

## HOW DOES THE CREDIT RATING REACT TO THE FUNCTION OF D&O INSURANCE?



 Ya-Fang Wang<sup>1</sup>

<sup>1</sup>Department of Accounting, Providence University (Taiwan)  
Email: [yfwang2@pu.edu.tw](mailto:yfwang2@pu.edu.tw)



### ABSTRACT

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#### Keywords

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This study investigated the association between credit ratings and affiliated directors and found that credit raters perceive affiliated directors as a credit risk-increasing factor in corporate government and thus are more likely to assign unfavorable ratings to companies with high levels of affiliated directors. However, credit raters perceive the function of D&O insurance as a credit risk-decreasing factor in mitigating the effects of affiliated directors and thus are more likely to assign favorable ratings to companies with high ratio of affiliated directors when these companies have purchased the D&O insurance. These results imply that credit raters encourage companies purchasing D&O insurance in protecting the quality of corporate government.

#### JEL Classification:

M41, G30.

**Contribution/ Originality:** This study contributes to provide empirical evidence regarding the association between rating decisions and corporate government situations; moreover, this study further examines effects of D&O insurance on previously association.

### 1. INTRODUCTION

Corporate government matters not only a firm's perspective at managerial strategies and its economic consequences, but also a valuation of firm's risks and values. The board is the life of corporate government, and the composition of board members plays a relevant role in the function of the board. To protect the board's operations and the right and interests of both shareholders and directors, Directors' and officers' (D&O) insurance offers protections over corporate government settings. Therefore, the D&O insurance as a strategic tool on corporate governance seems to play an important role in promoting the efficiency of corporate governance and then increasing the confidence of market participants and investors (e.g., credit raters). Using credit ratings as proxy for the sophisticated investor's valuations, this study examines the effect of the composition of board members on investor's valuation, and explores whether the effect of D&O insurance would influence the relationship between affiliated directors and credit ratings.

### 1.1. Credit Rating and Affiliated Director

Prior studies indicate that credit raters are sophistication, experience and use of portfolio strategies, they in incorporating both managerial risk-taking factors and managerial risk-mitigating strategies into their credit risk evaluation (Cheng and Neamtiu, 2009; Alp, 2013; Kuang and Qin, 2013; Bruno *et al.*, 2016). Prior studies mainly focus on examining the association between credit ratings and financial quality/performance and demonstrate whether credit ratings provide a guarantee for default probability (Hribar and Jenkins, 2004; Lin *et al.*, 2009; Beaver *et al.*, 2012; Alissa *et al.*, 2013). From prior fraud cases (e.g., Enron and WorldCom), we know that the quality of corporate government is directly related to financial reporting and default risk; moreover, the board plays an important role in promoting the efficiency of corporate government. Therefore, this study differs from previous studies in attempting to examine the association between credit ratings and corporate government situations by examining whether and how affiliated members of the board affect credit raters' decisions, because affiliated members matter to the mechanism of corporate government and the quality of financial reporting, and assessments of credit risk of companies with high ratio affiliated directors can potentially provide useful and timely information to market participants. Thus, the first research question is as follows:

**RQ1:** Whether affiliated directors of the board affect rating decisions.

### 1.2. The Importance of D&O Insurance

Affiliated members are more likely to engage in self-interested strategies and incur shareholder lawsuits than Non-affiliated members, as a result, shareholders and directors are more likely to suffer losses of wealth. Boyer (2014) indicates that there are three ways are recommended to protect the board member's equity and wealth: Corporate indemnification plans, Limited liability provisions and D&O insurance policies.<sup>1</sup> However, only the D&O insurance policy can protect both shareholders and directors in case of a lawsuit. The function of D&O insurance seems to play an important role in corporate government. Much of the research on the D&O insurance focuses on the managerial opportunism in accounting choice and economic consequences (Zou *et al.*, 2008; Cao and Narayanamoorthy, 2014; Woo *et al.*, 2015; Boyer and Tennyson, 2016). This investigation differs from previous studies in examining whether the function of D&O insurance matters for rating decisions in assessing cases of affiliated directors. Thus, the second research question is as follows.

