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Presenting a non-linear model and optimization of conservatism and cost of equity based on the moderating role of corporate governance quality

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Abstract

Conservatism can reduce equity costs to the optimal level, and then, of course, increasing the level of conservatism will increase equity costs. Considering the existing (linear) relationships between conservatism and the cost of equity, it is important to know whether there is a non-linear relationship between these two components, and considering the impact of corporate governance on this type of relationship (in comparative terms), this issue was also investigated. In this regard, using a non-linear model, the existence of a uniform or U-shaped relationship between conservatism and the cost of equity was investigated. This research has been carried out in the framework of inductive-inductive arguments. In this research, library and field methods were used to collect information. The theoretical foundations and the research carried out were used as a library basis. The statistical population of this research includes all the companies listed on the Tehran Stock Exchange during the financial periods of 2013-2022. According to Cochran's formula, the number of samples used in this research has been obtained for an error of 0.085 (about 8.5%). According to research findings, there is a non-linear relationship between accounting conservatism and cost of equity. Therefore, it is obvious that the U relationship is the opposite meaning that if conservatism increases in a company, the cost of equity will increase first, and after a certain level of conservatism, an increase in conservatism will lead to a decrease in the cost of equity. Also, the quality of corporate governance affects the non-linear relationship between accounting conservatism and the cost of equity. For this purpose, 5 components of corporate governance, including independence of the board of directors, concentration of ownership, ownership of institutional shareholders, managerial ownership and ownership of real shareholders, were investigated, and the results showed that the quality of corporate governance has a significant effect on the non-linear relationship between accounting conservatism and the cost of equity.

Keywords: non-linear model, conservatism, equity cost, corporate governance quality
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1 Introduction

Accounting conservatism has been one of the most challenging accounting issues in the last century and one of the limiting principles of accounting. Despite the existing criticisms of it, it has always maintained its place among

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accounting principles, so the survival of conservatism in the face of criticisms against it over the years is proof of the fundamentals of this principle. Sterling [39] considers conservatism to be the most effective evaluation principle in accounting. Accounting conservatism is defined as applying a higher degree of verifiability to identify good news compared to bad news [9].

Conservatism is a cautious reaction to information asymmetry between investors and company management, which plays an important role in financial reporting and prepares information to help shareholders in the process of monitoring company management [26]. Conservatism is a concept or mechanism created to deal with the challenge of uncertainty or information asymmetry and is a response to information asymmetry. In fact, with increasing conservatism, information asymmetry decreases. The concept of conservatism was first proposed by Bliss [7]. He said, Don't predict the profits, but forget all the losses. The first researcher who operationalized accounting conservatism and used it in an experimental research was Basu [4]. He stated that in order to recognize the profit, more evidence should be considered than when the loss was recognized. One of the basic elements in making investment decisions is the cost of equity, which decreases the added economic value of companies. Since the cost of equity is the basis of comparison in the evaluation of investment opportunities, companies need to maintain their capital cost at a reasonable level, because if the cost of equity is high, the company will have to abandon many of its potential investment projects (Regarding the fact that in our country the rate of financing through debt (interest rate) is not competitive and is usually determined through the banking system and in an orderly manner, therefore, in this research, among the components of the cost of capital, only the cost of equity has been considered.).

The cost of equity (cost of capital) is the minimum expected rate of return. If the expected return is less than the cost of equity (capital cost), the value of the economic unit will decrease. Therefore, in order to maintain the value of the economic unit, the management should try to bring the expected return to at least the level of the cost of equity.

Since the cost of equity is the basis of comparison in the evaluation of investment opportunities, companies are forced to maintain their cost of equity at a reasonable level. Because if the cost of equity is high, the company will have to abandon many of its potential investment projects. The key to success is reducing the cost of equity. Therefore, conservatism can be beneficial for companies because it reduces the cost of equity (capital) to the optimal level, and of course, after that, increasing the level of conservatism increases the cost of equity.

There is an ongoing debate among academics and standard setters as to how much conservatism is considered beneficial or harmful to users of financial statements. The Financial Accounting Standards Board and the International Accounting Standards Board no longer consider accounting conservatism as a desirable quality characteristic of financial reporting because they believe that conservatism may lead to a negative misrepresentation of financial statements and unbiasedness [36].

