

Uncertainty, Corporate Governance and Investor Protection

Xiaowei Tan¹ and Zhongming Ding^{1,2}

¹*School of Management, Hefei University of Technology,
NO. 193 of Tunxi Road, Hefei, China, 230009*

²*School of Finance, Anhui University of Finance and Economics,
NO.255 of Hongye Road, Bengbu, China, 233041*

¹*Email: tanxiaowei918@163.com,* ²*Email: dingzm2006@126.com*

Abstract

The cost of equity capital is the expected rate of return that investors provide equity capital to listed companies, it reflect the protection degree of corporate governance mechanisms to the interests of investors. The more effective corporate governance mechanism is, the lower cost of equity capital is. As a factor of influencing corporate operation as well as governance, uncertainty will change such relationship. In perspective of board monitoring, comparing the results of multiple regression with panel data regression, this paper confirm that the uncertainty is positive correlation to the cost of equity capital, the board monitoring is negative correlation to the latter. More importantly, the relationship between the board monitoring and the cost of equity capital will become less significant when the uncertainty the company facing is increasing, which means that the uncertainty will weaken governance efficiency.

Key words: *Uncertainty, Board Monitoring, the Cost of Equity Capital*

1. Introduction

Corporate governance Mechanism is a series of mechanisms combination to protect investors' interests. The perfect corporate governance structure and effective corporate governance mechanism can reduce the "principal-agent" problems which stem from information asymmetry problems, and ensure the interests of investors. The efficiency of corporate governance mechanism will finally be reflected in the enterprise value and investor protection degree [1]. The cost of equity capital is the price of equity financing to be paid and the return of providing enterprises capital [2], which embodies the sound corporate governance mechanism respecting for the capital risk reward [3]. So, the more perfect corporate governance mechanism is the lower cost to attract investors to hold the company's securities, so the interests of investors can be guaranteed.

However, the reality is not often as expected. Such as, why a corporate with relatively sound corporate governance exhibit declining performance, why investors' interests are violated, and why the effect of corporate governance goes away? One opinion is due to the path-dependence of corporate governance [4], the effective governance mechanism design will gave way to those more "efficient" recessive behavior for insiders which is likely to damage the interests of investors [5]; Another opinion is that the design of mechanisms, decision-making and business performance are affected by uncertainties [6, 7]. For all, the uncertainties impact corporate include: ① Intellectual capacity limitations between the internal decision-makers, subjective awareness of bias, difficult relations coordination, the changes of internal decision making structure and the reality of conflict [8]; ② The external environment is not as a given state as most studies assumed. The companies are in complex social networks, the environment is complex and dynamic which will lead to uncertainties. When the company's performance changes,

decision-makers and investors are difficult to distinguish such change is caused by either work reasons or the external environment [9].

The efficiency of corporate governance mechanism may be affected by uncertainties, the cost of equity capital will be affected by itself risks and uncertainties. This paper attempt to answer whether the uncertainty impact on the cost of equity capital, and at the same time, affect the efficiency of corporate governance, thus indirectly affect the equity capital.

From the perspective of board governance mechanism, this paper firstly separate risk and uncertainty, this is unlike most existing literatures that equivalent uncertainty to risk. Secondly, current research focused on how external environmental uncertainty risks impact cost of equity capital, while ignoring the uncertainty caused by the internal governance structure changes. For investors, the internal governance structure changes means varying future earnings expectations. Thirdly, existing research took the internal governance structure as fixed variable. This paper take into account the varying of the cost of equity capital, compare the cross-sectional data with panel data, and analysis the two-way impact of uncertainty on corporate governance as well as cost of equity capital.

The following of this paper is divided into four sections: Above all, we review the literatures to sort out the relationship of corporate governance and the cost of equity capital, and define risk and uncertainty. Next, we present the research hypothesis, the forth part is variable and model describe, the fifth part is the empirical analysis, and we rise the conclusion finally.

2. Literatures review

2.1 Corporate Governance and the Cost of Equity Capital

Corporate governance is a series of institutional arrangements for solving agency problems which is due to information asymmetry [10], corporate governance mechanisms can reduce the risk caused by information asymmetry, thereby reduce the cost of equity capital. Governance mechanisms and agency problems affect enterprises' systemic risk, the corporate governance level and the cost capital are negatively correlated [11]. Perfect corporate governance mechanism can reduce the possession of enterprise resource by management [12], increase cash flow, improve capital allocation efficiency [13], release greater and more timely earnings forecast information [14], cut down non-dispersible risks, reduce outsiders monitoring cost and restrict speculative insider trading [15], thereby reduce the equity capital cost. The board is the lynchpin of corporate governance mechanism, the main object of this paper is the board governance mechanism.

