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The Influence of Directors' and Officers' Insurance on Managerial Myopic Behavior

Guang-Zheng Chen

Department of Accounting, Feng Chia University

No.100, Wenhwa Road, Seatwen, Taichung 40724, Taiwan, R.O.C.

E-mail: gzchen0120@gmail.com

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Abstract

Literature on the effect of directors' and officers' insurance (D&O insurance) on managers' decision-making supports the contention that D&O insurance encourages managers to engage in opportunistic behaviors that benefit themselves at the expense of shareholders. Managerial myopia is an essential agency issue. The literature suggests that myopic managers have incentives to reduce R&D spending to boost current earnings in order to increase their private benefits. This study examines whether D&O insurance induces myopic R&D cuts. Using a sample of Taiwanese listed firms, the results show that firms with higher levels of D&O insurance coverage are more likely to cut R&D expenditures to avoid earnings declines. This study provide insight into how the incentives arising from D&O insurance play an essential role in determining managerial myopic behavior.

Keywords: Corporate Governance, D&O Insurance, R&D, Managerial Myopia, Agency Theory

1. Introduction

Directors' and officers' insurance (D&O insurance) alleviates the financial liability of officers and directors stemming from lawsuits filed against them while working for the company. However, empirical studies provide evidence that D&O insurance is likely to motivate managers to engage in opportunistic behavior (Chalmers et al., 2002; Chung and Wynn, 2008; Lin et al., 2011). Managerial myopia is an agency problem that occurs when managers sacrifice long-term value creation projects (e.g., R&D) for the purpose of meeting short-term goals (Porter, 1992). Research (Graham et al., 2005; Roychowdhury, 2006; Osma and Young, 2009) also suggests that managers opportunistically reduce R&D spending to boost current earnings for private benefits. Therefore, I examine whether D&O insurance provide managers with incentives to behave myopically by cutting R&D spending.

D&O insurance policy typically provides an essential shield for directors and officers against personal legal liabilities stemming from their business decisions. Nevertheless, D&O insurance can induce moral hazard problems, thus reducing the incentive of managers to act in the best interest of stakeholders (Baker and Griffith, 2010; Lin et al., 2011, 2013). Empirical studies of managerial myopic behavior have focused primarily on R&D expenditure. The evidence is consistent with managers myopically reducing R&D investment to meet short-term earnings goals (Baber et al., 1991; Dechow and Sloan, 1991; Bange and De Bondt, 1998; Bens et al., 2002; Roychowdhury, 2006; Cohen and Zarowin, 2010). Such managerial myopia occurs because R&D investments are immediately expensed under current accounting rules, yet may pay off in the long-term rather than in the short term (Fama and Jensen, 1983; Baysinger et al., 1991).

Research indicates that two circumstances are required for myopic investment behavior (Stein, 1988, 1989; Bushee, 1998). First, managers should place greater emphasis on the current market value of their firm. Second, capital markets should misprice current earnings without fully considering their underlying economics, or managers should believe that they do. Since D&O insurance leads managers to act in their own interest rather than the firm's interest, well-protected managers may have incentives to engage in myopic R&D investment behavior. R&D activities have a long-term relationship with highly uncertain, unpredictable future cash flows, as well as a high risk of failure (Holmstrom, 1989). Since D&O insurance induces managers to take action in pursuit of personal goals, they may be reluctant to engage in R&D activities and more likely to reduce the amount of R&D investment to achieve current-period earnings performance. Research (Fuller and Jensen, 2002; Rappaport, 2005) also provides evidence that capital markets can incorrectly price current earnings, and investors and managers have a mutually reinforcing obsession with short-term performance, with earnings as the most widely accepted metric.[1] Since D&O insurance induces managers to pursue opportunistic behavior and damage firm value, well-protected managers may be inclined to reduce R&D expenditures in order to report strong earnings, which in turn, drives up the firm's stock price in the short- run and increases their compensation. I therefore expect that D&O insurance coverage is associated with myopic R&D investment behavior.

[1] It is also consistent with Stein's (1988, 1989) observation that the capital market is myopic and will induce managers to behave myopically.

Based on a sample of Taiwanese listed firms over the period 2008-2012, I find that, consistent with my prediction, firms with higher D&O insurance coverage are more likely to cut R&D expenditures when faced with potential earnings declines. This finding suggests that D&O insurance induces managers to make corporate decisions which advance their own interests. The results are robust to several sensitivity checks.

This study contributes to the literature in several ways. First, research has investigated the effect of D&O insurance on the outcome of mergers and acquisitions (M&As) (Lin et al., 2011) and financial reporting quality (Chung and Wynn, 2008; Chung et a., 2013; Kim, 2015). This study adds to the literature on D&O insurance by showing that moral hazards related to D&O insurance can affect myopic R&D cuts. Second, this study contributes to the literature on managerial myopia. A large number of studies document that managers are inclined to sacrifice long-term value creation to achieve short-term earnings targets. These studies suggest that managers tend to reduce R&D expenditures in response to concerns about earnings declines or losses (Baber et al., 1991), short managerial horizons (Dechow and Sloan, 1991), catering to the short-term needs of transient institutional investors (Bushee, 1998), and the need to raise capital (Cohen and Zarowin, 2010). This study extends this line of research by provide evidence that D&O insurance coverage appears to be an important determinant of managerial myopia. Finally, this study adds to the stream of real earnings management literature since myopic R&D reduction is a type of real activities manipulation.

