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Published online: 04 Nov 2016.

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# Directors' and officers' liability insurance and the trade-off between real and accrual-based earnings management*

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**ABSTRACT**

In this study, we examine whether directors' and officers' legal liabilities affect their choices of different means of earnings management. We focus on listed firms in Taiwan, where information on directors' and officers' liability insurance is publicly available. Consistent with prior studies, we find that insured firms are more likely to use accrual-based earnings management. However, we demonstrate that the level of overall earnings management is marginally lower for insured firms because they rely less on costly real earnings management. Our findings suggest that carrying directors' and officers' liability insurance may, to some extent, mitigate costs resulting from earnings management.

## 1. Introduction

In general, directors' and officers' liability (D&O) insurance is purchased in order to protect the directors and officers of firms from personal liabilities in the event of litigation by stakeholders. Providing D&O insurance, however, may induce unintended moral hazards by shielding directors and officers from the potential consequences of stakeholder litigation. Relatedly, prior studies indicate that insured firms engage in opportunistic behavior during certain corporate events (Chalmers, Dann, and Harford 2002; Lin, Officer, and Zou 2011; Lin et al. 2013; Chan and Chen 2014). The reduction in the legal liabilities of directors and officers provided by D&O insurance also influences their financial reporting strategies (Chung and Wynn 2008; Wynn 2008; Lin et al. 2013). In this paper, we revisit the subject of the effects of D&O insurance on firms' financial reporting strategies by investigating whether the protection afforded by D&O insurance influences firms' trade-offs between different means of earnings management.

Because large negative earnings surprises increase the likelihood of costly stakeholder litigation, managers have incentives to voluntarily disclose loss information early (Skinner 1994). In contrast, managers may be less willing to disclose or recognize losses in a timely manner if they have adequate indemnification from D&O insurance (Chung and Wynn 2008; Wynn 2008). In addition, recognizing accrued losses in a less timely manner suggests that managers may have more freedom and greater incentives to engage in accrual-based earnings management (Gao 2013). However, accrual-based earnings management is more likely to incur lawsuits, despite being within the bounds of generally

accepted accounting principles (GAAP) (Graham, Harvey, and Rajgopal 2005). Therefore, we predict that uninsured directors and officers will use real earnings management to minimize their expected legal liabilities, because real earnings management involves less litigation risk. However, compared with accrual-based earnings management, real earnings management is less flexible and incurs more severe long-term underperformance. We thus predict that accrual-based earnings management is more pronounced when directors and officers have adequate legal liability coverage.

Our predictions are confirmed by evidence from past studies indicating that litigation risk influences firms' trade-offs between earnings management methods (Graham, Harvey, and Rajgopal 2005; Cohen, Dey, and Lys 2008; Cohen and Zarowin 2010; Zang 2012). However, prior studies mainly measure litigation risk at an industry-wide level or measure it according to regulatory pressure imposed by the Sarbanes-Oxley Act (SOX). This motivated us to investigate how directors' and officers' tolerance for litigation risk, when shifted by D&O insurance, influences their choices of earnings management means. Moreover, there is an ongoing debate about the pros and cons of acquiring D&O insurance. By comparing the respective costs of real and accrual-based earnings management, our findings are expected to convey different insights about the effect of providing D&O insurance.

We investigate listed firms in Taiwan, where information on D&O insurance has been publicly available since 2008. In Taiwan, the development of the D&O insurance industry is still at a relatively early stage; however, Taiwanese data exhibit a couple of characteristics. First, Taiwanese insurers generally refer to the insurance commodities offered in Western nations and provide similar D&O insurance policies. Second, a series of accounting scandals occurred in Taiwan from 2003 to 2005; consequently, Taiwan's government introduced strict regulations similar to SOX. D&O insurance information is not publicly available for US firms. However, because of similar insurance and regulation circumstances in both Taiwan and Western nations, our findings are expected to enrich our understanding of the different earnings management behaviors of insured and uninsured firms.

Our results consistently suggest that the protection of D&O insurance is associated with lower and higher levels of real and accrual-based earnings management, respectively. We also investigate how D&O insurance protection influences overall earnings management, which is the sum of real and accrual-based earnings management. We find marginally lower levels of overall earnings management in insured firms than in uninsured firms, implying that D&O insurance protection has a more pronounced impact on firms' trade-offs between earnings management means than it does on firms' incentives to manage earnings numbers. Furthermore, our results indicate that the protection of D&O insurance influences the trade-off between earnings management methods mainly when firms are exposed to a controllable level of litigation risk.

Our findings contribute to the earnings management literature. Although prior studies indicate that litigation risk influences firms' trade-offs between real and accrual-based earnings management, they have mainly focused on industry-wide litigation risk (Cohen and Zarowin 2010) or regulatory pressure imposed by SOX (Cohen, Dey, and Lys 2008; Cohen and Zarowin 2010; Zang 2012). However, directors and officers are ultimately responsible for financial statements and must select earnings management means according to their legal liabilities. Our study thus provides the first empirical evidence that directors' and officers' legal liabilities are a determinant of the aforementioned trade-off.

In addition to directly contributing to the understanding of the trade-off between earnings management methods, our findings also expand the literature regarding D&O insurance. We find that insured firms prefer accrual-based earnings management, which corresponds with past findings that the protection of D&O insurance is associated with weak corporate governance (Lin, Officer, and Zou 2011; Lin et al. 2013). However, our findings suggest that overall earnings management is not necessarily critical to insured firms. Our findings also indicate that, without D&O insurance protection, firms may rely more on real earnings management, which could prove costly in the long run (Graham, Harvey, and Rajgopal 2005; Cohen and Zarowin 2010; Kothari, Mizik, and Roychowdhury 2016). This suggests that carrying D&O insurance may, to some extent, mitigate costs resulting from earnings management.

The remainder of this paper is organized as follows. In the second section, we briefly review the related literature and develop our hypotheses. The sample selection and empirical design are introduced in the subsequent two sections. In the fifth section, we report our empirical results. Robustness tests are addressed in the sixth section, and the final section draws conclusions.

## 2. Literature review and hypothesis development

More than 70% of listed firms in developed nations such as Canada are covered by D&O insurance. As Core (1997) explains:

> The D&O policy is purchased and owned by the firm but covers the firm's directors and officers. Should a director or officer have to settle or defend a lawsuit related to his or her service to the firm, the D&O policy will reimburse the associated expense (subject to the policy limit and deductible), provided that the director or officer had acted honestly and in good faith. (63)

This suggests that as long as insured directors and officers have acted honestly and in good faith, any loss caused by their mistakes should not affect their personal wealth. Ideally, the mechanism of D&O insurance should encourage managers to perform their duties diligently and bear risk. To some extent, this outcome could be beneficial because of the reduced likelihood of underinvestment (Bhagat, Brickley, and Coles 1987; Core 1997). Both Holderness (1990) and Core (2000) indicate that D&O insurers in underwriting monitor the corporate governance of insured firms, which also benefits stakeholders. Moreover, the protection of D&O insurance may help to attract or retain competent outside directors, thereby improving board capability (Priest 1987; O'Sullivan 1997).

Although the preceding arguments seem intuitive, insured directors and officers may become negligent or take unnecessary risks, consequently impairing firm performance. Baker and Griffith (2007), in contrast with Holderness (1990) and Core (2000), find that D&O insurers neither monitor the corporate governance of insured firms during the life of the insurance contract nor manage litigation defense costs once claims arise. Some studies question the value of D&O insurance by considering its costs. For example, Chalmers, Dann, and Harford (2002), analyzing 72 initial public offerings (IPOs), report a negative relation between post-IPO stock price performance and D&O insurance coverage purchased in conjunction with IPOs. In a study of Canadian acquisitions, Lin, Officer, and Zou (2011) report a negative link between acquirers' abnormal returns surrounding the announcement date and D&O insurance coverage. Lin et al. (2013) further show that firms with higher D&O insurance coverage have higher loan spreads and exhibit increased risk-taking behavior. Chan and Chen (2014) note that Taiwanese firms covered by D&O insurance are more likely to have a higher degree of overinvestment.