**RQ2:** Whether the function of D&O insurance affects the association between affiliated directors of the board and rating decisions.

## 2. RESEARCH DESIGN

### 2.1. Data Sources

Our sample was restricted to Taiwanese listed electronic companies over the period 2010-2015 and included in the Taiwan Economic Journal (*TEJ*) database. This study focuses on the electronic industry because the available data on D&O insurance is limited. Information on D&O insurance, affiliated director, and financial data were obtained from the TEJ annual files. Cases that did not disclose information related to D&O insurance or financial data were excluded. Table 1 reports the sample distribution. Panel A shows there are 72.23% of electronic observations with D&O insurance. This highest percentage of D&O insurance purchasing seems to imply the importance of D&O insurance. Panel B shows that the non-D&O subsample has a median credit rating of 6, with 11.46 percent in the investment grade rating. Additionally, the D&O subsample has a median credit rating of 5, with 23.03 percent in the investment grade rating; moreover, this percentage is a more-than-double increase than the non-D&O subsample. Overall, the average credit rating in the non-D&O subsample seems to be somewhat inferior to that in the D&O subsample.

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<sup>1</sup>Please refer to Boyer (2014) for a discussion of protections of the board.

Table 1. Sample Distribution

Panel A : Distribution of observations by year and D&O							
Year D&O <sup>a</sup>	2010	2011	2012	2013	2014	2015	Total
D&O	389	393	408	418	431	458	2,497 (72.23%)
Non-D&O	169	171	159	150	162	149	960 (27.77%)
Total	558	564	567	568	593	607	3,457

  

Panel B : Distribution of observations by D&O and TCRI rating					
TCRI Rating <sup>b</sup>	Rating Grade	Frequency		Percentage (Cumulative)	
		D&O	Non-D&O	D&O	Non-D&O
1	Investment lower risk rating	21	0	0.84 (0.84)	0.00 (0.00)
2		34	1	1.36 (2.20)	0.10 (0.10)
3		132	17	5.29 (4.49)	1.77 (1.88)
4		388	92	15.54 (23.03)	9.58 (11.46)
5	medium risk rating	583	162	23.35 (46.38)	16.88 (28.33)
6		708	304	28.35 (74.73)	31.67 (60.00)
7		370	179	14.82 (89.55)	18.65 (78.65)
8	Speculative higher risk rating	187	141	7.49 (97.04)	14.69 (93.33)
9		40	54	1.60 (98.64)	5.63 (98.96)
10		34	10	1.36 (100)	1.04 (100)

<sup>a</sup> D&O (Non-D&O) denotes companies (not) purchase D&O insurance.

<sup>b</sup> Taiwan Corporate Credit Rating Index (TCRI), where the credit rating is divided into ten degrees, with the highest degree representing the highest credit risk.

#### Model Specification – Credit Rating vs. D&O Insurance

To examine the effects of affiliated directors on credit ratings, the research model (1) was constructed. Further, the research model (2) was constructed to examine whether the association between credit ratings and affiliated directors are affected by the function of D&O insurance. Since the *TCRI* rating is in ordinal scale, research models (1) and (2) are the ordered probit model. Research models (1) and (2) are as follows:<sup>2</sup>

$$\begin{aligned}
 TCRI_{i,t} = & \alpha_0 + \alpha_1 AFF_{i,t} + \alpha_2 LOSS_{i,t} + \alpha_3 ROA_{i,t} + \alpha_4 GROWTH_{i,t} + \alpha_5 MB_{i,t} \\
 & + \alpha_6 DE_{i,t} + \alpha_7 OCF_{i,t} + \alpha_8 ZSCORE_{i,t} + \delta SIZEQUINTILE_{i,t} \\
 & + \eta YEAR_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 TCRI_{i,t} = & \alpha_0 + \alpha_1 AFF_{i,t} + \alpha_2 D \& O_{i,t} + \alpha_3 AFF \times D \& O_{i,t} + \alpha_4 LOSS_{i,t} \\
 & + \alpha_5 ROA_{i,t} + \alpha_6 GROWTH_{i,t} + \alpha_7 MB_{i,t} + \alpha_8 DE_{i,t} + \alpha_9 OCF_{i,t} \\
 & + \alpha_{10} ZSCORE_{i,t} + \delta SIZEQUINTILE_{i,t} + \eta YEAR_{i,t} + \varepsilon_{i,t}
 \end{aligned} \tag{2}$$

