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Uncertainty, investment, and cost of equity

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Abstract

Uncertain environmental conditions are because of changes in the operational environment where the company operates. Environmental uncertainty is random and unpredictable and is the inability of predicting the future events. Environmental uncertainty decreases the optimal allocation of resources to companies and leaves a negative effect on the level of corporate investment. Previous studies indicated that increasing the cost of equity decreases the investment rate. Thus, the present study aimed to investigate the relationship between environmental uncertainty, cost of equity, and investment. This study was applied in terms of objective and analytical in nature. In order to collect the data, the financial statements of the companies on the Tehran Stock Exchange were used. The statistical sample of this study included 120 companies listed on the Tehran Stock Exchange during 2011-2017. The findings of this study indicated that environmental uncertainty had no significant effect on corporate investment. A significant negative relationship was found between cost of equity and investment. This relationship was adjusted by environmental uncertainty. Thus, the first hypothesis of the study was rejected while the second and third hypotheses were confirmed.

Keywords: Environmental uncertainty, cost of equity, investment

Introduction

Lower cost of capital not only enables companies to enhance the required resources for business development, but also provides the basis for improving corporate performance. Jensen et al (1976) believed that companies should reduce information asymmetries between managers and investors to achieve a low cost of capital. Every company has its own risk and return, i.e. the company which aims to earn profits. Each group of investors, e.g. the holders of bond, preferred stock, and common stock require a rate of return which fits with the related risk. Thus, the cost of capital refers to the minimum rate of return which the company should obtain for providing the desired return of investors in the company.Reducing information asymmetry is highly beneficial for the market because it allows investors to determine the expected risk and return (cost of equity) of their investment appropriately. Therefore, a significant number of accounting and financial studies focused on the relationship between disclosure and cost of equity (Aboody et al, 2005). The present study investigated the relationship between uncertainty, investment, and cost of equity in the companies listed on the Tehran Stock Exchange.

Problem statement

The relationship between cost of equity and the level of investment looks clear. Financial standard theory indicates that the decisions on capital budgeting are made using the net present value of assets. The discounting of future cash flows caused by the project is used to make investment decisions. The rate of discounting in such decisions is the cost of equity.Increasing the average cost of equity decreases the investment rate. This method is extensively used for financial decisions

(Graham et al, 2001). Despite significant theoretical foundations on the relationship between the cost of equity and investment as well as the widely use of the net present value, there is little empirical evidence in this regard (Drobetz et al, 2018). The relationship between investment and cost of equity depends on how the cost of equity is measured (Frank et al, 2016).

Uncertain environmental conditions are because of changes in the operational environment where the company operates. Environmental uncertainty is random and unpredictable and is the inability of predicting the future events (Milliken, 2014).

Duncan (1972) believed that environmental uncertainty is the lack of information on predicting the cause and effect of relationships. Downey et al, (1975) defined the inability to predicting the outcome of decisions as environmental uncertainty.

While facing the environmental uncertainty, managers should use their authority and flexibility to create various strategies for survival and obtain maximum returns for shareholders and themselves. Previous studies investigated how managers use their authority and abilities to cope with environmental uncertainty.

According to Drobetz et al, (2018), uncertainty affects economic returns. They believed that uncertainty affects economic growth (Baker et al, 2013), bank liquidity (Berger et al, 2018), business cycle (Basu et al, 2012), dynamic investments, etc. Uncertain environmental conditions are because of changes in the opertaional environment where the company operates. Major economic procedures and the globalization of the economy because of technological advances and increased competition may enhance environmental uncertainty.

In order to response to environmental uncertainty, managers often use their flexibility and authorities to better adapt to environmental changes. Previous studies investigated the relationship between managers' flexibility while facing environmental uncertainty (HUANG et al, 2017).

Based on the theoretical literature, uncertainty may have a negative effect on corporate investments. The reasoning is that when there is high uncertainty, delays or mistakes in invetsment can be highly risky. Thus, companies prefer to wait for avoiding costly mistakes in investing (Schwartz et al, 2004). In this way, Baker et al, (2016) found that uncertainty results in lower investment rates.