Regarding financial reporting problems, Wynn (2008) finds that firms with excess cash for indemnification voluntarily disclose bad news both less frequently and in a less timely manner, while Chung and Wynn (2008) report that firms with higher D&O insurance coverage and cash for indemnification exhibit less timely loss recognition. These studies indicate that directors and officers change their financial reporting strategies according to their legal liabilities. According to the argument posited by Gao (2013) that delayed loss recognition aggravates the freedom and incentives of managing accruals upward, we examine the effect of D&O insurance from a different angle. Specifically, we aim to provide insights into the effects of D&O insurance by comparing the respective costs of real and accrual-based earnings management.

Firms manage both accruals and real activities to mislead stakeholders into believing that certain financial reporting goals have been met. Accrual-based earnings management involves the selection of accounting procedures or estimates that conform to GAAP. Examples include underestimating bad debt expenses and delaying asset write-offs. Real earnings management is implicated in departures from normal operational practices; examples include sales manipulation, overproduction, and discretionary expenditure reduction.

Prior studies indicate that firms select real or accrual-based earnings management according to the relative costs of each method (Cohen, Dey, and Lys 2008; Cohen and Zarowin 2010; Chi, Lisic, and Pevzner 2011; Burnett et al. 2012; Zang 2012). Litigation risk plays an essential role as one of the

various costs incurred by accrual-based earnings management. Compared with real earnings management, accrual-based earnings management incurs a higher level of litigation risk, despite being manifested within the bounds of GAAP.[1] This litigation concern has become more pronounced in the aftermath of accounting scandals around 2001 and the certification requirements imposed by stricter regulations.[2] Therefore, firms have shifted from accrual-based to real earnings management in the post-SOX period (Graham, Harvey, and Rajgopal 2005; Cohen, Dey, and Lys 2008; Cohen and Zarowin 2010; Zang 2012).[3] Studies considering these changes have mainly measured litigation risk faced by high litigation industries or regulatory pressure imposed by SOX. Managers are ultimately responsible for financial reporting, but how their tolerance for litigation risk influences their choices of different earnings management methods is still unclear. To shed light on this line of inquiry, we devote our attention to a firm-specific mechanism – D&O insurance that causes directors and officers to vary with regard to their legal liabilities and tolerances for litigation risk.

Real earnings management also has its costs. Compared with accrual-based earnings management, which is mainly implicated in paper gains or paper losses, real earnings management causes departures from firms' normal operational practices and, eventually, more severe long-term underperformance (Graham, Harvey, and Rajgopal 2005; Cohen and Zarowin 2010; Kothari, Mizik, and Roychowdhury 2016). Moreover, firms may have difficulties controlling the final effect on earnings attained by real earnings management. In contrast, accrual-based earnings management affects reported earnings more immediately and directly, because firms can still adjust their accruals after the end of the fiscal year but before the earnings announcement date (Zang 2012).

Generally, D&O insurance indemnifies directors and officers for damages, settlements, and legal expenses caused by wrongful acts such as errors, misstatements, misleading statements, omissions, and negligence (Chung and Wynn 2008).[4] Accrual-based earnings management, despite being manifested within the bounds of GAAP, is more likely to incur lawsuits, personal damages, or legal expenses in the litigious post-SOX period. Therefore, directors and officers who lack adequate indemnification from D&O insurance use real earnings management to minimize their expected legal liabilities. In contrast, directors and officers with adequate legal liability coverage are likely to use accrual-based earnings management, which is more flexible and leads to less long-term underperformance. In addition to having higher tolerance for litigation risk, insured directors may be negligent in monitoring officers' earnings management behavior (Lin et al. 2013; Aguir et al. 2014). Therefore, insured officers will have more chances to manage reported accruals and rely less on inflexible real earnings management.

In brief, we expect that directors' and officers' legal liabilities will affect the trade-off between earnings management means. We thus formulate the following hypotheses:

H1: *Ceteris paribus*, firms with D&O insurance have higher levels of accrual-based earnings management.

H2: *Ceteris paribus*, firms with D&O insurance have lower levels of real earnings management.

## 3. Sample selection

To test our hypotheses, we investigate firms listed in Taiwan from 2008 to 2013. The sample period begins in 2008 because of the availability of information related to D&O insurance. We exclude financial firms because they are highly regulated. After requiring at least 20 observations in each industry-year to estimate earnings management measures and eliminate observations with missing variables, our sample contains 6135 firm-year observations. All variables are extracted from the Taiwan Economic Journal database. All continuous variables are winsorized at the 1- and 99-percent levels to mitigate bias from outliers.

## 4. Research design

This section presents the empirical measures of earnings management and D&O insurance, and then develops our empirical model. All variable descriptions are summarized in Appendix A.

### 4.1. Measuring real earnings management

We follow Roychowdhury (2006) to estimate abnormal levels of operating cash flows, discretionary expenditures, and production.

$$CFO_{it}/A_{it-1} = \alpha_0 + \alpha_1\left(1/A_{it-1}\right) + \alpha_2\left(S_{it}/A_{it-1}\right) + \alpha_3\left(\Delta S_{it}/A_{it-1}\right) + \varepsilon_{it} \tag{1}$$

$$DISEXP_{it}/A_{it-1} = \alpha_0 + \alpha_1\left(1/A_{it-1}\right) + \alpha_2\left(S_{it-1}/A_{it-1}\right) + \varepsilon_{it} \tag{2}$$

$$PROD_{it}/A_{it-1} = \alpha_0 + \alpha_1\left(1/A_{it-1}\right) + \alpha_2\left(S_{it}/A_{it-1}\right) + \alpha_3\left(\Delta S_{it}/A_{it-1}\right) + \alpha_4\left(\Delta S_{it-1}/A_{it-1}\right) + \varepsilon_{it} \tag{3}$$

where $CFO$ is operating cash flows; $A$ is total assets; $S$ is net sales; $\Delta S$ is the change in net sales; $DISEXP$ is the sum of research and development, sales, general and administrative, and advertising expenses; and $PROD$ is the sum of costs of goods sold and the change in inventories.

Equations (1)–(3) are estimated for each industry and year with at least 20 observations. Price discounts and lenient credit terms make net sales generate abnormally low operating cash flows, while firms reducing discretionary spending exhibit abnormally low discretionary expenditures. Thus, the residuals estimated from Equations (1) and (2) are multiplied by −1 and are coded as $ABCFO$ and $ABEXP$, respectively. We use $ABCFO$ and $ABEXP$ to proxy sales manipulation and discretionary expenditure reduction, respectively. The residual of Equation (3) is used directly to measure overproduction and is coded as $ABPROD$. We also follow Cohen and Zarowin (2010) and Chan et al. (2015) to create two comprehensive measures of real earnings management. Specifically, we add $ABCFO$ and $ABEXP$ to make $REM$1, and add $ABPROD$ and $ABEXP$ to make $REM$2.

### 4.2. Measuring accrual-based earnings management

We follow Dechow, Sloan, and Sweeney (1995) to calculate discretionary accruals by the estimated coefficients from Equation (4):

$$TACC_{it}/A_{it-1} = \alpha_0 + \alpha_1\left(1/A_{it-1}\right) + \alpha_2\left(\Delta S_{it}/A_{it-1}\right) + \alpha_3\left(PPE_{it}/A_{it-1}\right) + \varepsilon_{it} \tag{4}$$

where $TACC$ is income before extraordinary items less operating cash flows; and $PPE$ is gross property, plant, and equipment. Other variables are defined as those in Equations (1–3).