where

$TCRI_{i,t}$	= Taiwan Corporate Credit Rating Index (TCRI), where the credit rating is divided into ten degrees, with the highest degree representing the highest credit risk;
$AFF_{i,t}$	= the number of affiliated directors divided by board size;
$D \& O_{i,t}$	= 1 if the company purchases the D&O insurance, and 0 otherwise;
$AFF \times D \& O_{i,t}$	= this interaction is the $AFF$ and $D \& O$ ;
$LOSS_{i,t}$	= 1 if operating income is less than zero, otherwise 0;
$ROA_{i,t}$	= net income divided by total assets;
$GROWTH_{i,t}$	= the percentage increase in sales over one year;
$MB_{i,t}$	= market value of equity divided by book value of equity;
$DE_{i,t}$	= total debt divided by total assets;
$OCF_{i,t}$	= cash flow from operations divided by total assets;

<sup>2</sup> To control for outliers, all continuous variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles.

$ZSCORE_{it}$	= the risk of financial distress from the Altman (1968) z-score model; <sup>3</sup>
$SIZEQUINTILE_{it}$	= dummy variables controlling for size based on total assets;
$YEAR_{it}$	= dummy variables controlling for years;
$\varepsilon$	= the residual term.

The dependent variable,  $TCRI$ , is the TCRI ratings to capture credit risk (Gul and Goodwin, 2010; DeFond *et al.*, 2011). The test variable,  $AFF$ , is the level of affiliated directors, measured as the number of affiliated directors divided by board size. In model (1), the coefficient on  $AFF$  is expected to be positive, implying that credit raters give unfavorable ratings to companies with weaker corporate governance. The test variable,  $D\&O$ , is an indicator variable equals to 1 if the company purchases the D&O insurance, and 0 otherwise. In model (2), the coefficient on  $D\&O$  is expected to be negative, implying that credit raters give favorable ratings to companies with D&O insurance when their perceived risk is affected by the function of D&O insurance. Meanwhile, by examining the significance of the coefficient of  $AFF \times D\&O$ , this study can shed light on the association between the function of D&O insurance in mitigating the effects of affiliated directors and credit rating. Following prior research (Jorion *et al.*, 2009; Li *et al.*, 2010; Chandra, 2011; Bentley *et al.*, 2013; Kaplan and Williams, 2013) control variables include major determinants affecting credit raters' decisions. This study predicts the coefficients of  $ROA$ ,  $GROWTH$ ,  $MB$ ,  $OCF$  and  $ZSCORE$  (or  $LOSS$ ,  $DE$ ) to be negative (or positive) because profitable (or unprofitable) companies are less (or more) likely to receive unfavorable ratings.  $SIZEQUINTILE$  and  $YEAR$  are controlling for the effects of company size and year.

### 3. RESULTS AND ANALYSIS

Table 2 presents the descriptive statistics for dependent variable, test variables, and all control variables used in this study, partitioned into D&O (n=2,497) and non-D&O (n=960) subsamples. The results show that the mean (median) values of  $TCRI$  (credit ratings) and  $AFF$  (the ratio of affiliated directors) reported in the non-D&O subsample is larger than those reported in the D&O subsample at least at the 0.01 level for both tests. These results indicate that companies without the D&O insurance are more likely to receive unfavorable ratings; moreover, such companies are more likely to appoint affiliated directors.