Uncertainty is highly unusual at the macro level (Drobetz et al, 2018). Bloom (2009) believed that environmental uncertainty has a highly strong relationship with negative economic, political, and social shocks. In other words, uncertainty is high in such conditions. Environmental uncertainty leaves a negative effect on capital market returns (Baker et al, 2016). Similar patterns can be observed at the micro level.

For instance, stock returns fluctuate at the company and industry levels during recessions (Campbell et al, 2011). In addition, efficiency growth reduces among industries (Bloom, 2014). Accordingly, there is a causal relationship between uncertainty and economic status.

Previous studies indicated that uncertainty can be increased for a number of reasons during the recession. A reasoning is that production, investment, and hiring activities of companies provide information to the capital market. When these activities reduce during the recession, less information is transmitted to the capital market, leading to uncertainty (Fajgelbaum et al, 2014).

Another reasoning on the relationship between recession period and uncertainty is that analysts have little experience about recession periods because such conditions usually occur rarely. Thus, the accuracy of their predictions decreases, resulting in the increased uncertainty (Orlik et al, 2014).

Accoridng to Bloom (2009), environmental uncertainty reduces economic growth and makes companies delay their investment and employment. Bloom (2014) stated that environmental uncertainty decreases the optimal allocation of resources to companies. Gulen et al, (2016) believed that the increase of uncertainty has a negative effect on the level of investment in the company. In response to environmental uncertainty, companies decrease their investment as a quarter to a fifth. Such literature shows a negative relationship between environmental uncertainty and the level of investment.

In fact, companies delay their investments to avoid the high costs of wrong investments in conditions of uncertainty (McDonald et al, 1986). Drobetz et al, (2018) stated that environmental uncertainty leads to a reduction in corporate investments.

Accordingly, it is expected that the increase in equity leads to a redcution in corporate investment. In conditions where uncertainty is high, companies will be less interested in investment. Thus, this study aimed to investigate the relationship between environmental uncertainty, cost of equity, and investment.

The significance of the study

Decision-making and judgement on the best way of investment to maximize the shareholder wealth are among the most significant issues in the field of financial issues. In order to achieve such a goal, increasing the return on investment and minimizing the cost of capital are two appropriate strategies. Thus, the information on the cost of capital has always played a critical role in corporate decisions.

Achieving the best rate is highly important in determining the optimal structure of the financial structure of companies, especially in aachieving the best results of operations in form of profitability and increasing stock prices. Determining the optimal combination of financing sources is one of the most critical goals and decisions of managers, especially financial managers. In other words, managers should select the best structure of financing methods in order to maximize shareholder wealth.

Selecting the financing structure or capital structure is one of the most complicated decisions which managers should make for maximizing the shareholder wealth. Environmental uncertainty refers to a key concept in the organization theory literature. Thomson (1973) in his book “Organizations in Practice” believes that uncertainty is a fundamental problem which should be adapted by top managers of organizations (Ashrafi, 2002).

Uncertain environmental conditions are because of the changes in the operational environment where the company operates. Environmental uncertainty is random and unpredictable and is the inability of predicting the future events (Milliken, 1987). According to Duncan (1972), environmental uncertainty refers to the lack of information about predicting the cause and effect of relationships. While facing the environmental instability, managers should use their authority and flexibility to create various solutions to survive and then obtain maximum returns for shareholders and themselves. Previous studies investigated how managers use their authority and abilities to cope with environmental uncertainty.

Thus, addressing the relationship between uncertainty, cost of equity, and investment for shareholders (optimal allocation of their capital based on uncertainty conditions) managers (to make appropriate investment decisions based on cost of equity and uncertainty) auditors (to identify the effect of uncertainty conditions on corporate investments and risk to assess audit risk),

creditors (determining the terms of payment credits based on uncertainty conditions and evalauting the credit risk) and other stakeholders is a significant issue.