The reminder of this paper is organized as follows. Section 2 reviews relevant literature and develop the hypothesis. Section 3 outlines the research design. Section 4 details the sample selection and presents the empirical findings. Section 5 concludes.

2. Literature Review and Hypothesis Development

2.1 Research on D&O Insurance

D&O insurance is designed to protect directors and officers from liability stemming from actions connected to their corporate position. D&O insurance covers situations in which the director or officer commits fraudulent or illegal activities unintentionally, but does not violate his/her duty to the shareholders and the firm. The insurance policy typically does not cover the total liability, and management should bear part of the cost personally. The items generally covered contain judgments or settlements in actions alleging negligence. The policy does not cover liability including willful misconduct, self-dealing, bad faith, knowing violation of security laws, personal profit, or dishonesty.

Holderness (1990) and O'Sullivan (1997) argue that D&O insurance acts as a monitor mechanism for directors and officers because the D&O insurer entirely scrutinizes the insured, and coverage limits and deductibles exist. In addition, Kalelkar and Nwaeze (2015) suggest that abnormally higher D&O insurance coverage can more fully insulate managers against legal penalties stemming from exercising their corporate decision-making authority. Therefore, higher abnormal coverage induces mangers to take actions that will maximize shareholder value. However, a considerable body of research suggests that D&O insurance alleviates the expected litigation risk of managers, thus introducing severe agency problems

and managerial opportunism. For instance, Zou et al. (2008) indicate that D&O insurance could be opportunistically purchased to protect corporate insiders (managers or controlling shareholders) against potential lawsuit costs stemming from the expropriation of outside shareholders. Chalmers et al. (2002) document a negative association between the amount of D&O insurance purchased at the time of the IPO (initial public offering) and three-year post-IPO stock returns. Their finding suggests that managers are prone to purchase D&O insurance when they are aware of overvalued IPO stocks (and thus the litigation risks caused by subsequent price decreases). In addition, several studies document a significantly positive association between D&O coverage limits and the likelihood that firms restate earnings (Lin et al., 2013; Kim, 2015). Similarly, D&O insurance coverage limits have also been shown to be negatively associated with earnings quality (Chung et al., 2013) and earnings conservatism (Chung and Wynn, 2008). Moreover, higher D&O coverage is pertinent to firms that have lower abnormal-period returns during mergers and acquisitions (Lin et al., 2011), higher costs of debt and equity capital (Lin et al., 2013; Chen et al., 2016), and higher audit fees (Chung et al., 2015).

2.2 Research on Managerial Myopia

Myopia refers to underinvestment in long-term value creating activities for the purpose of meeting short-term goals (Porter, 1992). Research provides evidence of managerial myopia, mainly with respect to R&D expenditures. For instance, Baber et al. (1991) demonstrate that when spending on R&D may reduce the ability of managers to report positive income or an increase in income, they decrease R&D expenditures to report stronger earnings. Dechow and Sloan (1991) show that CEOs will reduce R&D expenditures to increase short-term earnings in the final years of their tenure. Bens et al. (2002) find that managers cut R&D expenditure to fund share repurchase programs in order to mitigate earnings per share dilution due to stock option exercise. In addition, Graham et al. (2005) survey and interview over 400 senior executives and report that 80% would cut R&D as well as other discretionary expenditures to meet earnings benchmarks. Roychowdhury (2006) provides evidence consistent with the contention that managers manipulate real activities, such as R&D, to avoid reporting annual losses. Osma and Young (2009) also document that the pressure to report positive levels and changes of earnings in a large sample of R&D-active UK firms results in contemporaneous cuts in R&D spending. More recently, Chen et al. (2015) report evidence that firms with severance pay or fixed employment agreements for managers can reduce their myopic behavior of cutting R&D expenditures to boost short term performance in order to increase their job security. As mentioned above, such managerial myopia can be attributed to the current accounting rules forcing firms to expense R&D in the period incurred. Namely, the increase of R&D expenditures has a negative effect on short-term accounting earnings and stock performance, while benefits from the expenditures occur in the future.[2] In the presence of such negative effects, firms have incentives to reduce R&D expenditures to boost current earnings, which results in conflicts of interest between managers and outside shareholders.

2.3 D&O Insurance and Managerial Myopia

[2] The literature indicates that R&D projects are typically risky, unpredictable, long-term oriented, multi-stage, labor intensive and idiosyncratic (e.g., Holmstrom, 1989; Baysinger et al., 1991; Kothari et al., 2002).