2.2 Uncertainty and Corporate Governance

Most research interchanges uncertainty and risk directly, means that either takes the uncertainty as risk, or directly ignored uncertainty [16-19]. In fact, uncertainty and risk has a significant difference. The most distinguishing risks can be estimated with varying probabilities, uncertainty is "Despite policy makers know the scope of the event or the likelihood of future output, but because each event is different, they can't be effectively divided reference group" [6]. Uncertainty is a function of a lack of relevant and reliable data, but policy-makers can use to predict based on historical knowledge and to subjectively estimate future events or output [20]. It is unconditional and can't be avoided [21]. So, uncertainty is more complex and more difficult to predict.

Uncertainty can't be controlled, but it will affect the agent's job performance [22]. Taking into account the mitigation of uncertainty, the internal governance of listed companies plays an important potential role to minimize agency costs [23]. The board works with certain constraints which impact on performance indirectly [24]. Uncertainty affect the internal cultural gap, risk management quality [25]. Meanwhile, the external

environmental uncertainty reinforces the influence on information, when a business is in a high degree of environmental uncertainty, due to lack of sufficient information, the risk of decision-making failure is increasing [26]. So, whether uncertainty of inside causes or uncertainty of external environment, both impact on corporate governance.

3. Research Hypothesis

According to the traditional views, risk will increase investors' expectations of future earnings, capital requirements for greater reward, thereby increasing the cost of equity capital [2, 27]. In addition to systemic risk, however, the uncertainty contain internal factors such as market capitalization par value ratio, size, liquidity, and external macroeconomic variables such as interest rates, inflation and the degree of globalization *et al.*, [2]. For investors, the uncertainty of future earnings is higher, the investors demand return rate is higher, the cost of equity capital is high [28]. At the same time, the uncertainty means more severe information asymmetry; result in the difficulty to evaluation expected investment income, cash holdings will be greater benefits [29]. Thus in an uncertain environment, in order to compensate investors for providing equity capital, investors requires a higher rate of return on investment, because if return on investment is low, it is better to hold cash. **Therefore, we hypothesize 1: Uncertainty is associated with equity capital cost of capital positively.**

The main function of board of directors is decision-making and monitoring [30]. Board structure affects the cost of equity capital [31]. The cost of equity capital is negative correlation with the board independence and board members [32]. In higher board independence, lower the board redundancy, higher institutional ownership, higher external directors' equity, higher auditing, stronger shareholder Rights Company, the allocation of capital is more efficient [13]. High-intensity of board monitoring encourages management's efforts; bring more stable future performance and less enterprise risk. Investors can obtain a long-term stable investment return in the future, its lower risk premium, **so we propose hypothesis 2: Board monitoring negatively correlated with the cost of equity capital.**

However, board monitoring process is a complex game and will be impacted by uncertain factors. Uncertainty weakens board monitoring intensity [33]. When monitoring management led to that changes magnitude is too large, investors can't identify whether corporate coordination cost is too high and information asymmetry is increasing. Since the degree of information asymmetry and cost of equity capital is a significant positive correlation [34]. At the same time, private information will be induce new systemic risks, investors require more compensation [35], resulting in higher return expectation on equity capital.

The external uncertainties are caused by environment complexity and dynamic. When faced on a complex and dynamic environment, the board struggling to cope with a variety of unexpected situations as well as high intensity of market competition to eliminate uncertainty, board members need to employ their experience and ability to provide decisions and suggestions, it means reducing of the monitoring intensity, as the two are mutually alternative relationship [36], thus hypothesis 3 is: Under uncertainty, the board monitoring intensity is negatively correlated with the cost of equity capital, but with the uncertainty increasing, the negative correlating is significantly declining.

4. Variable and Models

4.1. Variable Definitions

Cost of Equity Capital (*coce*): Cost of equity capital was originally calculated by the CAPM model. However, studies have shown that the CAPM is not suitable for Chinese capital markets [27]. There are four models for calculating Cost of equity capital: R_{GLS}

model [37], R_{CT} model [38] R_{PEG} model [39] and R_{OJ} model [40]. Empirical proofs have demonstrated their availability for Chinese market [41]. Taking into account the uncertainty, R_{OJ} model is based on abnormal earnings growth, and contains the national inflation rate g_{it} what effect external environment. This paper select R_{OJ} model, the formula is shown as following:

$$P_t = \frac{FEPS_{t+1}}{R_{OJ}} + \frac{FEPS_{t+2} - FEPS_{t+1} - R_{OJ} \times FEPS_{t+1}(1 - POUT)}{R_{OJ} \times (R_{OJ} - g_{it})} \quad (1)$$

$$\text{Then: } R_{OJ} = A + \sqrt{A^2 + \frac{FEPS_{t+1}}{P_t} \times \left(\frac{FEPS_{t+2} - FEPS_{t+1}}{PEPS_{t+1}} - g_{it} \right)} \quad (2)$$

Where: $A = \frac{1}{2}(g_{it} + \frac{POUT \times FEPS_{t+1}}{P_t})$. P_t is the time on the company's stock price at time t;

$FEPS_{t+i}$ is the mean per share earnings forecast of the year i after the time t; is the expected dividend yield, using a four-year history dividend to measure the average dividend payout ratio forecast, scrolling calculations. If the company-specific payout ratio is lost, consider whether there is no dividend or profit is negative. g_{it} is the expected long-term earnings growth, valued by long-term annual inflation rate and limited from 0 to 0.2 [15].

