Directors' and Officers' Liability Insurance and the Cost of Debt

Ching-Chieh Tsai, Jo-Lan Liu, Yu-Ching Liu, and Chen-Wei Hao

***Abstract*—This study examines whether the purchase of directors' and officers' (hereafter D&O) liability insurance coverage plays a monitoring or a managerial opportunism role in the cost of debt for the firms listed in Taiwan for the period from 2008 to 2015. The empirical results reveal a negative association between D&O liability insurance coverage and the cost of debt and implying that D&O liability insurance plays a monitoring role for Taiwanese firms. Overall, our evidence is consistent with the notion that D&O liability insurance insulates D&Os from the discipline effect of shareholder litigation, leading to a decrease in the cost of debt.**

***Index Terms*—Directors' and officers' liability insurance, the cost of debt, managerial opportunism, Heckman two-stage approach.**

I. Introduction

D&O liability insurance is purchased by a firm to cover D&Os for legal liability in the course of their corporate duties. There is no consensus about the corporate governance monitoring role and the managerial opportunism behavior of D&O insurance [1]-[7]. Debt financing is an important financial source for Taiwanese firms. In the study of Lin *et al*. [8] finds that higher levels of D&O insurance coverage are associated with higher loan spreads for Canadian listed firms. Motivated by the study of Lin *et al*. [8] and takes advantage of the mandatory disclosure requirement of D&O liability insurance policies by firms listed in Taiwan, this study seeks to examine how D&O liability insurance affects the disciplining of shareholder litigation and therefore the cost of debt for the firms listed in Taiwan.

To examine the relationship between D&O liability insurance and the cost of debt, our paper includes the cost of debt variable, D&O liability variable and control variables in the regression models. In addition, as D&O liability insurance is a firm choice, the sample selection of firms with D&O insurance may result in self-selection bias when OLS regression analysis is used. Therefore, based on prior research, we control for this potential bias by the Heckman [9] two-stage estimation procedure.

The empirical results reveal a negative relationship between D&O liability insurance purchase policy and the cost of debt. In addition, the findings show that firms with higher D&O liability insurance coverage enjoy a decrease of the cost of debt. These results support the notion that D&O liability insurance plays a corporate governance monitoring role for Taiwanese firms and could offer protections to their D&Os, leading to a decrease in the cost of debt.

Our study contributes to the extant D&O liability insurance in two ways. First, our study adds to the growing literature on the D&O liability insurance to explain the notion of corporate governance monitoring role that D&O liability insurance plays in the cost of debt financing. Second, our study provides empirical evidence to demonstrate that the regulators should make the D&O liability insurance disclosure rules mandatory among firms to ensure that they comply.

The remainder of our study is organized as follows. In the next section, we introduce the literature and hypotheses development. Section III we discuss our research design. Section IV provides our empirical results. Finally, Section V concludes.

II. Hypotheses Development

D&O liability insurance is a policy purchased by a firm to cover and spread the liability risk of material harm to the company and shareholders caused by the wrongdoings or negligence on the part of D&Os in the course of their corporate duties. As to the prior research regarding the effects of D&O insurance on corporate policies, two opposing arguments have been examined: the monitoring role and the managerial opportunism argument. Proponents of the corporate governance monitoring hypothesis argue that since that D&O purchasers are thoroughly screened by the insurers, D&O insurance helps ensure that the D&Os act in the interests of shareholders [1]-[2], [5]. Chen *et al.* [10] find that firms with D&O liability insurance have greater stock market liquidity than firms without such insurance for firms listed in Taiwan. Chen *et al.* [11] indicate that the listed firms in Taiwan simultaneously determine corporate R&D investments and CEO compensations and the protection effect from the D&O liability insurance intensifies the relationship between R&D investments and CEO compensation.

However, the managerial moral hazard opportunism proponents provide empirical and lend support to the notion that D&O insurance could weaken the effectiveness of litigation as a managerial control device by reducing the incentive of managers to act in the best of shareholders. Such studies have indicated the negative associations that exist between D&O insurance and (1) the firm's market and accounting performance[12]-[15], (2) investment efficiency [11], [16]-[17], (3) accounting quality [18]-[20], and many others[10], [21]-[25]. In addition, Chen *et al.* [11] find that

Manuscript received May 10, 2017; revised July 23, 2017.