Myopic managerial behavior typically occur under two circumstances (Stein, 1988, 1989; Bushee, 1998). First, managers should place greater emphasis on current market value relative to future market value. They are reluctant to wait until the temporary mispricing (if any) based on short-term earnings performance is corrected and thus reluctant to adopt a long-term perspective. Second, capital markets should misprice firms' current-period earnings without regard to their underlying economics, or managers must believe that they do. Since D&O insurance results in a host of moral hazard issues and reduces managers' incentives to act in the best interest of shareholders (Baker and Griffith, 2010; Lin et al., 2011), well-protected managers may have incentives to cut R&D to increase short-term earnings rather than engage in long-term value creation. First, R&D investments are long-term, risky, and expensive projects. Since D&O insurance induces managers to act opportunistically, they may focus on short-term earnings performance and thus underinvest in R&D. Second, capital markets can incorrectly price current earnings if investors are short-term oriented (Ellis, 2004) or misinterpret the persistence of earnings components (Sloan, 1996). Research suggests that investors and managers have a mutually reinforcing obsession with short-term performance, and such short-term focus motivates managers to actively participate in the earnings game (Fuller and Jensen, 2002; Rappaport, 2005).[3] As well-protected managers are inclined to make decisions that primarily generate private benefits for themselves rather than for shareholders, they may underinvest in R&D to increase current earnings. This boosts their firms' stock price and maximizes their compensation. Consequently, D&O insurance leads managers to act in their own interest at the expense of shareholders, and well-protected managers may be reluctant to pursue risky R&D activities and inclined to cut R&D to achieve near-term earnings performance. This leads to the following hypothesis:

Hypothesis 1: *Ceteris paribus*, firms with higher D&O insurance coverage are more likely to cut R&D to manage earnings.

3. Research Design

To capture managerial myopic behaviors, I follow Bushee (1998) and partition sample firms into three groups: a small earnings decrease (SD) group, a large earnings decrease (LD) group, and an earnings increase (IN) group. The SD group includes firm-years which have a decrease in the pre-tax, pre-R&D earnings from the previous year to the current year and in which the decrease is less than the previous year's R&D. Baber et al. (1991) and Bushee (1998) suggest that within this group, myopic managers can potentially avoid an earnings decrease by cutting the current year R&D. The LD group includes firm-years in which there is a decrease in the pre-tax, pre-R&D earnings from the previous year to the current year and in which the decrease is greater than the previous year's R&D. The IN group includes firm-years which have an increase in the pre-tax, pre-R&D earnings from the previous year to the current year. For LD and IN groups, cutting R&D is not helpful or necessary to achieve short-term earnings increase (Chen et al., 2015).

[3] Even when the capital markets are efficient, managerial myopic behavior can result so long as managers believe that markets can be fooled (Stein, 1989), which they do (Graham et al., 2005).

I run the following logit regression to test the effect of D&O insurance coverage on R&D cuts.

$$\begin{aligned}\text{Prob}(CUT_t = 1) = f(&\alpha_0 + \beta_1 DOLIMIT_t + \beta_2 PCRD_t + \beta_3 CIRD_t + \beta_4 CGDP_t + \beta_5 TOQ_t \\ &+ \beta_6 CSALES_t + \beta_7 CCAP_t + \beta_8 \text{Ln}MV_t + \beta_9 LEV_t + \beta_{10} FCF_t + \beta_{11} DIST_t \\ &+ \beta_{12} INSOWN + \beta_n YEAR + \beta_m IND + \varepsilon_t)\end{aligned} \quad (1)$$

where *CUT* is a dummy variable equal to 1 if R&D decreases relative to the previous year, 0 otherwise. *DOLIMIT* is D&O coverage limit scaled by market value of equity. *PCRD* is the difference in the natural logarithm of R&D between the previous year and the year before. *CIRD* is the difference in industry R&D intensity (R&D expenditures scaled by total sales) between the current year and the previous year, where the industry is defined using the two-digit Taiwan Economic Journal (TEJ) code. *CGDP* is the difference in the natural logarithm of GDP between the current year and the previous year. *TOQ* is the sum of market value of common equity and book value of debt, divided by the book value of total assets. *CSALES* is the difference in the natural logarithm of sales between the current year and the previous year. *CCAP* is the difference in the logarithm of capital expenditures between the current year and the previous year. Ln*MV* is the natural logarithm of market value of equity. *LEV* is total debts divided by total assets. *FCF* is operating cash flows minus capital expenditures, scaled by total assets. *DIST* is the change in pre-tax, pre-R&D earnings divided by previous year's R&D. *INSOWN* is the percentage of shares held by institutional investors.

In equation (1), the primary variable of interest is the coefficient on *DOLIMIT*. If well-protected managers are prone to cut R&D expenditures to manage earnings upwards, I would expect a positive and significant coefficient on *DOLIMIT* in the small earnings decrease (SD) group. By contrast, I expect that the coefficients on *DOLIMIT* would not be significant for the large earnings decrease (LD) and earnings increase (IN) groups.

Following Bushee (1998), I include several control variables that influence R&D investments and the likelihood of cutting R&D. First, I control for a firm's R&D investment opportunity set by using following proxies: (1) last year's change in R&D (*PCRD*) that captures the trend in R&D investments; (2) the change in industry R&D intensity (*CIRD*) that captures the R&D investment opportunity in the industry; (3) the change in GDP (*CGDP*) that captures the economy level of investment opportunity; and (4) Tobin's Q (*TOQ*), change in sales (*CSALES*), and change in capital expenditures (*CCAP*) that capture the firm's growth opportunities. Each of the above variables is expected to be negatively related to the likelihood of an R&D cut. Second, firm size (*SIZE*) is controlled for because smaller firms are more likely to suffer cash flow shortages that lead them to cut R&D. Third, leverage (*LEV*) is included in the model to capture the firm's incentives to increase earnings to reduce debt contracting costs. Fourth, free cash flows (*FCF*) is included to control for fund availability because firms have higher incentives to cut R&D when facing a serious cash shortage. Fifth, distance to earnings goal (*DIST*) is controlled for because larger distance increases the likelihood of an R&D cut to meet earnings goals. Fifth, institutional ownership (*INSOWN*) captures the monitoring by institutional investors and firms are less likely to engage in

earnings management through R&D reduction. Lastly, I include year dummies (*YEAR*) and industry dummies (*IND*) in the regression to control year and industry fixed effects.

