts that directors' liability insurance could worsen the agency problem because boards are likely to be less responsible/efficient under the protection of this insurance. Thus, if directors' liability insurance serves as a positive (negative) incentive for directors, their attendance rate for board meetings should be higher (lower) for the insured firms. In summary, we propose the following hypotheses:

H1: If directors' liability insurance serves as a positive incentive as suggested by the monitoring hypothesis, directors' board meeting attendance for insured firms should be higher than that of uninsured firms (more monitoring leads to more responsible behaviors).

H2: If directors' liability insurance serves as a negative incentive as suggested by the managerial opportunism argument, directors' board meeting attendance for insured firms should be lower than that of uninsured firms (moral hazard leads to less responsible behaviors).

3. SAMPLE

To test our hypotheses, we use yearly observations at both director and firm levels of listed firms in Taiwan during the period from 2008 to 2015. The reason we use 2008 as the starting year of our sample is the mandatory disclosure of directors' liability insurance in Taiwan began in 2008. Our sample is unique in two ways. First, unlike in developed countries in which the majority of firms are already insured with directors' liability insurance, the percentages of insured and uninsured firms in Taiwan are about the same during the sample period although the number of insured firms increases gradually. This would allow us to be able to compare not only between insured firms but also between insured and uninsured firms[2]. Secondly, the information on board attendance in Taiwan is very completely available at both director and firm levels. Earlier studies using observations from the U.S. could only identify directors whose attendance rate was less than 75%. Our sample can clearly show the exact attendance rate of each director. There are also some interesting traits in Taiwan regarding corporate governance, which make this country very different from the others. For instance, concentrated ownership structure, the divergence between control and cash flow rights, family-controlled firms and business groups (Claessens et al., 2000; Claessens, Djankov, Fan, & Lang, 2002; Morck & Yeung, 2003) are very common in Taiwan.

In order to keep board members' information as complete as possible, we only exclude non-listed firms and observations with missing variables during our sample selection process. Our final sample contains 98,524 yearly observations at the director level and 8,968 yearly observations at the firm level of listed firms on either the Taiwan Stock Exchange (TWSE) or Taipei Stock Exchange (OTC)[3].

4. VARIABLES

In our regression analyses, the major variables are directors' liability insurance and board meeting attendance. For directors' liability insurance, a dummy indicator is used to differentiate between insured and uninsured firms. We also use the coverage and residuals of directors' liability insurance, also found in Zou et al. (2008), Lin et al. (2011), and Boyer and Stern (2014), as alternative ways to measure directors' liability insurance in our robustness tests. Board meeting attendance is measured at both director and firm levels. At the director level, it is calculated as the actual number of attendance scaled by the total number of board meetings in that year. However, if a board member is replaced in the middle of a year, board meeting attendance is calculated as the actual number of attendance scaled by the total number of board meetings in that year prior to the replacement. At the firm level, board meeting attendance is the average of all the attendance rates of board members in the firm[4].

Jiraporn, Davidson, DaDalt, and Ning (2009) address that directors with multiple board seats exhibit a higher tendency to be absent from board meetings and this result is not sensitive to firm characteristics, board structure, ownership stakes, or even meeting fees[5]. Lin, Yeh, and Yang (2014) show that board attendance would be influenced by meeting frequency, the board size, and director shareholding. In addition, Chou, Li, and Yin (2010) point out that the work effort, estimated by board meeting attendance, of outside directors could be affected by financial leverage[6]. Masulis and Mobbs (2014) indicate that directors may distribute their effort unequally based on the directorship's relative prestige. As a result, we also include relevant corporate governance and economic control variables such as the number of directorships held,

[2] Jia and Tang (2014) examine the linkage between directors' liability insurance and board meeting attendance of independent directors in China. However, the percentage of insured firms in their sample is only about 2.3% of the uninsured firms.

[3] While our sample only contains information of directorships of listed firms on either TWSE or OTC, the number of directorships held by individual directors therefore could be underestimated since these directors could also be board members in non-listed or private firms. However, we believe the influence of this limitation is minor because these private firms very often are small and would assign family members as board members.

[4] We also use the median of all the attendance rates of all board members in our analyses. Results are still consistent.

[5] Adams and Ferreira (2008) suggest a potential positive relation between meeting fees and board meeting attendance.

