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Case Study

The Effect of Stock Price Crash Risk on the Cost of Capital with the Mediating Role of Shareholders' Ownership

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Abstract

Stock prices face several negative and sudden adjustments and managers postpone disclosing the negative/bad news for a long term. A consequence of stock price cash risk may be on the cost of capital which is funds' cost for a company, or from an investor's perspective, it is the necessary rate of return on the current securities portfolio of a company. This criterion is employed to assess new projects of a company, as well. Accordingly, an issue which has not been significantly addressed in the research about the relationship between stock price cash risk and cost of capital is the mediating role of large shareholders' ownership, while shareholders essentially own the company and reap the benefits or losses of the firm's success or failure. Hence, the objective of this research is to investigate the effect of stock price crash risk on the cost of capital with the mediating role of the large shareholders' ownership. For this purpose, we considered the listed firms in the Tehran Stock Exchange as our case study. Noticeably, the research time scope is 2012-2019. The method of this research is applied and its nature and content are correlational. Both deductive and inductive reasoning frameworks were used to undertake the study and the hypotheses were analyzed by panel analysis approach. The results showed that the stock price crash risk has a positive and significant effect on the cost of capital, however, the large shareholders' ownership reduces the effect of stock price crash risk on the cost of capital.

Keywords: Stock price crash risk, cost of capital, shareholders' ownership

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Introduction

Lots of research argue that a firm's internal information management affects its stock price (Chen et al., 2006). In other words, data enters into the market randomly and the data dissemination process, regardless of whether it is good or bad, is done systematically. However, managers usually hide negative information from investors and accumulate it within the firm. The result of these operations makes the commercial unit image better and increases the investment motivation of people outside the organization in the business unit. This constraint is because if the amount of bad collected news reaches a certain threshold or constraint at a certain time, it will be either very costly or impossible to hide it from then on. When the bad news reaches its climax, it all suddenly spreads which makes high negative returns for the stock to which the market has adapted and that is price crash (Liu & Ren, 2019). It will lead to stock price crash risk is which is the result of firms hiding their negative information (Romer, 1993). The disclosure of quality information can significantly reduce stock price crash risk (Ni & Yin, 2019). In the context of various social media, improving the information ability of investors can significantly affect the stock price crash risk (Ding et al., 2018). Furthermore, a strong management will lead to a lower stock price crash risk in the future (Zhou & Huang, 2019).

Nowadays, managers are under pressure to reduce the operational costs, select the cheapest type of capital structure, increase the firm value, conduct timely debt payments, perform activity continuity, and have more presence in the domestic and foreign markets. To achieve these goals, managers' strategies are to provide the desired financial resources at the lowest cost. In addition, the implicit cost of capital is one of the main issues in decision-making and selecting optimal strategies for investing funds and capital structure to increase the overall value of the economic unit. The higher expected return by the investors leads to the more implicit firm under the cost of capital burden, and the managers must work more to increase the wealth of the investors (Rezaei & Mohammadpour, 2018). Thus, firm managers try to reduce investment risk in order to decrease their cost of implicit capital and increase shareholders' wealth. On the other hand, stock price crash is a phenomenon that generally occurs for the existence of bubbles in the firm's stock price and this matter is because of management measures such as delaying the release of bad news and accelerating the release of good news, tax evasion, a continuation of negative current value projects, and the lack of transparency of financial data (Kim et al., 2011). According to accounting research, business unit managers will always be able to accumulate a certain amount of bad news in the firm in the policy of "delay in publishing bad news and accumulating it as confidential information" which happens because of factors such as the cost of this policy or generally the inability of managers to continue this action (e.g. changing the management of the business unit). Eventually, once the amount of negative accumulated information reaches that final level, managers cannot prevent this news from spreading to the market and investors anymore. The investors with the newly obtained information will reconsider their previous beliefs by releasing this news in the market that is the basis of the current stock price of the firm and base their expectations on new information which will cause a sudden and negative adjustment of the firm's stock price. This phenomenon is called a stock price crash in the financial literature (Hutton et al., 2009).