Research objectives

The main objective of this study was to investigate the relationship between environmental uncertainty, cost of equity and investment of the companies listed on the Tehran Stock Exchange. The detailed objectives of this study are as follows:

Objective 1: Ensuring the relationship between environmental uncertainty and investment of the companies listed on the Tehran Stock Exchange.

Objective 2: Providing the relationship between the cost of equity and investment of companies listed on the Tehran Stock Exchange.

Objective 3: Identifying the effect of environmental uncertainty on the relationship between the cost of equity and investment in the companies listed on the Tehran Stock Exchange.

The results of this study are expected to help managers make optimal decisions on corporate investments and help investors to avoid wasting resources by allocating capitals optimally. In addition, the probable findings of this study can reveal the different dimensions of the effect of uncertainty on corporate performance and decisions.

Research question

Is there any significant relationship between environmental uncertainty, cost of equity, and investments of the companies listed on the Tehran Stock Exchange?

Research hypotheses

Hypothesis 1: There is a significant relationship between environmental uncertainty and corporate investment.

Hypothesis 2: There is a significant relationship between cost of equity and corporate investment.

Hypothesis 3: Environmental uncertainty adjusts the relationship between cost of equity and corporate investment.

Method

This study was purpose in terms of applied, quantitative in terms of data, and descriptive-correlation in terms of data collection method and is also considered as positive accounting research. This study was conducted in the framework of inductive reasoning and it was also ex-post factor in terms of execution time (past information).

The subject scope of this study was cost of equity, environmental uncertainty, and investment of the companies listed on the Tehran Stock Exchange.

The time scope included a six-year period from the beginning of 2011 to the end of 2017. These companies were determined using the purposeful sampling method and the companies which had the desired features were studied while other companies were eliminated. The spatial scope of this study was the companies listed on the Tehran Stock Exchange.

Findings

In order to test the research hypotheses, Formula 1 is estimated:

Formula 1:

$$inv_{it} = \beta_0 + \beta_1 pu_{it} + \beta_2 cf_{it} + \beta_3 wacc_{it} + \beta_4 wacc_{it} * pu_{it} + \beta_5 Lev_{it} + \beta_6 size_{it} + \beta_7 roa_{it} + \epsilon_{it}$$

If the beta coefficient is significant, the first hypothesis, the third beta coefficient will be significant but if the second hypothesis and the fourth beta coefficient are significant, the third hypothesis will be accepted.

Operational definition of research variables and their measurement

Measurement of variables

According to HUANG et al (2017), sales rate is an appropriate measure of environmental uncertainty because it is based on external environmental conditions and can be calculated using Formula 2:

$$pu(si) = \frac{\sqrt{\sum_{i=1}^{5} \frac{(si - s_{mean})^2}{5}}}{s_{mean}}$$

In Formula 2:
Si :Company sales revenue (descaled with the first assets of the period)
s_{mean} :
the average income of the company during five consecutive years (descaled with the first assets of the period)
Wacc: the weighted average cost of equity
According to Satayesh et al. (2013), the weighted average cost of capital involves the costs of the components of capital; Thus, the cost of capital is calculated as follows:
Formula 3:

$$WACC = (WD * KD) + (WP * KP) + (WS * KS) + (WE * KE)$$

In Formula 3:
WD :Percentage of debt share in total capital
WP :Percentage of preferred stock in total capital
WS :Percentage of common stock shares in total capital
WE :Percentage of retained earnings share in total capital
KP:cost rate preferred stock
KD :debt cost rate
KS :common stock cost rate
KE :retained earnings cost rate
Debt cost rate is calculated by Formula 4:
Formula 4:

$$KD = kD(1 - T)$$

Kd :interest rate
The common stock cost rate is calculated as follows:
Formula 5:

$$KS = \frac{D1}{P0(1 - p1)}$$

In Formula 5:
D1 :Profits paid at the end of the first year
P0 :Stock price at time zero
G :Growth rate was calculated using the geometric mean of sales during the years of the studied period.
Retained earnings cost rate is calculated by Formula 6:
Formula 6:

$$KE = \left(\frac{D.(1 + g)}{P.}\right) + g$$

It should be noted that there is no preferred stock in Iran.