[6] Brook and Rao (1994) suggest the net benefit of directors' liability insurance is greater for financially troubled firms.

number of board meetings, director compensation, the board size, board holding, managerial holding, institutional holding, percentage of independent directors, firm size, leverage, market-to-book (M/B) ratio, and firms' stock return volatility.

We use the number of board seats as the board size of a firm. For director ownership at the director (firm) level, we use the percentage of shares outstanding held by individual directors (all board members) at the end of each sample year[7]. According to the agency theory, increased directors' ownership may alleviate interest conflicts between directors and shareholders[8]. In other words, shareholder wealth may be better protected in firms that have a higher percentage of director ownership (Howton, Howton, & Olson, 2001; Akhtaruddin & Haron, 2010). Therefore, we use board holding as one of our control variables because Insured directors may be more willing to serve by attending board meetings more if their ownership is higher. Directors' compensation may also be related to board meeting attendance. However, information on the individual compensation of board members is not available in Taiwan. As a result, we use the average compensation of all board members instead. A higher level of director compensation is likely to encourage board members to get involved with board activities in order to secure their board seats and compensation in the future (Yermack, 2004; Adams & Ferreira, 2008)[9]. The number of board meetings is the total number of board meetings held in the sample year. Having more board meetings would take more board members' time and, therefore, it may increase the absence rate[10]. Finally, we also include industry and year dummy indicators in our analyses to control for industry and year effects. Industries are identified by industry codes classified by TWSE.

Table 1 describes the mean, median, 1st percentile, and 99th percentile of all variables. It also shows the correlation between board meeting attendance and each independent variable. The mean of board meeting attendance is 81.8%, while the mean of directors' liability insurance is 0.6 showing that, unlike most western countries in which most firms are covered by directors' liability insurance, the numbers of insured and uninsured firms in Taiwan are approximately equal. This implies that the development of this insurance in Taiwan may still be in the early stage. This equal representation between insured and uninsured firms could complement the existing literature by allowing us to better understand the value of directors' liability insurance in the early stage of its introduction to a country. The average number of directorships held by each director is 2, and the average board size is 10. The average number of board meetings every year is 7.7. The mean (median) firm size is 71.4 (3.71) billion New Taiwanese dollars (NT$). Moreover, the mean (median) of firms' stock return volatility is 2.52 (2.37). The mean (median) of M/B ratio is 1.49 (1.04). The mean (median) of leverage is 0.38 (0.35).

Table 1. Summary statistics

Variables	*Mean*	*P1*	*Median*	*P99*	*Correlation with attendance*
Attendance (%)	81.8	0	100	100	-
D&O insurance	0.60	0	1	1	0.05***
Directorship(s)	2.04	1	1	10	0.01***
Meeting(s)	7.70	3	7	20	-0.05***
Director compensation	967	0	387	9,670	0.03***
Board size	10.1	6	10	21	0.002
Board holding (%)	23.7	3.56	19.8	70.4	0.001
Managerial holding (%)	1.47	0	0.49	11.3	0.02***
Institutional holding (%)	39.1	1.02	36.4	91.25	0.03***
Independence rate (%)	14.6	0	18.2	44.4	0.08***
Assets	71.4	0.22	3.71	2,064	0.03***
Leverage	0.38	0.04	0.35	0.95	-0.002
Market-to-book ratio	1.49	0.48	1.04	6.51	-0.01***
Std. dev of daily stock returns	2.52	0.76	2.37	4.91	-0.01***

*Notes: The sample contains 98,524 director-level yearly observations of listed firms in Taiwan during the period from 2008 to 2015. Attendance is measured in percentage and calculated as the number of attendance scaled by the number of meetings, which is the attendance rate of individual directors during each sample year. D&O insurance is a dummy indicator. It is 1 if the firm in which the observation director serves on its board is protected by the D&O insurance during the sample year and 0 otherwise. Directorship(s) represents the number of directorship(s) held by the observation director. Meeting(s) is the number of board meetings in a fiscal year. Director compensation measured in thousands of New Taiwanese dollars is the average compensation of board members in a firm in which individual directors serve on its board. Board size represents the number of board members. Board, managerial and institutional holdings are the percentages of shares held by the board members, executives and institutions respectively. Independence rate is the number of independent director(s) divided by the number of total board members. Assets are total assets at the end of the year measured in billions of New Taiwanese dollars. Leverage is the total debt over total assets. Market-to-book ratio is estimated by the market value of the firm scaled by its book value. Market value is measured as the market value of shares outstanding at the end of the year plus the book value of total debt.*** indicates the level of significance at 1%.*

Table 2 compares the mean and median values of board meeting attendance between insured and uninsured firms. It shows that, on average, the board meeting attendance rate of insured firms is 2.9% higher than that of uninsured firms.