Table-2. Descriptive Statistics

Variables <sup>a</sup>	D&O <sup>b</sup> (n=2,497)			Non-D&O (n=960)			Test of Differences <sup>c</sup>	
	Mean	Median	Std. Dev	Mean	Median	Std. Dev	t-test	Wilcoxon
$TCRI$	5.6011	6.0000	1.5526	6.2729	6.0000	1.4501	11.60***	11.31***
$AFF$	0.1658	0.1429	0.1590	0.2425	0.2500	0.1643	12.58***	12.68***
$LOSS$	0.2259	0.0000	0.4182	0.2740	0.0000	0.4462	2.97***	2.97***
$ROA$	0.0368	0.0434	0.0822	0.0325	0.0383	0.0859	-1.39	-1.78*
$GROWTH$	0.0506	0.0164	0.2749	0.0409	0.0037	0.2858	-0.91	-1.62
$MB$	1.6180	1.2500	1.2719	1.5251	1.2400	1.1168	-1.98**	-1.25
$DE$	0.3966	0.3936	0.1701	0.3800	0.3638	0.1735	-2.56**	-2.74***
$OCF$	0.0692	0.0683	0.1043	0.0575	0.0608	0.1042	-3.24***	-2.71***
$ZSCORE$	3.9230	3.0923	3.3452	3.7678	3.0559	3.1418	-1.24	-0.99

<sup>a</sup> The definitions of the variables reported in this table are:  $TCRI$  = Taiwan Corporate Credit Rating Index (TCRI), where the credit rating is divided into ten degrees, with the highest degree representing the highest credit risk;  $AFF$  = the number of affiliated directors divided by board size;  $LOSS$  = 1 if operating income is less than zero, otherwise 0;  $ROA$  = net income divided by total assets;  $GROWTH$  = the percentage increase in sales over one year;  $MB$  = market value of equity divided by book value of equity;  $DE$  = total debt divided by total assets;  $OCF$  = cash flow from operations divided by total assets;  $ZSCORE$  = the risk of financial distress from the Altman (1968) z-score model. All continuous variables are winsorized at the first and 99th percentiles.

<sup>b</sup> D&O (Non-D&O) denotes companies (not) purchase D&O insurance.

<sup>c</sup> Asterisks \*, \*\*, \*\*\* indicate significance at the 0.10, 0.05, and 0.01 levels, respectively.

<sup>3</sup> Altman (1968) Z-score is defined as  $Z\text{-score} = 1.2\tau_1 + 1.4\tau_2 + 3.3\tau_3 + 0.6\tau_4 + 1.0\tau_5$ , where  $\tau_1$  = working capital divided by total assets,  $\tau_2$  = retained earnings divided by total assets,  $\tau_3$  = earnings before interest and taxes divided by total assets,  $\tau_4$  = market value of equity divided by book value of total debt, and  $\tau_5$  = sales divided by total assets.

Table 3 reports the Pearson and Spearman correlations for dependent variable, test variables, and all control variables to be used in the ordered probit models (1) and (2). As depicted in this Table, most explanatory variables are not significantly correlated with each other. The results show that *TCRI* is positively correlated with *AFF*, statistically significant at the 0.05 level, implying that credit raters seem to be more concerned about the role of affiliated directors in corporate government, and then assign unfavorable ratings to companies with higher ratio of affiliated directors. Overall, the correlations between control variables are mostly not very high, except for some variables. This study further computed variance inflation factors (VIF) for research models (1) and (2), wherein the largest VIF was 3.53 and the mean VIF was 2.06, which is well below the 10 threshold of concern recommended by Kennedy (1998). Thus, empirical results were not affected by multicollinearity.

Table-3. Correlation Matrix <sup>a</sup>

Variable <sup>b</sup>	1	2	3	4	5	6	7	8	9
1. <i>TCRI</i>		0.0908	0.4959	-0.5818	-0.1987	-0.2652	0.1053	-0.4683	-0.4167
2. <i>AFF</i>	0.0820		0.0498	-0.0427	-0.0230	-0.1199	0.0293	-0.0214	-0.0977
3. <i>LOSS</i>	0.4842	0.0477		-0.7389	-0.3391	-0.3078	0.0598	-0.4207	-0.4125
4. <i>ROA</i>	-0.5535	-0.0070	-0.7379		0.4217	0.5835	-0.1947	0.5992	0.6141
5. <i>GROWTH</i>	-0.1387	-0.0249	-0.2823	0.3767		0.3757	0.1089	0.1732	0.1917
6. <i>MB</i>	-0.1520	-0.0706	-0.1586	0.3347	0.2646		-0.0566	0.3227	0.5413
7. <i>DE</i>	0.1456	0.0241	0.0657	-0.1840	0.0934	0.0204		-0.2020	-0.6384
8. <i>OCF</i>	-0.4474	0.0026	-0.3817	0.5844	0.1474	0.2292	-0.1985		0.3640
9. <i>ZSCORE</i>	-0.2595	-0.0971	-0.2458	0.4334	0.1050	0.4273	-0.5965	0.2901	