Board monitoring intensity: This paper adopts two variables representing monitoring intensity. The one is natural logarithm of management compensation, denoted by *comp*. The other one is earnings management, denoted by *earning*, calculated by the Modified Jones Model, which is shown as:

$$NDA_t = \alpha_1 \frac{1}{A_{t-1}} + \alpha_2 \frac{\Delta REV_t - \Delta REC_t}{A_{t-1}} + \alpha_3 \frac{PPE_t}{A_{t-1}} \quad (3)$$

Where: NDA_t is the non-manipulative accruals profit of period t adjusted by total assets of period $t-1$; ΔREV_t is the income difference between period t and period $t-1$; ΔREC_t is the net receivables difference between period t and period $t-1$; PPE_t is the fixed assets of period t; A_{t-1} is the total assets of period $t-1$; α_1 , α_2 , α_3 are company characteristic parameters, estimated by OLS regression from:

$$\frac{TA_t}{A_{t-1}} = a_1 \frac{1}{A_{t-1}} + a_2 \frac{\Delta REV_t}{A_{t-1}} + a_3 \frac{PPE_t}{A_{t-1}} + \varepsilon_t \quad (4)$$

a_1 , a_2 , a_3 are the estimated value of α_1 , α_2 , α_3 , TA_t is the total accruals of period t. ε_t is the remaining term. The high earning management and high compensation means less board monitoring intensity, so the variables denoted by *-comp* and *-earning*.

Uncertainty: This paper divide uncertainty into corporate governance uncertainty(*Gov-uncertainty*) and the uncertainty of the external environment uncertainty(*Ext-uncertainty*). *Gov-uncertainty* means the uncertainty that is due to changes in the governance structure, which consist of three aspects: namely the rate of change in the number of board of directors, represented by *Num*, the second is an independent board of directors rate changes, with the *Independent* representation, the third is the degree of protection as one of indicators of investor equity multiplier, represented by *Right*. *Ext-uncertainty* is caused by the changes of market and competition environment which can lead to income, so we adopt income volatility to represent it, denoted by *Income*. All of the variables are estimated by volatility, the volatility is bigger, the uncertainty is lager.

Industry is the industry control variables, according to the Commission divided the 13 industry categories marked, denoted by *Industry*.

4.2. Models

In this paper, a cross-sectional data from a static and dynamic panel data were both investigate the impact supervisory board under uncertainty on the cost of equity capital, according to the study hypothesis, build model as follows. Taking into account the interaction of monitoring and uncertainties, this paper introduce interaction term of both, the model are as following:

① Multiple linear regression of sectional data

$$coce_i = \alpha_0 + \alpha_1 \sum_{l=1}^l monitoring_i + \alpha_2 \sum_{k=1}^k Gov-uncertain y_i + \alpha_3 \sum_{n=1}^n Ext-uncertainty_i + \alpha_4 \sum_{k=1}^k monitoring_i * uncertain y_i + \alpha_5 Industry_i + \varepsilon_i \quad (5)$$

Where: l represent the number of monitoring variables, k , n are the number of internal uncertainty and external uncertainty variables, i is the number of cross-sectional data, ε_i is the error term.

② Pool data regression

$$coce_{i,t} = \beta_0 + \beta_1 \sum_{l=1}^l monitoring_{i,t} + \beta_2 \sum_{k=1}^k Gov-uncertain y_{i,t} + \beta_3 \sum_{n=1}^n Ext-uncertainty_{i,t} + \beta_4 \sum_{k=1}^k monitoring_{i,t} * uncertain y_{i,t} + \beta_5 Industry_{i,t} + \eta_{it} + \varphi_{it} + \varepsilon_{i,t} \quad (6)$$

Where: t is the time variables, η_{it} , φ_{it} are fixed effect and random effect, the others is as above.

5. Empirical Study

5.1 Descriptive Statistics

The data is obtained from RESSET database of China, includes 734 A-share listed companies and 3670 five years (2008-2012) samples. Excluding 824 missing data as well as financial companies, and excluding 515 coce more than 0.3 data (Wang, 2013) samples, there are 440 companies and 2200 samples remained.