Table 2. Comparative statistics

		D&O insurance		Difference
		with	without	(1) - (2)
		(1)	(2)	
Attendance (%)	Mean	82.9	80.0	2.9***
	Median	*100*	*100*	0***
N		58,968	39,556	

*Notes: The sample contains 98,524 director-level yearly observations of listed firms in Taiwan during the period from 2008 to 2015. Attendance is measured in percentage and calculated as the number of attendance scaled by the number of meetings, which is the attendance rate of individual directors during each sample year. D&O insurance is a dummy indicator. It is 1 if the firm in which the observation director serves on its board is protected by the D&O insurance during the sample year and 0 otherwise. *** indicates the level of significance at 1%.*

[7] Results remain consistent when the percentage of shares held at the beginning of each year is used.

[8] While board of directors may also be shareholders, these directors however are also agents selected by shareholders to monitor and assist the firm's administration. A higher level of ownership presumably would increase their willingness to pursue shareholders' best interests.

[9] Board compensation could be a result of bargaining between the CEO and board members (Ryan & Wiggins, 2004) or board compensation may not necessarily provide identical incentive to outside and inside directors. As most firms in Taiwan have very few outside or independent directors on board and large compensation to board members could be an alternative channel for controlled shareholders to distribute firm profits to themselves since they tend to dominate board memberships (Claessens et al., 2000), board activities may not necessarily be influenced by compensation. Our findings however reveal that remuneration to board members seems to matter.

[10] Vafeas (1999) shows that board meeting frequency could be the result of prior firm performance and may influence subsequent firm performance.

5. EMPIRICAL RESULTS

Table 3 reports the relationship between directors' liability insurance and directors' board meeting attendance over the sample period from 2008 to 2015. Column 1 of Table 3 shows a significant positive relationship between directors' liability insurance and directors' board meeting attendance. The coefficient of D&O insurance is 2.485. Column 2 in Table 3 examines this relationship with relevant corporate governance control variables included. The coefficient of D&O insurance is 1.536, which is statistically significant. The Column 3 in Table 3 examines this relationship with relevant economic control variables included. The coefficient of D&O insurance is 2.536 and is statistically significant. Finally, Column 4 in Table 3 estimates the relationship between directors' liability insurance and directors' board meeting attendance with all corporate governance and economic control variables included. The coefficient of D&O insurance is 1.581 and is still statistically significant. The results of Table 3 consistently show that directors' liability insurance and directors' board meeting attendance are positively associated. This result supports the monitoring hypothesis indicating a better alignment between directors' and shareholders' interests. Furthermore, Table 3 also shows that board meeting attendance is positively associated with director compensation, managerial holding, institutional holding, board independence, and is negatively associated with the number of board meetings, the board size, board holding, leverage, and M/B ratio.

Table 3. Regression analysis

	(1)	*(2)*	*(3)*	*(4)*
D&O insurance	2.485***	1.536***	2.536***	1.581***
	(12.76)	(7.59)	(12.99)	(7.80)
Directorship(s)		-0.075		-0.067
		(-1.52)		(-1.37)
Meeting(s)		-0.407***		-0.386***
		(-15.95)		(-14.99)
Director compensation		0.0003***		0.0003***
		(6.79)		(7.00)
Board size		-0.168***		-0.178***
		(-5.07)		(-5.35)
Board holding (%)		-0.012*		-0.014**
		(-1.76)		(-1.98)
Managerial holding (%)		0.339***		0.330***
		(9.05)		(8.79)
Institutional holding (%)		0.015***		0.016***
		(3.00)		(3.34)
Independence rate (%)		0.150***		0.149***
		(19.84)		(19.70)
Assets			0.0002	-0.0003
			(0.66)	(-1.00)
Leverage			-4.682***	-3.542***
			(-8.59)	(-6.47)
Market-to-book ratio			-0.063***	-0.051***
			(-3.22)	(-2.63)
Std. dev. of daily stock returns			-0.004	-0.006
			(-0.25)	(-0.42)
Industry & year dummies	Yes	Yes	Yes	Yes
R^2	0.01	0.02	0.02	0.02