Inv ‹Investment:

It is equal to cash for the acquisition of fixed assets, intangible assets, and other non-current assets divided by the total assets at the beginning of the period.
Control variables
Lev :Ratio of total debt to total assets of the company
Roa :Ratio of net profit to total assets of the company
Size :Logarithm of total assets of the company on the basis of 10
Sample, sampling method, and sample size
The selection of samples from the companies listed on the Tehran Stock Exchange during 2011 - 2017 was performed by considering the following criteria:
1. Company has change the fiscal year during the studied period.
2. The trading symbol of the company is active and traded at least once a year.
3. The company is not an intermediation among the financial, insurance and banking institutions.
Accordingly, the sample of this study is selected from the statistical population through a systematic elimination method, so that the companies without the above-mentioned conditions are removed from the sample.

Table 1: Systematic elimination method

Number of companies		Description	Row
۵۰۲		Number of companies listed on the Stock Exchange at the end of 2017	۱
	۱۰۶	Number of companies which were not active on the Stock Exchange during the time scope	۲
	۸۷	Number of companies which were listed on the Stock Exchange since 2011	۳
	۴۰	Number of companies which were part of holdings, investments, financial intermediation, banks or leasing.	۴
	۸۳	Number of companies which changed the fiscal year at the time scope of the study or their fiscal year does not end at the end of March	۵
	۶۶	Number of companies which had a trading halts of more than six months at the time scope and the companies with incomplete information	۶
۳۸۲		Total number of eliminated companies.	۸
۱۲۰		Number of sample member companies	۹

Coefficient of determination (R^2)

The relationship between x and y of Formula 7 can be explained by the coefficient of determination. The coefficient of determination shows the extent to which the independent and control variables could explain the changes in the dependent variable. Such a value is always between zero and one.
Formula 7:

$$R^{۲} = \frac{a\sum y + b\sum xy - ny^{-۲}}{\sum y^{۲} - ny^{-۲}}$$

Although the correlation coefficient 50% does not mean that two or more variables have 50% common changes, the correlation square (coefficient of determination) indicates such common changes. If the correlation of the two variables is 50%, they have common changes of $(۵۰\%)^{۲}$ or 25%.

Tests of the model type selection

In this method, first the restricted F test was performed as follows to select the type of model estimation method:

$$H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5$$

$$H_1: \exists\, r \neq s \;\Rightarrow\; \alpha_r \neq \alpha_s$$

Formula 8:

$$F = \frac{(R^2_{LSDV} - R^2_{Pooled})/(T-1)}{(1 - R^2_{LSDV})/(NT - T - K)}$$

Formula 9:

$$F = \frac{(RSS_{Pooled} - RSS_{LSDV})/(T-1)}{RSS_{LSDV}/(NT - T - K)}$$

In Formulas 8 and 9, R^2_{LSDV} and RSS_{LSDV} indicate the coefficient of determination and sum of squares for the residuals obtained from the fixed effects model. In addition, R^2_{Pooled} and RSS_{Pooled} represent the coefficient of determination and sum of squares for the residuals obtained from the pooled model. N shows the number of sections (companies) and T represents the length of time period (years).
If the null hypothesis is rejected, the model will be estimated by the fixed effects method,

otherwise the model will be estimated by the pooled method. In the second approach, the random effects and common effects models were compared using the Breusch–Pagan test:
H0: The absence of random effects – pooled model
H1: The presence of random effects --- random effects model
The Lagrange coefficient statistics for the Breusch - Pagan test are presented as follows:

Formula 10:

$$LM = \frac{NT}{2(T-1)}\left[\frac{\sum_{i=1}^{N}\left(\sum_{t=1}^{T} u_{it}\right)^2}{\sum_{i=1}^{N}\sum_{t=1}^{T} u_{it}^2} - 1\right]^2 = \frac{NT}{2(T-1)}\left[\frac{T^2 \bar{u}'\bar{u}}{u'u} - 1\right]^2 \sim \chi^2$$