Besides, the implicit cost of capital is the long-term financing cost of firms. Entities raise funds through debt and equity and use them in assets. The cost of capital is the minimum rate of return that maintains the value of the firm. Estimation of cost of capital is one of the main relevant issues to investment decisions that are used by firms or shareholders to evaluate investment opportunities. Financial economists have considered forecasting-based approaches in response to the constraints in determining the cost of capital through historical returns (Badri & Ghahramani, 2012). According to the consensus of many researchers in the field of the short-sightedness of linear models, the nonlinearity and long-term view of prediction-based approaches can be pointed out (Foroughi & Moazzeni, 2016). The cost of capital stock is calculated using the current price and expected future earnings in a prediction-based approach. Predicted profit is the closest observable index that can be considered in the market expectations. Many articles and researches on the two main elements of this research have been conducted so far due to the relevance of explanatory information based on empirical evidence of capital market information. However, the relationship between stock price crash risk and cost of capital with mediating role of main stock price crash risk has been investigated in fewer articles. On the other hand, it seems that examining these three elements together is very useful and helps users and financial analysts in making better relevant decisions. Moreover, precise research about the analysis of the cost of capital can reduce the stray liquidity and inflation volume, increase employment, improve management consequences, and increase investors' wealth.

According to what mentioned above, this study mainly aims to investigate the effect of stock price crash risk on the cost of capital with the mediating role of large shareholders' ownership. To this end, we intend to answer the following two questions: 1) how is the effect of stock price crash risk on the cost of capital? 2) how is the effect of stock price crash risk on the cost of capital with the mediating role of large shareholders' ownership. Accordingly, the following hypotheses are taken into consideration here: H1) Stock price crash risk is effective on the cost of capital. H2) Large shareholders' ownership is effective on the relationship between stock price crash risk and cost of capital.

Literature Review

The effect of constraint on the stock price crash risk was studied by (Dastgir et al., 2019) through considering the effect of accrual items. The test results show that the financing constraint increases the probability of a stock price crash. Furthermore, the positive effect between the financing constraint and the stock price crash risk is intensified by considering the effect of accruals. The relationship between the firm social responsibility and the implicit cost of capital was studied by (Rezaei & Mohammadpour, 2018). Their results showed a negative and significant relationship between firm social responsibility and their implicit cost of capital. Also, the effective factors on the cost of capital with emphasis on the quality of auditing in the listed firms on the Tehran Stock Exchange was investigated by (Salehi et al., 2017). The results showed that the auditing quality does not reduce the cost of capital, but the cost of capital of the firm also decreases by increasing the tenure of the auditor. The relationship between board diversity and stock risk was examined by (Jebran et al., 2019). Their findings showed that more diversity on the board could reduce the risk of a future stock crash. The relationship

between stock price crash risk and stock capital cost was investigated by (Liu & Ren, 2019). The results showed that a positive relationship between stock price crash risk and cost of capital, according to which increasing stock price crash risk will increase the cost of capital. The relationship between social responsibility and the cost of implicit capital was studied by (Yaneg, 2018). Their sample included 32,974 firms from the United States. The research method is applied and correlational in terms of purpose, and the regression method has been used to test the research hypotheses. The results showed a negative relationship between social responsibility and the cost of capital. The effect of managerial ability on stock risk was examined by (Park & Jung, 2017). They showed a negative relationship between managerial ability and stock risk.

Methodology

According to the objective, questions and hypotheses of this study, our conceptual model has been developed as shown in Figure 1.