Notes: The sample contains 98,524 director-level yearly observations of listed firms in Taiwan during the period from 2008 to 2015. All regressions are ordinary least squares (OLS) analyses. Dependent variable is the attendance rate measured in percentage and calculated as the number of attendance scaled by the number of meetings of individual directors during each sample year. D&O insurance is a dummy indicator. It is 1 if the firm in which the observation director serves on its board is protected by the D&O insurance during the sample year and 0 otherwise. Directorship(s) represents the number of directorship(s) held by the observation director. Meeting(s) is the number of board meetings in a fiscal year. Director compensation measured in thousands of New Taiwanese dollars is the average compensation of board members in a firm in which individual directors serve on its board. Board size represents the number of board members. Board, managerial and institutional holdings are the percentages of shares held by the board members, executives and institutions respectively. Independence rate is the number of independent director(s) divided by the number of total board members. Assets are total assets at the end of the year measured in billions of New Taiwanese dollars. Leverage is the total debt over total assets. Market-to-book ratio is estimated by the market value of the firm scaled by its book value. Market value is measured as the market value of shares outstanding at the end of the year plus the book value of total debt.
****, ** and * indicate the levels of significance at 1%, 5% and 10%, respectively.*

6. ROBUSTNESS TESTS

Table 4 examines whether our findings are robust to fixed effect and random effect models. Columns 1 and 2 show the results of our fixed effect analyses, while columns 3 and 4 show the results of the random effect analyses. The coefficient of D&O insurance under the fixed effect (random effect) model is 0.54 (0.869). As shown in Table 4, the positive relationship between directors' liability insurance and directors' board meeting attendance is still significant.

Table 4. Alternative tests: Fixed- and random-effect analyses

	(1)	*(2)*	*(3)*	*(4)*
D&O insurance	1.070***	0.540**	1.537***	0.869***
	(3.95)	(1.97)	(6.63)	(3.68)
Directorship(s)		-0.365***		-0.124
		(-3.58)		(-1.37)
Meeting(s)		-0.261***		-0.294***
		(-10.42)		(-12.54)
Director compensation		0.0004***		0.0004***
		(7.92)		(8.67)
Board size		-0.309***		-0.225***
		(-6.35)		(-5.47)
Board holding (%)		-0.073***		-0.057***
		(-8.60)		(-7.65)
Managerial holding (%)		0.221***		0.279***
		(4.67)		(6.71)
Institutional holding (%)		0.072***		0.057***
		(10.94)		(10.02)
Independence rate (%)		0.054***		0.085***
		(5.61)		(10.04)
Assets		0.002***		0.001***
		(4.87)		(3.53)
Leverage		-0.445		-1.813***
		(-0.69)		(-3.14)
Market-to-book ratio		-0.031		-0.035*
		(-1.49)		(-1.95)
Std. dev. of daily stock returns		0.032**		0.022*
		(2.51)		(1.90)
Industry & year dummies	Yes	Yes	Yes	Yes
R^2	0.01	0.01	0.01	0.01

*Notes: The sample contains 98,524 director-level yearly observations of listed firms in Taiwan during the period from 2008 to 2015. Regressions 1 and 2 are fixed-effect analyses. Regressions 3 and 4 are random-effect analyses. Dependent variable in all regressions is the attendance rate measured in percentage and calculated as the number of attendance scaled by the number of meetings of individual directors during each sample year. D&O insurance is a dummy indicator. It is 1 if the firm in which the observation director serves on its board is protected by the D&O insurance during the sample year and 0 otherwise. Directorship(s) represents the number of directorship(s) held by the observation director. Meeting(s) is the number of board meetings in a fiscal year. Director compensation measured in thousands of New Taiwanese dollars is the average compensation of board members in a firm in which individual directors serve on its board. Board size represents the number of board members. Board, managerial and institutional holdings are the percentages of shares held by the board members, executives and institutions respectively. Independence rate is the number of independent director(s) divided by the number of total board members. Assets are total assets at the end of the year measured in billions of New Taiwanese dollars. Leverage is the total debt over total assets. Market-to-book ratio is estimated by the market value of the firm scaled by its book value. Market value is measured as the market value of shares outstanding at the end of the year plus the book value of total debt. ***, ** and * indicate the levels of significance at 1%, 5% and 10%, respectively.*

To address the concern that there may be a non-linear relationship between the dependent and independent variables, in Table 5, we use logarithmically transforming variables, and re-estimate our regression analyses in Table 3. Results in Table 5 are consistent with the results in Table 3.