If the null hypothesis is not rejected, the common effects model will be used to estimate the model. However, if the null hypothesis is rejected, the random effects model should be tested against the fixed effects model using the Hausman test and the superior model should be selected for estimating the model.
If a fixed effects model is selected, it should be tested against the random effects model through the Hausman test as follows:

H0: There is no correlation between explanatory variables and individual effects – random effects model
H1: There is a correlation between explanatory variables and individual effects – fixed effects model

Formula 11:

$$H = \left(\hat{\beta}_{FEM} - \hat{\beta}_{REM}\right)' \left(\hat{Var}\left(\hat{\beta}_{FEM}\right) - \hat{Var}\left(\hat{\beta}_{REM}\right)\right)^{-1} \left(\hat{\beta}_{FEM} - \hat{\beta}_{REM}\right) \sim \chi^2$$

In the above-mentioned model, $\hat{\beta}_{REM}$ represents the slope coefficients in the fixed effects model, $\hat{\beta}_{REM}$ represents the slope coefficients in the random effects model, and Var indicates the symbol of variance. This statistic has a $\chi 2$ distribution. If the null hypothesis is rejected, the model will be estimated by the fixed effects method. Otherwise, the random effects method will be used.

Descriptive statistics
Summary of descriptive statistics such as mean, median, minimum, maximum, and standard deviation are presented in this section. The equilibrium point and center of gravity for the distribution, and central tendency are represented by the mean as the main central tendency.
Median shows that 50% of the sample data is below it and 50% above this level. Medium is used as a measure of inclination to the center of the distributions which are asymmetric. The standard deviation is the most significant dispersion parameter obtained from the root of variance. This index indicates the average fluctuation of observations from their mean. Table 2 represents the descriptive statistics of all variables, including the independent, dependent and control variables.
The results indicate that the average cost of equity for the studied companies is 28%, which is 67 and 14% in the maximum and minimum cases. In addition, the average investment of the studied companies in fixed assets, intangible assets, and other non-current assets is 7%, which is 85% and 0.02% in the maximum and minimum cases.
Furthermore, the average leverage of the companies indicates that approximately 58% of assets are financed from debts and the rest by equity. Such a ratio is 1.269 and 0.09 in the maximum and minimum cases. A financial leverage higher than 1 shows at least one company in the sample whose equity was negative, i.e., it had a high accumulated loss.

Table 2: Descriptive statistics of variables

Kurtosis	Skewness	Standard deviation	Minimum	Maximum	Median	Mean	Variable symbol	Variable

١٧,٢٠٠٧	٢,٧٣٩٣	٠,٠٩٤٢	٠,٠٠٠١	٠,٩٥٠٢	٠,٠٧٨٦	٠,٠٩٩٧	PU	Environmental uncertainty
٤,٧٧٣٢	١,٥٧١١	٠,١٣٦٢	٠,١٤٥٨	٠,٦٧١٩	٠,٢٣٧٧	٠,٢٨٢٧	WACC	Cost of equity
١٩,١٤٩٩	٣,٢٤١٨	٠,٠٨٩٤	٠,٠٠٠٢	٠,٨٥٣٤	٠,٠٣٩٩	٠,٠٧٠٥	INV	Investment
٢,٩٩٩٩	-0.0740	٠,١٧٧١	٠,٠٩٠٢	١,٢٦٩٠	٠,٥٩٣٣	٠,٥٨٥٥	LEV	Financial leverage
٤,٦٢٢٣	٠,٥٥٢٤	٠,١١٦٨	-0.370	٠,٥٥٣٣	٠,٠٩٣٣	٠,١٠٩٩	ROA	Return on assets
٤,٢٢٣٢	٠,٨١٧٢	٠,٦٨٩٤	٤,٤١٥٣	٨,٤١٤٢	٦,٠٨٨٤	٦,١٦٦٥	Size	Company size

In addition, the average return on assets of the companies is 11%, which is 55% at the best and -37% at the worst cases.