Table 1. Descriptive Statistics for Coce and Firm Characteristics

| Variable | N | Range | Minimum | Maximum | Mean | Std.Deviation |
|------------------|------|-------|---------|---------|----------|---------------|
| Coce | 2197 | 0.19 | 0.01 | 0.20 | 0.1081 | 0.0414 |
| -Earning | 2197 | 0.29 | -0.30 | -0.01 | -0.0600 | 0.6595 |
| -Comp | 2197 | 6.14 | -16.96 | -10.82 | -13.8836 | 0.7629 |
| Num | 2197 | 2.29 | -0.58 | 1.71 | 0.0318 | 0.2550 |
| Indep | 2195 | 3.75 | -1.00 | 2.75 | 0.0414 | 0.2767 |
| Right | 2175 | 4.57 | -2.65 | 1.92 | 0.2559 | 0.2992 |
| Income | 2102 | 1.97 | 0.01 | 1.98 | 0.5367 | 0.4215 |
| -Earning* Num | 2197 | 6.92 | -4.42 | 2.50 | 0.0037 | 0.1523 |
| -Earning* Indep | 2195 | 9.55 | -4.85 | 4.70 | 0.0019 | 0.1709 |
| -Earning* Right | 2175 | 14.73 | -1.43 | 13.30 | 0.0301 | 0.4936 |
| -Earning* Income | 2102 | 12.51 | -1.01 | 11.50 | 0.0194 | 0.3360 |
| -Comp* Num | 2197 | 31.68 | -23.40 | 8.27 | -0.4399 | 3.5292 |
| -Comp* Indep | 2195 | 51.94 | -36.82 | 15.13 | -0.5760 | 3.8377 |
| -Comp* Right | 2175 | 62.71 | -27.09 | 35.62 | -3.5357 | 4.0998 |
| -Comp* Income | 2102 | 27.97 | -28.07 | -0.10 | -7.4346 | 5.8369 |

In Table 2, from 2008 to 2012, the average of cost of equity capital (coce) is 0.108, the minimum 0.01, maximum 0.20, the mean of earnings management is 0.06, the average executive compensation natural logarithm is 13.8836. For internal uncertainties, the volatility mean of directors number change ratio is 0.03, indicating an average of 3% each year, but the larger fluctuation range from -0.58 to 1.71; The board independence movements range from -1.00 to 2.75. Equity multiplier is the biggest volatility uncertainty indicators, from -2.65 to 1.92. The external uncertainties volatility from 0.01 to 1.98, the mean of 0.5367 and a standard deviation of the greatest uncertainty indicators, indicating that greater uncertainty is caused by enterprises external factors.

5.2 Multiple Regression Analysis and Panel Data Regression

We take the unit root test to examine the stability of panel data firstly. There are three methods in the test: LLC test (Levin-Lin-Chu test), Fisher-ADF test and Fisher-PP test. Only the three test results are significant, the variable is stationary, otherwise utilize the first-order difference method for data processing, the results are as follows:

Table 2. Unit Root Test

| | LLC | ADF | PP | |
|-------------------|--------------|------------|------------|------------|
| Coce (R_{OJ}) | -93.9482 *** | 1338.49*** | 1665.43*** | Smooth |
| -Earning | 110.026*** | 1393.56*** | 1660.70*** | Smooth |
| -Compensation | 216.499*** | 1047.81*** | 1186.54*** | Smooth |
| Num | -40.6281*** | 1027.32*** | 1031.94*** | Smooth |
| Indep | -137.603*** | 2138.77*** | 2546.66*** | Smooth |
| Right | -100.119*** | 876.025 | 1069.14*** | Not smooth |
| Income | -50.1482*** | 1059.50*** | 1265.08*** | Smooth |
| -Earning* Num | -177.969*** | 1123.96*** | 1228.54*** | Smooth |
| -Earning* Indep | -400.690*** | 2104.67*** | 2540.82*** | Smooth |
| -Earning* Right | -74.4661*** | 1627.54*** | 1950.00*** | Smooth |
| -Earning* Income | -409.591*** | 1842.86*** | 2291.48*** | Smooth |
| -Comp* Num | -40.8925*** | 1030.65*** | 1034.88*** | Smooth |
| -Comp*Indep | -127.804*** | 2114.26*** | 2519.44*** | Smooth |
| -Comp* Right | -103.427*** | 865.532 | 1066.00*** | Not smooth |
| -Comp* Income | -48.2753*** | 1052.28*** | 1246.99*** | Smooth |
| □ Right | -36.9575*** | 869.258*** | 1038.65*** | Smooth |
| □Comp×Right | -34.2376*** | 825.682*** | 1135.24*** | Smooth |

*** Indicates significant at the 1% level, ** indicates at the 5% significance level, and * at the 10% significance level.

The fixed effects and random effects test statistic is the amount of time fixed effects 30.0083, P value of 0.0000, chi-square test is 117.7884, P value of 0.0000. So the panel data regression is fixed effects model. The results of multiple regression analysis of cross-sectional data and panel data regression are shown as follows:

Table 3. Multiple Regression and Panel Data Fixed Effects Regression

| Variable | Panel A: Multiple regression of section data | | | | | Panel B: Panel data fixed effects regression | | | | |
|----------|--|----------------------|---------------------|----------------------|--------------------|--|----------------------|---------------------|----------------------|---------------------|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 | Model 9 | Model 10 |
| Constant | 0.263*** (8.262) | 0.140*** (84.270) | 0.263*** (8.262) | 0.126*** (39.926) | 2.285*** (4.52) | 0.125*** (38.524) | 0.347*** (10.634) | 0.328*** (9.933) | 0.126*** (10.356) | 0.231*** (3.905) |
| Num | 0.051 (2.554) | | 0.045** (2.183) | | 0.816** (2.125) | 0.004 (0.387) | | 0.003 (0.315) | | 0.005 (0.247) |
| Indep | 0.046** | | 0.046** | | 0.353 | 0.004 | | 0.004 | | 0.078 |

| | | | | | | | | | | |
|----------------------|-----------------------|----------------------|---------------------|-----------------------|----------------------|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | (2.246) | | (2.263) | | (0.945) | (0.613) | | (0.667) | | (0.636) |
| Right | 0.051** (2.515) | | 0.055*** (2.663) | | -0.919** (-2.558) | 0.039*** (3.994) | | 0.035*** (3.6336) | | -0.329* (-1.860) |
| Income | -0.084*** (-4.217) | | -0.084 (-4.230) | | -0.098** (-2.468) | 0.008* (1.950) | | 0.007* (1.7090) | | 0.303*** (3.778) |
| -Earning | | -0.035** (-2.089) | -0.024 (-1.200) | | -0.031 (-0.4946) | | 0.008 (0.423) | 0.007 (0.283) | | -0.009 (-0.014) |
| -Comp | | -0.033* (-1.726) | -0.018 (-0.869) | | -0.224 (-0.566) | | -0.015*** (-6.461) | -0.014*** (-6.174) | | -0.007* (-1.789) |
| -Earning* Num | | | | -0.288*** (-5.955) | -0.006 (-0.298) | | | | 0.017*** (2.915) | -0.018*** (-2.983) |
| -Earning* Indep | | | | -0.017*** (-2.702) | -0.002 (-0.062) | | | | 0.015 (1.064) | -0.017 (-0.814) |
| -Earning* □ Right | | | | -0.018 (-1.127) | 0.011 (0.251) | | | | 0.020 (1.054) | -0.022 (-0.897) |
| -Earning* Income | | | | 0.023 (-1.095) | -0.015 (-0.355) | | | | -0.026** (-2.084) | -0.026* (-1.895) |
| -Comp* Num | | | | -0.029** (-2.248) | -0.206 (-0.519) | | | | -0.006 (-0.881) | -0.004 (-0.297) |
| -Comp* Indep | | | | -0.043** (-2.065) | -0.772** (-2.006) | | | | -0.004 (-0.907) | -0.005 (-0.584) |
| -Comp* □ Right | | | | -0.019* (-1.686) | 0.973*** (2.701) | | | | -0.027*** (-3.638) | -0.026** (-2.066) |
| -Comp* Income | | | | -0.022*** (-3.092) | -0.304 (-0.814) | | | | -0.003 (-1.067) | -0.021*** (-3.710) |
| Industry | control | Control | control | control | control | control | Control | control | Control | control |
| adjusted R^2 | 0.120 | 0.100 | 0.151 | 0.075 | 0.086 | 0.054 | 0.063 | 0.070 | 0.073 | 0.078 |
| F | 8.964*** | 2.673* | 6.338*** | 3.842*** | 3.831*** | 16.279*** | 24.982*** | 17.088*** | 12.961*** | 11.047*** |
| D-W | 1.810 | 1.811 | 1.819 | 1.822 | 1.828 | 2.246 | 2.254 | 2.262 | 2.263 | 2.267 |

*** Indicates significant at the 1% level, ** indicates at the 5% significance level, and * at the 10% significance level. For the equity multiplier *right*, when it is in multiple regression of section data, it represents *right*, when it is in Panel data fixed effects regression, it means □ *right*. *** Indicates significant at the 1% level, ** indicates at the 5% significance level, and * at the 10% significance level.

According to panel A, Table 3, the effects of board independence volatility and equity multiplier volatility on the cost of equity capital is significantly positive, the effect of directors number is positive but not significant simultaneously, indicating that the higher internal uncertainty is, the higher cost of equity capital is. The influence of external uncertainty is negative significant. The empirical results support the hypothesis1 partly. Earnings management and management compensation are positively correlated with the cost of equity capital, the hypothesis 2 holds. After addition of internal and external uncertainties, the correlation between board monitoring and the cost of equity capital becomes insignificant, hypothesis 3 is Proved. Based on the model 4 and model 5, the interaction of uncertainties and monitoring intensity are decreasing significantly, indicating that under conditions of uncertainty, the impact of board monitoring of the cost of equity capital is an important change took place, support the hypothesis 3. It should be noted that, although the F value of the five models were significant, goodness of fit (Adjusted R^2) is low, the fit is not ideal.