<sup>a</sup> Pearson correlations in the lower diagonal and Spearman correlations in the upper diagonal. Bold text indicates 5% statistical significance.

<sup>b</sup> The definitions of the variables reported in this table are: *TCRI* = Taiwan Corporate Credit Rating Index (TCRI), where the credit rating is divided into ten degrees, with the highest degree representing the highest credit risk; *AFF* = the number of affiliated directors divided by board size; *LOSS* = 1 if operating income is less than zero, otherwise 0; *ROA* = net income divided by total assets; *GROWTH* = the percentage increase in sales over one year; *MB* = market value of equity divided by book value of equity; *DE* = total debt divided by total assets; *OCF* = cash flow from operations divided by total assets; *ZSCORE* = the risk of financial distress from the Altman (1968) z-score model. All continuous variables are winsorized at the first and 99th percentiles.

Table-4. Credit Rating and D&amp;O Insurance

Variables <sup>a</sup>	Pred. Sign	(1)		(2)	
		Coef.	z-value <sup>b</sup>	Coef.	z-value
<i>AFF</i>	+	0.2147	1.91**	0.4364	2.20**
<i>D&amp;O</i>	—			-0.1330	-2.10**
<i>AFF</i> × <i>D&amp;O</i>	?			-0.4815	-2.03**
<i>LOSS</i>	+	0.4830	7.02***	0.4760	6.93***
<i>ROA</i>	—	-5.6875	-10.58***	-5.8514	-10.86***
<i>GROWTH</i>	—	0.3144	3.85***	0.3137	3.84***
<i>MB</i>	—	-0.0867	-3.26***	-0.0817	-3.05***
<i>DE</i>	+	2.5175	14.46***	2.5372	14.65***
<i>OCF</i>	—	-1.1336	-4.54***	-1.1168	-4.50***
<i>ZSCORE</i>	—	-0.0021	-0.21	-0.0003	-0.03
<i>SIZEQUINTILE</i>		Included		Included	
<i>YEAR</i>		Included		Included	
Pseudo R <sup>2</sup>		26.95%		27.23%	
N		3,457		3,457	

<sup>a</sup> The definitions of the variables reported in this table are: *TCRI* = Taiwan Corporate Credit Rating Index (TCRI), where the credit rating is divided into ten degrees, with the highest degree representing the highest credit risk; *AFF* = the number of affiliated directors divided by board size; *D&O* = 1 if the company purchases the D&O insurance, and 0 otherwise; *AFF* × *D&O* = this interaction is the *AFF* and *D&O*; *LOSS* = 1 if operating income is less than zero, otherwise 0; *ROA* = net income divided by total assets; *GROWTH* = the percentage increase in sales over one year; *MB* = market value of equity divided by book value of equity; *DE* = total debt divided by total assets; *OCF* = cash flow from operations divided by total assets; *ZSCORE* = the risk of financial distress from the (Altman, 1968) z-score model. All continuous variables are winsorized at the first and 99th percentiles.

<sup>b</sup> Asterisks \*, \*\*, \*\*\* indicate significance at the 0.10, 0.05, and 0.01 levels, respectively. One-tailed for directional expectations, two-tailed for others.