Equation (4) is estimated for each industry and year with at least 20 observations. We calculate nondiscretionary accruals as $\hat{\alpha}_0 + \hat{\alpha}_1\left(1/A_{it-1}\right) + \hat{\alpha}_2\left((\Delta S_{it} - \Delta REC_{it})/A_{it-1}\right) + \hat{\alpha}_3\left(PPE_{it}/A_{it-1}\right)$, where $\Delta REC$ is the change in accounts receivable. Discretionary accruals are the difference between $TACC_{it}/A_{it-1}$ and nondiscretionary accruals. We follow Ashbaugh-Skaife et al. (2008) to calculate the performance-matched discretionary accruals. For each industry-year, observations are divided into ten portfolios by sorting the previous year's return on assets. The performance-matched discretionary accruals are discretionary accruals less the median of discretionary accruals in the respective performance-matched portfolio, where the median is calculated without the value of the particular sample firm. We code the performance-matched discretionary accruals as $AEM$, and use $AEM$ to proxy accrual-based earnings management.

### 4.3. Measuring D&O insurance

We use an indicator variable (i.e. $D\&O$) to differentiate firms with and without D&O insurance protection.[5] Although this approach is applied extensively in prior studies (Core 1997; O'Sullivan 2002; Lin, Officer, and Zou 2011; Lin et al. 2013), it may have the limitation of determining the protection level

or firms' incentive to acquire this insurance. Thus, we examine D&O insurance coverage and excess D&O insurance coverage in the 'Robustness tests' section that follows below. These robustness tests enable further consideration of whether the propensity for a specific earnings management method is associated with the protection level of D&O insurance.[6]

### 4.4. Empirical model

We use Equations (5) and (6) to investigate how D&O insurance protection influences firms' trade-offs between accrual-based and real earnings management.

$$
\begin{aligned}
AEM_{it} = {}& \beta_0 + \beta_1 D\&O_{it} + \beta_2 ASSETS_{it} + \beta_3 MB_{it} \\
& + \beta_4 SALEG_{it} + \beta_5 ROA_{it} + \beta_6 ZSCORE_{it} + \beta_7 MKTSHARE_{it} + \beta_8 MTR_{it} + \beta_9 INST_{it} \\
& + \beta_{10} BIGN_{it} + \beta_{11} ATENURE_{it} + \beta_{12} CYCLE_{it} + \beta_{13} NOA_{it-1} + \beta_{14} M\&A_{it} \\
& + \beta_{15} RESTRUCT_{it} + \beta_{16} WRITEOFF_{it} + \beta_{17} REM1_{it} + \gamma YEAR + \delta INDUSTRY + \varepsilon_{it}
\end{aligned}
\tag{5}
$$

$$
\begin{aligned}
REM_{it} = {}& \beta_0 + \beta_1 D\&O_{it} + \beta_2 ASSETS_{it} + \beta_3 MB_{it} \\
& + \beta_4 SALEG_{it} + \beta_5 ROA_{it} + \beta_6 ZSCORE_{it} + \beta_7 MKTSHARE_{it} + \beta_8 MTR_{it} + \beta_9 INST_{it} \\
& + \beta_{10} BIGN_{it} + \beta_{11} ATENURE_{it} + \beta_{12} CYCLE_{it} + \beta_{13} NOA_{it-1} + \beta_{14} M\&A_{it} \\
& + \beta_{15} RESTRUCT_{it} + \beta_{16} WRITEOFF_{it} + \beta_{17} AEM_{it} + \gamma YEAR + \delta INDUSTRY + \varepsilon_{it}
\end{aligned}
\tag{6}
$$

where *AEM* is the performance-matched discretionary current accruals described in the preceding section; *REM* is *ABCFO*, *ABEXP*, *ABPROD*, *REM*1, or *REM*2 described in the preceding section; *D&O* equals one if a firm is protected by D&O insurance during the fiscal year, and zero otherwise; *ASSETS* is the natural logarithm of total assets; *MB* is the market-to-book ratio; *SALEG* is yearly sales growth; *ROA* is income before extraordinary items divided by total assets at the beginning of the fiscal year; *ZSCORE* is the Z-score in Altman (1968)[7]; *MKTSHARE* is net sales divided by the industry-year total of net sales; *MTR* is the marginal tax rate; *INST* is the proportion of shares held by institutional investors; *BIGN* equals one if a firm is audited by a big audit firm, and zero otherwise; *ATENURE* equals one if a firm's auditor tenure is above the yearly median of auditor tenure, and zero otherwise; *CYCLE* is days inventory outstanding plus days sales outstanding less days payables outstanding; *NOA* equals one if a firm's net operating assets divided by net sales is above the industry-year median of net operating assets divided by net sales, and zero otherwise[8]; *M&A* equals one if a firm undergoes mergers and acquisitions, and zero otherwise; *RESTRUCT* equals one if a firm undergoes restructuring activities, and zero otherwise; *WRITEOFF* equals one if a firm reports assets write-downs, and zero otherwise; *YEAR* is the set of indicator variables that represent various years; and *INDUSTRY* is the set of indicator variables that represent various industries.

Hypothesis 1 predicts a positive $\beta_1$ in Equation (5), and Hypothesis 2 predicts a negative $\beta_1$ in Equation (6). According to Zang (2012), Equations (5) and (6) include control variables related to the costs of the two earnings management methods. Accrual-based earnings management is constrained by accounting flexibility, which implies a negative and positive coefficient on *NOA* and *CYCLE*, respectively, in Equation (5). The coefficients on *BIGN* and *ATENURE* are expected to be negative in Equation (5). Firms with market leadership or superior financial health may perceive that real earnings management is less costly; therefore, the coefficients on *MKTSHARE* and *ZSCORE* are expected to be positive in Equation (6). Real earnings management has a real effect on earnings and is limited by firms' marginal tax rates, which implies a negative coefficient on *MTR* in Equation (6). Sophisticated institutional investors are proficient at analyzing the long-term implications of real earnings management; thus, the coefficient on *INST* is expected to be negative in Equation (6). We also follow Chan et al. (2015) to control for material corporate events (i.e. *M&A*, *RESTRUCT*, and *WRITEOFF*) and to include *REM*1 and *AEM* in Equations (5) and (6), respectively.

Self-selection bias is a concern in any study investigating the relationship between corporate governance structure and corporate decision-making. The lack of control for firm characteristics in carrying

D&O insurance can lead to an inaccurate attribution of the trade-off of earnings management means to litigation protection. Thus, we follow Chung and Wynn (2008) and use the two-stage Heckman (1979) model in our main analyses. In the first stage, we conduct a probit regression of *D&O* on proxies for business risk and governance quality.

$$
\begin{aligned}
D\&O_{it} = \ &\alpha_0 + \alpha_1 ASSETS_{it} + \alpha_2 MB_{it} + \alpha_3 HIGHTECH_{it} \\
&+ \alpha_4 LEV_{it} + \alpha_5 M\&A_{it} + \alpha_6 RESTRUCT_{it} \\
&+ \alpha_7 MANAGER_{it} + \alpha_8 OUTBLOCK_{it} + \alpha_9 EXCASH_{it} + \varepsilon_{it}
\end{aligned}
\tag{7}
$$

where *HIGHTECH* equals one if a firm is in the chemical, pharmaceutical, or electronics industry, and zero otherwise; *LEV* is total debt divided by total assets; *MANAGER* is the proportion of shares held by managers; *OUTBLOCK* is the proportion of shares held by the largest outside shareholder; and *EXCASH* is the residual estimated from the regression of cash holdings on the determinants of cash holdings.[9] Other variables are defined as those in Equations (5) and (6).

In the second stage, we estimate Equations (5) and (6) by incorporating the control of Equation (7). We use the maximum likelihood estimation and use Rogers standard errors adjusted for heteroscedasticity and firm clusters.

## 5. Empirical results

This section presents summary statistics of earnings management measures, D&O insurance coverage, and control variables. We then discuss regression results.

