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Directors' and officers' liability insurance and the sensitivity of directors' compensation to firm performance

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ABSTRACT

The fundamental idea of directors' and officers' (D&O) liability insurance is to provide liability protection to boards of directors and executive officers against accusations of wrongful acts in their capacity. This paper shows that although directors' compensation and firm performance are positively correlated, D&O insurance significantly weakens this positive relationship. Therefore, instead of providing positive incentive to boards of directors, D&O insurance may actually worsen the agency problem, which is very different from the essential idea and purpose of implementing this insurance. Specifically, with 5619 firm-year observations of 1236 listed firms in Taiwan during the period from 2008 to 2012, we show that D&O insurance reduces the sensitivity of directors' compensation to firm performance by approximately 42% for the insured firms. As a result, instead of alleviating agency problem, D&O insurance actually increases firms' agency costs. Our results are robust to alternative measures of directors' compensation, alternative measures of D&O insurance, firms' corporate governance quality, firm size, firm risk, industry characteristics, CEO's power, and different sample selections.

1. Introduction

Directors' and officers' (D&O) liability insurance is a liability insurance payable to the directors and officers of a company as indemnifications for certain losses as a result of a legal action brought for alleged wrongful acts in their capacity as directors and officers. It provides general cover to a firm's directors and senior executives by reimbursing the costs resulting from lawsuits and judgements arising out of poor management decisions, employee dismissals, shareholder grievances, and other such acts committed in good faith.[1] We examine the value of D&O insurance through its impact on firms' agency costs by analyzing the

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[1] Personal financial protection insurance, as it was called then, was developed in response to significant reforms in the United States financial system, namely the U.S. Securities Act (1933 & 1934) and the Investment Company Act (1940). It wasn't until the 1940s and 1950s that state laws in America were passed allowing directors and officers to be indemnified by companies, effectively transferring the costs associated with defending management onto organizations. By the mid-1980s, despite the majority of public companies having D&O coverage, the insurance market found itself in serious difficulty. A number of large company failures in the banking and oil industries, along with the stock market crash of 1987, resulted in D&O claim costs increasing by over 50%, placing significant strain on the profitability of insurers. This, combined with a shortage of reinsurance capacity, made eight of the top ten insurers leave the D&O market. High premiums, restricted policy coverage, along with improved economic conditions during the early 1990s, attracted significant capacity back into the D&O insurance market. The D&O industry as a whole has been susceptible to the peaks and troughs of the economic cycle, with securities litigation having a significant contribution to the difficult market conditions of 2001, following the collapse of Enron and the dot-com bubble, and then again in 2007 in the wake of the financial crisis. Insurance and reinsurance capacity remains generally strong.

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difference in the sensitivity of directors' compensation to firm performance (referred to hereafter as directors' pay-performance sensitivity) between insured and uninsured firms. Our empirical findings suggest that directors' pay-performance sensitivity is significantly lower for insured firms than for uninsured firms. We contribute to the current literature by showing that D&O insurance reduces directors' pay-performance sensitivity. The weaker directors' pay-performance sensitivity of insured firms suggests that D&O insurance may actually increase firms' agency costs, and possibly decrease shareholder wealth.

The essential idea of D&O insurance is to provide liability protection to a board of directors to encourage them to actively perform their duties as directors. As a result, D&O insurance should enhance the functionality of the board which should ultimately be beneficial to shareholders. In line with this notion, Bhagat, Brickley, and Coles (1987); Romano (1991); Core (1997) and O'Sullivan (1997) among others suggest that on one hand, carrying this insurance could transfer the liability risk from shareholders to the insurer especially in the event of litigation. On the other hand, external monitoring from the insurance company for the purpose of mitigating the cost due to either adverse selection or moral hazard may decrease the likelihood of corporate wrongdoing and, as directors' wealth is protected, an active board may prevent corporate underinvestment as well. The wide use of D&O insurance by companies in developed countries such as the U.S. and Canada shows both the need and the value of this insurance. However, just as more countries are trying to encourage their firms to adopt D&O insurance, some recent empirical works (see, for example, Boyer (2003) and Baker and Griffith (2007)) find that there is no significant relationship between this insurance and shareholder wealth. Moreover, some studies such as Chalmers, Dann, and Harford (2002); Zou, Wong, Shum, Xiong, and Yan (2008), and Lin, Officer, and Zou (2011) surprisingly reveal a negative relationship between D&O insurance and shareholder wealth when firms have IPOs, acquisition announcements, and severer earnings management. One possible explanation of this negative relationship between D&O insurance and shareholder wealth may be that boards are likely to be more aggressive and/or less careful under the protection of D&O insurance. They may be willing to take more risks to get higher expected returns from IPO or acquisition projects (Chi, Weng, & Liou, 2011; Lu & Horng, 2007). Unfortunately, on average, the results of such high risk projects are not successful.

Although the aforementioned literature has enriched our understanding of D&O insurance, there is still no consensus about the effect of this insurance on shareholder wealth. Unlike prior research that has indirectly estimated the value of D&O insurance through examining the changes in firm performance, shareholder wealth, or market reaction to insured firms after they acquire this type of insurance, in this paper, we try to offer an alternative approach to examining the value of D&O insurance through its impact on firms' agency costs. Specifically, we analyze the difference in the sensitivity of directors' compensation to firm performance between insured and uninsured firms. Directors' pay-performance sensitivity is a more direct measurement for capturing the relationship between directors' compensation and firm performance. Through examining the differences in directors' pay-performance sensitivity between insured and uninsured firms, we can better understand the value of D&O insurance from the perspective of the agency theory. Specifically, if D&O insurance provides a positive (negative) value for firms, directors' pay-performance sensitivity should be higher (lower) for insured firms, indicating a stronger (weaker) relationship between directors' compensation and firm performance.