Ching-Chieh Tsai, Jo-Lan Liu, Yu-Ching Liu, Chen-Wei Hao are with the Accounting Information Department, National Taichung University of Science and Technology, Taichung, Taiwan (e-mail: tcc57@ nutc.edu.tw, lrl@ nutc.edu.tw, guo622@gmail.com, hewei820801@gmail.com).

doi: 10.18178/joebm.2017.5.7.524

information quality and risk-taking appear to be two underlying channels through which D&O insurance positively affects the cost of equity of Canadian firms.

Both equity and debt financing are important external financial resources in emerging markets. Mitton [26] indicates that although both developed markets and emerging markets have experienced an increase in leverage over the past decades, the increase has been more pronounced in emerging markets. While prior research indicates that firm-specific determinants of the cost of debt include accounting quality [27]-[35], big 4 auditor [36]-[38], board characteristics [39]-[40], ownership structure [41]-[45], and many others [47]-[52]. However, there is relatively scant evidence examines the role that D&O insurance plays on the cost of debt. Bradley and Chen [40] find that firms that provide limited liability and indemnification for their directors enjoy higher credit ratings and lower yield spreads. Using managerial entrenchment and earnings management activities to proxy for managers' opportunism, Ghouma [51] shows that low levels of managerial opportunism result in firms enjoying lower corporate bond costs.

However, Using D&O insurance data for a sample of Toronto Stock Exchange (TSE) 300 Index constituent stocks and (syndicated) bank loan data from the Loan Pricing Corporation (LPC) DealScan database, Lin *et al.* [8] argue that lenders view D&O insurance coverage as increasing credit risk and find that higher levels of D&O insurance coverage are associated with higher loan spreads. Unlike most Western advanced economies such as the U. S. and Canada, where the capital markets are highly developed, the financial markets in Taiwan have been substantially developed and banks are the major fund providers for firms seeking external financial sources. Since the enactment of the Financial Asset Securitization Act in 2002, banks in Taiwan have been able to securitize their assets to enhance liquidity and risk management [52].

In addition, unlike most firms in developed economies are covered by D&O insurance, in Taiwan, Articles 39 and 49 of the Corporate Governance Best-Practice Principles for Taiwan Stock Exchange (TWSE) and GreTai Securities Market (GTSM) Listed Companies were amended in the end of 2006 and indicated that listed firms may take out liability insurance for their directors and supervisors. Therefore, Taiwan provides a unique and suitable environment for examining the relation between D&O insurance and the cost of debt.

Motivated by the prior studies as mentioned above, our paper seeks to test whether the purchase of D&O liability insurance plays a monitoring or a managerial opportunism role on the cost of debt of firms listed in Taiwan. Therefore, we formulate the following non-directional hypothesis:

H1. There is an association between the purchase of D&O insurance and the cost of debt.

Following the earlier literature [3], [6], [8], [12], we further investigate the effects of the amount of D&O insurance coverage on the cost of debt and construct the following hypothesis:

H2. There is an association between the purchase amount of D&O insurance and the cost of debt.

III. Research Design

A. Data and Sample Selection

To examine our hypotheses, the sample firms employed in this study include firms listed on the Taiwan Stock Exchange and in the GreTai Securities Market in Taiwan for the period from 2008 to 2015. The reason we use 2008 as the starting year of our study is that publicly-listed firms in Taiwan have since the end of 2007 been required by amended laws to disclose information regarding the liability insurance that they carry on behalf of their D&Os. All relevant data are collected from the Taiwan Economic Journal (TEJ) database. This study excludes the firms in the finance and insurance industries and government firms due to the unique nature of their regulations and requirements. Non-calendar firms are excluded in our data. After deleting firms with missing data and observations used in the process of estimating variables, the final sample comprises a total of 10,391 firm-year observations of which 6,137 are D&O insurance purchasers and 4,254 are non-purchasers.

B. Model Specification

Maddala [53] indicates that the problem of selection bias arises whenever there is non-random sampling. As D&O insurance is a firm choice, the selection of firms with D&O insurance may result in self-selection bias when OLS regression analysis is used. We control for this potential bias by employing the Heckman [9] two-stage estimation procedure [8].

In the first stage, this study obtains the inverse Mills' ratio MILLS by running the following probit model.

$$\begin{aligned} P(D\&O_{it}) &= \beta_0 + \beta_1 ROA_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 DIOWN_{it} \\ &+ \beta_5 MAOWN_{it} + \beta_6 INST_{it} + \beta_7 ELEC_{it} + \Phi YEAR + \varepsilon_{it} \end{aligned} \quad (1)$$

where, D&O is a dummy variable that takes a value of one if the firm purchases D&O insurance, and zero otherwise; ROA is the sum of profit after tax plus interest expense to total assets; SIZE is the logarithm of total assets to control for firm size; LEV is the total debt to total assets to control for leverage; DIOWN is the percentage of ownership held by the directors; MAOWN is the percentage of ownership held by the top-managers; INST is the percentage of ownership held by the institutional investors; ELEC is a dummy variable that takes a value of one if the firm belongs to the electronics industry, and zero otherwise; and year dummy variables YEAR is included to control for the fixed effect of the year.