4. Data Sample and Empirical Results

4.1 Sample

The initial sample includes nonfinancial firms listed in the Taiwan Stock Exchange (TSE) over the period 2008-2012.[4] The data concerning D&O insurance coverage, ownership structure, financial statement and stock price are obtained from Taiwan Economics Journal (TEJ) database.[5] Table 1 outlines the sample selection. I start with an initial sample of 7,143 firm-years for the empirical analysis. I delete 969 firm-years due to the lack of D&O insurance data. I drop 2,730 firm-years with missing or insignificant R&D expenditures (R&D expenditures less than 1% of sales). I exclude another 136 firm-years because they do not have sufficient data to calculate the regression variable. The final sample consists of 3,308 firm-year observations; 684 for SD group, 1,067 for LD group, and 1,557 for IN group.

Table 1. Sample Selection

	Firm-years
Non-financial firms listed on the Taiwan Stock Exchange from 2008 to 2012	7,143
Less:	
firms with missing D&O insurance data	969
Firms with missing R&D data in the current year	72
Firms with missing or insignificant R&D in the previous year	2,658
Firms without necessary data to calculate regression variables	136
Final sample	3,308
Small earnings decrease (SD) group	684
Large earnings decrease (LD) group	1,067
Earnings increase (IN) group	1,557

The SD group comprises firm-years for which $-RDEXP_{t-1} < (EBTRD_t\text{-}EBTRD_{t-1}) < 0$. The LD group comprises firm-years for which $(EBTRD_t\text{-}EBTRD_{t-1}) < -RDEXP_{t-1}$. The IN group comprises firm-years for which $(EBTRD_t\text{-}EBTRD_{t-1}) > 0$. *RDEXP* = R&D expenditures. *EBTRD* = pre-tax, pre-R&D earnings.

4.2 Descriptive Statistics

Table 2 presents descriptive statistics for the sample (Panel A) and the results of univariate tests that statistically assess the comparisons between SD group, LD group, and IN group (Panel B). To avoid the effect of outliers, all continuous variables are winsorized at the 1% and 99% tails. In Panel A, it is about 47% of the sample firm-years cut R&D expenditures. Overall, the average (median) D&O coverage limit (*Coverage_limit*) is \$170.989 million (\$87.374 million), and the mean (median) D&O coverage limit (*DOLIMIT*) accounts for 6.9% (2.0%) of market value of equity. In Panel B, for almost all of the variables, the mean for the SD group lies between those of the LD and IN groups, consistent with previous research (Bushee, 1998) that is concerned with the performance ranking of this three groups. In addition, the means difference of *CUT* and *DOLIMIT* between SD group and IN group are statistically significant at the 1% and 5% levels. This suggests that firms in SD group with

[4] I start with the year 2008 because it is the first year with public disclosure of D&O insurance coverage.
[5] The data for GDP is retrieved from National Statistics, R.O.C. (Taiwan) website.

higher likelihood of cutting R&D and higher D&O coverage. However, there is no significant difference between SD group and LD group in *CUT* and *DOLIMIT*.

Table 2. Descriptive Statistics

Panel A: Full sample

	Mean	Standard deviation	Q1	Median	Q3
CUT	0.468	0.499	0.000	0.000	1.000
Coverage_limit	170.989	362.660	0.000	87.374	194.985
DOLIMIT	0.069	0.140	0.000	0.020	0.072
PCRD	0.056	0.288	-0.093	0.045	0.189
CIRD	0.000	0.002	0.000	0.001	0.001
CGDP	0.019	0.038	-0.014	0.014	0.026
TOQ	1.426	0.767	0.916	1.202	1.687
CSALES	-0.015	0.303	-0.167	-0.009	0.142
CCAP	-0.078	1.214	-0.760	-0.080	0.585
Ln*MV*	14.841	1.405	13.861	14.713	15.695
LEV	0.323	0.156	0.201	0.309	0.423
FCF	0.037	0.100	-0.014	0.037	0.094
DIST	0.018	5.033	-1.614	-0.121	1.272
INSOWN	0.329	0.207	0.163	0.296	0.468

Panel B: Separately for the small earnings decrease (SD), large earnings decrease (LD), and earnings increase (IN) groups

	Mean			Differences in Means	
	SD group (n = 684)	LD group (n = 1,067)	IN group (n = 1,557)	SD versus LD	SD versus IN
CUT	0.518	0.540	0.397	-0.022	0.121***
DOLIMIT	0.073	0.078	0.061	-0.004	0.013**
PCRD	0.095	0.065	0.033	0.030**	0.062***
CIRD	0.001	0.001	0.000	-0.000***	0.001***
CGDP	0.015	0.009	0.028	0.007***	-0.013***
TOQ	1.416	1.160	1.613	0.256***	-0.198***
CSALES	-0.055	-0.166	0.107	0.111***	-0.162***
CCAP	-0.160	-0.180	0.027	0.020	-0.187***
Ln*MV*	14.753	14.628	15.025	0.125*	-0.273***
LEV	0.296	0.329	0.331	-0.032***	-0.035***
FCF	0.041	0.026	0.042	0.015***	-0.001
DIST	-0.451	-4.292	3.177	3.841***	-3.628***
INSOWN	0.325	0.317	0.338	0.008	-0.012