Our unique sample includes firms in Taiwan that have distinctive board characteristics. Unlike most Western countries where corporate boards are well developed, the percentage of independent board of directors in Taiwan is relatively low (17% on average) even after the adoption of new regulatory requirements of independent boards in recent years[2] for new financial and large firms. In addition, the lack of board committees, cross-shareholding, and family control are common. Thus, it is apparent that corporate boards in Taiwan currently face more challenges than boards in developed countries. With 5619 firm-year observations of 1236 listed firms in Taiwan during the period from 2008 to 2012, our empirical findings suggest that directors' pay-performance sensitivity is significantly lower for insured firms than for uninsured firms. Our results are robust to alternative measures of directors' compensation, alternative measures of D&O insurance, firms' corporate governance quality, firm size, firm risk, industry characteristics, CEO's power, and different sample selections. This paper shows that although directors' compensation and firm performance are positively correlated, D&O insurance significantly weakens this positive relationship. This suggests that the moral hazard[3] problem associated with firms with D&O insurance may induce boards to work passively and less effectively in terms of advising and monitoring. Knowing that directors and executive officers are protected from being financially liable for wrongdoings, it is likely that the board of an insured firm may perform its duties less carefully. As a result, instead of providing positive incentive to boards of directors, D&O insurance may actually increase firms' agency costs, which is very different from the essential idea and purpose of implementing this insurance.

Presumably, the stronger the positive relationship between directors' compensation and firm performance, the better alignment the firm will have between its directors' and shareholders' best interests. Furthermore, if a firm has better alignment between the interests of its directors and shareholders, the firm's agency costs are supposed to be lower. With this paper, we contribute to the current literature by not only showing the positive relationship between directors' compensation and firm performance, but also documenting the negative effect of D&O insurance on this positive relationship. Specifically, our results

[2] An insider-dominated board could be just as effective as an outsider board in monitoring (Wang, 2014). Corporate boards in Taiwan have directors and supervisors. In this paper, we mainly focus on directors. However, our results still remain consistent when we use the average compensation to both groups.

[3] A moral hazard is a situation where a party has the tendency to take risks because the costs that could incur will not be felt by the party taking the risk. It is a tendency to be more willing to take a risk, knowing that the potential costs of taking such risk will be borne, in whole or in part, by others. Moral hazard arises because an individual or institution does not take the full consequences and responsibilities of its actions, and therefore has a tendency to act less carefully than it otherwise would.

show a significantly positive sensitivity of directors' compensation to firm performance, however, this sensitivity between directors' compensation and firm performance is significantly lower for firms insured with D&O insurance. The weaker directors' pay-performance sensitivity of insured firms suggests that D&O insurance may actually increase firms' agency costs, and possibly decrease shareholder wealth.

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

2. Literature review and hypothesis development

2.1. D&O insurance and shareholder wealth

There is no empirical consensus on the effect of D&O insurance on shareholder wealth. Two opposing arguments about D&O insurance have been studied in the literature: the monitoring hypothesis and the managerial opportunism argument. The monitoring hypothesis suggests that D&O insurance plays a governance role because an insurer thoroughly scrutinizes the insured. Holderness (1990) suggests that D&O insurance has an important governance role in publicly owned companies. O'Sullivan (1997) relates the D&O insurance purchase decisions of 366 firms in the United Kingdom to their corporate governance characteristics, and concludes in favor of Holderness' (1990) view that D&O insurance serves as a form of monitoring of directors and officers. Bhagat et al. (1987) examine the stock returns of New York firms around the announcement of the purchase of D&O insurance, and find no evidence that shareholder wealth is reduced by purchases of this type of insurance. Similarly, Brook and Rao (1994) report insignificant stock price reactions to firms' adoption of provisions intended to limit director liability. Chen, Yi, and Lin (2011) find that purchases of D&O insurance tend to increase stock market liquidity for firms in Taiwan. This indicates that firms with D&O insurance are more attractive to investors because they feel better protected. These empirical results suggest that the effect of D&O insurance on shareholder wealth may indeed be positive.

However, other research has focused on the moral hazard effects of D&O 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. Chalmers et al. (2002) examine purchases of D&O insurance around the initial public offerings of 72 U.S. firms, and find that these firms' long-run stock performance is negatively related to the amount of D&O insurance purchased. Kim (2005) uses proprietary data to construct a matched sample of 93 U.S. firms and finds that firms which purchase excessive amounts of D&O insurance are significantly more likely to engage in earnings restatements. Boubakri, Ghalled, and Martin Boyer (2008) use data from a sample of 138 Canadian seasoned equity offerings to examine the relationship between D&O insurance and earnings management. Similar to Kim, they find that excessive D&O insurance coverage is associated with more aggressive earnings management. Chi et al. (2011) find that managers are more likely to misstate a company's earnings when they are covered by D&O insurance. Zou et al. (2008) find that the announcements of D&O insurance decisions in firms that engage in earnings management, and/or are controlled by a local government, seem to have a negative wealth effect. Lin et al. (2011) examine the effect of directors' and officers' liability insurance on the outcomes of merger and acquisition decisions. They find that acquirers whose executives have a higher level of D&O insurance coverage experience significantly less abnormal announcement-period stock returns. Moreover, acquirers with a higher level of D&O insurance protection tend to pay higher acquisition premiums and their acquisitions appear to exhibit lower synergies.

2.2. Hypothesis development

In modern corporations, where the separation between shareholders and managers exists, managers may have incentives that are different from those of the shareholders, leading them to making decisions that are not in line with the shareholders' best interests. Jensen and Meckling (1976) argue that zero or partial ownership of firm managers cause them to work less vigorously and pursue personal benefits because shareholders bear most of the costs. The misalignment of interests between managers and shareholders results in one of the most challenging issues encountered by firms today — the agency problem. The monitoring hypothesis suggests that D&O insurance may alleviate the agency problem through external monitoring provided by insurers, while the managerial opportunism argument asserts that D&O insurance could worsen the agency problem because boards are likely to be more aggressive and/or less careful under the protection of this insurance. Holmstrom (1979) and Jensen and Murphy (1990) argue that it is appropriate for firms to determine directors' compensation based on firm performance. Presumably, according to the agency theory, to align the interests of the two parties, a change in directors' compensation should be positively associated with the change in shareholder wealth. Addressing German companies, Andreas, Rapp, and Wolff (2012) find that ROA is positively associated with average director compensation. Furthermore, the stronger this positive relationship is, the better the alignment of interests between directors and shareholders is. This means that directors should get higher (lower) pay for their good (bad) performance. Thus, if D&O insurance provides a positive (negative) value for shareholder wealth, the directors' pay-performance sensitivity should be higher (lower) for the insured firms, indicating a stronger (weaker) relationship between directors' compensation and firm performance. In summary, we propose the following hypotheses.