Inferential statistics

Heterogeneity of variance test

Another classic assumption is the heterogeneity of variance test. In this study, the modified Wald test was used for investigating this issue. Considering the significant effect of the heterogeneity of variance on estimating the standard deviation of coefficients, and the issue of statistical inference, it is necessary to study the presence or absence of the heterogeneity of variance before any estimation.

Table 3: Results of heterogeneity of variance test

significance level	statistics χ^2	heterogeneity of variance test
٠/٠٠٠	١١٢٧/٧٧	Model (1)

The results obtained from Table 3 show that the probability of statistics in the model is less than 0.05, indicating a heterogeneity between the variables. Since one of the methods for solving the problem of the heterogeneity of variance is generalizing the general least squared method, this method was used for estimating the research model.

Variables stationary test

In this study, Levin, Lin and Chou (LLC) test was used for determining the reliability of the variables. The results of this test in Table 4 show that the independent and dependent variables are stationary during the research period as the significant level (P-Value) for the test is less than 5%.

Table 4: Results of variables stationary test

Significance level	Statistics	Variable
٠/٠٠٠	-١٩/٨١١	PU
٠/٠٠٠	-١٩/٩٩٥	INV
٠/٠٠٠	-٢٠/١٠١	WACC
٠/٠٠٠	-٩/٧٠٧	LEV
٠/٠٠٠	-٢٨/٧٢٨	ROA
٠/٠٠٠	-٢١/٤٣٤	Size

Selecting a pattern for the model

The analytical-hybrid regression model was used for testing the hypotheses. In studying the cross-sectional data and time series, if the coefficients of cross-sectional effects and time effects are not significant, the data can be mixed with each other and estimated by a regression of at ordinary least squares.

In most of the panel data, the cross coefficients or time series are often significant. This model is known as the composite regression model. Regarding the composite structure of the data, the Chow test was used for studying the composition and the Hausman test was used for investigating the presence of a fixed effect. If the significance level of the Chow test is less than 0.05, the panel data method will be used for estimating the panel data model, while if the significance level is more than 0.05, pool data will be used for estimating the model.

In addition, if the significance level of Hausman test is less than 0.05, the fixed effects test should be used for estimating the model. If the significance level is more than 0.05, the random effects test should be used for estimating the model. Considering the panel nature of data in this study, the Chow and Hausman tests were used for selecting the fitting pattern of the research models. The results of the Chow and Hausman test are shown in Table 5.

Table 5: Selecting an appropriate pattern for the model

Confirmed method	Result	Significance level	Statistics value	Test	Model
Panel data method	Rejecting H0	۰/۰۰۰	۳/۸۵۲	Chow test	Model)۱(
Fixed effects method	Rejecting H0	۰/۰۰۰	۵۱/۹۹۶	Hausman test	

The probability value of F statistics (Chow test) for the research model is less than 5% and it is appropriate to use the panel data model to fit such relationships. Further, the probability of Hausmann statistic for the research model is less than 5% and a panel data pattern with fixed effects should be used to fit these models.

Results of research hypotheses testing

Based on the results of Table 6, there is a positive relationship between environmental uncertainty and company investment that is not statistically significant at the 95% confidence level. Thus, the first hypothesis of the study is not confirmed at the 95% confidence level. Accordingly, companies fail to pay enough attention to environmental uncertainty in their investment decisions. Thus, they make investments without considering the unpredictability of the future which can challenge the predicted return on investment and decrease the ability of the company to maximize shareholders' wealth and have the ability to service debt. In addition, there is a positive relationship between cost of equity and company investment, which is statistically significant at the 95% confidence level. Thus, the second hypothesis of the research is confirmed at the 95% confidence level. Such findings indicate that the higher the cost of equity in the company, the higher the investment. In other words, the companies increase investments to compensate for the minimum return expected by shareholders and obtain the excess returns. In fact, the companies increase their investments when they are under pressure by shareholders to make more returns. Furthermore, there is a negative relationship between the mutual effects of environmental uncertainty on cost of equity and company investment, being statistically significant at the 95% confidence level. In other words, environmental uncertainty results in a shift in