In response to this change in the position of the Financial Accounting Standards Board and the International Accounting Standards Board regarding accounting conservatism, a growing body of studies examines the economic consequences of accounting conservatism. Especially how accounting conservatism affects the cost of equity capital. The theory provides ambiguous predictions about the effect of conservatism on the cost of equity capital. It can be predicted that accounting conservatism reduces the cost of equity (cost of capital) by reducing information risk, reducing information asymmetry and limiting profit management. Researchers in this framework argue that conservative practices have increased the quality of the information environment by increasing information efficiency and increasing information accuracy [3, 43], limiting opportunities for profit management [10, 24, 41], and also limiting false signals by companies [30]. Based on this, accounting conservatism reduces the overall risk of information and thus the cost of equity capital. Applying things such as the rule of lower cost or net price and sales value in inventory evaluation, not recognizing goodwill, considering research and development expenses as expenses, identifying expenses before exploitation as expenses, etc., all indicate the importance of conservatism.

On the other hand, some theoretical studies argue that increasing the overall quality of information may increase information asymmetry and thus the cost of equity capital, especially in semi-efficient and inefficient markets [5, 23]. Conservative practices may be exposed to management's opportunistic behavior through "big bath/understating profit to overstate it in the future" accounting, which compromises the quality of earnings and increases the cost of equity capital [8]. Gigler et al. argue that financial reports have less information content with frequent bad news disclosures [15]. In the same vein, other researchers provide evidence that conservative practices reduce the quality of information for analysts and lead to biased and ineffective earnings forecasts [1, 17, 25, 29, 32]. Johnstone [20] analytically shows that early recognition of losses (conservatism) may increase the cost of equity financing by reducing expected returns, even in cases where information is highly accurate. Existing empirical studies on the effect of accounting conservatism on the cost of capital provide mixed (positive or negative) and inconclusive results. For example, Francis et al. [12] did not find a significant relationship between accounting conservatism and cost of equity capital. However, Chan et

al. [8] and Biddle and Hilary [6] found a positive relationship between conditional conservatism and cost of equity capital. In contrast, other studies provide empirical evidence of a negative relationship between conservatism and cost of equity capital [2, 13, 21, 32].

Ruch and Taylor [36] argue that mixed results are due to cost of capital measurement issues and accounting conservatism. However, the reduced findings are likely attributed to the use of linear models that can fail to model competing theories [16]. Therefore, we hypothesize that the relationship between accounting conservatism and the cost of equity capital may be nonlinear. This hypothesis has been established by theoretical studies that include the possibility of a negative, positive or neutral relationship between accounting conservatism and the cost of equity capital. The theory of too much of a good thing assumes that any relationship between two variables reaches a certain maximum and then leads to a decrease in the variable. In other words, the effect of too much of a good thing theory integrates positive and negative relationships into one framework and predicts an inverted U-shaped relationship.

In contrast to the too-much-of-a-good-thing theory effect, the too-little-of-a-good-thing theory assumes a U-shaped relationship in which the relationship starts with a negative effect up to a threshold, after which it turns positive. The existence of potential effects of too much of a good thing or too little of a good thing between accounting conservatism and the cost of equity capital raises serious concerns about the accuracy of linear models used in previous empirical studies. Conservative reporting and corporate governance both play a role in reducing information asymmetry. In relation to corporate governance, we can mention its four main goals, including accountability, transparency, respect for fairness and respect for the rights of the beneficiaries. The essence of corporate governance is accountability and transparency. That is, if accountability and transparency are achieved, other goals will also be achieved. Also, the category of accountability is raised when there is a conflict of interest. Accountability in corporate governance is a general concept, and in the theoretical framework, it is a special concept. That is, in the theoretical framework, the manager is accountable to the owner only as a steward. While in corporate governance, the manager is accountable to all stakeholders and even the government. The main reason for using corporate governance is to monitor the part of the company that controls the assets of shareholders and investors. This ensures that:

- The balance of power should be appropriately distributed among the members of the board of directors (independence).
- Executive managers (required) to be rewarded or awarded fairly.
- The board of directors should accept the responsibility of supervising the executive directors and risk management.
- External auditors are independent, and the company is not influenced by their performance.
- Issues such as compliance with business ethics, corporate social responsibility (stakeholder theory) and support for financial corruption whistleblowers should be dealt with.