### 5.1. Summary statistics

Table 1 presents the distribution of main variables. As shown in Panel A, the mean of *D&O* is 0.550, indicating that the numbers of firms with and without D&O insurance are nearly equal. This phenomenon is dramatically distinct from those of Canadian samples, which indicate that more than 70% of firms carry D&O insurance (Lin, Officer, and Zou 2011; Lin et al. 2013). This suggests that the adoption of D&O insurance is still at a relatively early stage in Taiwan.

Panel B contains descriptive statistics on D&O insurance coverage. The whole sample presents the widely distributed and right-skewed D&O insurance coverage, demonstrating that the percentage of insured firms is slightly higher than that of uninsured firms. The insured sample indicates that the mean value of D&O insurance coverage is NT$251.294 million. This value is obviously lower than those of samples of Canadian firms. Again, these results indicate that the adoption of D&O insurance is still at a relatively early stage in Taiwan.

### 5.2. Regression results

Table 2 summarizes the main results from the testing of our hypotheses. Panel A presents the results of Equation (7), which determines firms' self-selections in carrying D&O insurance. Large firms, growing firms, and high-tech firms have high levels of risk exposure and tend to carry D&O insurance, which is consistent with the findings in Core (1997, 2000). As theorized in Mayers and Smith (1990), managerial ownership increases with managerial risk aversion and the demand for D&O insurance. The positive coefficient on *OUTBLOCK* suggests that outside blockholders use lawsuits as a monitoring device, which is consistent with the notion expressed in Romano (1991).

We incorporate the control of Equation (7) into Equations (5) and (6), and the results are presented in Panel B. Column (1) indicates that, compared with uninsured firms, insured firms exhibit higher levels of accrual-based earnings management. This result supports Hypothesis 1. Columns (2), (3), and (4) suggest that insured firms exhibit lower levels of sales manipulation, discretionary expenditure reduction, and overproduction, respectively. In Columns (5) and (6), two comprehensive measures of

**Table 1.** Summary statistics.

| | Mean | Std. Dev. | 25% | Median | 75% |
|---|---|---|---|---|---|
| *Panel A. Distribution of main variables* | | | | | |
| D&O | 0.550 | 0.498 | 0.000 | 1.000 | 1.000 |
| AEM | −0.000 | 0.093 | −0.051 | 0.001 | 0.051 |
| ABCFO | 0.001 | 0.088 | −0.049 | 0.003 | 0.052 |
| ABPROD | 0.001 | 0.112 | −0.052 | 0.007 | 0.058 |
| ABEXP | 0.001 | 0.063 | −0.020 | 0.008 | 0.032 |
| ASSETS | 15.054 | 1.279 | 14.183 | 14.880 | 15.780 |
| MB | 1.113 | 0.754 | 0.625 | 0.897 | 1.344 |
| SALEG | 0.034 | 0.339 | −0.142 | −0.005 | 0.140 |
| ROA | 0.039 | 0.096 | 0.001 | 0.042 | 0.092 |
| ZSCORE | 3.982 | 3.811 | 1.830 | 2.917 | 4.713 |
| MKTSHARE | 0.017 | 0.040 | 0.002 | 0.005 | 0.014 |
| MTR | 0.082 | 0.105 | 0.000 | 0.000 | 0.170 |
| INST | 0.343 | 0.218 | 0.167 | 0.304 | 0.500 |
| BIGN | 0.847 | 0.360 | 1.000 | 1.000 | 1.000 |
| ATENURE | 0.382 | 0.486 | 0.000 | 0.000 | 1.000 |
| CYCLE | 115.308 | 202.703 | 38.050 | 74.890 | 124.290 |
| NOA | 0.506 | 0.500 | 0.000 | 1.000 | 1.000 |
| M&A | 0.044 | 0.205 | 0.000 | 0.000 | 0.000 |
| RESTRUCT | 0.006 | 0.075 | 0.000 | 0.000 | 0.000 |
| WRITEOFF | 0.102 | 0.303 | 0.000 | 0.000 | 0.000 |
| *Panel B. Distribution of D&O insurance coverage* | | | | | |
| D&O insurance coverage (NT$ million) | | | | | |
| Whole sample | 138.242 | 334.401 | 0.000 | 49.227 | 151.375 |
| Insured sample | 251.294 | 418.187 | 88.770 | 149.275 | 291.900 |
| D&O insurance coverage divided by total assets at the beginning of the fiscal year | | | | | |
| Whole sample | 0.041 | 0.103 | 0.000 | 0.008 | 0.048 |
| Insured sample | 0.074 | 0.130 | 0.019 | 0.043 | 0.083 |

Notes: The sample contains 6135 observations from 2008 to 2013.
All variables are defined in Appendix A.

real earnings management exhibit results similar to those in Columns (2), (3), and (4). These results support Hypothesis 2. The row of rho values presents the correlations between the unobserved determinants of the selection equation, i.e. Equation (7), and the unobserved determinants of the outcome equations, i.e. Equations (5) and (6). We perform Wald tests to test the independence of errors between the selection and outcome equations. The significant rho suggests that correcting firms' self-selections in carrying D&O insurance is material.

In brief, our results suggest that firms without D&O insurance protection control their legal liabilities and tend to use real earnings management. However, insured firms tend to rely more on accrual-based earnings management, which is more flexible and incurs less long-term underperformance. Although the finding of higher levels of accrual-based earnings management is consistent with the findings in Lin, Officer, and Zou (2011) and Lin et al. (2013), the finding of lower levels of costly real earnings management suggests that carrying D&O insurance may, to some extent, mitigate costs resulting from earnings management. Because of the conflicting effects of D&O insurance, we examine how D&O insurance influences overall earnings management. Specifically, we add *AEM* and *REM*1 to construct *EM*. Column (7) demonstrates that insured firms have lower levels of overall earnings management.[10]

The control variables exhibit results that are consistent with those of Zang (2012) and Chan et al. (2015), except for *INST*, *BIGN*, and *NOA*. Institutional shareholders not only play a monitoring role but also put firms under pressure to avoid reporting losses. The contrasting *INST* results in this study may suggest that institutional shareholders have the opposite effects in Taiwanese capital market. Although the *BIGN* results of this study are contrary to those of prior studies, the *ATENURE* results are consistent with those of prior studies. The inconsistent *BIGN* results may suggest that *BIGN* is an inaccurate measure of audit quality in Taiwan.[11] The inconsistent *NOA* results, meanwhile, may be

**Table 2.** D&O insurance and the trade-off between real and accrual-based earnings management.

*Panel A. First stage results of the Heckman (1979) method*

| Dependent variable = D&O | |
| --- | --- |
| ASSETS | 0.160 (0.000) |
| MB | 0.099 (0.010) |
| HIGHTECH | 0.856 (0.000) |
| LEV | 0.450 (0.142) |
| M&A | 0.072 (0.445) |
| RESTRUCT | 0.174 (0.469) |
| MANAGER | 2.713 (0.062) |
| OUTBLOCK | 2.718 (0.000) |
| EXCASH | 0.818 (0.000) |
| Intercept | −3.120 (0.000) |
| Observations | 6135 |
| Pseudo $R^2$ | 0.101 |