According to the panel B, equity multiplier is the only internal uncertainty significant positively correlated with the cost of equity capital, while the external uncertainty has a positive impact on the cost of equity capital. Number and independence of board volatility are very weak positive relationship with cost of equity capital. The results indicate that, in long time, investors can adjust their expected return of equity according the changes of governance structure, but can't do it to response for external uncertainties, the external uncertainties are still increasing cost of equity capital. Earnings Management is positively

related to the cost of equity capital. The management compensation pay a significant negative correlation to it, probably because the fixed salary effect is more obvious, prolonged anticipation and uncertainties affect equity incentives thus affect the supervision results and intensity[42]. After joined the uncertainties, the significance between monitoring and cost of equity capital is declining, which prove that the uncertainties effect the relationship between board monitoring intensity and cost of equity capital.

5.3. Robustness test

Taking into account the changes of the equity capital cost caused by uncertainties, this paper take $\Delta y_{i,t} = y_{i,t} - y_{i,t-1}$ as dependent variables to investigate the impact of uncertainty on the relationship between the board monitoring and the cost of equity capital. To control panel data multicollinearity, we use the period SUR weight analysis. Robustness test results are as follows. Overall, the paper's concludes is robustness, uncertainties effect the relationship of board monitoring intensity and the cost of equity capital.

Table 4. Multiple Regression and Panel Data Fixed Effects Regression

| Variable | Panel A: Multiple regression of section data | | | | | Panel B: Panel data fixed effects regression | | | | |
|------------------------|--|-----------------------|-----------------------|------------------------|----------------------|--|----------------------|----------------------|-----------------------|----------------------|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 | Model 9 | Model 10 |
| Constant | 0.064*** (20.184) | 0.218*** (6.365) | 0.193*** (5.593) | 0.0659*** (20.3406) | 0.107* (1.652) | 0.069*** (6.401) | 0.385*** (3.532) | 0.321*** (2.862) | 0.081*** (7.847) | 0.255 (1.028) |
| Num | -0.004 (-0.092) | | -0.004 (-0.141) | | 0.544 (1.066) | 0.002 (0.823) | | 0.001 (0.342) | | 0.078 (1.368) |
| Indep | 0.019 (0.763) | | 0.022 (0.896) | | 0.037 (0.084) | -0.004 (-0.179) | | -0.001 (-0.079) | | 0.323 (0.950) |
| Right | 0.076*** (3.133) | | 0.071*** (2.905) | | -0.273 (-0.531) | 0.010 (0.242) | | 0.013 (0.345) | | 0.281 (0.903) |
| Income | 0.073*** (3.002) | | 0.073*** (2.987) | | 1.216** (2.505) | -0.028* (-1.809) | | -0.025 (-0.162) | | 0.334*** (2.769) |
| -Earning | | -0.004 (-0.173) | -0.003 (-0.117) | | -0.042 (0.616) | | -0.012 (-0.529) | -0.016 (-0.656) | | -0.198** (-2.445) |
| -Comp | | -0.100*** (-4.126) | -0.009*** (-3.743) | | -0.031 (-0.671) | | 0.029*** (-3.007) | -0.017** (-2.280) | | -0.012* (-1.878) |
| -Earning* Num | | | | -0.058* (-1.758) | -0.063* (-1.916) | | | | 0.151** (2.067) | -0.013* (-1.686) |
| -Earning* Indep | | | | -0.018 (-0.043) | -0.024 (-0.562) | | | | -0.430*** (-3.052) | -0.030 (-1.052) |
| -Earning* □ Right | | | | -0.069 (-1.363) | -0.089 (-1.491) | | | | 0.092 (0.6006) | -0.033 (-0.998) |
| -Earning* Income | | | | -0.080 (-1.505) | 0.067 (1.159) | | | | -0.106 (-1.022) | -0.017 (-0.947) |
| -Comp* Num | | | | -0.015 (-0.588) | -0.528 (-1.038) | | | | -0.004 (-1.157) | -0.008 (-1.467) |
| -Comp* Indep | | | | -0.018 (-0.728) | -0.012 (-0.285) | | | | 0.003* (1.736) | -0.012 (-0.868) |
| -Comp* □ Right | | | | -0.081*** (-3.199) | 0.353 (0.687) | | | | -0.0124 (-0.407) | -0.017 (-0.786) |
| -Comp* Income | | | | -0.058** (-2.291) | -1.151** (-2.368) | | | | -0.002* (-1.796) | 0.023** (-2.763) |
| Industry | control | control | control | control | control | control | control | control | control | control |
| djusted R ² | 0.132 | 0.103 | 0.142 | 0.062 | 0.072 | 0.074 | 0.072 | 0.032 | 0.095 | 0.215 |
| F | 5.652*** | 8.5112*** | 6.0653*** | 2.826*** | 3.309*** | 0.871 | 2.295* | 1.313 | 1.797* | 2.342** |
| D-W | 1.654 | 1.742 | 1.66 | 1.648 | 1.648 | 2.034 | 2.001 | 2.098 | 2.067 | 2.135 |

For the equity multiplier *right*, when it is in multiple regression of section data, it represents *right*, when it is in Panel data fixed effects regression, it means □ *right*. ***indicates significant at the 1% level, ** indicates at the 5% significance level, and * at the 10% significance level.