In this regard, various domestic and foreign research have also been conducted, some of which are mentioned: Rahimpour et al. [34] investigated the effect of the role of accounting conservatism in companies achieving the target financial leverage in companies listed on the Tehran Stock Exchange. To conduct this research, 98 companies were used from 2000 to 2020. The results of the research show that conservatism can play an important role in accelerating the adjustment of the capital structure of companies. Also, the results of this research indicate that large and profitable companies have a longer period of time to adjust their capital structure and achieve the target capital structure due to their less desire for external financing in case of using external sources for financing. In other words, these companies have a lower adjustment speed. Jalili and A. Asadi [18] investigated the effect of corporate governance mechanisms on the accounting conservatism of companies listed on the Tehran Stock Exchange. The research hypotheses were tested using a sample consisting of 645 companies (2011 to 2015) and using the multiple regression model based on the combined data technique. The findings indicate that the variables of board size, percentage of institutional ownership and the amount of floating shares have a significant effect on accounting conservatism, while the percentage of board ownership does not have a significant effect on conservatism.

In his research, Rashidi [35] investigated the relationship between the deviation caused by the company's management mechanisms and accounting conservatism, taking into account the moderating effect of agency costs. In this research, in order to investigate corporate governance, the deviation of the optimal corporate governance model has been used. For this purpose, the data of 120 companies were collected for the period between 2012-2017 and tested using the panel data regression method with fixed effects. The research results indicate that there is a significant relationship between corporate governance and accounting conservatism. Also, the results of this research show that

agency costs have no effect on the relationship between corporate governance and accounting conservatism. Xu et al. [42] showed that capable managers have superior skills for predicting the economic outlook of companies and their private transfer and have significant effects on conservatism, and as a result, can reduce information asymmetry.

In a research, Lu et al. [27] investigated how the level of corporate social responsibility affects the cost of equity through operational risk. The results of the research showed that the performance of the social responsibility level has a negative relationship with the cost of equity. Social responsibility level performance has a negative relationship with operational risk. Operational risk is an intermediary variable between the performance of social responsibility level and cost of equity, and the intermediary effect is different between long-term and short-term risks.

In [19], Jashni et al. quoted that Eldersoun et al. have investigated the relationship between conditional conservatism and profitability of companies with leverage and capitalization conditions in Bucharest stock companies. The statistical sample of the research includes 399 capital companies and 188 leveraged companies. The statistical method of the research is the correlation test and multiple regression. The results of the first hypothesis showed that there is a direct and significant relationship between conditional conservatism and profitability in capital companies. The results of the second hypothesis showed that there is an inverse and significant relationship between conditional conservatism and profitability in leveraged companies. Therefore, this research aims to present the nonlinear relationship model of conservatism and the cost of equity according to the role of the moderator of the quality of the corporate governance system. Based on this, research hypotheses are presented as follows:

1. There is a non-linear relationship (U-shaped curve) between accounting conservatism and cost of equity.
2. The quality of corporate governance affects the non-linear relationship between accounting conservatism and the cost of equity.

2 Research method

Conducting this research is done within the framework of inductive-inductive arguments. In this sense, the theoretical foundations and the background of the research are compiled in a theoretical framework and through library studies, articles and the use of websites, and the collection of information to reject or accept the hypotheses is done with inductive reasoning. Also, in this research, library and field methods are used to collect information. The theoretical foundations and the research done are used as a library foundation.