*Panel B. Second stage results of the Heckman (1979) method*

| Dependent variable = | (1) AEM | (2) ABCFO | (3) ABEXP | (4) ABPROD | (5) REM1 | (6) REM2 | (7) EM |
| --- | --- | --- | --- | --- | --- | --- | --- |
| D&O | 0.046 (0.002) | −0.056 (0.000) | −0.057 (0.026) | −0.087 (0.001) | −0.091 (0.000) | −0.139 (0.002) | −0.199 (0.000) |
| ASSETS | −0.009 (0.000) | 0.012 (0.000) | 0.001 (0.604) | 0.005 (0.054) | 0.012 (0.000) | 0.006 (0.177) | 0.011 (0.006) |
| MB | 0.012 (0.000) | −0.006 (0.010) | −0.026 (0.000) | −0.034 (0.000) | −0.034 (0.000) | −0.061 (0.000) | −0.049 (0.000) |
| SALEG | −0.030 (0.000) | 0.050 (0.000) | −0.010 (0.001) | 0.058 (0.000) | 0.040 (0.000) | 0.048 (0.000) | 0.021 (0.044) |
| ROA | 0.541 (0.000) | −0.590 (0.000) | −0.041 (0.044) | −0.429 (0.000) | −0.629 (0.000) | −0.470 (0.000) | −0.104 (0.012) |

*(Continued)*

**Table 2.** (Continued)

*Panel B. Second stage results of the Heckman (1979) method*

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| ZSCORE | −0.001 (0.005) | 0.000 (0.799) | 0.002 (0.007) | −0.000 (0.891) | 0.002 (0.003) | 0.002 (0.196) | 0.001 (0.434) |
| MKTSHARE | −0.025 (0.554) | −0.080 (0.119) | 0.125 (0.003) | 0.205 (0.001) | 0.046 (0.433) | 0.331 (0.000) | 0.042 (0.639) |
| MTR | −0.042 (0.000) | −0.000 (0.968) | −0.024 (0.027) | −0.112 (0.000) | −0.025 (0.063) | −0.137 (0.000) | −0.173 (0.000) |
| INST | −0.009 (0.218) | −0.010 (0.065) | 0.020 (0.026) | 0.027 (0.014) | 0.010 (0.341) | 0.047 (0.013) | 0.003 (0.866) |
| BIGN | 0.000 (0.985) | 0.005 (0.028) | −0.013 (0.012) | −0.015 (0.017) | −0.008 (0.139) | −0.028 (0.009) | −0.020 (0.013) |
| ATENURE | −0.003 (0.084) | 0.004 (0.003) | 0.001 (0.718) | 0.002 (0.479) | 0.005 (0.044) | 0.003 (0.540) | 0.003 (0.525) |
| CYCLE | 0.000 (0.462) | 0.000 (0.393) | −0.000 (0.072) | −0.000 (0.007) | −0.000 (0.424) | −0.000 (0.006) | 0.000 (0.969) |
| NOA | 0.009 (0.000) | −0.020 (0.000) | 0.010 (0.001) | 0.002 (0.607) | −0.010 (0.004) | 0.012 (0.063) | −0.001 (0.835) |
| M&A | 0.006 (0.227) | 0.001 (0.780) | 0.003 (0.502) | 0.004 (0.594) | 0.003 (0.555) | 0.006 (0.527) | 0.025 (0.028) |
| RESTRUCT | 0.016 (0.198) | 0.004 (0.720) | 0.003 (0.769) | 0.024 (0.220) | 0.006 (0.704) | 0.027 (0.302) | 0.062 (0.027) |
| WRITEOFF | −0.000 (0.930) | −0.005 (0.062) | −0.001 (0.693) | −0.007 (0.171) | −0.006 (0.128) | −0.008 (0.267) | −0.017 (0.037) |
| REM1 | 0.552 (0.000) | | | | | | |
| AEM | | 0.658 (0.000) | 0.026 (0.012) | −0.059 (0.006) | 0.684 (0.000) | −0.033 (0.239) | |
| Intercept | 0.094 (0.001) | −0.116 (0.000) | 0.013 (0.707) | 0.004 (0.918) | −0.091 (0.025) | 0.020 (0.778) | −0.018 (0.772) |
| Rho | −0.309 (0.016) | 0.605 (0.000) | 0.427 (0.112) | 0.463 (0.008) | 0.561 (0.000) | 0.474 (0.018) | 0.630 (0.000) |
| Observations | 6135 | 6135 | 6135 | 6135 | 6135 | 6135 | 6135 |

Notes: Panel A presents the first-stage regression result of the two-stage Heckman (1979) method, which determines firms' selections in carrying D&O insurance.
Panel B presents the second-stage results, in which the control of the first stage is incorporated. The row of rho presents the correlations between the unobserved determinants of the selection and outcome equations. The statistics of year and industry fixed effects are omitted for simplicity.
*p* values are presented in parentheses.
All variables are defined in Appendix A.

derived from sampling. The signs of the coefficient on *NOA* become consistent with our predictions after we limit our sample to observations suspected of managing earnings.

## 6. Robustness tests

In this section, we conduct six tests to verify the robustness of our findings. First, we use propensity score matching to control for fundamental differences in firm characteristics. Specifically, we use Equation (7) to calculate propensity scores, and match each insured firm to the uninsured firm with the closest propensity score in the same year.[12] Panel A of Table 3 presents characteristic differences between 1463 matched pairs. The mean differences between insured and uninsured firms are all insignificant, suggesting that these pairs are matched appropriately. We use these matched pairs to employ Equations (5) and (6), and the related results are summarized in Panel B. Columns (1), (2), and (3) exhibit qualitatively similar results to those in Table 2. However, Column (4) demonstrates that the propensity score matching analysis presents an insignificant relationship between D&O insurance and overall earnings management. The inconsistent results of overall earnings management may be derived from the fact that D&O insurance protection influences firms' trade-offs between earnings management means rather than firms' targeted numbers of reported earnings.

Second, we apply a difference-in-difference approach to test our hypotheses. Specifically, we focus on firms that initially purchase D&O insurance in our sample period and firms that never carry D&O insurance in our sample period. We create an indicator variable (*POSTD&O*) that equals one if a firm is an insured firm in those years after initially purchasing D&O insurance, and zero if the firm is an uninsured firm in those years before initially purchasing D&O insurance or if the firm never has D&O insurance in the sample period. We then replace *D&O* in Equations (5) and (6) with *POSTD&O*. This approach yields 3310 observations for 238 and 469 firms that initially purchase and never have D&O insurance, respectively. The second-stage results of the Heckman (1979) method

**Table 3.** Robustness test results – propensity score matching analysis.

*Panel A. D&O insurance determinants between insured and matched firms*

|  | Insured firms | | Uninsured firms | | Difference in | |
|---|---|---|---|---|---|---|
|  | (1) | (2) | (3) | (4) | (1) – (3) | (2) – (4) |
|  | Mean | Median | Mean | Median | Mean | Median |
| ASSETS | 15.006 | 14.827 | 14.985 | 14.843 | 0.021 (0.615) | −0.016 (0.901) |
| MB | 1.107 | 0.890 | 1.109 | 0.897 | −0.002 (0.933) | −0.007 (0.380) |
| HIGHTECH | 0.640 | 1.000 | 0.640 | 1.000 | 0.000 (1.000) | 0.000 (1.000) |
| LEV | 0.086 | 0.043 | 0.084 | 0.025 | 0.002 (0.689) | 0.018 (0.394) |
| M&A | 0.044 | 0.000 | 0.047 | 0.000 | −0.003 (0.655) | 0.000 (0.655) |
| RESTRUCT | 0.005 | 0.000 | 0.007 | 0.000 | −0.002 (0.467) | 0.000 (0.467) |
| MANAGER | 0.017 | 0.008 | 0.017 | 0.005 | 0.000 (0.453) | 0.003 (0.035) |
| OUTBLOCK | 0.034 | 0.022 | 0.035 | 0.018 | −0.001 (0.584) | 0.004 (0.335) |
| EXCASH | −0.004 | −0.027 | −0.000 | −0.026 | −0.004 (0.506) | −0.001 (0.613) |
| Observations | 1463 | 1463 | 1463 | 1463 | 2926 | 2926 |

*Panel B. Regression results of propensity score matching sample*

|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent variable = | AEM | REM1 | REM2 | EM |
| D&O | 0.008 (0.018) | −0.009 (0.038) | −0.021 (0.010) | −0.002 (0.832) |
| Observations | 2926 | 2926 | 2926 | 2926 |
| Adjusted $R^2$ | 0.427 | 0.521 | 0.188 | 0.079 |

Notes: In Panel A, *t* tests and Wilcoxon matched-pairs signed-rank tests are performed to test the significances of mean and median differences, respectively.
In Panel B, the statistics of intercept, control variables, year, and industry fixed effects are omitted for simplicity.
*p* values are presented in parentheses.
All variables are defined in Appendix A.

are presented in Panel A of Table 4 and exhibit similar patterns to those in Table 2. We also use this sample to use the propensity score matching approach, which yields 1418 observations for 142 pairs of initially purchasing and non-purchasing firms. Panel B exhibits similar results to those in Table 3.