The inverse Mills' ratio then is introduced to the following probit model as an additional variable in the second stage to correct for potential self-selection bias and to investigate the relationship between D&O insurance and the cost of debt. The specifications of the variables are shown in Table I.

$$\begin{aligned} COSTD_{it} &= \beta_0 + \beta_1 D\&O_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 MB_{it} \\ &+ \beta_5 BOARD_{it} + \beta_6 DIOWN_{it} + \beta_7 PLEDGE_{it} \\ &+ \beta_8 MAOWN_{it} + \beta_9 DUAL_{it} + \beta_{10} MILLS_{it} \\ &+ \eta IND + \varphi YEAR + \varepsilon_{it} \end{aligned} \quad (2)$$

Similar to prior studies [29], [34], [44], we use interest rate on the firm's debt to proxy for the cost of debt, which is calculated as interest expense divided by average short and long term debt during the year. Our paper employs two dependent variables to represent D&O insurance purchase policy D&O: DO and IA. DO is an insurance dummy variable, which takes a value of 1 if the firm purchases D&O insurance, and 0 otherwise; IA is the natural logarithm of one plus the amount of D&O insurance of the firm.

Based on the prior studies and to avoid the possibility of model misspecification, this study includes a number of firm-specific control variables in the regression models [8], [27], [28], [36], [39], [41], [46], [51]. Specifically, we use: (1) the natural logarithm of the firm's total assets SIZE to control for firm size; (2) the total debt divided by total assets LEV to control for firm leverage; (3) the market-to-book value of total equity MB; (4) the numbers of the board of directors BOARD to control for board size; (5) the director ownership DIOWN is the percentage of outstanding shares owned by the directors; (6) the pledge ratio PLEDGE, which equals the ownership-in-pledge ratio of directors of a firm; (7) the managerial ownership MAOWN, which equals the percentage of outstanding shares owned by the top-level managers; (8) the CEO duality dummy variable DUAL, which takes a value of 1 if the firm's CEO also serves as the chairman, and zero otherwise; (9) the inverse Mills' ratio MILLS obtained from the first equation; and industry and year dummy variables are included in our study.

TABLE I: VARIABLE DEFINITIONS

Variable	Definitions
COSTD	The cost of debt, which is measured as interest expense divided by average short and long term debt
D&O	DO or IA, DO is an insurance dummy, which takes a value of 1 if the firm purchases D&O insurance, and 0 otherwise; IA is the natural logarithm of one plus the amount of D&O insurance of the firm
SIZE	Natural logarithm of total assets
LEV	Total debt divided by total assets
MB	Market to book value of total equity
BOARD	Numbers of the board of directors
DIOWN	Director ownership, which equals the percentage of outstanding shares owned by the directors
PLEDGE	The pledge ratio, which equals the ownership-in-pledge ratio of directors of a firm
MAOWN	Managerial ownership, which equals the percentage of outstanding shares owned by the top-level managers
DUAL	CEO duality dummy variable, which takes a value of 1 if the firm's CEO also serves as the chairman, and 0 otherwise
MILLS	Mills is obtained from Equation (1) to correct for the self-selection bias problems
IND	Industry dummy variables
YEAR	Year dummy variables

IV. EMPIRICAL ANALYSIS

A total of 10,391 firm-year observations are included in the sample to test the hypotheses. Table II presents summary statistics for the full sample and the results of the nonparametric Wilcoxon test for the subsamples, respectively. Panel A of Table Π indicates that the mean of the cost of debt COSTD is 1.026%. The average D&O insurance coverage purchaser ratio, DO, is 59%. The mean value of the logarithm of the amount of D&O insurance purchased, IA, is 7.010. The mean of the total assets SIZE is 15.308. The mean value of the leverage LEV is 40.5%. The mean value of the market-to-book value MB is 1.680. On average, the numbers of the board of directors BOARD is 2.391. The mean value of the director ownership DIOWN is 20.773%. The mean value of the pledge ratio of the directors PLEDGE is 7.811%. On average, the managerial ownership MAOWN is 1.552%. Finally, on average, 32% of the chairman and CEO positions are held by the same person DUAL.

