

Empirical Study of the Impacts of Managerial Incentives on Firms' Risk-bearing

—Comparison of Different Growth Listed Companies

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Abstract—Risk-bearing issues are always important for firms and influenced by many factors. The major objective of this article is to study the impacts of firms' managerial incentives on risk-bearing by a comparative analysis of different growth companies. Taking 2013-2018 China's A-share main board listed companies as study samples, this work selected indexes to measure the relationship of corporate managerial monetary incentive, equity incentive and risk-taking with the STATA. This paper analyzed the sample data by regression analysis and got some major conclusions: (1) Managerial equity and monetary incentives can promote the level of corporate risk-bearing; (2) The higher the growth of the company, the incentive effect of managerial monetary and equity incentives on firms' risk-bearing are more sensitive and effective.

Keywords—managerial equity incentive; managerial monetary incentive; firms' risk-bearing; growth of the company

I. INTRODUCTION

The issue of firms' managerial incentives and risk-bearing has been a hot topic studied by scholars in recent years. In previous literature, there were some limitations on sample selection and lack of studies on the impact of different growth of firms on the correlation between managerial incentives and risk-bearing. This paper tries to make up for the above shortcomings and enrich the research in the field of managerial incentives and risk-bearing.

On the basis of previous researches, this article divides the managerial incentives into monetary incentives and equity incentives. This paper firstly analyzes the impacts of the two incentives on risk-bearing based on 2013-2018 China's A-share mainboard 5035 listed companies, then considering the influence of different growth of enterprises, we further study the above relationship based on comparative analysis of different growth of listed firms.

II. LITERATURE REVIEW

Foreign scholars' studies on firms' risk-bearing were earlier than domestic studies. The majority of researchers make emphasis on risk-bearing of banks, and the focus on corporate risk-bearing arises in recent ten years. Haq, Pathan and Williams (2010) took banks as study objects, the conclusion was that managerial incentives and bank risk-bearing will change over time. The drawn graph is a U-shaped graph[1]. Li Yingchun (2012) studied the impact of corporate managerial

incentives on risk-bearing. The author's empirical analysis showed that the two are positively correlated, and very significant[2]. Zhang Reijun et al.(2013) get the conclusion that there is a positive correlation between managerial incentives and risk-bearing[3]. Boubakri et al.(2013) found that as the percent of foreign ownership increased, the risk-bearing level is also increased[4]. Wang Dong and Wu Desheng (2016) found the managerial equity incentives will promote the level of the risk-bearing, and the effect in SOEs is not sensitive as private companies [5].

The above literature indicated that managerial equity incentives and monetary incentives can promote the risk-bearing level of firms. Based on the above analysis, the first and second hypothesis H1 and H2 of this article are proposed:

H1: Managerial salary incentives could improve the risk-bearing level of firms.

H2: Managerial equity incentives have a positive impact on the risk-bearing of companies.

Zhou Jianan and Huang Dengshi (2006) have shown that the positive correlation between salary incentives and risk-taking levels is higher and more sensitive than those with lower growth opportunities [6]. Wang Xingyu et al. (2016) took the 2003-2015 Shanghai and Shenzhen A-share listed companies as samples, measured the life cycle of the company with cash flow indicators, and studied the level of risk tolerance. The empirical results show that the companies have more growth opportunities will bear more risk, their risk-taking levels are high.[7]. Based on the above analysis, we propose the hypothesis H3 and H4:

H3: Compared with low-growth companies, the relationship between managerial monetary compensation incentives and risk-bearing is stronger in high-growth companies, and the degree of correlation will be more significant in non-state-owned enterprises.

H4: Compared with low-growth companies, the sensitivity between managerial share incentives and corporate risk exposure is stronger in high-growth companies.

III. EMPIRICAL ANALYSIS DESIGN AND SELECTION OF INDICATORS

Sample selection of previous researches often limited in the specific industry which has some shortages. To avoid this limitation, we take Shanghai-Shenzhen A-share main board 5035 listed corporations during 2013-2018 as study samples. More samples than other literature and the latest data will get more meaningful and useful results of research.

The stock price in China is greatly influenced by external factors due to the imperfect capital market. This paper selects the volatility value of the return on assets(ROA) as the proxy variable of risk-bearing. The calculation method refers to the literature of Faccio et al. [8] (2011), and we take three years as the observation value to calculate the risk-bearing of firms. The followings are calculation formula:

$$Risk = \sqrt{\frac{1}{T-1} \sum_{t=1}^T \left(AdjROA_{i,t} - \frac{1}{T} \sum_{t=1}^T AdjROA_{i,t} \right)^2} \quad (1)$$

$$AdjROA_{i,t} = ROA_{i,t} - \frac{1}{N} \sum_{k=1}^N ROA_{k,t} \quad (2)$$

i in formulas (1) and (2) refers to a company in the study sample, N represents all sample companies, t means a year in three years, T is the length of time rolling 3, k is the kth of the 1-5035 sample companies.