6. Conclusion

These paper researches the uncertainty affect the relationship between board monitoring intensity and the cost of equity capital. Compared multiple regression of section data and panel data regression results, we conclude that the uncertainty and cost of equity capital are positively relative, board monitoring and cost of equity capital are negative, the uncertainties waken the negative relationship of board monitoring intensity and cost of equity capital. The results indicate that under conditions of uncertainty, investors' expected return, is not only influenced by board monitoring, but also affected by uncertainties.

Acknowledgement

We would like to express our gratitude to Academician Shanlin Yang for providing ideas for this paper, and we acknowledge Dr. Sumei Ruan who provided data and suggestions in empirical analysis. The last but not the least, we thanks for Dr. Liqiang Hou's revising work. Thank you!

References

- [1] R. La Porta, F. Lopez-de-Silanes, A. Shleifer and R. Vishny, "Investor Protection and Corporate Valuation", *Journal of Finance*, vol. 57, (2002), pp. 1147-1170.
- [2] Y. F. Shen, M. Xiao and T. Lin, "Investor Protection and Firm Capital Structure", *Economic Research Journal*, vol. 7, (2009), pp. 131-142.
- [3] F. J. Yuan, Q. Feng and D. Han, "Internal Control Attestation, Characteristics of Ultimate Controller and the Cost of Equity Capital: Empirical Evidence from A-Share in SEE", *Journal of Audit & Economics*, vol. 4, (2013), pp. 34-42.
- [4] M. H. Li, "Complementary Institutional and Corporate Governance Convergence", *Economic Review*, vol. 1, (2007), pp. 144-152.
- [5] L. A. Bebchuk and M. J. Roe, "A Theory of Path Dependence in Corporate Ownership and Governance", vol. 52, (2009), pp. 138-170.
- [6] J. Sanderson, "Risk, Uncertainty and Governance in Megaprojects: A Critical Discussion of Alternative Explanations", *International Journal of Project Management*, vol. 30, (2012), pp. 432-443.
- [7] R. Lueg and B. G. Borisov, "Archival or Perceived Measures of Environmental Uncertainty? Conceptualization and New Empirical Evidence", *European Management Journal*, vol. 32, (2014), pp. 658-671.
- [8] H. Tosi, R. Aldag and R. Storey, "On the Measurement of the Environment: An Assessment of the Environmental Uncertainty Subscale", *Administrative Science Quarterly*, vol. 18, no. 1, (1973), pp. 27-36.
- [9] P. Walsh and K. Seward, "On the Efficiency of Internal and External Corporate Control Mechanisms", *Academy of Management Review*, vol. 15, no. 3, (1990), pp. 421-458.
- [10] W. Y. Zhang, "Ownership, Governance Structure and The Principal-agent relationship--and Some Viewpoints Comment Cui and Zhou", *Economic Research Journal*, vol. 9, (1996), pp. 3-16.
- [11] H. Ashbaugh, D. W. Collins and R. La Fond, "Corporate Governance and the Cost of Equity Capital", SSRN Working paper, (2004).
- [12] R. Lambert, C. Leuz and R. Verrecchia, "Accounting Information, Disclosure, and The Cost of Capital", *Journal of Accounting Research*, vol. 45, no. 2, (2007), pp. 385-420.
- [13] S. S. Chen and I. J. Chen, "Corporate Governance and Capital Allocations of Diversified Firms", *Journal of Banking & Finance*, vol. 36, (2012), pp. 395-409.
- [14] K. C. Rakow, "The Effect of Management Earnings Forecast Characteristics on Cost of Equity Capital", *Advances in Accounting, Incorporating Advances in International Accounting*, vol. 26, (2010), pp. 37-46.
- [15] K. C. Chen, Z. H. Chen and J. Wei, "Legal Protection of Investors, Corporate Governance, and The Cost of Equity Capital", *Journal of Corporate Finance*, vol. 15, (2009), pp. 273-289.
- [16] J. Froud, "The Private Finance Initiative: Risk, Uncertainty and The State", *Accounting, Organizations and Society*, vol. 28, (2003), pp. 567-589.
- [17] Y. R. Xiao, "Risk Decisions under Uncertainty", *Nankai Economic Research*, no. 1, (2003), pp. 34-37.
- [18] O. Perminova, M. Gustafsson and K. Wikström, "Defining Uncertainty in Projects: A New Perspective", *International Journal of Project Management*, vol. 28, no. 1, (2008), pp. 73-79.
- [19] J. Chen, H. W. Chen and D. H. Wu, "Ex ante Uncertainty Risk, Governance Conflicts, and Auditor