The SD group comprises firm-years for which $-RDEXP_{t-1} < (EBTRD_t\text{-}EBTRD_{t-1}) < 0$. The LD group comprises firm-years for which $(EBTRD_t\text{-}EBTRD_{t-1}) < -RDEXP_{t-1}$. The IN group comprises firm-years for which $(EBTRD_t\text{-}EBTRD_{t-1}) > 0$. *RDEXP* = R&D expenditures. *EBTRD* = pre-tax, pre-R&D earnings. Variable definitions: *CUT* = 1 if R&D decreases relative to the previous year, and 0 otherwise; *DOLIMIT* = D&O coverage limit scaled by market value of equity; *Coverage_limit* is the D&O insurance coverage limit measured in million dollars. *PCRD* = the difference in the natural logarithm of R&D between the previous year and the year before; *CIRD* = the difference in industry R&D intensity (R&D expenditures scaled by total sales) between the current year and the previous year, where the industry is defined using the two-digit Taiwan Economic Journal (TEJ) code; *CGDP* = the difference in the natural logarithm of GDP between the current year and the previous year; *TOQ* = the sum of market value of common equity and book value of debt, divided by the book value of total assets; *CSALES* = the difference in the natural logarithm of sales between the current year and the previous year; *CCAP* = the difference in the logarithm of capital expenditures between the current year and the previous year; Ln*MV* = the natural logarithm of market value of equity; *LEV* = total debts divided by total assets; *FCF* = operating cash flows minus capital expenditures, scaled by total assets; *DIST* = the change in pre-tax, pre-R&D earnings divided by previous year's R&D; *INSOWN* = the percentage of shares held by institutional investors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed tests).

4.3 Empirical Results

Table 3 presents logit regression results, first for SD group (Model 1) and then for LD group (Model 2) and IN group (Model 3). As shown in Model 1, the coefficient on *DOLIMIT* is positive and significant at the 5% level, consistent with the hypothesis that firms with higher D&O coverage are more likely to cut R&D to avoid earnings decreases. In addition, the marginal effect for *DOLIMIT* in Model 1, 0.308, when multiplied by the interquartile range of 0.091, suggests that moving from the first to the third quartile of *DOLIMIT* increases the probability of cutting R&D by approximately 3%. Among control variables, *CIRD* and *CCAP* are significantly associated with the likelihood of cutting R&D in predicted directions. On the other hand, *CGDP* and *DIS* are positively and negatively associated with *CUT*, respectively, which is inconsistent with my predictions.

In models 2 and 3, the coefficients on *DOLIMIT* are not significant at conventional levels. Consistent with my prediction, managers' incentives to cut R&D to avoid earnings decrease is low or non-existent in the LD and IN groups, and thus D&O coverage is not expected to affect the likelihood of cutting R&D.

Table 3. D&O Coverage and the Likelihood of Cutting R&D

		Dependent variable: *CUT*					
		Model 1 SD group		Model 2 LD group		Model 3 IN group	
	Predicted signs	Coefficient (*z*-statistic)	Marginal effect	Coefficient (*z*-statistic)	Marginal effect	Coefficient (*z*-statistic)	Marginal effect
DOLIMIT	+	2.315**	0.308	0.141	0.008	0.202	0.014
		(2.43)		(0.29)		(0.40)	
PCRD	–	-0.544	-0.137	-0.485**	-0.121	-0.891***	-0.227
		(-1.51)		(-2.08)		(-3.67)	
CIRD	–	-214.058**	-36.881	-59.675	-7.516	-16.985	-21.940
		(-2.35)		(-0.79)		(-0.37)	
CGDP	–	14.451**	-1.182	5.735	0.305	10.241*	-1.894
		(2.34)		(1.11)		(1.78)	
TOQ	–	-0.234	-0.035	-0.246	-0.038	-0.339***	-0.039
		(-1.53)		(-1.60)		(-3.29)	
CSALES	–	-0.830	-0.314	-1.873***	-0.485	-1.189***	-0.333
		(-1.43)		(-6.14)		(-4.70)	
CCAP	–	-0.201**	-0.053	-0.097*	-0.030	-0.232***	-0.055
		(-2.46)		(-1.73)		(-4.49)	
Ln*MV*	–	-0.079	-0.010	-0.079	-0.013	-0.252***	-0.048
		(-0.86)		(-1.24)		(-4.30)	
LEV	+	0.289	0.063	0.889**	0.196	-0.056	0.017
		(0.43)		(2.06)		(-0.13)	
FCF	–	1.065	-0.008	-0.774	-0.260	-2.061***	-0.570
		(1.03)		(-1.01)		(-2.76)	
DIST	+	-0.687**	-0.140	-0.001	0.000	0.006	0.003
		(-2.23)		(-0.05)		(0.41)	
INSOWN	+	-0.419	-0.140	-0.224	-0.020	-0.121	-0.079
		(-0.85)		(-0.60)		(-0.36)	
Intercept		15.584***		0.986		5.412***	
		(11.00)		(0.88)		(4.25)	
Year / Industry dummy variables		Included		Included		Included	
Pseudo R^2		0.108		0.084		0.155	
n		684		1,067		1,557	