This article takes the managerial incentive as the explanatory variable. Considering the real condition of the incentive of Chinese firms, we set the equity incentive and monetary incentive as the proxy variables of managerial incentives. The calculation method refers to Gao Lei (2018)[9]. The Size (the size of companies), Lev (the asset-liability ratio), AGE(the age of the firms), Growth(the growth of companies), Top1(the percentage of the largest stockholder) and State (the nature of proprietorship) are selected as control variables. See Table I for details:

TABLE I. DESCRIPTION OF VARIABLES SELECTED

Variable symbol	Description
RISK	Volatility of ROA STDEV in the last 3 years
MR	Managerial equities / total assets
PAY	Top three managers' salaries / total salaries
Size	Ln(Total assets)
Lev	Total liabilities / total assets
Age	Ln(Operational years of listed firms)
Top1	Number of stocks taken by the largest stockholder / total shares
Growth	The spread between the operating profit of the current year and previous year / total operating profit of the previous year
State	SOEs:1, non-SOEs: 0
Year	Dummy variable
Ind	Dummy variable

The analysis objective of this article is the impacts of managerial incentives on risk-bearing. Firstly, make an analysis of the relationship based on whole samples. Secondly, based on a different level of firm growth, explore the different relationships between managerial incentives and risk-bearing. Take relevant literature for reference, this article builds analytical models as follows:

$$RISK = \partial_0 + \partial_1 PAY + \partial_2 Size + \partial_3 Lev + \partial_4 AGE + \partial_5 Growth + \partial_6 TOP1 + \partial_7 State + \Sigma Year + \Sigma Ind + \varepsilon \quad (3)$$

$$RISK = \partial_0 + \partial_1 MR + \partial_2 Size + \partial_3 Lev + \partial_4 AGE + \partial_5 Growth + \partial_6 TOP1 + \partial_7 State + \Sigma Year + \Sigma Ind + \varepsilon \quad (4)$$

The dependent variable in above model (3)and model (4) are both RISK(corporate risk-bearing), and the explanatory variables are MR (managerial equity incentives) and PAY (managerial monetary incentives). We predict managerial equity incentives and salary incentives could improve the level of risk-bearing, so H1and H2 are assumed to be verified.

In these models, we group the growth of companies by median, predicting that the sensitivity of managerial monetary incentives, share incentives and corporate risk-bearing is stronger in high-growth companies, and this sensitivity will be more significant in non-state-owned enterprises, that is, hypothesis H3 and H4. In addition, we introduce variables such as company size, asset-liability ratio (Lev), etc. to control the impacts of these factors on corporate risk exposure.

IV. EMPIRICAL ANALYSIS RESULTS

A. Descriptive statistics explanation

TABLE II. DESCRIPTION VALUE OF MAIN VARIABLES

Variables	Min	Max	STDEV	Median
RISK	0.0001	11.9671	0.1805	0.0176
PAY	0.0801	1.0000	0.1253	0.3827
MR	0.0000	0.5996	0.0299	0.0006
Growth	-0.9484	87.4837	2.2196	0.1211
Size	17.3882	28.0699	1.2628	22.2733
Lev	0.0080	2.5785	0.2025	0.4420
Top1	0.0029	0.8411	0.1482	0.2955
AGE	0.0000	3.2958	0.7510	3.0879
State	0.0000	1.0000	0.4712	1.0000

Table II shows descriptive statistical results of the main variables. It is found that the median of RISK is 0.0176, which is similar to other scholars. Previous literature indicated that companies in developed countries have a higher level of risk-bearing. Compared with other countries, the level of risk-bearing in China is moderate. The minimum 0 and median 0.0006 of MR indicates that there are only a few listed firms of China that use managerial equity incentives and the managerial shares of listed companies of China are far lower than developed countries. For PAY, the standard deviation is 0.1253, which reflects that managerial salaries of different firms in China have a big difference.

On the control variables, for Growth, the minimum value is -0.9484 and the maximum is 87.4837, which reflects that the maximum and minimum values vary greatly. The standard deviation of Top1 is 0.1482 and the median is 0.2955, which means that most of the listed companies in China have a high concentration of equity. The standard deviation of Lev is 0.2025 and the minimum and maximum values are 0.008 and 2.5785 respectively, which indicates the level of debt ratios differs greatly among listed companies in China.

B. Regression analysis

TABLE III. MANAGERIAL EQUITY AND MONETARY INCENTIVES AND RISK-BEARING

Equity incentive		Monetary incentive	
variable	coefficient	variable	coefficient
MR	0.068088***	PAY ***	0.01356
Growth	0.00058	Growth	0.0006
Size	-0.0052***	Size***	-0.005
Lev	0.00974**	Lev**	0.0098
Top1	0.00238	Top1	0.00099
AGE	0.00439***	AGE***	0.00409
State	-0.003***	State***	-0.00194
Cons	0.12842	Cons	0.11752
Year&Ind	Control	Year&Ind	Control
N	5035	N	5035
R ²	0.0912	R ²	0.0952

It can be found from Table III: (1) the PAY (managerial monetary incentive) and the MR (managerial equity incentive), the Size, the Lev. and the nature of ownerships are all significant factors affecting the level of risk-bearing. (2) The empirical results of model 3 show that the regression coefficient of the variable PAY is 0.01356 and reaches 1% level of Significance, reflecting that the managerial monetary incentive has a positive relationship with risk-bearing of firms, thus H1 is verified. (3) The empirical results of Model 4 indicate that the regression coefficient of the variable MR is 0.06808 and has a significance level of 1%, therefore H2 is verified.