Column (1) of Table 4 reports the estimated results from the ordered probit model in Equation (1). The coefficient on the test variable *AFF* was 0.2147, which is significant at the 5% level ( $z = 1.91$ ), suggesting that credit raters perceive high ratio of affiliated directors as a credit risk-increasing factor and thus are more likely to assign unfavorable ratings to companies with high ratio of affiliated directors. This study further investigates whether the

function of D&O insurance affects the association between credit raters (credit ratings) and weak corporate government (affiliated directors). Column (2) of Table 4 reports the estimated results from the ordered probit model in Equation (2). In Column (2), the coefficient of  $AFF$  is significant and positive (at the 5% significance level), whereas the coefficients of  $D\&O$  and  $AFF \times D\&O$  are significant and negative (both at the 5% significance level). These results imply that credit raters perceive the role of D&O insurance as a credit risk-decreasing factor in mitigating the effects of affiliated directors and thus are more likely to assign favorable ratings to companies with high ratio of affiliated directors when these companies have purchased the D&O insurance.

### 3.1. Further Analysis: Life-Cycle Stage

Credit risk is close related to companies' life-cycle stage, and firm's credit risk taking varies across firm's life-cycle. For example, growth companies may have high credit risk than those companies in the maturity or decline stage because such companies are commonly regarded as risk-taking. Thus, this study includes life-cycle effects into account and employs the methods of Anthony and Ramesh (1992) for the classification of a firm according to life-cycle. In Column (1) of Table 5, the coefficient on the test variable  $AFF \times D\&O$  was -1.3287, which is significant at the 1% level ( $z = -3.13$ ), whereas the coefficient of  $AFF \times D\&O$  in Columns (2) and (3) of Table 5 is insignificant. Notably,  $AFF \times D\&O$  is significant only in growth companies. These results imply that credit raters not only considered the role of D&O insurance in corporate government to make rating decisions, but their ratings are also affected by different life-cycle stages.

Table-5. Credit Rating and D&O Insurance: Life-Cycle Effect

Variables <sup>b</sup>	Pred. Sign	(1) Growth <sup>a</sup>		(2) Maturity		(3) Decline	
		Coef.	z-value <sup>c</sup>	Coef.	z-value	Coef.	z-value
$AFF$	+	0.7594	2.04**	0.2183	0.80	0.7304	1.39*
$D\&O$	-	0.1987	1.80**	-0.4526	-5.09***	-0.0497	-0.21
$AFF \times D\&O$	?	-1.3287	-3.13***	0.3226	0.98	-1.1310	-1.43
$LOSS$	□	0.3492	3.34***	0.5909	5.88***	0.4038	1.58*
$ROA$	-	-7.2602	-9.59***	-5.0105	-6.25***	-4.3704	-2.42***
$GROWTH$	-	0.4891	3.71***	0.0817	0.70	0.6245	2.06**
$MB$	-	-0.1070	-3.38***	-0.0446	-0.98	-0.2269	-2.46***
$DE$	+	2.9281	10.11***	2.3934	10.29***	2.6444	4.55***
$OCF$	-	-0.8301	-2.28**	-1.6863	-4.60***	-1.6822	-2.06**
$ZSCORE$	-	0.0407	2.93***	-0.0234	-1.51*	-0.0471	-1.61*
$SIZEQUINTILE$		Included		Included		Included	
$YEAR$		Included		Included		Included	
Pseudo R <sup>2</sup>		26.85%		29.69%		26.98%	
N		1,366		1,812		279	

<sup>a</sup> Growth denotes companies in the growth stage of life cycle; Maturity denotes companies in the maturity stage of life cycle; Decline denotes companies in the decline stage of life cycle.

<sup>b</sup> The definitions of the variables reported in this table are:  $TCRI$  = Taiwan Corporate Credit Rating Index (TCRI), where the credit rating is divided into ten degrees, with the highest degree representing the highest credit risk;  $AFF$  = the number of affiliated directors divided by board size;  $D\&O$  = 1 if the company purchases the D&O insurance, and 0 otherwise;  $AFF \times D\&O$  = this interaction is the  $AFF$  and  $D\&O$ ;  $LOSS$  = 1 if operating income is less than zero, otherwise 0;  $ROA$  = net income divided by total assets;  $GROWTH$  = the percentage increase in sales over one year;  $MB$  = market value of equity divided by book value of equity;  $DE$  = total debt divided by total assets;  $OCF$  = cash flow from operations divided by total assets;  $ZSCORE$  = the risk of financial distress from the Altman (1968) z-score model. All continuous variables are winsorized at the first and 99th percentiles.