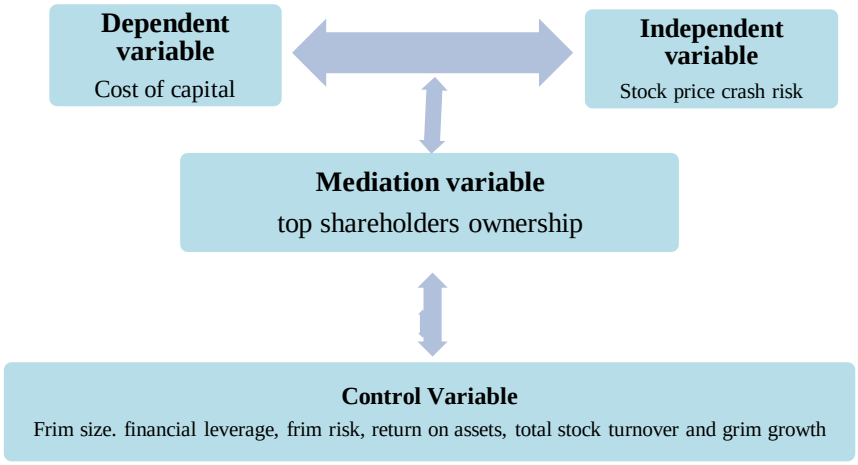

Figure 1: Detailed Conceptual Model Conceptual Model of (Liu & Ren, 2019)

As it is observed in this model, this research tries to answer this question whether stock price crash risk is effective on cost of capital, firm size, financial leverage, firm risk, return on assets, total financial turnover, and firm growth. According to the mentioned issues in the research variable parts, the dependent and independent variables in this model are cost of capital and stock price crash risk, respectively, and the control variable includes firm size, financial leverage, firm risk, return on assets, total financial turnover, and firm growth. In this research, data was collected using the initial data of firms. In other words, the required data was completely obtained by librarian method using Novin Rahavard software and referring to Tehran Stock Exchange Organization and constitutional financial statements of the listed firms in Tehran Stok Exchange in 2012-2019. Data about the financial statements from the stock exchange data site has been used in addition to studying the basic financial statements at this time.

Statistical model

In this research, the following statistical model is used for analysis to test the hypothesis, inspired by the article conceptual model presented by (Liu & Ren, 2019).

First model: COC it = α0+ α 1 CRASHRISK it + α 2 ControlVariable it + εit

Second model: COC it = α 0+ α1 CRASHRISK it + α 2TopHold it * CRASHRISK it + α 3TopHold it + α 4ControlVariable it + εit

Where,

COC: cost of capital in firm i in year t.

CRASHRISK: stock price crash risk in firm i in year t.

TopHold: main stock price crash risk in firm i in year t;

Corration size: control variables (firm size, financial leverage, firm risk, return on assets, total stock turnover, and firm growth) in firm i in year t;

ε: regression equation error; and

α: Correlation coefficient of variables

Operational definition of research variables:

Dependent variable: cost of equity capital

In this research, the modified model of (Ohlson & Juettner-Nauroth, 2005) is used as a criterion for estimating the implicit cost of capital.

$$ROJ = \mathrm{A} + \sqrt{\sqrt{A^2} + \frac{E1}{Po}} \left(\frac{\Delta E2}{\mathrm{E}} - (\gamma - 1)\right) \quad (1)$$

$$Coc = \mathrm{A} + \sqrt{\sqrt{A^2} + \frac{E1}{Po}} \left(\frac{\Delta E2}{\mathrm{E}} - (Y - 1)\right) \quad (2)$$

COC: cost of capital

E1: Dividend prediction in year t = 1,

E2: Dividend prediction in year t = 2,

$$\Delta E2 = E2 - E1 \quad (3)$$

A: actual growth rate calculated as follows:

$$A = \frac{1}{2}\left(\gamma - 1 + \frac{d1}{P0}\right) A = \frac{1}{2}\left(\gamma - 1 + \frac{d1}{P0}\right) \quad (4)$$

Current market price of ordinary shares of the firm: p0

$d1d1$: Dividends in year t = 1 (since dividends are not predicted for all firms, current dividends are used, as in (Nekrasov & Shroff, 2009).