TABLE IV. MANAGERIAL MONETARY INCENTIVES, CORPORATE GROWTH AND RISK-BEARING

	Non-state-owned		State-owned	
	Growth>M	Growth≤M	Growth>M	Growth≤M
PAY	0.02197*** (4.50)	0.01339** (2.51)	0.00466 (0.63)	0.00241 (0.35)
Growth	0.01646*** (7.03)	-0.0572*** (-9.98)	0.02538*** (5.62)	-0.04716*** (-6.93)
Size	0.00474*** (-6.99)	-0.00494*** (-5.74)	0.00274*** (-3.24)	-0.00396*** (-4.9)
Lev	0.00259 (0.69)	0.00501 (1.20)	-0.00059 (-0.1)	0.00956 (1.83)
Top1	0.01304*** (3.10)	-0.00151 (-0.31)	0.00255 (0.42)	-0.00148 (-0.26)
AGE	0.00647 (7.00)	0.00057 (0.46)	0.0014 (0.93)	0.00021 (0.12)
Cons	0.0939 (6.31)	0.13305 (7.09)	0.06166 (3.48)	0.10087 (6.08)
Year&Ind	control	control	control	control
N	1853	1510	674	994
R ²	0.1273	0.1605	0.24	0.1821

TABLE V. MANAGERIAL EQUITY INCENTIVES, CORPORATE GROWTH AND RISK-BEARING

	Non-state-owned		State-owned	
	Growth>M	Growth≤M	Growth>M	Growth≤M
MR	0.0881*** (3.00)	0.0336 (1.01)	0.46615* (1.87)	0.31839 (0.85)
Growth	0.0169 (7.21)	-0.05761 (-10.04)	0.02112 (6.19)	-0.03105 (-5.54)
Size	-0.00481 (-7.04)	-5202 (-6.11)	-0.00284 (-3.03)	-0.00465 (-5.12)
Lev	0.00341 (0.90)	0.00525 (1.25)	0.0051 (0.91)	0.01293 (2.43)

Cont. to TABLE V.				
Top1	0.01432	0.00099	0.00782	-0.00338
	(3.46)	(0.20)	(1.13)	(-0.49)
AGE	0.0075	0.00116	0.00302	0.00058
	(7.77)	(0.92)	(1.56)	(0.28)
Cons	0.10051	0.14187	0.05633	0.11631
	(6.75)	(7.67)	(2.58)	(5.49)
Year&Ind	control	control	control	control
N	1853	1510	674	994
R ²	0.1217	0.1577	0.2332	0.2423

Table IV and table V are tested in two groups according to the median value of the Growth of sample companies. Among them, Growth > median represents a higher growth group, and the Growth ≤ median represents a lower growth group.

It can be seen in Table IV, the PAY coefficient is positive for both state-owned enterprises and non-state-owned enterprises. In the non-state-owned enterprises group, when the Growth > median, the coefficient of PAY is 0.02197 and reaches 1% significance level, when the Growth ≤ median, the coefficient of PAY is 0.01339 at 5% significance level, which initially proves that H3 is established; In the state-owned enterprises group, it can be seen that whether it is high-growth or low-growth enterprises, the PAY regression results are not significant, indicating that the managerial monetary compensation incentives have no obvious effect, further indicating that the managerial monetary incentives have stronger incentive effects for non-state-owned enterprises, thus verifying the hypothesis H3.

In Table V, the regression coefficients of MR for high-growth firms were 0.08810 and 0.46615, respectively, reaching a level of significance of 1% and 10%, which means the sensitivity between managerial equity incentives and corporate risk exposure is stronger in high-growth companies. The regression coefficients of MR in low-growth enterprises are 0.03360 and 0.31839, respectively, which do not meet the significance requirements, indicating that for low-growth enterprises, equity incentives should not be implemented, proving H4.

V. CONCLUSION

This article analyzes the relationship between managerial monetary, equity incentives and risk-bearing of firms, and further studies the impacts of different growth of companies on the relation between managerial incentives and risk-bearing. The following major conclusions have been drawn.

(1) The managerial monetary incentives and equity incentives have a promoting impact on risk-bearing and can improve the level of firms' risk-bearing.

(2) When the growth of an enterprise is high, the incentive effect of the managerial monetary compensation incentive on the risk-bearing of companies is more effective.

(3) When the growth of the company is low, the positive correlation between managerial equity incentives and risk exposure is weaker and the sensitivity is lower.

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