the relationship between cost of equity and corporate investment. Thus, the third hypothesis of the research is confirmed at 95% confidence level. Accordingly, the business units which work in an uncertain environment decrease the amount of their investments when the cost of equity is high, because the expected return on investment may not be realized in the uncertainty or there is a big gap between realization and prediction which can result in the non-realization of the expected return of shareholders and reduced value of the company in such conditions. Further, there is a significant positive relationship between corporate investment and control variables of return on assets, as well as financial leverage.

Significance	T statistics	Standard error	Coefficient	Variable
۰,۸۰۷	۰,۲٤٤٥	۰,۰۳۷۹	۰,۰۰۹۳	Fixed value
۰,۲٥۷	۱,۱۳٥۰	۰,۰۲۱۰	۰,۰۲۳۸	Environmental uncertainty
۰,۰۰۱	۳,٤۸۹۸	۰,۰۱۲۲	۰,۰٤۲٦	Cost of equity
۰,۰۰۰	-3.6195	۰,۰٦٤۰	-0.231691	Environmental uncertainty * cost of equity
۰,۰۰۰	٤,۰۸۹۲	۰,۰۱۱۰	۰,۰٤٥۰	Financial leverage
۰,۷٦۲	۰,۳۰۳۰	۰,۰۰٥٦	۰,۰۰۱۷	Company size
۰,۰۰۰	۱۰,۱٥۰۲	۰,۰۱٤۸	۰,۱٥۰٥	Return on assets
۰/٦۱۷	Adjusted coefficient of determination		۱/۸٥	Durbin-Watson
۰/۰۰۰	Probability of F statistics		۱۱/۸۲۱	statisticsF

Based on the test results of the regression model, the significance level of F statistic, indicating the significance of the regression is less than 5%. It means that the model is significant at the 95% confidence level. The adjusted coefficient shows that about 62% of the dependent variable changes can be explained by the model independent variables. Furthermore, the value of Durbin-Watson estimated in Table 6 equals 1.85. Considering that the calculated value is in the range between 1.5 - 2.5, it shows the absence of first-order correlation.

In general, the results of this study are shown in Table 17:

Table 7: Results of the effectiveness of independent variables on dependent variables in the multivariate regression model

Result	Description	Hypothesis
Rejected	There is a significant relationship between environmental uncertainty and corporate investment.	First
Confirmed	There is a significant relationship between cost of equity and corporate investment.	Second
Confirmed	Environmental uncertainty adjusts the relationship between cost of costs and corporate investment.	Third

Discussion and conclusion

Uncertain environmental conditions are because of the changes in the operational environment where the company operates and is random and unpredictable.
Accordingly, it is expected that the increase in equity leads to a reduction in corporate investment rate and companies will be less willing to invest in uncertain conditions. Therefore, this study aimed to investigate the relationship between environmental uncertainty, cost of equity, and investment.
The following hypotheses were tested to achieve the research objectives:
Hypothesis 1: There is a significant relationship between environmental uncertainty and corporate investment.
Hypothesis 2: There is a significant relationship between cost of equity and corporate investment.
Hypothesis 3: Environmental uncertainty adjusts the relationship between cost of equity and corporate investment.
Findings of this study indicate that environmental uncertainty has no significant effect on corporate investment. There is a significant negative relationship between cost of equity and investment and such a relationship is adjusted by environmental uncertainty. Thus, the first hypothesis of this study is rejected while the second and third hypotheses are confirmed.

Suggestions for the future studies

1- It is suggested to study the effect of environmental uncertainty on cost of debt.
2- It is suggested to study the relationship between cost of debt and corporate investment.
3- It is suggested to study the relationship between financial reporting quality and corporate investment.