Table 5. Alternative tests: Natural logarithm

	(1)	*(2)*
D&O insurance	0.107***	0.056***
	(14.91)	(7.54)
Log (directorship(s))		0.055***
		(7.01)
Log (meeting(s))		-0.024**
		(-2.53)
Log (director compensation)		0.042***
		(19.16)
Log (board size)		-0.054***
		(-3.33)
Log (board holding)		0.021***
		(3.48)
Log (managerial holding)		0.054***
		(9.98)
Log (institutional holding)		-0.012**
		(-2.39)
Independence rate (%)		0.004***
		(15.90)
Log (assets)		0.016***
		(4.25)
Leverage		-0.097***
		(-4.67)
Market-to-book ratio		0.0003
		(0.45)
Std. dev. of daily stock returns		-0.0001
		(-0.01)
Industry & year dummies	Yes	Yes
R^2	0.01	0.02

*Notes: The sample contains 98,524 director-level yearly observations of listed firms in Taiwan during the period from 2008 to 2015. The regressions are ordinary least squares (OLS) analyses. Dependent variable is the natural logarithm of attendance rate calculated as the number of attendance scaled by the number of meetings of individual directors during each sample year. D&O insurance is a dummy indicator. It is 1 if the firm in which the observation director serves on its board is protected by the D&O insurance during the sample year and 0 otherwise. Directorship(s) represents the number of directorship(s) held by the observation director. Meeting(s) is the number of board meetings in a fiscal year. Director compensation measured in thousands of New Taiwanese dollars is the average compensation of board members in a firm in which individual directors serve on its board. Board size represents the number of board members. Board, managerial and institutional holdings are the percentages of shares held by the board members, executives and institutions respectively. Independence rate is the number of independent director(s) divided by the number of total board members. Assets are total assets at the end of the year measured in billions of New Taiwanese dollars. Leverage is the total debt over total assets. Market-to-book ratio is estimated by the market value of the firm scaled by its book value. Market value is measured as the market value of shares outstanding at the end of the year plus the book value of total debt. *** and ** indicate the levels of significance at 1% and 5%, respectively.*

According to the corporate law in Taiwan, should a director be unable to attend a meeting, he/she may grant a proxy authorizing another person to attend and vote on his/her behalf. In Table 6, the dependent variable is the number of proxies used scaled by the number of board meetings the director should attend in that year. We use this different dependent variable to examine if directors' liability insurance would encourage directors to use a proxy when they are unable to attend a board meeting. Specifically, we examine the relationship between directors' liability insurance and the ratio between the number of proxies used and the number of board meetings a director should attend in a year using ordinary least squares, fixed effect, and random effect regression models. Results in Table 6 show that indeed, directors' liability insurance encourages directors to use a proxy when they are unable to attend a board meeting.

Table 6. Alternative tests: Number of proxy voting used

	(1)	(2)	(3)
D&O insurance	0.675***	0.592***	0.585***
	(6.76)	(3.73)	(4.68)
Directorship(s)	0.429***	0.195***	0.308***
	(17.89)	(3.33)	(6.45)
Meeting(s)	0.101***	0.095***	0.098***
	(7.98)	(6.53)	(7.55)
Director compensation	0.0001	-0.0001***	-0.0001***
	(0.33)	(-4.99)	(-3.90)
Board size	0.273***	0.242***	0.266***
	(16.52)	(8.56)	(12.24)
Board holding (%)	-0.004	0.016***	0.008**
	(-1.31)	(3.24)	(2.00)
Managerial holding (%)	-0.087***	-0.023	-0.050**
	(-4.72)	(-0.85)	(-2.26)
Institutional holding (%)	0.018***	-0.021***	0.0001
	(7.47)	(-5.42)	(0.01)
Independence rate (%)	-0.022***	-0.006	-0.014***
	(-5.82)	(-1.05)	(-3.06)
Assets	0.0002	-0.001***	-0.0002
	(1.60)	(-3.72)	(-0.93)
Leverage	0.395	1.081***	0.740**
	(1.46)	(2.89)	(2.38)
Market-to-book ratio	-0.022**	0.001	-0.011
	(-2.28)	(0.08)	(-1.15)
Std. dev. of daily stock returns	0.015**	0.0005	0.009
	(2.10)	(0.06)	(1.41)
Industry & year dummies	Yes	Yes	Yes
R^2	0.01	0.01	0.01