I. If D&O insurance increases shareholder wealth as suggested by the monitoring hypothesis, the sensitivity of directors' compensation to shareholder wealth for insured firms should be higher than that of uninsured firms, indicating a stronger

relationship between directors' compensation and firm performance (better alignment between directors' and shareholders' interests).

II. If D&O insurance decreases shareholder wealth as suggested by the managerial opportunism argument, the sensitivity of directors' compensation to shareholder wealth for insured firms should be lower than that of uninsured firms, indicating a weaker relationship between directors' compensation and firm performance (worse alignment between directors' and shareholders' interests).

3. Sample

To test our hypotheses, we use firm-year observations in Taiwan over the period from 2008 to 2012. Our sample includes firm-year observations from listed firms on either the Taiwan Stock Exchange (TWSE) or GreTai Securities Market (OTC). The sample is unique in the following ways. First, although listed firms in Taiwan are not required to have D&O insurance, they are required to disclose purchases of this insurance. Secondly, unlike most Western countries such as the U.S. and Canada in which most firms are covered by D&O insurance, the numbers of insured and uninsured firms in Taiwan are approximately equal in our sample. This equal representation between insured and uninsured firms allows us to better understand the value of D&O insurance in the early stage of its introduction to a country. Thirdly, the findings of this paper may complement related empirical research based on observations from other Asian countries, such as China and Korea, which have cultures similar to Taiwan but very different firm characteristics.[4]

The reason we use 2008 as the starting year of our sample is the mandatory disclosure of D&O insurance in Taiwan began in 2008. However, we understand including the year of the financial crisis in our sample may misestimate the sensitivity of directors' compensation to shareholder wealth. In consideration of this effect, we use all possible robustness analyses to the best of our knowledge to verify our results. To construct our sample, first, we obtain firm-year observations from listed firms on either the Taiwan Stock Exchange (TWSE) or GreTai Securities Market (OTC) and exclude financial firms because they face more distinctive regulations than firms in other industries which may cause their boards to function differently from those of other firms'.[5] Secondly, in order to accurately calculate changes of directors' compensation and shareholder wealth, firm-year observations included in our sample must have all relevant financial and accounting data one year prior to the observations. That is, although our sample period starts from 2008, all firms in our sample should have been listed on either Taiwan Stock Exchange (TWSE) or GreTai Securities Market (OTC) at least from 2007 without any missing data for our empirical tests. Finally, after excluding non-calendar firms, our final sample consists of 5619 firm-year observations from 1236 listed firms which represent over 95% of listed firms in Taiwan.

4. Empirical results

4.1. Sensitivity of directors' compensation to firm performance

In order to examine directors' pay-performance sensitivity, we follow Jensen and Murphy (1990) and use the change of shareholder wealth as the key independent variable in our Ordinary Least Squares (OLS) regression analyses. The change of shareholder wealth for a firm in a given year is calculated by using the return on common stock in that year multiplied by the firm's equity value (in millions of New Taiwanese dollars) which is stock price multiplied by the number of outstanding shares at the beginning of the current year.[6] The change of directors' compensation is the dependent variable in our regression analyses. It is determined by the difference of a firm's average total compensation to board directors (in thousands of New Taiwanese dollars) between prior and current years.[7] Panel A of Table 1 describes the mean, median, 1st percentile, and 99th percentile of all variables. This shows that the average amount of change in directors' compensation for all companies was a reduction of 35,700 New Taiwanese dollars during the sample period, while the average amount of change in shareholder wealth was an increase of 14.381 billion New Taiwanese dollars. This indicates that firms, on average, experienced increased shareholder wealth but had decreased directors' compensation over the period from 2008 to 2012 even though there were still some firms which had great increases in both variables.[8] Furthermore, we use a dummy variable to differentiate insured and uninsured firms in a given year. Unlike most Western countries in which most firms are covered by D&O insurance, the mean of the dummy variable is 0.55 showing that the numbers of insured and uninsured firms in Taiwan are approximately equal. This implies that the development of this

[4] Observing Chinese listed firms, Zou et al. (2008) report that the incidence of seeking D&O insurance is positively related to the extent of controlling-minority shareholder incentive conflicts. Regan and Hur (2007) examine publicly listed nonfinancial firms in Korea, and find that several firm characteristics such as firm size and ownership structure are important determinants of insurance demand. Moreover, they provide evidence that members of chaebols demand more insurance than unaffiliated firms.

[5] Financial firms represent only about 3% of listed firms in Taiwan during the sample period.

[6] Other variables such as return on assets and return on sales may be used to proxy shareholder wealth as well. However, from the investors' point of view, stock price is a relatively straightforward indicator of gains or losses. Hence, the annual stock return multiplied by the firm value at the beginning of the year is used in this paper to capture changes of shareholder wealth.

[7] After 2005, information about compensation to individual directors is no longer reported. Instead, the total annual compensation to the board is disclosed. As a result, we use the average compensation to individual directors as the measure of compensation because the total compensation could be sensitive to the number of board directors.

[8] We have similar empirical results when the largest and smallest 1% of both change in shareholder wealth and change in directors' compensation are excluded.

Table 1
Summary statistics.
The sample consists of 5619 firm-year observations of 1236 listed firms in Taiwan during the period from 2008 to 2012. In Panel A, change in directors' compensation measured in thousands of New Taiwanese dollars is directors' compensation in the current year minus the compensation in the previous year. Change in shareholder wealth measured in millions of New Taiwanese dollars is the market value of common shares outstanding at the beginning of the current year multiplied by the stock return in the current year. D&O insurance is a dummy variable; it is 1 if the observation firm is insured by D&O insurance during the sample year and 0 otherwise. In Panel B, total assets are measured in millions of New Taiwanese dollars. Leverage is calculated as total debt scaled by total assets. Percentage of independent director is calculated as the number of independent director(s) divided by the number of total board members. Director and institutional ownerships are the percentage of shares held by directors and institutional investors. Director compensation is the average total compensation to individual directors measured in thousands of New Taiwanese dollars. Firm performance is the market to book ratio which is the stock price at the year-end multiplied by the number of shares outstanding and then divided by total assets. *** and * indicate significance levels at 1% and 10%, respectively. All variables are extracted from the Taiwan Economic Journal (TEJ).