The SD group comprises firm-years for which $-RDEXP_{t-1} < (EBTRD_t\text{-}EBTRD_{t-1}) < 0$. The LD group comprises firm-years for which $(EBTRD_t\text{-}EBTRD_{t-1}) < -RDEXP_{t-1}$. The IN group comprises firm-years for which $(EBTRD_t\text{-}EBTRD_{t-1}) > 0$. *RDEXP* = R&D expenditures. *EBTRD* = pre-tax, pre-R&D earnings. Variable definitions: *CUT* = 1 if R&D decreases relative to the previous year, and 0 otherwise; *DOLIMIT* = D&O coverage limit scaled by market value of equity; *PCRD* = the difference in the natural logarithm of R&D between the previous year and the year before; *CIRD* = the difference in industry R&D intensity (R&D expenditures scaled by total sales) between the current year and the previous year, where the industry is defined using the two-digit Taiwan Economic Journal (TEJ) code; *CGDP* = the difference in the natural logarithm of GDP between the current year and the previous year; *TOQ* = the sum of market value of common equity and book value of debt, divided by the book value of total assets; *CSALES* = the difference in the natural logarithm of sales between the current year and the previous year; *CCAP* = the difference in the logarithm of capital expenditures between the current year and the previous year; Ln*MV* = the natural logarithm of market value of equity; *LEV* = total debts divided by total assets; *FCF* = operating cash flows minus capital expenditures, scaled by total assets; *DIST* = the change in pre-tax, pre-R&D earnings divided by previous year's R&D; *INSOWN* = the percentage of shares held by institutional investors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed tests). The *z*-statistics in parentheses are based on standard errors adjusted for clustering at the firm level.

4.4 Robustness Checks

4.4.1 Endogeneity

To address the endogeneity issue for managerial myopic behaviors and D&O insurance purchase decision, I use a two-stage estimation technique developed by Heckman (1979). In the first stage, I estimate a probit model to obtain the inverse Mills ratio (*IMR*) by using variables that previous studies (e.g., Core, 1997, O'Sullivan, 2002, Chung and Whynn, 2008) have found to affect D&O purchase decision. In the second stage, I include *IMR* in equation (1) as an additional control variable to correct for potential endogeneity bias. The first-stage probit model is specified as follows.

$$\begin{aligned}\text{Prob}(PURCHASE_t=1)= f(&\gamma_0+\gamma_1 \text{Ln}MV_t+\gamma_2 LEV_t+\gamma_3 MTB_t+\gamma_4 CEOOWN_t+\gamma_5 OUTOWN_t\\ &+\gamma_6 ACQU_t+\gamma_7 DIVE_t+\gamma_8 CROSS_t+\gamma_9 HITE_t+\gamma_{10} EXCASH_t \\ &+\gamma_n YEAR+\gamma_m IND+\varepsilon_t)\end{aligned} \quad (2)$$

where *PURCHASE* is a dummy variable equal to 1 if the firm carries D&O insurance coverage, 0 otherwise. *MTB* is market-to-book ratio. *CEOOWN* is the percentage of shares held by CEO. *OUTOWN* is the percentage of shares held by outside blockholders. *ACQU* is a dummy equal to 1 if the book value of total assets at the fiscal year-end increases by more than 25% from the beginning of the fiscal year, 0 otherwise. *DIVE* is a dummy equal to 1 if the book value of total assets at the fiscal year-end decreases by more than 25% from the beginning of the fiscal year, 0 otherwise. *CROSS* is a dummy variable equal to 1 if the firm is cross-listed in a foreign stock exchange, 0 otherwise. *EXCASH* is the residual from the regression of cash on determinants of cash holdings.[6] Other variables are defined as before.

The results of this analysis are shown in Table 4. The coefficient on *DOLIMIT* remains significant with expected positive sign, whereas the coefficient on *IMR* is not significant at conventional levels. This suggests that the main results unlikely to be driven by the potential endogeneity problem associated with D&O purchase decision.

[6] Following Chung and Wynn (2008), cash holdings is defined as the sum of cash, cash equivalents, and short-term investments. The determinants of cash holdings include firm size, market-to-book ratio, leverage ratio, cash flow (defined as earnings before depreciation and amortization, less interest, taxes, and common dividends), net working capital (excluding cash), percentage of independent directors on the board, outside blockholder ownership, engagement in divestures, cross-listing status, and membership in high-tech industry, where cash holdings, cash flow, and net working capital are all scaled by lagged total assets.