<sup>c</sup> Asterisks \*, \*\*, \*\*\* indicate significance at the 0.10, 0.05, and 0.01 levels, respectively. One-tailed for directional expectations, two-tailed for others.

### 3.2. Further Analysis: Industry Supply Chain

The Taiwan electronic industry has the complete supply chain from up-stream to down-stream, and companies of different supply chain stages may face differential industry expertise and risk. For example, the industry expertise of down-stream companies are the most likely to substitute, and such companies are more likely to face high credit risk because of financial and grow constraints. Thus, this study includes supply chain effects into account. In Column (2) of Table 6, the coefficient on the test variable  $AFF \times D\&O$  was -1.3771, which is significant at the 10% level ( $z = -1.93$ ), whereas the coefficient of  $AFF \times D\&O$  in Columns (1) and (3) of Table 6 is

insignificant. Notably,  $AFF \times D\&O$  is significant only in middle-stream companies. These results imply that rating decisions are affected by effects of different supply chain stages.

Table-6. Credit Rating and D&amp;O Insurance: Supply Chain Effect

Variables <sup>b</sup>	Pred. Sign	(1) Up-stream <sup>a</sup>		(2) Middle-stream		(3) Down-stream	
		Coef.	z-value <sup>c</sup>	Coef.	z-value	Coef.	z-value
<i>AFF</i>	+	1.0020	2.43***	0.0947	0.15	0.6480	1.91**
<i>D&amp;O</i>	—	-0.1200	-0.89	0.1423	0.56	-0.1153	-0.95
$AFF \times D\&O$	?	-0.1904	-0.35	-1.3771	-1.93*	-0.4624	-1.10
<i>LOSS</i>	+	0.3956	1.98**	0.2324	1.14	0.543□	4.17***
<i>ROA</i>	—	-5.9491	-4.22***	-7.4895	-3.98***	-4.1258	-3.88***
<i>GROWTH</i>	—	-0.0170	-0.08	0.3792	1.46*	0.05□3	0.30
<i>MB</i>	—	0.0711	0.84	-0.1172	-1.35*	-0.0182	-0.44
<i>DE</i>	+	3.2013	7.44***	2.4113	4.84***	1.6901	5.14***
<i>OCF</i>	—	-2.2413	-2.92***	-1.0772	-1.55*	-1□9970	-3.95***
<i>ZSCORE</i>	—	0.0224	0.83	-0.0513	-1.51*	-0.1150	-3.77***
<i>SIZEQUINTILE</i>		Included		Included		Include□	
<i>YEAR</i>		Included		Included		Included	
Pseudo R <sup>2</sup>		36.09%		25.73%		29.04%	
N		616		449		947	

<sup>a</sup> Up-stream denotes companies in the up-stream of supply chain; Middle-stream denotes companies in the middle-stream of supply chain; Down-stream denotes companies in the down-stream of supply chain.

<sup>b</sup> The definitions of the variables reported in this table are: *TCRI* = Taiwan Corporate Credit Rating Index (TCRI), where the credit rating is divided into ten degrees, with the highest degree representing the highest credit risk; *AFF* = the number of affiliated directors divided by board size; *D&O* = 1 if the company purchases the D&O insurance, and 0 otherwise;  $AFF \times D\&O$  = this interaction is the *AFF* and *D&O*; *LOSS* = 1 if operating income is less than zero, otherwise 0; *ROA* = net income divided by total assets; *GROWTH* = the percentage increase in sales over one year; *MB* = market value of equity divided by book value of equity; *DE* = total debt divided by total assets; *OCF* = cash flow from operations divided by total assets; *ZSCORE* = the risk of financial distress from the Altman (1968) z-score model. All continues variables are winsorized at the first and 99th percentiles.

<sup>c</sup> Asterisks \*, \*\*, \*\*\* indicate significance at the 0.10, 0.05, and 0.01 levels, respectively. One-tailed for directional expectations, two-tailed for others.