Panel A

	Mean	1%	Median	99%
Change in directors' compensation	−35.7	−3672	0	2879
Change in shareholder wealth	14,381	−3.901,803	−3061	3,945,787
D&O insurance	0.55	0	1	1

Panel B

	D&O insurance		Difference
	Yes	No	(1) − (2)
	(1)	(2)	
Total assets	18,911	10,417	8494***
	3766	*2866*	*900****
Leverage	0.35	0.36	−0.01
	0.34	*0.34*	*0*
Std. of daily stock returns	2.62	2.55	0.07***
	2.60	*2.49*	*0.11****
Pct. independent director	0.20	0.10	0.10***
	0.29	*0*	*0.29****
Director ownership	19.0	20.9	−1.90***
	15.1	*17.3*	*−2.20****
Institutional ownership	35.9	34.1	1.80***
	32.4	*30.1*	*2.30****
Director compensation	1020	826	194***
	392	*328*	*64****
Firm performance	1.51	1.28	0.23*
	1.11	*1.04*	*0.07****

insurance in Taiwan may still be in the early stage.[9] This equal representation between insured and uninsured firms could complement the existing literature by allowing us to better understand the value of D&O insurance in the early stage of its introduction to a country. Panel B of Table 1 compares the characteristics of uninsured firms to insured firms with mean (top) and median (bottom) values. It shows insured firms tend to be larger, having a higher percentage of independent director, and with more institutional ownership, which are consistent with prior research.

Table 2 reports the relationship between changes in directors' compensation and changes in shareholder wealth for both firms with and without D&O insurance over the sample period from 2008 to 2012. The first column of Table 2 shows a significant positive relationship between changes in directors' compensation and changes in shareholder wealth. The coefficient of change in shareholder wealth is 0.000095 which indicates a million dollar increase (decrease) in shareholder wealth measured in New Taiwanese dollars (NT$) would increase (decrease) a firm's average total compensation to board directors by NT$95. The second column in Table 2 examines the effect of D&O insurance on the positive relationship between change in directors' compensation and change in shareholder wealth. The coefficient of the interactive term between change in shareholder wealth and the dummy variable of D&O insurance is −0.000063, which is statistically significant. This suggests that D&O insurance reduces the sensitivity of directors' compensation to shareholder wealth by approximately 42% for insured firms. This result supports the managerial opportunism argument by showing a weaker relationship between directors' compensation and firm performance for the insured firms, indicating a worse alignment between directors' and shareholders' interests.

Because directors' compensation in the current year might be determined by a firm's performance in the prior year, the changes in shareholder wealth in the year prior to sample observations are included in the third column of Table 2 to prevent possible overestimation of the importance and significance of the change in shareholder wealth in the current year. The third column in Table 2 shows that after controlling for the change in shareholder wealth in the prior year, the results are still consistent. The coefficient of change in shareholder wealth is 0.000165, while the coefficient of the interactive term between

[9] The number of firms with D&O insurance increased during the sample period. From 2008 to 2012, there are a total of 83 firms in our sample which became insured. And there are 15 firms which became uninsured after being insured.

Table 2
D&O insurance and directors' pay-performance sensitivity.
The sample consists of 5619 firm-year observations of 1236 listed firms in Taiwan during the period from 2008 to 2012. All regressions are ordinary least squares. The dependent variable is the change of directors' compensation during the sample year measured in thousands of New Taiwanese dollars. It is calculated as the average total compensation to individual directors in the current year minus that in the previous year. Change in shareholder wealth measured in millions of New Taiwanese dollars is the market value of common shares outstanding at the beginning of the current year multiplied by the stock return in the current year. D&O insurance is a dummy variable; it is 1 if the observation firm is insured by D&O insurance during the sample year and 0 otherwise. Firm fixed effect is controlled. All variables are extracted from the Taiwan Economic Journal (TEJ). *T*-statistics are calculated based on clustered standard errors at the firm level. *** indicates a significance level at 1%.

	(1)	(2)	(3)
Change in shareholder wealth	0.000095***	0.000149***	0.000165***
	(12.10)	(7.22)	(7.88)
Change in shareholder wealth x D&O insurance		−0.000063***	−0.000070***
		(−2.83)	(−3.13)
Change in shareholder wealth in year (t-1)			0.000037***
			(4.34)
Firm fixed effect	Yes	Yes	Yes
R^2	0.03	0.03	0.03

	(4)
Change in shareholder wealth	0.000165***
	(7.90)
Change in shareholder wealth x D&O insurance	−0.000070***
	(−3.14)
Change in shareholder wealth in year (t-1)	0.000036***
	(4.33)
D&O insurance	32.04627
	(−0.88)
Firm fixed effect	Yes
R^2	0.03

the change in shareholder wealth and the dummy variable of D&O insurance is −0.00007. Again, the results suggest that although directors' compensation and firm performance are positively correlated, D&O insurance significantly weakens this positive relationship. This may be because knowing that directors and executive officers are protected from being financially liable for wrongdoings, the board of an insured firm may perform its duties less carefully and/or effectively. Consequently, instead of providing positive incentive to boards of directors, D&O insurance may actually increase firms' agency costs. It is possible that the boards of directors of insured firms may be compensated differently from the directors of uninsured firms. However, we carefully check this possibility and find that the insured and uninsured firms in our sample are not significantly different in terms of their directors' compensation, financial performance, and accounting performance.[10] The fourth column in Table 2 has D&O insurance as an additional independent variable. The coefficient of the D&O insurance is insignificant. The results shown in column (4) are consistent with the results in column (3). Moreover, when we use D&O insurance as an additional independent variable for all the other regression tests, we still have similar results.