Table 4. Endogeneity

		Dependent variable: *CUT*	
		SD group	
	Predicted signs	Coefficient	*z*-statistic
DOLIMIT	+	2.439**	2.53
PCRD	–	-0.537	-1.47
CIRD	–	-205.769**	-2.25
CGDP	–	17.337**	2.52
TOQ	–	-0.223	-1.47
CSALES	–	-0.894	-1.50
CCAP	–	-0.190**	-2.30
Ln*MV*	–	-0.009	-0.07
LEV	+	0.328	0.49
FCF	–	1.087	1.05
DIST	+	-0.666**	-2.16
INSOWN	+	-0.386	-0.78
IMR		0.895	1.10
Intercept		13.323***	5.05
Year / Industry dummy variables		Included	
Pseudo R^2		0.108	
n		682	

The SD group comprises firm-years for which $-RDEXP_{t-1} < (EBTRD_t\text{-}EBTRD_{t-1}) < 0$. *RDEXP* = R&D expenditures. *EBTRD* = pre-tax, pre-R&D earnings. Variable definitions: *CUT* = 1 if R&D decreases relative to the previous year, and 0 otherwise; *DOLIMIT* = D&O coverage limit scaled by market value of equity; *PCRD* = the difference in the natural logarithm of R&D between the previous year and the year before; *CIRD* = the difference in industry R&D intensity (R&D expenditures scaled by total sales) between the current year and the previous year, where the industry is defined using the two-digit Taiwan Economic Journal (TEJ) code; *CGDP* = the difference in the natural logarithm of GDP between the current year and the previous year; *TOQ* = the sum of market value of common equity and book value of debt, divided by the book value of total assets; *CSALES* = the difference in the natural logarithm of sales between the current year and the previous year; *CCAP* = the difference in the logarithm of capital expenditures between the current year and the previous year; Ln*MV* = the natural logarithm of market value of equity; *LEV* = total debts divided by total assets; *FCF* = operating cash flows minus capital expenditures, scaled by total assets; *DIST* = the change in pre-tax, pre-R&D earnings divided by previous year's R&D; *INSOWN* = the percentage of shares held by institutional investors. *IMR* = the inverse Mills ratio obtained from equation (2). *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed tests). The *z*-statistics are based on standard errors adjusted for clustering at the firm level.

4.4.2 Alternative Measure of D&O Coverage

This paper adopts the raw D&O coverage levels (coverage limits deflated by market value of equity) as the independent variable of interest in the primary test. To provide more direct and compelling evidence on whether abnormally high D&O coverage increases the likelihood of cutting R&D, I replace the raw coverage variable by an estimated abnormal D&O coverage, *ABDOLIMIT*, which is defined as the residual from the regression of coverage limits on its determinants[7]. As shown in Table 5, the coefficient on *ABDOLIMIT* is still positive and significant. This suggests that the results based on abnormal D&O coverage as the dependent

[7] Following Wynn (2008) and Chung et al. (2013), the determinants of D&O insurance coverage limits include firm size, leverage ratio, cash holdings, volatility of stock returns (measured as the natural logarithm of annualized variance of daily return over the current fiscal year), percentage of independent directors on the board, outside blockholder ownership, cross-listed status, and membership in high-tech industry.

variable are very similar to those reported in the paper using D&O coverage levels.

Table 5. Abnormal D&O Coverage

		Dependent variable: *CUT*	
		SD group	
	Predicted signs	Coefficient	*z*-statistic
ABDOLIMIT	+	2.225**	2.33
PCRD	–	-0.540	-1.50
CIRD	–	-211.079**	-2.35
CGDP	–	13.707**	2.23
TOQ	–	-0.219	-1.44
CSALES	–	-0.836	-1.44
CCAP	–	-0.201**	-2.46
Ln*MV*	–	-0.148*	-1.66
LEV	+	0.442	0.66
FCF	–	0.985	0.96
DIST	+	-0.680**	-2.21
INSOWN	+	-0.363	-0.74
Intercept		16.861***	12.32
Year / Industry dummy variables		Included	
Pseudo R^2		0.106	
n		684	

The SD group comprises firm-years for which $-RDEXP_{t-1} < (EBTRD_t - EBTRD_{t-1}) < 0$. *RDEXP* = R&D expenditures. *EBTRD* = pre-tax, pre-R&D earnings. Variable definitions: *CUT* = 1 if R&D decreases relative to the previous year, and 0 otherwise; *ABDOLIMIT* = the residual from the regression of *DOLIMIT* on the economic determinants of D&O coverage; *DOLIMIT* = D&O coverage limit scaled by market value of equity; *PCRD* = the difference in the natural logarithm of R&D between the previous year and the year before; *CIRD* = the difference in industry R&D intensity (R&D expenditures scaled by total sales) between the current year and the previous year, where the industry is defined using the two-digit Taiwan Economic Journal (TEJ) code; *CGDP* = the difference in the natural logarithm of GDP between the current year and the previous year; *TOQ* = the sum of market value of common equity and book value of debt, divided by the book value of total assets; *CSALES* = the difference in the natural logarithm of sales between the current year and the previous year; *CCAP* = the difference in the logarithm of capital expenditures between the current year and the previous year; Ln*MV* = the natural logarithm of market value of equity; *LEV* = total debts divided by total assets; *FCF* = operating cash flows minus capital expenditures, scaled by total assets; *DIST* = the change in pre-tax, pre-R&D earnings divided by previous year's R&D; *INSOWN* = the percentage of shares held by institutional investors. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed tests). The *z*-statistics are based on standard errors adjusted for clustering at the firm level.