In Panel B of Table II, almost all of the t-value and Wilcoxon values of the variables are significantly negative at least at the 1% level. The t value and Wilcoxon values of the cost of debt COSTD, are significantly negative at the 0.1 percent level. These findings are consistent with our predicted signs and show that D&O insurance purchasers are with lower cost of debt than non-purchasers.

TABLE II: DESCRIPTIVE STATISTICS AND DIFFERENCE TESTS OF SUBSAMPLES

Panel A: All Samples (N=10,391)					
Variable	Mean	Median	St. Dev.	Mini.	Max.
COSTD	1.026	0.826	0.957	0.000	4.479
DO	0.590	1.000	0.492	0.000	1.000
IA	7.010	11.060	5.919	0.000	16.000
SIZE	15.308	15.109	1.451	10.356	21.625
LEV	0.405	0.404	0.180	0.005	0.991
MB	1.680	1.235	2.856	0.067	192.868
BOARD	2.391	3.000	0.970	0.000	9.000
DIOWN	20.773	16.660	14.015	0.000	87.830
PLEDGE	7.811	0.000	16.792	0.000	100.000
MAOWN	1.552	0.540	2.589	0.000	39.340
DUAL	0.320	0.000	0.466	0.000	1.000

Panel B: D&O Purchase Difference Test				
	Purchasers (N=6,137)	Non-Purchasers (N=4,254)	Difference Test	
Variable	Mean	Mean	t-value	Wilcoxon Z
COSTD	0.926	1.170	-12.911***	-14.221***
SIZE	15.422	15.143	9.650***	-8.660***
LEV	0.404	0.408	-1.036	-0.670
MB	1.788	1.525	4.618***	-8.217***
BOARD	2.304	2.517	-11.063***	-0.787
DIOWN	20.400	21.311	-3.257***	-7.737***
PLEDGE	7.821	7.797	0.072	-1.016
MAOWN	1.749	1.268	9.341***	-15.988***
DUAL	0.320	0.320	0.093	-0.093

Notes: The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are as defined in Table I.

For brevity, we do not tabulate the specifications of the Pearson/Spearman correlation matrix of the related variables for the cost of debt. All of the variables are significantly correlated with the dependent variable COSTD at least at the 10% level, respectively. The relationships show that all of the explanatory variables are important in explaining the cost of debt. While most of the independent variables are highly correlated with the others, the variance inflation factors (VIF) of the explanatory variables in the regressions amount to less than 2, which suggests that a severe multicollinearity

problem does not exist.

The results of the effects of D&O insurance on the cost of debt are provided in Table III. The D&O insurance coefficients (DO and IA) in Models 1 and 2 of Table III are all negative and significant at the 1% level and provide evidence in support of the hypotheses H1 and H2, respectively. The results are consistent with prior studies [22], [23] and show that both D&O insurance purchase policy and purchase amount are negatively related with the cost of debt. The evidence is consistent with the corporate governance monitoring role of D&O insurance literature Bradley and Chen [40] and indicates that firms with D&O insurance insulate D&Os from the discipline from potential litigation and enjoy lower cost of debt.

In regard to the control variables, the results in Table III are generally in the predicted directions and are consistent with the prior literature. Collectively, firms with larger board size and higher ownership-in-pledge ratio of directors, do not have CEO duality enjoy lower cost of debt. For brevity, we do not tabulate the probit regression estimation results to obtain the inverse Mills ratio from the first stage of Heckman [9]. Nevertheless, in Models 1 and 2 of Table III, the MILLS coefficients are all negative and significant at the 1% level. The findings show that the sample self-selection bias has been corrected in our study by employing the Heckman two-stage approach.

TABLE III: REGRESSION ANALYSES OF D&O LIABILITY INSURANCE AND THE COST OF DEBT (N=10,391)

$COSTD_{it} = \beta_0 + \beta_1 D\&O_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + \beta_4 MB_{it} + \beta_5 BOARD_{it} + \beta_6 DIOWN_{it} + \beta_7 PLEDGE_{it} + \beta_8 MAOWN_{it} + \beta_9 DUAL_{it} + \beta_{10} MILLS_{it} + \eta IND + \varphi YEAR + \varepsilon_{it}$