4.2. Further analyses on the sensitivity of directors' compensation to firm performance

Table 3 examines whether our findings are robust to quality of corporate governance and firm risk. We use two different measures to differentiate corporate governance quality among our sample firms. Among the important factors that have been identified in the literature for better corporate governance, one factor which is widely believed to be critical is whether the board consists of a majority of independent directors (Weisbach, 1988; Borokhovich, Parrino, & Trapani, 1996; Cotter, Shivdasani, & Zenner, 1997; Uzun, Szewczyk, & Varma, 2004; Marciukaityte, Szewczyk, Uzun, & Varma, 2006). In panel A of Table 3, we categorize firms into two groups: column (1) of panel A uses a sub-sample that only has firms with independent director(s) (indicating a higher quality of corporate governance), while column (2) of panel A uses a sub-sample that only has firms without independent director(s) (indicating a lower quality of corporate governance). In panel B of Table 3, we categorize firms into two groups based on the transparency ratings reported by Securities and Futures Institute in Taiwan: column (1) of panel B uses a sub-sample that only has firms with annual transparency ratings at least at the level of A− (indicating a higher quality of corporate governance), while column (2) of panel B uses a sub-sample that only has firms with annual transparency ratings not higher than the level of B (indicating a lower quality of corporate governance).[11] In panel C of Table 3, we use

[10] It could be possible that directors with relatively high or low compensation may act differently under the protection of D&O insurance. However, when we re-estimate regression (3) in Table2 using data showing directors' compensation above and below the sample median, the coefficients of *change in shareholder wealth * D&O insurance* remain negative and significant at a 1% level in both groups.

[11] Detailed information related to the transparency rankings applied in our tests could be obtained in the following link: http://www.sfi.org.tw/EDIS/. In addition, Ryan and Wiggins (2004) among others empirically suggest that high CEO power may reduce the incentive from compensation for board directors to monitor. To confirm whether our findings remain consistent with these firms, we re-estimate regression (3) in Table 2 using firms whose CEOs are also the chairman. While the coefficient of *change in shareholder wealth* becomes insignificant, the coefficient of *change in shareholder wealth * D&O insurance* remains negative and significant at a 1% level.

Table 3
Impact of quality of corporate governance and firm risk on directors' pay-performance sensitivity.
The samples consist of firm-year observations of listed firms in Taiwan during the period from 2008 to 2012. All regressions are ordinary least squares. Dependent variable is the change of directors' compensation during the sample year measured in thousands of New Taiwanese dollars. It is calculated as the average total compensation to individual directors in the current year minus that in the previous year. Transparency ratings A++, A+, A, A−, B, C, and C− indicate different qualities of firms' information transparency from high to low. The ratings are reported annually by the Securities and Futures Institute in Taiwan. Change in shareholder wealth measured in millions of New Taiwanese dollars is the market value of common shares outstanding at the beginning of the current year multiplied by the stock return in the current year. D&O insurance is a dummy variable; it is 1 if the observation firm is insured by D&O insurance during the sample year and 0 otherwise. Firm fixed effect is controlled. All variables are extracted from the Taiwan Economic Journal (TEJ). *T*-statistics are calculated based on clustered standard errors at the firm level. *** and ** indicate significance levels at 1% and 5%, respectively.

	(1)	(2)
Panel A	Independent directors	
	With	Without
Change in shareholder wealth	0.000072***	0.000507***
	(3.95)	(10.53)
Change in shareholder wealth x	−0.000074***	−0.000127**
D&O insurance	(−3.77)	(−2.49)
Change in shareholder wealth in year (t-1)	0.000041***	0.000123***
	(5.42)	(6.58)
Firm fixed effect	Yes	Yes
R^2	0.01	0.14
N	2762	2857
Panel B	Transparency rankings	
	>B	≤B
Change in shareholder wealth	0.000137***	0.000390***
	(6.15)	(6.69)
Change in shareholder wealth x	−0.000102***	−0.000145**
D&O insurance	(−4.16)	(−2.45)
Change in shareholder wealth in year (t-1)	0.000031***	0.000126***
	(3.26)	(6.68)
Firm fixed effect	Yes	Yes
R^2	0.02	0.07
N	2456	3163
Panel C	Standard deviation of daily stock returns	
	≤Median	>Median
Change in shareholder wealth	0.000090***	0.000606***
	(4.25)	(10.82)
Change in shareholder wealth x	−0.000074***	−0.000410***
D&O insurance	(−3.15)	(−7.14)
Change in shareholder wealth in year (t-1)	0.000036***	0.000039**
	(3.92)	(2.30)
Firm fixed effect	Yes	Yes
R^2	0.01	0.10
N	2810	2809

standard deviations of firms' daily stock returns to differentiate firm risk among our sample firms. In column (1) of panel C, we use a sub-sample that only has firms with a standard deviation of daily stock returns that is not greater than the sample median (indicating a lower level of firm risk), while column (2) of panel C uses a sub-sample that only has firms with a standard deviation of daily stock returns that is greater than the sample median (indicating a higher level of firm risk). As shown by Table 3, indeed, our findings still hold regardless of the quality of corporate governance and firm risk. That is, D&O insurance significantly weakens the sensitivity of directors' compensation to firm performance. Therefore, this insurance may increase firms' agency costs.

We have additional tests in Table 4 in order to further address endogeneity. It is possible that firms whose directors and officers have lower pay-performance sensitivity may choose to purchase more D&O insurance. Due to this concern, in column (1) of Table 4, we only use observations with pay-performance sensitivity that is greater than the sample median. The proxy of pay-performance sensitivity is the change of directors' compensation scaled by the change of shareholder wealth.[12] In column (2), we use year dummies to control for year fixed effects for the entire sample. Additionally, column (3) shows the results of an industry fixed effects analysis in which both year fixed effects and industry fixed effects are controlled for. Results in Table 4 are still consistent with the results in Table 2.

[12] We have similar results when only use observations with pay-performance sensitivity that is lower than or equal to the sample median.

