

THE IMPACT OF CEOS' INCENTIVES AND EXPERIENCE ON CORPORATE CREDIT RISK

¹FENG-TSE TSAI, ²CHIA-FEN TSAI, ³PING-CHAO WU

^{1,3}Department of Finance, Asia University, Taiwan

²Department of Finance, National Sun Yat-sen University, Taiwan

E-mail: ¹ftsai@asia.edu.tw

Abstract - The objective of this paper is to comprehensively understand how CEOs' risk preference, proxied by their incentives, gender, age, power, and experience affect firm credit risk. We find that more debt-based compensation is associated with lower firm credit risk. CEOs having more equity-based compensation can level up firm credit risk except in the financial crisis period. Moreover, CEOs' experience is beneficial for firm credit quality only during the financial crisis. To sum up, CEOs' incentives and experience matter to corporate credit risk particularly during the financial crisis.

I. INTRODUCTION

The CEO is a key decision maker in corporate investment and financing decisions. Thus, CEOs' risk attitude and personal traits play critical roles on firm credit quality. However, CEOs' risk preference is not easily and directly measured. Thus, we follow the literature to capture CEOs' risk preference from several distinct aspects. First, CEO compensation plays an important role on deciding CEO risk taking behavior (Matolcsy & Wright 2011; Cassell et al. 2012; Cain & McKeon 2016; Lee & Shen 2016). The incentives can be categorized into cash, equity-based and debt-based compensation. Equity-based compensation encourages CEOs to take more risks while debt-based compensation makes CEOs more conservative and hence reduces corporate risk exposures (Yermack & Sundaram 2005).

Second, gender is associated with risk attitude or overconfidence. Huang and Kisgen (2013) find that female CEOs exhibit relative less overconfidence in significant corporate decision making compared with men. In addition, age could matter to CEOs' risk preference especially in retirement age. For instance, Jenter and Lewellen (2015) find that the likelihood of receiving a successful takeover bid is sharply higher when target CEOs are close to age 65. In the corporate strategy, the older CEOs are documented to invest less in the R&D and keep the company at lower operating leverage (Serfling 2014).

Third, CEOs' power and experience can be related to firm credit risk as well. Adams et al. (2005) suggest that firms whose CEOs have more decision-making power experience more variability in performance. Moreover, the length of CEO work experience in his or her firm before become CEO is relevant to firm investment and financing policies (Dittmar & Duchin 2015). We also consider whether the CEO born at the depression characteristics which would potentially affect managerial decisions (Malmendier et al. 2011), with a more conservative corporate strategy.

The remainder of this paper is organized as follows: Section 2 briefly describes the data source, sample filtering process and the empirical model setting. The empirical results are provided in Section 3. Section 4 offers conclusions.

II. DATA AND MODEL

CEO compensation data retrieves from CompustatExecucomp. To construct our sample, we begin with all firm-year observations in the Execucomp database from 2006 to 2014 since the mandatory disclosure of executives' pension benefits and deferred compensations starts in 2006. Accordingly, we incorporate corporate financial data in Compustat. After discarding missing values, the final sample consists of 6,183 firm-years from 2006 to 2014.

We examine the relation of CEOs' characteristics and firm credit risk by running the following panel regression:

$$\begin{aligned} AZ_{(i,t+1)} = & \alpha_i + \beta_1 CEODE_{(i,t)} + \beta_2 \\ & VADA_{(i,t)} + \beta_3 FEMALE_{(i,t)} + \beta_4 \\ & TENURE_{(i,t)} + \beta_5 RETIRE_{(i,t)} + \beta_6 \\ & POWER_{(i,t)} + \beta_7 \\ & DEPRESS_{(i,t)} + \beta' Controls + \epsilon_{(i,t)} \end{aligned}$$

AZ is Altman's Z score which measures firm creditworthiness. CEODE and VADA proxy for debt-based and equity-based compensations of CEOs, respectively. FEMALE is a dummy variable to identify CEOs' gender. TENURE captures the years from an individual joining the company to becoming a CEO. RETIRE is value one if the CEO's age is between 60 and 65. POWER is proxied by the proportion of CEO's compensation to top managers' compensation. DEPRESS is a dummy to show if a CEO is born during the great depression. We control firm characteristics such as market-to-book value, R&D expenses, sales growth and cash holdings. Appendix details the definition of variables.

III. EMPIRICAL RESULTS

Table 1 lists the mean, standard deviation and three quantiles of our sample. Average Z-score of sample firms is 3.98. In addition, average CEO relative to firm's debt to equity ratio is 1.19 while the average

vega to delta ratio is 0.40. In the sample, 0.18% are female CEOs and 23.35% of CEOs are in retired age. CEOs' compensation to Top 5 managers' compensation is 31.58% on average. CEOs spend averagely 9.74 years to the position of CEO. About 1.68% of CEOs experience great depression.