Variable	Predicted Sign	Model 1 DO Coefficient (t-value)	Model 2 IA Coefficient (t-value)
Intercept		1.322*** (8.842)	1.324*** (8.822)
DO	?	-0.108*** (-3.294)	
IA	?		-0.009*** (-3.062)
SIZE	?	0.001 (0.180)	0.002 (0.245)
LEV	+	0.088 (1.600)	0.088 (1.603)
MB	-	-0.005 (-1.543)	-0.005 (-1.549)
BOARD	?	-0.017* (-1.742)	-0.017* (-1.725)
DIOWN	-	0.000 (-0.334)	0.000 (-0.357)
PLEDGE	-	-0.001* (-1.677)	-0.001* (-1.691)
MAOWN	-	0.002 (0.456)	0.002 (0.451)
DUAL	+	0.076*** (3.776)	0.075*** (3.749)
MILLS	?	-0.184*** (-2.652)	-0.184*** (-2.654)
IND		YES	YES
YEAR		YES	YES
Adj-R^2		5.00%	5.00%
F-statistic		16.777***	16.732***

Notes: Robust *t*-statistics are in parentheses. The symbols ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. All variables are as defined in Table I.

V. CONCLUSION

This study examines whether the purchase of directors' and officers' liability insurance coverage plays a monitoring or a managerial opportunism role in the cost of debt for the firms listed in Taiwan for the period from 2008 to 2015. The empirical results reveal a negative relationship between D&O purchase policy and the amount of liability insurance coverage and the cost of debt and implying that D&O liability insurance plays a corporate governance monitoring role for Taiwanese firms. Overall, our evidence is consistent with the notion that D&O liability insurance insulates D&Os from the discipline effect of shareholder litigation, leading to a decrease in the cost of debt.

We employ the interest expenses of short and long term debt as a proxy for the cost of debt. Additional studies could apply alternative measures to proxy for the cost of debt. In addition, as D&O insurance is a firm choice, our study does not introduce the other types of approach to test the sample selection bias. Future studies could apply the other types of methods to consider the problems. Moreover, our findings could be driven by an endogeneity problem, conducting additional analyses to this concern would be worthwhile.

ACKNOWLEDGMENT

The authors would like to thank three anonymous referees, the Journal of Economics, Business and Management editorial board, and participants at the 2017 International Conference on E-Business and Internet for their insightful comments and suggestions. Any remaining errors are the authors' responsibility.

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Ching-Chieh Tsai was born in Changhua County, Taiwan. She received her B.B.A. degree from Fu Jen Catholic University, Taipei, Taiwan, in 1989, her M.B.A. degree in business management from National Sun Yat-Sen University, Kaohsiung, Taiwan, in 1992, and her Ph.D. degree in business management from National Sun Yat-Sen University, Kaohsiung, Taiwan, in 2012. She is now an associate professor in the Department of Accounting Information at National Taichung University of Science and Technology, in Taichung, Taiwan. From 1992 to 2012, she has been a lecturer in the Department of Accounting Information at National Taichung University of Science and Technology, in Taichung, Taiwan.

Her main research interests include corporate governance, earnings management, as well as financial accounting. So far she has published several papers in conference proceedings and journals including journals such as Emerging Markets Finance & Trade, International Journal of e-Education, e-Business, e-Management and e-Learning, Journal of Economics, Business and Management, and Journal of American Business Review.

Jo-Lan Liu was born in Taichung City, Taiwan. She received her B.B.A. degree from Chung Yuan Christian University, Chung Li District, Taoyuan City, Taiwan, in 1992, her M.B.A. degree in business management from Soochow University, Taipei, Taiwan, in 1995, and her Ph.D. degree in business management from National Chung Kung University, Tainan, Taiwan, in 2006. She is now an associate professor in the Department of Accounting Information at National Taichung University of Science and Technology, in Taichung, Taiwan.

Her main research interests include auditing, corporate governance, earnings management, as well as financial accounting. So far she has published several papers in conference proceedings and journals including journals such as Journal of Contemporary Accounting and Economics, Emerging Markets Finance & Trade, Accounting and Finance Research, International Journal of Public Information Systems, Journal of Accounting Review, and Sun Yat-Sen Management Review.

Yu-Ching Liu was born in Taichung County, Taiwan. She received her B.B.A. degree from National Taichung University of Science and Technology, in Taichung, Taiwan, in 2015. She is now a graduate student in the Department of Accounting Information at National Taichung University of Science and Technology, in Taichung, Taiwan.

Chen-Wei Hao was born in Keelung City, Taiwan. He received his B.B.A. degree from National Taichung University of Science and Technology, in Taichung, Taiwan, in 2015. He is now a graduate student in the Department of Accounting Information at National Taichung University of Science and Technology, in Taichung, Taiwan.