Practical suggestions

Because of the lack of a significant relationship between environmental uncertainty and investment, the company decision makers are suggested to pay special attention to environmental uncertainty in their investments as uncertainty about the future can cause challenge in return on investment.

Research limitations

The statistical sample of this study included 120 companies listed on the Tehran Stock Exchange during 2011-2017. Thus, the generalization of the results of this study to the entire statistical population and future, as well as the previous periods should be accompanied carefully.
1) Such results were obtained regardless of the type of industry and at the level of companies. Thus, testing the research hypotheses in each industry may result in different results.
2) Using other criteria such as cost of equity and environmental uncertainty can result in different results.

Resources

1. Jensen, M.C. and Meckling, W.H. (1976), "Theory of the firm: managerial behavior, agency costs and ownership structure", Journal of Financial Economics, Vol. 3 No. 4, pp. 305-360.
2. Aboody, D., Hughes, J. and Liu, J. (2005), "Earnings quality, insider trading, and cost of capital", Journal of Accounting Research, Vol. 43 No. 5, pp. 651-673.
3. Graham, J.R., Harvey, C.R., (2001). The theory and practice of corporate finance: Evidence from the field. Journal of Financial Economics 60 (2), 187–243.
4. Drobetz W, El Ghoul S, Guedhami O, Janzen M, (2018), Policy Uncertainty, Investment, and the Cost of Capital, Journal of Financial Stability. https://doi.org/10.1016/j.jfs.2018.08.005
5. Frank, M.Z., Shen, T., (2016). Investment and the weighted average cost of capital. Journal of Financial Economics 119 (2), 300–315.
6. Duncan, R. B. (1972). Characteristics of organizational environments and perceived environmental uncertainty. Administrative Science Quarterly, 17, 313-327.

7. Milliken, F. (1987). Three types of perceived uncertainty about the environment: State, effect, and response uncertainty. Academy of Management Review, 12(1), 133-143.
8. Downey, H. K., & Slocum, J. W. (1975). Uncertainty: Measures, research and sources of variation. Administrative Science Quarterly, 18, 562-577.
9. Baker, S.R., Bloom, N., (2013). Does uncertainty reduce growth? Using disasters as natural experiments. NBER Working Paper No. 19475
10. Basu, S., Bundick, B., (2012). Uncertainty shocks in a model of effective demand. NBER Working Paper No. 18420.
11. Berger, A.N., Guedhami, O., Kim, H.H., Li, X., (2018). Economic policy uncertainty and bank liquidity creation. Available at SSRN: https://ssrn.com/abstract=3030489
12. Baker, S.R., Bloom, N., Davis, S.J., (2016). Measuring economic policy uncertainty. Quarterly Journal of Economics 131 (4), 1593–1636
13. Huang, H., Sun, l Zhang, j. (2017). "Environmental Uncertainty and Tax Avoidance" In Advances in Taxation. Published online. 83-124.
14. Schwartz, E.S., Trigeorgis, L., (2004). Real options and investment under uncertainty: Classical readings and recent contributions. MIT Press, Cambridge, MA.
15. Bloom, N., (2009). The impact of uncertainty shocks. Econometrica 77 (3), 623–685.
16. Bloom, N., (2014). Fluctuations in uncertainty. Journal of Economic Perspectives 28 (2), 153– 175.
17. Campbell, J.Y., Lettau, M., Malkiel, B.G., Xu, Y., (2011). Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk. Journal of Finance 56 (1), 1–43
18. Fajgelbaum, P., Schaal, E., Taschereau-Dumouchel, M., (2014). Uncertainty traps. NBER Working Paper No. 19973
19. Orlik, A., Veldkamp, L., (2014). Understanding uncertainty shocks and the role of black swans. NBER Working Paper No. 20445
20. Gulen, H., Ion, M., (2016). Policy uncertainty and corporate investment. Review of Financial Studies 29 (3), 523–564.
21. McDonald, R., Siegel, D., (1986). The value of waiting to invest. Quarterly Journal of Economics 101 (4), 707–727.