Table 1. descriptive statistics

The sample consists of 6,183 firm-year observations spanning from 2006 to 2014. Appendix details the definitions of the variables.

	count	mean	sd	p25	p50	p75
AZ	6183	3.983645	4.577	2.095522	3.336323	4.99265
CEODE	6183	1.191636	4.748	0	0	.3151929
VADA	6183	.4012485	0.341	.1267792	.3382787	.5949796
FEMALE	6183	.0187611	0.136	0	0	0
TENURE	6183	9.742035	10.469	0	6	17
RETIRE	6183	.2335436	0.423	0	0	0
POWER	6183	.3158282	0.079	.2693219	.314677	.3583709
DEPRESS	6183	.0168203	0.129	0	0	0
MB	6183	1.976346	1.168	1.25263	1.604985	2.239236
RD	6183	.0306259	0.052	0	0	.0379825
SALESG	6183	.0787387	0.178	.0031924	.0726754	.1517566
CASH	6183	.133727	0.167	.0221705	.069299	.1821312

In Table 2, firm credit quality, measured by AZ, is positively related to CEOs' inside debt holdings, female CEOs, tenure to CEO and other firm characteristics. However, CEOs' equity-based compensation and power are negatively associated with firm creditworthiness.

Table 2. correlation analysis

	AZ	CEODE	VGAG	FEMALE	TENURE	RETIRE	POWER	DEPRESS	MB	RD	SALESG
CEODE	0.070***	1									
VADA	-0.132***	0.038***	1								
FEMALE	0.0251**	-0.002	-0.014	1							
TENURE	0.021*	0.041***	-0.038***	-0.067***	1						
RETIRE	-0.008	0.033***	-0.040***	-0.036***	0.114***	1					
POWER	-0.022*	0.007	0.016	-0.009	-0.064***	0.068***	1				
DEPRESS	0.002	-0.032**	-0.062***	0.037***	-0.013	-0.051***	-0.014	1			
MB	0.371***	0.021*	-0.177***	0.036***	0.034***	-0.046***	-0.060***	-0.027**	1		
RD	0.116***	0.007	0.032**	-0.003	-0.144***	-0.057***	-0.101***	-0.030**	0.350***	1	
SALESG	0.076***	-0.041***	-0.158***	0.011	-0.036***	-0.014	0.038***	0.013	0.188***	0.094***	1
CASH	0.210***	0.097***	-0.044***	0.036***	-0.181***	-0.084***	-0.098***	-0.045***	0.335***	0.552***	0.121***

* p<.1, ** p<0.05, *** p<0.01

We conduct panel regressions and several robustness tests in Table 3. If we only consider CEO-related variables, model (1) shows that CEOs' inside debt holdings and female CEOs significantly increase firm credit quality while CEO's equity-based compensation, retirement age and depression experience have negative impacts on firm credit quality. However, when we control firms' market-to-book values, R&D expenses, sales growth and cash holdings (in model (2) and (3)), we find that debt-based compensation positively affects firm creditworthiness but equity-based incentive is positively associated with firm credit risk. Other CEOs' characteristics have no significant effect on

firm credit. In model (4), we adopt the 2-year average of future Z-scores as the explained variable to proxy for firm long-term creditworthiness. The result is similar to model (2) and (3). Additionally, we examine the sample in the financial crisis (year 2007 and 2008) and find that debt-based compensation remains significantly affect firm credit risk. Moreover, CEOs' experience such as tenure to CEO and the great depression experience have positive impacts on firm credit quality during the financial crisis.