- Choice: Empirical Evidence from China's IPO Market, 1998-2004", *Journal of Zhejiang University*, vol. 40, no. 5, (2010), pp. 92-102.
- [20] M. Thiry, "Combining Value and Project Management into an Effective Programme management model", *International Journal of Project Management*, vol. 20, (2002), 221-227.
- [21] G. Slater and D. Spencer, "The Uncertainty Foundations of Transaction Costs Economic", *Journal of Economic Issues*, vol. 35, (2000), pp. 61-87.
- [22] X. Xu and W. H. Qiu, "Study on Impact of Uncertain State of World to Optimal Contract in Principal-Agent Theory", *Chinese Journal of Management Science*, vol. 2, (1999), pp. 62-66.
- [23] D. Henry, "Agency Costs, Ownership Structure and Corporate Governance Compliance: A Private Contracting Perspective", *Pacific-Basin Finance Journal*, vol. 18, (2010), pp. 24-46.
- [24] Y. Z. Xue, H. W. Peng and G. D. Li, "Supervisory Board Meeting and its Effect Factors", *Impact of Financial and Economic Issues*, vol. 1, (2010), pp. 99-105.
- [25] A. Slangen and R. van Tulder, "Cultural Distance, Political Risk, or Governance Quality? Towards a More Accurate Conceptualization and Measurement of External Uncertainty in Foreign Entry Mode Research", *International Business Review*, vol. 18, (2009), pp. 276-291.
- [26] J. B. Niu and J. Zhao, "Information Cost, Environmental Uncertainty and Independent Directors", *Premium*, vol. 15, no. 2, (2012), pp. 70-80.
- [27] X. Y. Chen and A. J. Sun, "Beta Is Dead: Evidence from China", *Journal of Peking University*, vol. 37, 4, (2000), pp. 28-37.
- [28] Y. Zeng and Z. F. Lu, "The Relationship between Disclosure Quality and Cost of Equity Capital of Listed Companies in China", *Economic Research Journal*, vol. 2, (2006), pp. 69-80.
- [29] L. Y. Han and B. Y. Liu, "Corporate Governance, Uncertainty and Cash Value", *China Economic Quarterly*, vol. 10, no. 2, (2011), pp. 523-550.
- [30] F. Fama and C. Jensen, "Separation of Ownership and Control", *Journal of Law and Economics*, vol. 26, no. 2, (1983), pp. 301-325.
- [31] D. H. Tran, "Multiple Corporate Governance Attributes and Cost of Capital--Evidence from Germany", *The British Accounting Review*, vol. 24, (2014), pp. 1-52.
- [32] H. Ashbaugh, D. Collins and R. La Fond, "Corporate Governance and the Cost of Equity Capital (Working Paper, University of Madison-Wisconsin)", Available on the internet at, (2004), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=639681.
- [33] Z. M. Ding and X. W. Tan, "The Research of Board Monitoring Behavior under Uncertainty", *Journal of Business Economics*, vol. 4, (2014), pp. 23-32.
- [34] W. P. He, A. Lepone and H. Leung, "Information Asymmetry and The Cost of Equity Capital", *International Review of Economics and Finance*, vol. 27, (2013), pp. 611-620.
- [35] D. Easley and M. O'Hara, "Information and the Cost of Capital", *Journal of Finance*, vol. 59, (2004), pp. 1553-1583.
- [36] O. Faleye and R. UdiHoitash, "The Costs of Intense Board Monitoring. *Journal of Financial Economics*", vol. 101, (2011), pp. 160-181.
- [37] W. R. Gebhardt, C. M. C. Lee and B. Swaminathan, "Toward an implied cost of capital", *Journal of Accounting Research*, vol. 39, (2001), pp. 135-176.
- [38] J. Claus and J. Thomas, "Equity Premia as Low as Three Percent? Evidence from Analysts' Earnings Forecasts for Domestic and International Stock Markets", *Journal of Finance*, vol. 56, (2001), pp. 1629-1666.
- [39] P. Easton, "PE Ratios, PEG Ratios, and Estimating the Implied Expected Rate of Return on Equity Capital", *The Accounting Review*, vol. 79, (2004), pp. 73-95.
- [40] J. Ohlson and B. Juettner-Nauroth, "Expected EPS and EPS Growth as Determinants of Value", *Review of Accounting Studies*, vol. 10, (2005), pp. 349-365.
- [41] L. L. Wang, "Real Activities Earning Management and Cost of Equity Capital", *Journal of Management Science*, vol. 26, no. 5, (2013), pp. 87-99.
- [42] S. M. Ruan, S. L. Yang and C. Zhang, "Management Incentive, Capital Structure and Value Creation of Listed Company", *Economic Theory and Business Management*, vol. 7, (2013), pp. 70-80.

Authors

Xiaowei Tan, He received his M.Sc. in Finance (2011) from Anhui University of Finance and Economics. Now he is Ph.D. at School of Management, Hefei University of Technology. His current research interests include Business Management and Corporate Governance.

Zhongming Ding, He received his PhD in Business management (2009) from Hefei University of Technology. Now he is full professor of Finance at School of Finance, Anhui University of Finance and Economics. Since 2009 he is rector of Anhui University of Finance and Economics. His current research interests include different aspects of Securities Investment and Corporate Governance.