*Notes: The sample contains 93,649 director-level yearly observations of listed firms in Taiwan during the period from 2008 to 2015. Regression 1 is ordinary least squares (OLS) analysis. Regressions 2 and 3 are fixed- and random-effect analyses. Dependent variable is the proxy attendance rate measured in percentage and calculated as the number of proxies used scaled by the number of meetings of individual directors during each sample year. D&O insurance is a dummy indicator. It is 1 if the firm in which the observation director serves on its board is protected by the D&O insurance during the sample year and 0 otherwise. Directorship(s) represents the number of directorship(s) held by the observation director. Meeting(s) is the number of board meetings in a fiscal year. Director compensation measured in thousands of New Taiwanese dollars is the average compensation of board members in a firm in which individual directors serve on its board. Board size represents the number of board members. Board, managerial and institutional holdings are the percentages of shares held by the board members, executives and institutions respectively. Independence rate is the number of independent director(s) divided by the number of total board members. Assets are total assets at the end of the year measured in billions of New Taiwanese dollars. Leverage is the total debt over total assets. Market-to-book ratio is estimated by the market value of the firm scaled by its book value. Market value is measured as the market value of shares outstanding at the end of the year plus the book value of total debt. *** and ** indicate the levels of significance at 1% and 5%, respectively.*

In Table 7, we use interactive terms between directors' liability insurance and various variables to examine how the positive association between directors' liability insurance and board meeting attendance rate would be affected by the number of directorships held by directors, the number of board meetings in a year, director compensation, director independence, and director's education level. Regression 1 in Panel A shows that the number of directorships held by directors has no significant influence. Regression 2 in Panel A shows that while the number of board meetings is negatively associated with directors' attendance rate, directors' liability insurance actually alleviates this negative relationship. Regression 3 in Panel A shows that director compensation is positively associated with board meeting attendance, but directors' liability insurance weakens this positive relationship. Regression 1 in Panel B shows that director independence significantly increases board meeting attendance, while the director's education level has no significant influence on attendance as shown in Regression 2 of Panel B.

Table 7. Alternative tests: Interactive terms

	(1)	(2)	(3)
Panel A			
D&O insurance	1.469***	0.723*	2.213***
	(5.19)	(1.65)	(10.14)
D&O × Directorship(s)	0.060		
	(0.57)		
D&O × Meeting(s)		0.111**	
		(2.21)	
D&O × Director compensation			-0.001***
			(-7.83)
Directorship(s)	-0.110		
	(-1.22)		
Meeting(s)		-0.450***	
		(-11.59)	
Director compensation			0.001***
			(10.20)
Other control variables	Yes	Yes	Yes
R^2	0.02	0.02	0.02
N	98,524	98,524	98,524
Panel B			
D&O insurance	1.529***	1.293***	
	(7.11)	(4.69)	
*D&O*Independence*	0.335		
	(0.60)		
*D&O*Education*		0.568	
		(1.48)	
Independence	2.904***		
	(5.83)		
Education		-0.335	
		(-1.10)	
Other control variables	Yes	Yes	
R^2	0.02	0.02	
N	98,524	74,051	