4.4.3 Alternative Measure of Myopic R&D Cutting Behavior

In addition to using the previous year's R&D expenditures as a benchmark, I also adopt the normal level of R&D expenditures using the model developed by Roychowdhury (2006). To estimate the model, I run the following cross-sectional regression for each industry (defined by two-digit TEJ codes) and year.

$$\frac{RDEXP_t}{ASSET_{t-1}} = \theta_0 + \theta_1 \frac{1}{ASSET_{t-1}} + \theta_2 \frac{SALES_{t-1}}{ASSET_{t-1}} + \varepsilon_t \quad (3)$$

where *RDEXP* is R&D expenditures, *ASSET* is total assets, and *SALES* is total sales. Consistent with Roychowdhury (2006), I require at least 15 observations for each

industry-year grouping. The abnormal level of R&D expenditures is measured as the estimated residual from equation (3). I then create a dummy variable, *NEGABRD*, which equals 1 if firms with negative abnormal R&D expenditures, 0 otherwise. I further exclude firms that issue seasoned equity offerings as they are inclined to seek external financing due to existing R&D projects. Hence, the exclusion of such firms may produce a cleaner sample that exhibits incentives to manage earnings towards performance targets and thus increases the power of the tests. In Table 6, the regression with *NEGABRD* as the dependent variable shows that the coefficient on *DOLIMIT* is positive and significant (marginally significant). Therefore, the results are robust to alternative measures of managerial myopia.

Table 6. Abnormal R&D Expenditure

		Dependent variable: *NEGABRD*	
		SD group	
	Predicted signs	Coefficient	*z*-statistic
DOLIMIT	+	-1.704*	-1.79
PCRD	–	-1.604***	-3.33
CIRD	–	14.029	0.12
CGDP	–	24.693***	2.98
TOQ	–	-0.774***	-3.54
CSALES	–	1.212**	2.09
CCAP	–	-0.187**	-2.01
Ln*MV*	–	-0.363***	-3.40
LEV	+	2.107***	2.87
FCF	–	-0.469	-0.38
DIST	+	-1.184***	-3.31
INSOWN	+	1.394**	2.40
Intercept		-12.075	-0.02
Year / Industry dummy variables		Included	
Pseudo R^2		0.174	
n		598	

The SD group comprises firm-years for which $-RDEXP_{t-1} < (EBTRD_t - EBTRD_{t-1}) < 0$. *RDEXP* = R&D expenditures. *EBTRD* = pre-tax, pre-R&D earnings. Variable definitions: *NEGABRD* = 1 if firms with negative abnormal R&D expenditures, and 0 otherwise, where abnormal R&D expenditures is calculated using the method of Roychowdhury (2006); *DOLIMIT* = D&O coverage limit scaled by market value of equity; *PCRD* = the difference in the natural logarithm of R&D between the previous year and the year before; *CIRD* = the difference in industry R&D intensity (R&D expenditures scaled by total sales) between the current year and the previous year, where the industry is defined using the two-digit Taiwan Economic Journal (TEJ) code; *CGDP* = the difference in the natural logarithm of GDP between the current year and the previous year; *TOQ* = the sum of market value of common equity and book value of debt, divided by the book value of total assets; *CSALES* = the difference in the natural logarithm of sales between the current year and the previous year; *CCAP* = the difference in the logarithm of capital expenditures between the current year and the previous year; Ln*MV* = the natural logarithm of market value of equity; *LEV* = total debts divided by total assets; *FCF* = operating cash flows minus capital expenditures, scaled by total assets; *DIST* = the change in pre-tax, pre-R&D earnings divided by previous year's R&D; *INSOWN* = the percentage of shares held by institutional investors. *IMR* = the inverse Mills ratio obtained from equation (2). *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively (two-tailed tests). The *z*-statistics are based on standard errors adjusted for clustering at the firm level.

5. Conclusion

In this paper, I examine whether D&O insurance coverage results in managerial myopia.

Managers have incentives to boost short term performance to achieve targets for compensation and other contract reasons. D&O insurance could cause moral hazard problems and provide managers with incentives to take actions that attain their personal goals. I thus argue that D&O insurance increases managers' incentives to cut R&D expenditures to achieve earnings targets. Using a sample of 3,308 firm-years from Taiwanese listed firms over the period 2008-2012 that have D&O insurance information and material R&D expenditures (i.e., greater than 1% of sales). I partition the sample into three groups. The small earnings decrease group comprises firms with declines in pre-tax, pre-R&D earnings less than the amount of previous year's R&D expenditures. In these firms, managers have incentives to cut R&D to avoid earnings declines. Therefore, D&O insurance coverage is predicted to increase the likelihood of cutting R&D for this group. For firms that have a large decrease or an increase in the pre-tax, pre-R&D earnings, managers do not have incentives to reduce R&D to avoid earnings decreases because it is not feasible or necessary to do so. They are treated as control groups.

Consistent with my prediction, I find that firms with higher D&O insurance coverage tend to have a significantly higher incidence of cutting R&D in the small earnings decrease group. Also as expected, the impact of D&O insurance coverage is not significant for the control groups. The results are robust to controlling for endogeneity bias by using a Heckman self-selection model and to alternative measures of D&O insurance coverage and myopic R&D cuts. At the practical level, this study has important implications for regulators and accounting standard-setters in their attempts to protect outside investors in the market place. Regulators may need to oversee the amounts of D&O insurance coverage purchased by firms and require them to strengthen corporate governance effectiveness.

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