Third, we follow Lin, Officer, and Zou (2011) and use the instrumental variable method to mitigate the endogeneity concern of carrying D&O insurance. An appropriate instrument must meet two requirements: (1) that it be related to whether or not a firm carries D&O insurance, and (2) that it not be related to the error term in Equations (5) and (6). As indicated by Adams, Lin, and Zou (2011), firms in the same industry may compete for the same small pool in the labor market. To attract qualified directors and officers, a firm's compensation package – including D&O insurance – may be influenced by the compensation packages offered by competitors in the same industry. Firms in the same industry may also face similar levels of litigation risk (Core 2000). However, industry effects are removed from the residuals of Equations (1–4). Thus, we use the industry-year mean of *D&O* as an instrument for *D&O*. We replace *D&O* in Equations (5) and (6) with instrumented *D&O* (*IVD&O*), and the related results are summarized in Table 5. The results of Columns (1) and (2) support Hypotheses 1 and 2, respectively.

Next, we focus on observations of firms suspected of managing their earnings. Using this subsample could increase the power of testing the trade-off decisions (Zang 2012). We follow Zang (2012) to define earnings management suspects as firm-years that meet or just beat earnings targets (i.e. zero earnings or previous year's earnings).[13] However, using a nonrandom sample in the regression estimation creates a potential omitted-variable problem. Therefore, we follow Zang (2012) to control for

**Table 4.** Robustness test results – difference-in-difference approach.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent variable = | AEM | REM1 | REM2 | EM |
| *Panel A. Second stage results of the Heckman (1979) method* | | | | |
| POSTD&O | 0.052 (0.000) | −0.084 (0.000) | −0.122 (0.154) | −0.059 (0.075) |
| Rho | −0.345 (0.003) | 0.492 (0.001) | 0.382 (0.303) | 0.166 (0.147) |
| Observations | 3310 | 3310 | 3310 | 3310 |
| *Panel B. Regression results of the propensity score matching sample* | | | | |
| POSTD&O | 0.013 (0.019) | −0.019 (0.015) | −0.023 (0.148) | −0.012 (0.355) |
| Observations | 1418 | 1418 | 1418 | 1418 |
| Adjusted $R^2$ | 0.459 | 0.562 | 0.226 | 0.095 |

Notes: In Panel A, the sample consists of firms that initially purchase D&O insurance and firms that never carry D&O insurance during the sample period. The results are estimated from the second-stage regressions of the two-stage Heckman (1979) method, in which the control of firms' selections in purchasing D&O insurance is incorporated. The row of rho presents the correlation between the unobserved determinants of the selection and outcome equations. The statistics of intercept, control variables, year, and industry fixed effects are omitted for simplicity.
In Panel B, the sample consists of firms that initially purchase D&O insurance and matched firms that never carry D&O insurance during the sample period.
*p* values are presented in parentheses.
All variables are defined in Appendix A.

**Table 5.** Robustness test results – instrumental variable method.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent variable = | AEM | REM1 | REM2 | EM |
| IVD&O | 0.070 (0.064) | −0.087 (0.016) | −0.001 (0.982) | −0.028 (0.736) |
| Observations | 6135 | 6135 | 6135 | 6135 |
| Adjusted $R^2$ | 0.337 | 0.432 | 0.210 | 0.065 |

Notes: D&O insurance incidence is instrumented by the industry-year median of D&O insurance incidence. The statistics of intercept, control variables, year, and industry fixed effects are omitted for simplicity.
*p* values are presented in parentheses.
All variables are defined in Appendix A.

**Table 6.** Robustness test results – earnings management suspects.

*Panel A. First stage results of the Heckman (1979) method*

Dependent variable = *SUSPECT*

| | |
|---|---|
| *D&O* | −0.004 (0.925) |
| *HABITUAL* | 0.188 (0.000) |
| *ASSETS* | −0.231 (0.000) |
| *MB* | −0.199 (0.000) |
| *LEV* | −0.509 (0.010) |
| *ISSUE* | −0.066 (0.847) |
| *LNSHARE* | 0.267 (0.000) |
| *ROA* | 0.826 (0.002) |
| Intercept | −0.848 (0.053) |
| Observations | 6135 |
| Pseudo $R^2$ | 0.047 |

*Panel B. Second stage results of the Heckman (1979) method*

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent variable = | *AEM* | *REM*1 | *REM*2 | *EM* |
| *D&O* | 0.011 (0.015) | −0.020 (0.004) | −0.043 (0.000) | −0.017 (0.120) |
| Rho | −0.496 (0.018) | 0.271 (0.004) | 0.113 (0.276) | −0.095 (0.621) |
| Observations | 1385 | 1385 | 1385 | 1385 |

Notes: Panel A presents the first-stage regression result of the two-stage Heckman (1979) method, which determines earnings management suspects. The statistics of year fixed effects are omitted for simplicity.
Panel B presents the second-stage results, in which the control of the first stage is incorporated. The sample only contains earnings management suspects. The row of rho presents the correlations between the unobserved determinants of the selection and outcome equations. The statistics of intercept, control variables, year, and industry fixed effects are omitted for simplicity.
*p* values are presented in parentheses.
All variables are defined in Appendix A.

firms' self-selections in earnings management. Specifically, we use the Heckman (1979) method, and the first-stage probit model is used to explain firms' decisions to manage their earnings.

$$SUSPECT_{it} = \alpha_0 + \alpha_1 D\&O_{it} + \alpha_2 HABITUAL_{it} + \alpha_3 ASSETS_{it}$$
$$+ \alpha_4 MB_{it} + \alpha_5 LEV_{it} + \alpha_6 ISSUE_{it+1} \qquad (8)$$
$$+ \alpha_7 LNSHARE_{it} + \alpha_8 ROA_{it} + \gamma YEAR + \varepsilon_{it}$$

where *SUSPECT* equals one if (a) *ROA* is between 0 and 0.005 or (b) the yearly change in earnings per share before extraordinary items is between 0 and 0.6, and zero otherwise[14]; *HABITUAL* is the number of the quarters that quarterly income before extraordinary items per share beats or meets the previous year's quarterly income before extraordinary items per share; *ISSUE* equals one if a firm issues equity, and zero otherwise; and *LNSHARE* is the natural logarithm of common shares outstanding. Other variables are defined as those in Equations (5)–(7).