Table 3. regression analysis and robustness tests

	(1)	(2)	(3)	(4)	(5)
	AZ	AZ	AZ	AZ_2Y	AZ_2Y
CEODE	0.0919*** (9.04)	0.0575*** (5.96)	0.0505*** (4.89)	0.0456*** (4.45)	0.0558*** (3.60)
VADA	-1.701*** (-10.76)	-0.810*** (-5.95)	-0.795*** (-5.06)	-0.757*** (-4.70)	-0.361 (-1.30)
FEMALE	0.781* (1.65)	0.279 (0.74)	0.487 (1.08)	0.417 (0.90)	-0.633 (-1.64)
TENURE	0.00113 (0.22)	0.00503 (1.09)	0.00291 (0.59)	0.000244 (0.05)	0.0343*** (3.18)
RETIRE	-0.235* (-1.70)	0.0479 (0.37)	-0.0271 (-0.17)	0.0295 (0.20)	0.276 (1.02)
POWER	-1.136 (-1.46)	0.257 (0.34)	-0.147 (-0.16)	-0.325 (-0.39)	0.874 (0.73)
DEPRESS	-0.486** (-1.97)	0.251 (1.23)	-0.00941 (-0.04)	-0.0565 (-0.24)	0.635** (2.26)
MB		1.300*** (10.32)	1.278*** (7.53)	1.203*** (8.13)	0.903** (2.39)
RD		-6.656** (-2.51)	-7.601** (-2.47)	-5.659* (-1.93)	-5.096 (-1.34)
SALESG		-0.0650 (-0.16)	-0.143 (-0.27)	-0.369 (-0.72)	-0.320 (-0.54)
CASH		3.912*** (4.40)	4.111*** (3.82)	3.247*** (3.27)	1.564 (0.90)
_cons	4.956*** (17.84)	1.205*** (3.54)	1.427*** (3.11)	1.743*** (4.28)	1.171* (1.71)
Year FE	YES	YES	YES	YES	YES
Industry FE	NO	NO	YES	YES	YES
r2	0.0398	0.167	0.283	0.285	0.0750
N	6212	6183	6183	6041	854

t statistics in parentheses

* p<.1, ** p<0.05, *** p<0.01

CONCLUSION

We measure CEOs' risk-taking preference and characteristics by alternative incentives, gender, age, power and experience. The results display that CEOs' compensations strongly link to firm credit risk and especially debt-based compensation helps reduce firm credit risk. In addition, CEOs spend more time to become CEO and their experience in the great

depression facilitate companies overcome financial difficulties in the financial crisis period.

ACKNOWLEDGEMENT

We are grateful to the Ministry of Science and Technology of Taiwan (grant numbers: MOST 106-2410-H-468-010) for financial support.

APPENDIX A. Definitions of Variables

	Name	Variable definitions
Firm credit risk		
Altman Z-score	<i>AZ</i>	Altman Z-Score (Altman 1968) is constructed using main balance sheet and income statement variables that are available in Compustat. The Z-score is a simple weighted average of several accounting ratios and higher scores display better credit quality. The formula is: $\text{Z-Score} = 3.3 \text{ EBIT/Total Assets} + 0.99 \text{ Net Sales /Total Assets} + 0.6 \text{ Market Value of Equity / Total Liabilities} + 1.2 \text{ Working Capital/Total Assets} + 1.4 \text{ Retained Earnings /Total Assets}$
CEOs' risk preference and characteristics		
CEO inside debt holding	<i>IDH</i>	The present value of accumulated pension benefits and deferred compensation as reported in Execucomp
CEO inside debt to equity ratio	<i>CEODE</i>	CEO's debt-to-equity ratio, defined as IDH/IEH, where IEH is the value of CEO's equity holding portfolio.
CEO pay-performance sensitivity	<i>Delta</i>	The dollar change in the value of the CEO's stock and option portfolio for a 1% change in stock price.
The sensitivity of CEO wealth to stock volatility	<i>Vega</i>	The dollar change in the value of the CEO's stock and option portfolio for a 1%change in standard deviation of returns.
CEO pay-performance sensitivity ratio	<i>VADA</i>	Vega/Delta; we follow extant literature by adopting traditional measures (e.g., the vega and the delta) to control for the average incentive effects of equity-based compensation and assume that, for the average CEO, equity-based compensation increases CEO risk-taking incentives.
CEO gender	<i>FEMALE</i>	Equal to one if CEO is a female
Tenure to become CEO in their firms	<i>TENURE</i>	The number of years an individual spends in his or her company to become CEO
CEOs near to the retired	<i>RETIRE</i>	Equal to one if the CEO's age is between 60 and 65
CEO power	<i>POWER</i>	The ratio of CEO compensation to the sum of CEO compensation and top five executive compensation
Depression dummy	<i>DEPRESS</i>	Equal to one if the CEO was born at the period from 1920 to 1930

Firm characteristics

Market to Book	<i>MB</i>	Market to book (Compustat, (Item6-Item60+Item99*Item25)/Item6)
R&D expenditure ratio	<i>RD</i>	Research and development expense divided by the lagged assets (Compustat,Max (0, Item46)/lagged Item 6).
Sales growth	<i>SALESG</i>	Logarithm of sales growth rate from t-1 to t. (Compustat, 117)
Cash balance	<i>CASH</i>	Cash balance (Compustat, Item 1) standardized by the lagged assets (Compustat, Item 6)

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