Table 4
Additional tests to address endogeneity.
The sample consists of firm-year observations of listed firms in Taiwan during the period from 2008 to 2012. Regressions (1) and (2) are ordinary least squares. Regression (3) is an industry fixed effects analysis. The dependent variable in all regressions is the change of directors' compensation during the sample year measured in thousands of New Taiwanese dollars. It is calculated as the average total compensation to individual directors in the current year minus that in the previous year. In regression (1), we only include observations with pay-performance sensitivity that is greater than the sample median (we have similar results when only include observations with pay-performance sensitivity that is lower than or equal to the sample median). We use the change of directors' compensation scaled by the change of shareholder wealth as the proxy of pay-performance sensitivity. Year dummies are included in all regressions to control for year fixed effects. In regression (3), we use industry fixed effects analysis. Change in shareholder wealth measured in millions of New Taiwanese dollars is the market value of common shares outstanding at the beginning of the current year multiplied by the stock return in the current year. Directors' liability (D&O) insurance is a dummy variable; it is 1 if the observation firm is insured by D&O insurance during the sample year and 0 otherwise. Firm fixed effect is controlled. All variables are extracted from the Taiwan Economic Journal (TEJ). *T*-statistics are calculated based on clustered standard errors at the firm level. *** and ** indicate significance levels at 1% and 5%, respectively.

	(1)	(2)	(3)
Change in shareholder wealth	0.001104***	0.000137***	0.000135***
	(19.48)	(6.54)	(6.40)
Change in shareholder wealth x	−0.000572***	−0.000052**	−0.000051**
D&O insurance	(−9.70)	(−2.35)	(−2.28)
Change in shareholder wealth in year (t-1)	0.000198***	0.000032***	0.000031***
	(10.22)	(3.78)	(3.63)
Year dummies	Yes	Yes	Yes
Firm fixed effect	Yes	Yes	Yes
R^2	0.27	0.04	0.04
N	2809	5619	5619

Table 5 shows consistent results after we add total assets, leverage, standard deviation of daily stock returns, percentage of independent directors, director and institutional ownerships, return on assets, sales growth, years of firms' establishment, divergence, board size, CEO duality, and industry and year dummies as additional control variables.

5. Robustness tests

Our results support the managerial opportunism argument by showing a weaker relationship between directors' compensation and firm performance for firms insured with D&O insurance, indicating worse alignment between directors' and shareholders' interests. In this section, we illustrate all the robustness checks we have applied to verify our results. We first try to verify if our results are consistent for different subsamples. Because our sample period includes the time immediately after the financial crisis triggered by the burst of the real estate bubble in the U.S., the weaker directors' pay-performance sensitivity may be the result of the immediate influence of this financial crisis. Due to this concern, in column (1) of Table 6, we exclude firm-year observations from 2008, 2009, and 2010 to minimize the direct impact of the financial crisis. Also, because stocks listed on the GreTai Securities Market (OTC) may be traded less frequently than those that are listed on the Taiwan Stock Exchange (TWSE), their most recently recorded prices may not appropriately reflect the current values of these firms. As a result, in column (2) of Table 6, we exclude all firm-year observations from the GreTai Securities Market (OTC).[13] In column (3) of Table 6, we exclude firm-year observations if they are in the first year the firm is insured by D&O insurance or one year before being insured.[14] During the sample period from 2008 to 2012, some firms changed their status of D&O insurance. In order to further verify our results, in column (4), firm-year observations are excluded if they become insured from being uninsured, and vice versa. Moreover, in column (5) of Table 6, we use only observations that become insured from being uninsured during the sample period. However, firm-year observations are excluded if they are in the first year the firm is insured by D&O insurance. Results in all the subsamples of Table 6 are consistent with the results in Table 2.

In Table 7, we use alternative measures for D&O insurance. It is possible that the impact of D&O insurance on directors' pay-performance sensitivity is a lag effect. That is, directors' pay-performance sensitivity in the current year is affected by D&O insurance status in the previous year rather than the D&O insurance status in the current year. Because of this, in column (1) of Table 7, we use the interaction between the change in shareholder wealth in the current year and the dummy variable of D&O insurance in the previous year (year t-1) as the interactive term. In column (2) of Table 7, we replace the D&O insurance dummy variable with the abnormal level of D&O insurance because a firm's demand for D&O insurance may be determined by

[13] Although the liquidity or trading activity could be different between stocks traded on the Taiwan Stock Exchange (TWSE) and GreTai Securities Market (OTC), the percentages of firms insured with D&O insurance are not significantly different in these two markets. The correlation between the insurance dummy used to differentiate insured and uninsured firms, and the market dummy applied to differentiate between firms listed on the Taiwan Stock Exchange (TWSE) and GreTai Securities Market (OTC) is less than 0.01, which is insignificant.

[14] Similar to regression (3) in Table 6, we also focus on observing firms which became insured in 2010. This arrangement allows us to compare the directors' pay-performance sensitivity of these firms in 2008 and 2011. While the number of observations decreased to 106, the coefficient of *change in shareholder wealth * D&O insurance* remains negative and significant at a 1% level.

Table 5
D&O insurance and directors' pay-performance sensitivity with additional control variables.
The sample consists of 5617 firm-year observations of listed firms in Taiwan during the period from 2008 to 2012. The regression is ordinary least squares. The dependent variable is the change of directors' compensation during the sample year measured in thousands of New Taiwanese dollars. It is calculated as the average total compensation to individual directors in the current year minus that in the previous year. Change in shareholder wealth measured in millions of New Taiwanese dollars is the market value of common shares outstanding at the beginning of the current year multiplied by the stock return in the current year. D&O insurance is a dummy variable; it is 1 if the observation firm is insured by D&O insurance during the sample year and 0 otherwise. Total assets are measured in millions of New Taiwanese dollars. Leverage is calculated as total debt scaled by total assets. Percentage of independent director is calculated as the number of independent director(s) divided by the number of total board members. Director and institutional ownerships are the percentage of shares held by directors and institutional investors. Return on assets is the return before tax, interests and depreciations scaled by total assets. Sales growth is the growth rate of sales in the last 3 years. Divergence is the difference between the control rights and cash flow rights. Board size is the number of board members. CEO duality is a dummy variable, where it is 1 if the CEO is also the chairman and 0 otherwise. Industry dummies are developed based on the industry identification codes from Taiwan Stock Exchange (TWSE). Firm fixed effect is controlled. All variables are extracted from the Taiwan Economic Journal (TEJ). *T*-statistics are calculated based on clustered standard errors at the firm level. ***, ** and * indicate significance levels at 1%, 5% and 10%, respectively.