Equation (8) is estimated using the entire sample, and the related result is summarized in Panel A of Table 6. The positive and significant coefficients on *HABITUAL* and *LNSHARE* imply capital market incentives to achieve earnings targets. The insignificant coefficient on *D&O* again suggests that D&O insurance protection mainly influences firms' trade-offs between earnings management means given

**Table 7.** Robustness test results – D&O insurance coverage.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent variable = | AEM | REM1 | REM2 | EM |
| *Panel A. D&O insurance coverage ratio (whole sample)* | | | | |
| COVER | 0.066 (0.001) | −0.068 (0.001) | −0.098 (0.014) | 0.010 (0.788) |
| Observations | 6135 | 6135 | 6135 | 6135 |
| Adjusted $R^2$ | 0.444 | 0.552 | 0.261 | 0.083 |
| *Panel B. D&O insurance coverage ratio (insured sample)* | | | | |
| COVER | 0.066 (0.001) | −0.046 (0.027) | −0.021 (0.586) | 0.067 (0.155) |
| Rho | 0.019 (0.943) | 0.466 (0.043) | −0.785 (0.000) | 0.783 (0.000) |
| Observations | 3375 | 3375 | 3375 | 3375 |
| *Panel C. Excess D&O insurance coverage ratio (whole sample)* | | | | |
| EXCOVER | 0.060 (0.002) | −0.061 (0.003) | −0.091 (0.023) | 0.011 (0.781) |
| Observations | 6135 | 6135 | 6135 | 6135 |
| Adjusted $R^2$ | 0.443 | 0.552 | 0.261 | 0.083 |
| *Panel D. Excess D&O insurance coverage ratio (insured sample)* | | | | |
| EXCOVER | 0.058 (0.004) | −0.039 (0.065) | −0.012 (0.751) | 0.064 (0.174) |
| Rho | −0.007 (0.977) | 0.473 (0.032) | −0.786 (0.000) | 0.783 (0.000) |
| Observations | 3375 | 3375 | 3375 | 3375 |

Notes: Panels A and C present the results of ordinary least squares regressions. Panels B and D present the second-stage results of the Heckman (1979) method, in which the control of firms' selections in purchasing D&O insurance is incorporated. The row of rho presents the correlations between the unobserved determinants of the selection and outcome equations. The statistics of intercept, control variables, year, and industry fixed effects are omitted for simplicity.
*p* values are presented in parentheses.
All variables are defined in Appendix A.

certain earnings targets. We then incorporate the control of Equation (8) into Equations (5) and (6), and focus on 1385 earnings management suspects. The results contained in Panel B consistently support our hypotheses.

As indicated in the preceding section, we turn to examine D&O insurance coverage. This allows us to investigate whether the propensity for a specific earnings management method is associated with the protection level of D&O insurance. We replace *D&O* in Equations (5) and (6) with D&O insurance coverage divided by total assets at the beginning of the fiscal year (*COVER*). The related results are summarized in Panel A of Table 7, and support Hypotheses 1 and 2. The results derived from only 3375 insured firms are summarized in Panel B. Hypotheses 1 and 2 are supported by the results in Columns (1) and (2), respectively.

We also follow Lin et al. (2013) to examine how excess D&O insurance coverage influences firms' trade-offs between earnings management methods. Specifically, we replace *D&O* in Equation (7) with the natural logarithm of D&O insurance coverage, and the exponential predicted value is the normal level of D&O insurance coverage (*XBCOVER*). Excess D&O insurance coverage (*EXCOVER*) is the difference between the D&O insurance coverage amount and *XBCOVER*, divided by total assets at the beginning of the fiscal year. We replace *D&O* in Equations (5) and (6) with *EXCOVER*. Panels C and D exhibit patterns similar to those in Panels A and B.

So far our results consistently suggest that D&O insurance protection is associated with lower levels of real earnings management and higher levels of accrual-based earnings management. We also find that insured firms, compared with uninsured firms, exhibit marginally lower levels of overall earnings management. This finding suggests that D&O insurance protection has a more pronounced impact on firms' trade-offs between earnings management means than it does on firms' incentives to manage earnings numbers.

Finally, we split our sample into high and low litigation risk circumstances. Prior studies indicate that acquiring firms commonly engage in class action litigation (Core 1997, 2000). Thus, we use *M&A* to split the level of litigation risk. The results are summarized in Panel A of Table 8. The first two columns indicate that the coefficients on *D&O* remain positive and negative when the dependent

**Table 8.** Robustness test results – diverse levels of litigation risk.

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Dependent variable = | AEM | REM1 | REM2 | EM |
| *Panel A. Litigation risk is split by litigable events (M&A)* | | | | |
| D&O | 0.046 (0.000) | −0.091 (0.000) | −0.140 (0.000) | −0.198 (0.000) |
| M&A | 0.014 (0.062) | −0.002 (0.769) | −0.016 (0.269) | 0.033 (0.066) |
| D&O*M&A | −0.013 (0.157) | 0.009 (0.357) | 0.036 (0.046) | −0.013 (0.546) |
| $\beta_{D\&O} + \beta_{D\&O*M\&A}$ | 0.033 (0.901) | −0.082 (0.305) | −0.104 (0.091) | −0.211 (0.165) |
| Rho | −0.307 (0.000) | 0.561 (0.000) | 0.474 (0.000) | 0.629 (0.000) |
| Observations | 6135 | 6135 | 6135 | 6135 |
| *Panel B. Litigation risk is split by deep pockets (LARGE)* | | | | |
| D&O | 0.047 (0.000) | −0.093 (0.000) | −0.146 (0.000) | −0.204 (0.000) |
| LARGE | 0.005 (0.203) | −0.012 (0.007) | −0.020 (0.013) | −0.017 (0.085) |
| D&O*LARGE | −0.004 (0.381) | 0.010 (0.030) | 0.033 (0.000) | 0.018 (0.090) |
| $\beta_{D\&O} + \beta_{D\&O*LARGE}$ | 0.043 (0.709) | −0.083 (0.705) | −0.113 (0.057) | −0.186 (0.902) |
| Rho | −0.309 (0.000) | 0.561 (0.000) | 0.473 (0.000) | 0.634 (0.000) |
| Observations | 6135 | 6135 | 6135 | 6135 |

Notes: The results are estimated from the second-stage regressions of the two-stage Heckman (1979) method, in which the control of firms' selections in carrying D&O insurance is incorporated. The row of rho presents the correlations between the unobserved determinants of the selection and outcome equations. The statistics of intercept, control variables, year, and industry fixed effects are omitted for simplicity.

*p* values are presented in parentheses.

All variables are defined in Appendix A.

variables are the measures of accrual-based and real earnings management, respectively. Although these coefficients on *D&O* are significant, the sums of the coefficients on *D&O* and *D&O*M&A* are indistinguishable from zero. Column (3) presents a positive and significant coefficient on *D&O*M&A*. Large firms are expected to have high levels of litigation risk, and D&O insurance acts as a deep pocket (Core 1997, 2000; Boyer 2014). We also use firms' market value of equity to split the level of litigation risk (*LARGE*). The results in Panel B display similar patterns to those in Panel A. These results suggest that D&O insurance influences firms' choices of earnings management means mainly when firms are exposed to a controllable level of litigation risk.

## 7. Conclusion

We investigate listed firms in Taiwan, where information on D&O insurance is publicly available, to examine whether carrying D&O insurance influences firm behavior in terms of earnings management. Our empirical findings show that insured firms exhibit significantly less and greater propensity to use real and accrual-based earnings management, respectively. The protection of D&O insurance influences firm behavior in terms of earnings management mainly when firms are exposed to a controllable level of litigation risk.

Our findings contribute to the literature related to earnings management and D&O insurance. Although prior studies indicate that industry-wide litigation risk or regulatory pressure imposed by SOX influences the trade-off between earnings management means, we further indicate that directors' and officers' legal liabilities are a determinant of this trade-off. Accrual-based earnings management, which incurs a higher possibility of stakeholder litigation but less long-term underperformance, would be relatively attractive if directors' and officers' legal liabilities were shifted. This implies that D&O insurance may, to some extent, mitigate costs resulting from earnings management.

Our findings may be of interest to auditors, regulators, and stakeholders when they assess firms' D&O policies and related earnings management behaviors. Evaluating a D&O insurance policy to limit the downsides of shifting the discipline imposed by the possibility of stakeholder litigation should be emphasized. However, related information is still not publicly available in the United States and is not complete in Taiwan. As such, the mandatory disclosure of D&O insurance information may be necessary to facilitate the identification of the potential benefits and costs of this insurance.