γ: Long-term growth rate in profit, according to (Ohlson & Juettner-Nauroth, 2005). Theory γ-1 should be between 3-5%, ie γ can be selected 1.03, 1.04, 1.50.

According to the theory of (Ohlson & Juettner-Nauroth, 2005), the sub-radical equation equals A and the cost of capital equals A2 when using the COC formula, if ΔE2 becomes negative and then the sub-radical expression gets negative.

$$(\frac{P2}{P1}) \qquad (5)$$

Independent variable: stock price crash risk

CRASHRISK: The negative skewness criterion of stock return has been used to measure stock price crash risk. According to (Hutton et al., 2009), Equation (6) has been used to measure the negative skewness of stock returns.

$$NCSKEWj,\theta = -[\mathrm{n}(\mathrm{n}-1)3.2\sum Wj,\theta] \div [\mathrm{n}(\mathrm{n}-1)(\mathrm{n}-2)(\sum Wj,\theta)3.2] \qquad (6)$$

In which, Wj,θ shows that specific monthly returns of the firm are j for month θ, and n is the number of monthly returns observed during the fiscal year.

In the above pattern, the higher the negative skewness coefficient leads to the more exposure of the firm to stock price crash.The firm-specific monthly return, denoted by Wj, θ, is equal to the natural logarithm of number one plus the residual number ej, θ which is obtained from Equation (7):

$$Wj,\theta = \mathrm{Ln}\ (1 + \mathrm{ej},\theta) \qquad (7)$$

In which, Wj, θ is the specific monthly return of firm j in month θ during the fiscal year.

ejt: the residual return of firm j is in month θ and is the residual or model (3) residual.

$$\mathrm{rj},\theta = \beta 0 + \beta 1\mathrm{jrm},\theta\text{-}2 + \beta 2\mathrm{jrm},\theta\text{-}1 + \beta 3\mathrm{jrm},\theta + \beta 4\mathrm{jrm},\theta{+}1 + \beta 5\mathrm{jrm},\theta{+}2 + \mathrm{ejt} \qquad (3)$$

Where,

rj, θ: stock returns of firm j in month θ during the fiscal year.

rm,θ: market return in the month θ. The beginning of the month index is deducted from the end of the month index and the result is divided by the beginning of the month index to calculate the monthly market return.

The third equation is estimated using the multivariate regression and the panel data methods, and the residual of the first equation is used to calculate the specific monthly return of firm. The specific monthly return of the firm is used to measure the risk of future stock price crash according to the mentioned definition.

Control variables

Firm size: Firm size is calculated by the natural logarithm of the book value of the total assets of the firm.

Leverage ratio: Leverage ratio is calculated by dividing total debts to total assets.

Return on total assets: It is obtained by dividing the net profit by the total assets.

Firm growth: It is obtained through the growth rate of operating income.

Firm risk (beta coefficient): It is obtained through the correlation between the stock returns of firms and the total market return.

Total stock turnover: The turnover rate of the total number of stocks is obtained by the natural logarithm.

Mediating variable: main stock price crash risk

Top shareholder's ownership: It is used through the top shareholder ratio to indicate the status of main shareholders.

Data analysis method

In this research, the multivariate regression method was used as a statistical method. Furthermore, data analysis in the descriptive statistics section began with the calculation of central indexes such as mean, median, the standard deviation, skewness, and kurtosis. Then, Kolmogorov-Smirnov (K-S) test was used to check the normality of the data distribution.

Table 1: the procedure of sample selection

Total number of the listed firms in Thran stock Exchange in 2019	522
Criteria	
Number of the inactive firms in stock exchange in 2012-2019	185
Number of the listed firms in stock exchange since 2019	63
Number of firms that have been holding, investing, financial intermediation, banking or leasing	52
Number of firms with the financial year ending in the last day of winter	53
Number of firms that have had a trading break of more than 3 months	31
The number of firms with inaccessible data in the research time scope	
Number of sample firms	138

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Research scope

The subject, place, and time scope of this research are as follows:

This research is theoretically related to the field of management and accounting which tries to investigate the effect of stock price crash risk on the cost of capital with the mediating role of main stock price crash risk. The spatial scope of the research includes the listed firms on the Tehran Stock Exchange. The time scope in this research is 8 years in 2012-2019.