Change in shareholder wealth	0.000133***
	(6.34)
Change in shareholder wealth x	−0.000050**
D&O insurance	(−2.25)
Change in shareholder wealth in year (t-1)	0.000030***
	(3.51)
Log (total assets)	−44.6284**
	(−2.49)
Leverage	209.732*
	(1.75)
Std. of daily stock returns	73.1996**
	(2.28)
Pct. independent directors	−226.826*
	(−1.80)
Log (director ownership)	60.3988*
	(1.67)
Log (institutional ownership)	−48.4180*
	(−1.79)
Return on assets	11.2604***
	(5.77)
Sales growth	0.019265
	(1.17)
Log (years since establishment)	25.9692
	(0.49)
Divergence	−0.377015
	(−0.18)
Log (board size)	46.2633
	(0.51)
CEO duality	−8.170098
	(−0.20)
Industry and year dummies	Yes
Firm fixed effect	Yes
R^2	0.06

firm characteristics. Specifically, the abnormal level of D&O insurance is the difference between the actual level and the predicted level of a firm's D&O insurance. The predicted level of D&O insurance is estimated by the following logistic model:

$$\begin{aligned} D\&O\ insurance_{it} = {} & \alpha_0 + \beta_1\ \ln(total\ assets_{it}) + \beta_2(leverage_{it}) + \beta_3(standard\ deviation\ of\ daily\ stocks\ returns_{it}) \\ & + \beta_4(percentage\ of\ independent\ board\ of\ directors_{it}) + \beta_5\ \ln(director\ ownership_{it}) \\ & + \beta_6 \ln(institutional\ ownership_{it}) + industry\ dummy_{it} + year\ dummies_i + \varepsilon_{it} \end{aligned} \quad (1)$$

The natural log of total assets is a proxy of firm size. Leverage is calculated as total debt scaled by total assets. Standard deviation of daily stock returns is a proxy of return volatility. The percentage of independent board of directors and institutional ownership indicate quality of corporate governance. Director ownership is used to determine the severity of interest conflicts between board of directors and shareholders. Industry and year dummy variables are included to control for industry and year fixed effects. In column (3) of Table 7, because a director's total compensation generally has two parts, fixed compensation and performance-based compensation, we use only the change in directors' compensation tied to earnings as the dependent variable since performance-based compensation should be more relevant to directors' pay-performance sensitivity. Results in Table 7 are still consistent with the results in Table 2.

Table 6
Robustness tests - alternative samples.
The samples consist of firm-year observations of listed firms in Taiwan during the period from 2008 to 2012. In regression (1), we only include observations in years 2011 and 2012. In regression (2), only firms traded on the Taiwan Stock Exchange (TWSE) are included. In regression (3), we exclude firm-year observations if they are in the first year the firm is insured by D&O insurance or one year before being insured. In regression (4), firm-year observations are excluded if they become insured from being uninsured in the sample year, and vice versa. In regression (5), we use only observations of firms that become insured from being uninsured during the sample period. However, firm-year observations are excluded if they are in the first year the firm is insured by D&O insurance. All regressions are ordinary least squares. The dependent variable is the change of directors' compensation during the sample year measured in thousands of New Taiwanese dollars. It is calculated as the average total compensation to individual directors in the current year minus that in the previous year. Change in shareholder wealth measured in millions of New Taiwanese dollars is the market value of common shares outstanding at the beginning of the current year multiplied by the stock return in the current year. D&O insurance is a dummy variable; it is 1 if the observation firm is insured by D&O insurance during the sample year and 0 otherwise. Firm fixed effect is controlled. All variables are extracted from the Taiwan Economic Journal (TEJ). *T*-statistics are calculated based on clustered standard errors at the firm level. ***, ** and * indicate significance levels at 1%, 5% and 10%, respectively.

	(1)	(2)	(3)	(4)	(5)
Change in shareholder wealth	0.000299***	0.000163***	0.000164***	0.000165***	0.001170***
	(5.31)	(6.15)	(7.80)	(7.81)	(14.34)
Change in shareholder wealth x	−0.000222***	−0.000069**	−0.000069***	−0.000070***	−0.001073***
D&O insurance	(−3.81)	(−2.45)	(−3.06)	(−3.08)	(−10.69)
Change in shareholder wealth in year (t-1)	0.000016	0.000033***	0.000035***	0.000036***	0.000078*
	(1.21)	(3.10)	(4.09)	(4.14)	(1.88)
Firm fixed effect	Yes	Yes	Yes	Yes	Yes
R^2	0.03	0.03	0.03	0.03	0.28
N	2347	3197	5426	5391	538

We acknowledge that D&O insurance might be a part of directors' compensation package (Core, 1997). That is, there might be a relation between D&O insurance and directors' compensation. In order to examine our results, in column (1) of Table 8, we only include observations with directors' compensation in the previous year that was greater than the sample median. Contrarily, in column (2) of Table 8, we only include observations with directors' compensation in the previous year that was less than or equal to the sample median. Finally, in column (3) of Table 8, instead of using a dummy variable, D&O insurance is the residual obtained by regressing the actual D&O insurance in the previous year on directors' compensation. Results in Table 8 are still consistent with the results in Table 2.[15]

All the results in our robustness checks, as reported in Tables 6, 7, and 8, are consistent with our main findings in Table 2. We not only consistently show a significant positive relationship between change in directors' compensation and change in shareholder wealth, but also document that D&O insurance significantly reduces the sensitivity of directors' compensation to shareholder wealth for insured firms. Our findings support the managerial opportunism argument by showing a weaker relationship between directors' compensation and firm performance for firms insured with D&O insurance, indicating a worse alignment between directors' and shareholders' interests. Therefore, D&O insurance could indeed worsen the agency problem and lead to a reduction of shareholder wealth.