Table-7. Credit Rating and D&amp;O Insurance: CEO-Duality Effect

Variables <sup>b</sup>	Pred. Sign	(1) Duality <sup>a</sup>		(2) Non-Duality	
		Coef.	z-value <sup>c</sup>	Coef.	z-value
<i>AFF</i>	+	0.6532	2.52***	0.2042	0.66
<i>D&amp;O</i>	—	-0.1972	-2.11**	-0.0831	-0.91
$AFF \times D\&O$	?	-0.6663	-1.97**	-0.2337	-0.66
<i>LOSS</i>	+	0.4909	5.14***	0.4536	4.53***
<i>ROA</i>	—	-4.9828	-6.78***	-6.9213	-8.33***
<i>GROWTH</i>	—	0.2529	2.18**	0.3923	3.35***
<i>MB</i>	—	-0.0772	-2.38***	-0.0706	-1.73**
<i>DE</i>	+	2.5226	9.73***	2.□726	11.08***
<i>OCF</i>	—	-1.3476	-3.55***	-0.9209	-2.74***
<i>ZSCORE</i>	—	-0.0177	-1.22	0.0133	0.91
<i>SIZEQUINTILE</i>		Included		Included	
<i>YEAR</i>		Included		Included	
Pseudo R <sup>2</sup>		24.08%		30.05%	
N		1,514		1,943	

<sup>a</sup> Duality (Non-Duality) denotes CEO-duality (Non-CEO Duality) companies.

<sup>b</sup> The definitions of the variables reported in this table are: *TCRI* = Taiwan Corporate Credit Rating Index (TCRI), where the credit rating is divided into ten degrees, with the highest degree representing the highest credit risk; *AFF* = the number of affiliated directors divided by board size; *D&O* = 1 if the company purchases the D&O insurance, and 0 otherwise;  $AFF \times D\&O$  = this interaction is the *AFF* and *D&O*; *LOSS* = 1 if operating income is less than zero, otherwise 0; *ROA* = net income divided by total assets; *GROWTH* = the percentage increase in sales over one year; *MB* = market value of equity divided by book value of equity; *DE* = total debt divided by total assets; *OCF* = cash flow from operations divided by total assets; *ZSCORE* = the risk of financial distress from the Altman (1968) z-score model. All continues variables are winsorized at the first and 99th percentiles.

<sup>c</sup> Asterisks \*, \*\*, \*\*\* indicate significance at the 0.10, 0.05, and 0.01 levels, respectively. One-tailed for directional expectations, two-tailed for others.

### 3.3. Further Analysis: CEO-Duality Effect

The board with the percentage of affiliated directors is a method of strategic management as a corporate governance mechanism, and market participants view this as weak corporate government. Also, CEO-duality is a style of leadership structure as a corporate governance mechanism. However, CEO-duality companies are

commonly regarded as weak corporate government, when compared to Non-CEO-duality companies. Thus, this study includes the CEO-duality effect to examine how the impact of D&O insurance affects the association between rating decisions and affiliated corporate government. In Column (1) of Table 7, the coefficient on the test variable  $AFF \times D\&O$  was -0.6663, which is significant at the 5% level ( $z = -1.97$ ), whereas the coefficient of  $AFF \times D\&O$  in Column (2) of Table 5 is insignificant. Notably,  $AFF \times D\&O$  is significant only in CEO-duality companies. These results imply that credit raters view CEO-duality leadership as the factor in decreasing the function of corporate government; however, credit raters are more likely to assign favorable ratings to CEO-duality companies with higher ratio of affiliated directors when such companies purchase the D&O insurance.

#### 4. CONCLUSIONS

This study provides empirical evidence regarding the association between rating decisions and corporate government situations; moreover, this study further examines effects of D&O insurance on previously association. Overall, evidence shows that companies with high ratio of affiliated directors are more likely to receive unfavorable ratings from credit raters; however, credit raters are more likely to assign favorable ratings to companies with high ratio of affiliated directors when such companies purchase the D&O insurance. These results imply that credit raters view the function of D&O insurance as a corporate governance mechanism in monitoring and improving the efficiency of the board. Empirical results also show that the above-mentioned association varies across firm's life-cycle, supply chain, and CEO-duality leadership.

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