Table 2: descriptive statistics of the descriptive variables

Number of variables			Central indexes		Kurtosis indexes				
Variables	Abbreviation	No.	mean	median	St.dev	skewness	kurtosis	min	Max
Cost of capital	ROJ	1104	0.32	0.27	0.21	1.61	4.11	0.04	1.37
Stock price crash risk	CRASH	1104	0.48	0.000	0.59	0.24	1.18	0.000	1
Main stock price crash risk	TopHold	1104	0.67	0.7	0.59	-0.22	1.8	0	0.99
Firm size	Size	1104	14.71	14.39	1.57	0.81	4.04	11.02	19.96
Financial Leverage	LEV	1104	0.65	0.67	0.46	-0.36	3.59	0.03	0.98
Firm risk	RISK	1104	0.59	0.54	0.91	1.11	3.27	0.49	2.88
Return on assets	ROA	1104	0.19	0.17	0.17	0.81	3.7	-0.55	0.81
Stock turnover	TURN	1104	0.33	0.16	0.51	1.59	8.12	0	3.23
Firm growth	G	1104	0.22	0.18	0.39	1.25	4.11	-0.8	1.89

All research variables except stock price crash risk and financial leverage for skewness are positive. It can be claimed based on the positive skewness that it can be said that the distribution of these variables is skewed to the right side. Furthermore, the kurtosis coefficient of all variables is positive which shows that their normal distribution kurtosis is 3 and equal to the normal distribution. The gap between the mean deviation from the mean shows that data is dispersed and not centralized around the mean. Median is a variable and another central and numerical index that half of the data is more and half is less than it. The mean cost of capital is (0.32), skewness (1.61) and kurtosis (4.11) show that cost of capital has a high deviation from the normal distribution. The mean risk of a stock crash (0.48) shows that at least one stock price crash is expected for 48% of observations during the research period. Firm size is calculated by the logarithm of the firm's annual sales and has a mean of 14.71 and a median of 14.39. The mean financial leverage shows that about 65% of a firm's capital consists of debt. This shows the claim of other groups of capital suppliers other than shareholders to the firm's assets. Median is a variable and another central and numerical index that half of the data is more and half is less than it. The mean risk of the firm is 0.59 and the mean return on assets has a mean of 0.19 and a maximum of 0.81. In addition, the firm growth has a mean of 0.22 and a maximum of 1.89.

Table 3: Results of model 1 estimation

Variable	Coefficient value	T-value	P-value	Result
CRASH	0.42	6.23	0.002	Positive and significant
RISK	0.31	2.45	0.039	Positive and significant
Size	-0.8	-5.12	0.009	Negative and significant
LEV	0.059	4.14	0.000	Positive and significant
ROA	-0.71	-2.31	0.018	Negative and significant
TURN	0.007	0.57	0.254	Insignificant
G	-0.16	-2.09	0.038	Negative and significant
C (constant value)	1.02	5.2	0.000	Positive and significant
F-value		21.15	F-value	0.000
Determination coefficient (R2)		0.4704	Durbin-Watson	1.93
Adjusted determination coefficient		0.4306		

Testing H1: Stock price crash risk is effective on the cost of capital.

According to the results of Table 3, the p-value for the relevant t-value to the CRASH is less than 0.05 (0.002), indicating its significance. Its coefficient is positive (0.042) and its t-value is 6.23. This t-value is in the range of the H0 area. Therefore, it is concluded that the stock price crash has a positive and significant effect on the cost of capital. Therefore, the first hypothesis is confirmed.