6. Conclusion

The fundamental idea of D&O insurance is to provide liability protection to the board of directors and executive officers of the firm for accused wrongful acts in their capacity. 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, D&O insurance should be able to mitigate the agency problem and ultimately increase shareholder wealth.

However, this paper shows evidence supporting the managerial opportunism argument. With 5619 firm-year observations of 1236 listed firms in Taiwan during the period from 2008 to 2012, our empirical findings suggest that directors' pay-performance sensitivity is significantly lower for insured firms than for uninsured firms. Specifically, we show that although directors' compensation and firm performance are positively correlated, D&O insurance reduces the sensitivity of directors' compensation to firm performance by approximately 42% for the insured firms. Our results are robust to alternative measures of directors' compensation, alternative measures of D&O insurance, firms' corporate governance quality, firm size, firm risk, industry characteristics, CEO's power, and different sample selections. According to the managerial opportunism argument, the moral hazard problem associated with firms with D&O insurance may induce the board to work passively and less effectively in terms of monitoring and advising. Knowing that directors and executive officers are protected from being financially liable for wrongdoings, this type of insurance protection is likely to reduce the directors' incentive to care and/or increase their willingness to take on more risky projects. As a result, instead of alleviating the agency problem, D&O insurance actually increases firms' agency costs. The findings of this paper have interesting implications for firms and policy makers. Based on our evidence showing that D&O insurance increases firms' agency costs, it is very important to investigate whether this type of insurance is necessary for all companies, especially those which are prone to the agency problem.

[15] We still have consistent results after adding change in sales, change of industry shareholder wealth, and change of market shareholder wealth as additional control variables.

Table 7
Robustness tests - alternative measures of D&O insurance and directors' compensation.
The samples consist of firm-year observations of listed firms in Taiwan during the period from 2008 to 2012. All regressions are ordinary least squares. The dependent variable in regressions (1) and (2) is the change of directors' compensation during the sample year measured in thousands of New Taiwanese dollars. It is calculated as the average total compensation to individual directors in the current year minus that in the previous year. The dependent variable in regression (3) is the change of directors' compensation related to firms' earnings. Change in shareholder wealth measured in millions of New Taiwanese dollars is the market value of common shares outstanding at the beginning of the current year multiplied by the stock return in the current year. D&O insurance is a dummy variable; it is 1 if the observation firm is insured by D&O insurance during the sample year and 0 otherwise. Abnormal level of D&O insurance is the difference between the actual level and the predicted level of this insurance. The predicted level of D&O insurance is estimated by the logistic model of Eq. (1). Column (4) shows the results of Eq. (1). Industry dummies are defined according to the industry classification provided by the Taiwan Stock Exchange (TWSE). Firm fixed effect is controlled. All variables are extracted from the Taiwan Economic Journal (TEJ). *T*-statistics are calculated based on clustered standard errors at the firm level. *** indicates a significance level at 1%.

	(1)	(2)	(3)
Change in shareholder wealth	0.000122***	0.000789***	0.000156***
	(5.13)	(16.08)	(7.83)
Change in shareholder wealth x D&O insurance			−0.000058***
			(−2.74)
Change in shareholder wealth x D&O insurance in year (t-1)	−0.000079***		
	(−3.10)		
Change in shareholder wealth x Abnormal amount of D&O insurance		−0.000777***	
		(−14.14)	
Change in shareholder wealth in year (t-1)	0.000041***	0.000051***	0.000035***
	(4.85)	(6.08)	(4.36)
Firm fixed effect	Yes	Yes	Yes
R^2	0.01	0.06	0.03
N	4619	5619	5611

	(4)
Constant	0.0106436***
	(7.82)
Log (total assets)	1.364996***
	(10.46)
Leverage	0.9278762
	(0.37)
Standard deviation of daily stock returns	1.257891***
	(4.38)
Percentage of independent board of directors	20.03612***
	(14.81)
Log (director ownership)	0.7524071***
	(4.89)
Log (institutional ownership)	1.266895***
	(5.35)
Industry dummies	Yes
Year dummies	Yes
Firm fixed effect	Yes
Log likelihood	−3203.5
Pseudo R^2	0.171

Table 8
Robustness tests – impact on directors' pay-performance sensitivity from the possible relation between D&O insurance and directors' compensation.
The sample consists of firm-year observations of listed firms in Taiwan during the period from 2008 to 2012. All regressions are ordinary least squares. The dependent variable in all regressions is the change of directors' compensation during the sample year measured in thousands of New Taiwanese dollars. It is calculated as the average total compensation to individual directors in the current year minus that in the previous year. In regression (1), we only include observations with directors' compensation in the previous year that was greater than the sample median. Contrarily, in regression (2), we only include observations with directors' compensation in the previous year that was less than or equal to the sample median. In regression (3), D&O insurance is the residual obtained by regressing the actual D&O insurance in the previous year on directors' compensation. Change in shareholder wealth measured in millions of New Taiwanese dollars is the market value of common shares outstanding at the beginning of the current year multiplied by the stock return in the current year. Directors' liability (D&O) insurance is a dummy variable in regressions (1) and (2); it is 1 if the observation firm is insured by D&O insurance during the sample year and 0 otherwise. Firm fixed effect is controlled. All variables are extracted from the Taiwan Economic Journal (TEJ). *T*-statistics are calculated based on clustered standard errors at the firm level. *** and ** indicate significance levels at 1% and 5%, respectively.

	(1)	(2)	(3)
Change in shareholder wealth	0.000191***	0.000592***	0.000090***
	(6.13)	(3.27)	(7.55)
Change in shareholder wealth x D&O insurance	−0.000076**	−0.000068***	−0.000135***
	(−2.30)	(−3.42)	(−5.14)
Change in shareholder wealth in year (t-1)	0.000048***	0.000002	0.000041***
	(3.84)	(0.28)	(4.79)
Firm fixed effect	Yes	Yes	Yes
R^2	0.04	0.004	0.01
N	2809	2810	4619

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