## Notes

1. Real earnings management does not involve the direct violation of regulations as long as its outcomes are properly disclosed (Chi, Lisic, and Pevzner 2011). Because there is no clear division between real earnings management and the arrangement of ordinary business courses, real earnings management is relatively easy for managers to justify. Managers also consider managing earnings by using real earnings management to be more ethical than employing accrual-based earnings management (Bruns and Merchant 1990).

2. Graham, Harvey, and Rajgopal (2005) indicate that firms have great difficulty in assuring stakeholders that there is no accrual-based earnings management in their financial statements. They report the comment of one survey respondent who expressed 'a corporate fear that even an appropriate accounting choice runs the risk of an overzealous regulator concluding *ex post* that accounting treatment was driven by an attempt to manage earnings' (36).

3. Around 2004, a series of accounting scandals also exploded in Taiwan. In the aftermath of these scandals, Taiwan's government introduced strict regulations for auditor hiring, auditor tenure, management responsibilities on financial reports, the function of audit committees, and the expertise of board members.

4. Taiwanese insurers provide highly similar D&O insurance policies. Moreover, D&O insurance indemnifies directors and officers only when the sued directors and officers have acted honestly and in good faith. Claims associated with any fraudulent act by insured directors and officers are thus excluded from indemnification in Taiwan. Therefore, we mainly focus on accrual-based earnings management manifested within the bounds of GAAP. However, insured directors and officers might believe that D&O insurance will provide indemnification for their fraudulent acts, as suggested by Lin et al. (2013), who report that firms with high D&O insurance coverage exhibit a high incidence of intentional financial restatements.

5. Directors and officers do not necessarily have the same interests under some circumstances, although theoretically they are all agents of shareholders. However, firms acquiring insurance for their directors generally acquire it for their officers as well. Following prior studies, we treat directors' and officers' liability insurance as a whole and control for board and managerial characteristics in our empirical model.

6. Core (2000) suggests that insurance premiums could measure firms' risk and enhance understanding of firms' real demand for D&O insurance. Unfortunately, insurance premium information is not disclosed in Taiwan. Thus, D&O insurance coverage may not accurately capture the level of litigation risk and may ignore firms' real demand for D&O insurance. The possibility of an endogenous relationship between D&O insurance and earnings management may mean that firms engaging in accrual-based earnings management decide to purchase D&O insurance or carry high insurance coverage. We control for firms' self-selections with regard to carrying D&O insurance in our main tests.

7. *ZSCORE* equals 0.3(net income/total assets) + 1.4(retained earnings/total assets) + 1.2(working capital/total assets) + 0.6(market value of equity/total liabilities).

8. Net operating assets is shareholders' equity minus cash and short-term investments plus total debt.

9. Cash holdings are measured by cash and short-term investments divided by total assets at the beginning of the fiscal year. The determinants include *ASSETS*, *MB*, *LEV*, *OUTBLOCK*, *HIGHTECH*, *CASHFLOW*, and *NWC*, where *ASSETS*, *MB*, *LEV*, *OUTBLOCK*, and *HIGHTECH* are defined as those in Equations (5–7). *CASHFLOW* is operating income before depreciation and amortization less the sum of interest, taxes, and common dividends, divided by total assets at the beginning of the fiscal year. *NWC* is noncash working capital divided by total assets.

10. Because D&O insurance is an element of corporate governance, we follow Liao and Wang (2015) to control for the quality of corporate governance. Specifically, we perform a principle component analysis and extract eight components from twenty-one corporate governance variables. Each component has an eigenvalue greater than one, and the cumulative percentage of explained variance is 69.39%. We use the Promax oblique rotation and add these composite components in Equations (5) and (6). This additional test generates qualitatively similar results (untabulated).

11. Long auditor tenure enhances auditor competence but impairs auditor independence; thus, the effect of auditor tenure on audit quality is still debatable. Because auditor industry expertise, compared with audit firm size and auditor tenure, may be a more pronounced measure of audit quality (Reichelt and Wang 2010; Chi, Lisic, and Pevzner 2011), we add auditor industry expertise in Equations (5) and (6). This additional test generates qualitatively similar results (untabulated).

12. We require that the propensity score difference between insured and matched uninsured firms is less than 0.01.

13. Effectively adopted earnings targets also include analyst forecasts and management forecasts. However, these forecasts are not common in Taiwan.

14. Zang (2012) requires that the yearly change in earnings per share before extraordinary items be less than $0.02, which equals approximately NT$0.6.

## Acknowledgements

## Disclosure statement

No potential conflict of interest was reported by the authors.

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## Appendix A. Variable descriptions.

| Variable | Description |
|---|---|
| ABCFO | The measure of sales manipulation |
| ABEXP | The measure of discretionary expenditure reduction |
| ABPROD | The measure of overproduction |
| AEM | The performance-matched discretionary accruals |
| ASSETS | The natural logarithm of total assets |
| ATENURE | An indicator variable that equals one if a firm's auditor tenure is above the yearly median of auditor tenure, and zero otherwise |
| BIGN | An indicator variable that equals one if a firm is audited by a big audit firm, and zero otherwise |
| COVER | D&O insurance coverage divided by total assets at the beginning of the fiscal year |
| CYCLE | Days inventory outstanding plus days sales outstanding less days payables outstanding |
| D&O | An indicator variable that equals one if a firm is protected by D&O insurance during the fiscal year, and zero otherwise |
| EM | The sum of AEM and REM1 |
| EXCASH | The residual estimated from the regression of cash holdings on the determinants of cash holdings |
| EXCOVER | D&O insurance coverage less the normal level of D&O insurance coverage, divided by total assets at the beginning of the fiscal year |
| HABITUAL | The number of the quarters that quarterly income before extraordinary items per share beats or meets previous year's quarterly income before extraordinary items per share |
| HIGHTECH | An indicator variable that equals one if a firm is in the chemical, pharmaceutical, or electronics industry, and zero otherwise |
| IVD&O | The fitted value of D&O, which is instrumented by the industry-year mean of D&O |
| INST | The proportion of shares held by institutional investors |
| ISSUE | An indicator variable that equals one if a firm issues equity, and zero otherwise |
| LARGE | An indicator variable that equals one if a firm's market value of equity is greater than the industry-year median of market value of equity, and zero otherwise |
| LEV | Total debt divided by total assets |
| LNSHARE | The natural logarithm of common shares outstanding |
| MANAGER | The proportion of shares held by managers |
| M&A | An indicator variable that equals one if a firm undergoes mergers and acquisitions, and zero otherwise |
| MB | The market-to-book ratio |
| MKTSHARE | Net sales divided by the industry-year total of net sales |
| MTR | The marginal tax rate |
| NOA | An indicator variable that equals one if a firm's net operating assets divided by net sales is above the industry-year median of net operating assets divided by net sales, and zero otherwise |
| OUTBLOCK | The proportion of shares held by the largest outside shareholder |
| POSTD&O | An indicator variable that equals one if a firm is an insured firm in those years after initially purchasing D&O insurance, and zero if the firm is an uninsured firm in those years before initially purchasing D&O insurance or if the firm never carries D&O insurance in the sample period. |
| REM1 | The sum of ABCFO and ABEXP |
| REM2 | The sum of ABPROD and ABEXP |
| RESTRUCT | An indicator variable that equals one if a firm undergoes restructuring activities, and zero otherwise |
| ROA | Income before extraordinary items divided by total assets at the beginning of the fiscal year |
| SALEG | Yearly sales growth |
| SUSPECT | An indicator variable that equals one if (a) ROA is between 0 and 0.005 or (b) the yearly change in earnings per share before extraordinary items is between 0 and 0.6, and zero otherwise |
| WRITEOFF | An indicator variable that equals one if a firm reports assets write-down, and zero otherwise |
| ZSCORE | The Z-score in Altman (1968) |