*Notes: The sample contains director-level yearly observations of listed firms in Taiwan during the period from 2008 to 2015. All regressions are ordinary least squares (OLS) analyses. Dependent variable is the attendance rate measured in percentage and calculated as the number of attendance scaled by the number of meetings of individual directors during each sample year. D&O insurance is a dummy indicator. It is 1 if the firm in which the observation director serves on its board is protected by the D&O insurance during the sample year and 0 otherwise. Directorship(s) represents the number of directorship(s) held by the observation director. Meeting(s) is the number of board meetings in a fiscal year. Director compensation measured in thousands of New Taiwanese dollars is the average compensation of board members in a firm in which individual directors serve on its board. Independence is a dummy indicator. It is 1 if the director is an independent director on the board and 0 otherwise. Education is a dummy indicator. It is 1 if the director has a graduate degree or above and 0 otherwise. Description of other control variables could be found in the text of Table 3. ***, ** and * indicate the levels of significance at 1%, 5% and 10%, respectively.*

In Table 8, the board meeting attendance rate used in the dependent variable is measured at the firm level. Specifically, it is the average of all the attendance rates of board members in the firm. Results in Table 8 are still consistent with the results in Table 3. Directors' liability insurance and directors' board meeting attendance are still positively associated at the firm level.

Table 8. Alternative tests: Firm level

	(1)	*(2)*
D&O insurance	2.051***	1.579***
	(5.30)	(3.93)
Meeting(s)		-0.341***
		(-6.54)
Director compensation		0.0003***
		(3.86)
Board size		-0.108
		(-1.34)
Board holding (%)		-0.033**
		(-2.36)
Managerial holding (%)		0.221***
		(3.01)
Institutional holding (%)		0.023**
		(2.35)
Independence rate (%)		0.055***
		(3.69)
Assets		-0.001
		(-0.69)
Leverage		-1.812*
		(-1.64)
Market-to-book ratio		-0.076
		(-1.45)
Std. dev. of daily stock returns		-0.017
		(-0.47)
Industry & year dummies	Yes	Yes
R^2	0.75	0.76

*Notes: The sample contains 8,968 firm-level yearly observations of listed firms in Taiwan during the period from 2008 to 2015. All regressions are ordinary least squares (OLS) analyses. Dependent variable is the average attendance rate measured in percentage and calculated as the number of attendance scaled by the number of meetings of individual directors during each sample year. D&O insurance is a dummy indicator. It is 1 if the firm in which the observation director serves on its board is protected by the D&O insurance during the sample year and 0 otherwise. Meeting(s) is the number of board meetings in a fiscal year. Director compensation measured in thousands of New Taiwanese dollars is the average compensation of board members in a firm in which individual directors serve on its board. Board size represents the number of board members. Board, managerial and institutional holdings are the percentages of shares held by the board members, executives and institutions respectively. Independence rate is the number of independent director(s) divided by the number of total board members. Assets are total assets at the end of the year measured in billions of New Taiwanese dollars. Leverage is the total debt over total assets. Market-to-book ratio is estimated by the market value of the firm scaled by its book value. Market value is measured as the market value of shares outstanding at the end of the year plus the book value of total debt. ***, ** and * indicate the levels of significance at 1%, 5% and 10%, respectively.*

7. CONCLUSION

Directors' liability insurance is developed to prevent directors from conservatism by providing liability protection as long as they do not breach their fiduciary duty. With this liability protection, directors are supposed to actively perform their duties in terms of monitoring and advising to protect firms' shareholder wealth without having to be worried about litigations. Moreover, external monitoring from an insurance company may also help decrease the likelihood of corporate wrongdoing because the insurer thoroughly scrutinizes the insured. Consequently, as suggested by the monitoring hypothesis, directors' liability insurance should be able to alleviate the agency problem and ultimately protect shareholder wealth.

Indeed, our results support the monitoring hypothesis. With 98,524 yearly observations at the director level and 8,968 yearly observations at the firm level of listed firms in Taiwan during the period from 2008 to 2015, our empirical findings suggest that directors' liability insurance and directors' board meeting attendance are positively associated. Specifically, we show that, on average, the board meeting attendance rate of insured firms is 2.9 percent higher than that of uninsured firms. Our results are robust to alternative measures of board meeting attendance, alternative measures of directors' liability insurance, the number of directorships held, number of board meetings, director compensation, the board size, board holding, managerial holding, institutional holding, board independence, firm size, leverage, M/B ratio, firms' stock return volatility, industry fixed effects, and year fixed effects.

The main contribution of this paper is that it provides direct evidence that shows D&O insurance indeed increases directors' participation level. Our findings provide a foundation for future research to further investigate how an increased directors' participation in firm operations may affect shareholder wealth.

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