Table 4: Results of model 2 estimation

Variable	Coefficient value	T-value	P-value	Result
CRASH	0.039	4.12	0.027	Positive and significant
TopHold	-0.012	-2.41	0.038	Negative and significant
CRASH*TopHold	-0.76	-7.16	0.026	Negative and significant
RISK	0.27	2.87	0.022	Positive and significant
Size	-0.16	-4.8	0.000	Negative and significant
LEV	0.038	3.48	0.000	Positive and significant
ROA	-0.66	-2.26	0.028	Negative and significant
TURN	0.004	0.61	0.203	Insignificant
G	-0.09	-2.17	0.032	Negative and significant
C (constant value)	1.72	8.32	0.000	Positive and significant
F-value		12.66	F-value	0.000
Determination coefficient (R2)		0.5112	Durbin-Watson	1.82
Adjusted determination coefficient		0.4832		

Testing H2: Large shareholders' ownership is effective on the relationship between stock price crash risk and cost of capital.

According to the results of Table 4, the p-value for the relevant t-value to the CRASH*TopHold is less than 0.05 (0.026) which means significant. Its coefficient is negative (-0.76) and its t-value is -7.61. This t-value is in the range of the H0 area. Therefore, it is concluded that the lage shareholders' ownership is effective on the

relationship between the stock price crash and cost of capital and this would reduce this effect. As a result, the second hypothesis is confirmed.

Conclusion

Stock price crash is caused by spreading negative news. Large shareholders, as the majority, will strictly monitor the managers and limit the opportunistic behaviors to protect their interests. Therefore, it is inferred that investors cannot understand the business situation of the firm in time. Also, in case of high fluctuation of stock prices, precise monitoring of managers seems to be difficult based on the information asymmetry. On the other hand, investors face increasing uncertainty, and thus, they need higher returns to compensate such a risk. Furthermore, the frequent stock price fluctuations make the investors ask the firm's management ability and increase their expectations about the amount of confronted risk. This will increase the needed risk by investors as well as the cost of capital. This is in agreement with the findings of research in (Liu & Ren, 2019). They concluded that increasing stock price crash risk will increase the cost of capital.

The result of checking the second hypothesis shows that the large shareholders' ownership has a negative effect on the relationship between the stock price crash risk and the cost of capital. This result shows that increasing shareholders' ownership reduces the effect of the stock price crash effect on the cost of capital. This finding may point to reduction of the stock crash risk and cost of capital. Such an effect on reducing the stock price crash risk may be due to the presence of institutional owners which leads to the firm's behavior change originating from the monitoring activities of these owners. These shareholders play a key role in shaping many changes in corporate governance systems. This group of shareholders has a considerable effect on the firms based on the ownership of a significant part of the firms' shares and can influence their procedures (including accounting and financial reporting procedures). Furthermore, the role of institutional owners is significantly important in the monitoring of the selected procedures from the managers and it is expected that the presence of owners is effective in a combination of shareholders on the firms' procedures because the institutional owners compose the significant part of the shareholders' group.

Besides, institutional owners prevent management motivation and ability to hide or delay spreading bad news of firms, their accumulation in the firm, and prevent the stock value crash risk. This effect can be justified from two perspectives regarding the effect on reducing the cost of capital: 1) Competition in the product market, and 2) the motivations of major owners to maximize the value of their work which leads to acts such as reducing competition and increasing disclosure. If they promote more cooperation between firms in the same industry and provide less competition and lower risks in the product market, shareholders will demand less cost of capital.

According to findings of present study, the following suggestions are presented:

1- According to the results of checking the first hypotheses, it is suggested that investors and activators of capital market can consider the risk potential of stock price

crash of firms because finally, they can increase the cost of capital and their return risk by disclosing information suddenly.

2- According to the results of checking the second hypothesis, it is suggested to the firms' owners to increase firm information transparency before reaching the undesired spreading of information by reinforcing the domestic control systems and monitoring the managers through the supportive and prevailing mechanisms because they can lead to the managers' opportunistic behaviors and increase the cost of capital.

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