The main method for collecting the data of this research is to review the documents reported by the Tehran Stock Exchange Organization. These data will be obtained through the financial statements of the companies and their accompanying notes, and for this purpose, the Rahvard Navin and Tadbir Pardaz software, as well as the information contained in the websites of the Stock Exchange Organization, will be used. Also, to collect information related to the background of the research, library documents and information received from the Internet, domestic and foreign prestigious journals and research-related topics are used. After collecting the data, the data are calculated and processed through Excel spreadsheet software and then analyzed using Eviews software. The statistical population of this research includes all the companies listed on the Tehran Stock Exchange during the financial periods of 2013-2022. In this research, the systematic elimination method has been used to homogenize the statistical population. In this research, a random sampling method was used to select the sample. For this purpose, first, the sample size was calculated using the Cochrane relationship, and then the number of sample companies was randomly selected from the screened statistical population.

$$n = \frac{N z_{\frac{\alpha}{2}}^2 p(1-p)}{\varepsilon^2 (N-1) + z_{\frac{\alpha}{2}}^2 p(1-p)}. \tag{2.1}$$

According to the above formula, the sample size is 186 companies within the confidence interval of 95% and considering the parameters of the above formula. Therefore, our observations reached 900 years. The number of samples used in this research was obtained for an error of 0.085 (about 8.5%).

- Measuring the cost of equity

  Establishing a balance between risk and return is one of the important functions of the capital market. Risk and return are among the basic concepts in financial literature, which are shown in the form of the cost of capital. The cost of capital is the weighted average of the cost of resources provided by debt and equity. After all, capital plays an essential role in financial provision and investment decisions. The cost of capital is conceptually defined in relation to the expected return. In other words, the cost of capital is the minimum expected rate of return. If the expected return is lower than the cost of capital, the value of the economic unit will decrease. Therefore,

in order to maintain the value of the economic unit, the management should try to bring the expected return to the level of the capital cost at least. In this, the key to success is reducing the cost of capital [31]. Since the cost of capital is based on the rate of return expected by investors, it is related to the amount of risk (changes in profit) accepted by them [38].

Because in our country, the cost of financing through debt (interest rate) is not competitive, and usually, it is determined through the banking system and in an orderly manner, so in this research, among the capital cost components, only the cost of equity has been considered. This research uses the CAPM and Gordon method to measure the cost of equity of the company.

Traditionally, the value of the company's capital is through the capital asset pricing model (CAPM) introduced by Markovitz [28], and later used by Trainor [40] and Sharpe [37] to describe the relationship between risk and expected rate of return, it is investigated. In the CAPM model, the cost of equity is calculated by estimating the relationship between systematic risk (market beta) and stock returns. In their proposed model, they tried to establish an implicit balance between the risk and return of securities. One of the assumptions of this model is that stockholders diversify well and common stockholders are only exposed to systematic investment risk. The basis for measuring the systematic risk is the beta related to the investment. In this method, the return of a company's share can be related to the return of the stock market by the following relationship:

$$Rf + B(Rm - Rf) = Stockcost = R \tag{2.2}$$

Numerous studies have shown that despite the criticism of the CAPM method, this model is still one of the most widely used methods in determining the cost of equity.

- Measurement of conservatism

Conservatism is defined as the asymmetric timeliness in the recognition of reported profit versus loss. Therefore, in conservatism, losses are recognized faster than profits in the current period. Basu's model [4] is the most widely used approach to evaluate the rate of reflection of losses faster than gains. However, Basu's [4] approach does not provide a constant level of conservatism. To overcome this shortcoming, Khan and Watts [22] present a new method that provides a conservative estimate at the firm level for each year. Following Khan and Watts [22], Basu's [4] model is specified as follows (Equation (2.3)):

$$NI_{it} = \beta_0 + \beta_1 D_{it} + \beta_2 R_{it} + \beta_3 DR_{it} + \varepsilon_{it} \tag{2.3}$$

NI_{it} is the annual net profit before extraordinary items of company t in year t, estimated by the net market value at the beginning of the period.

R_{it} is the annual return calculated as the sum of the monthly returns D is a dummy variable. If R is negative, it is bad news, and if R is positive, it is good news.

Khan and Watts [22] reformulate Basu's [4] model to estimate the timeliness that reflects good news accounting and conservatism at the firm level.

The increase of bad news (which is called CSCORE) and the timeliness of good news (which is called GSCORE) each year will be considered as a linear characteristic of the specific characteristics of each year as follows (Equations (2.4) and (2.5)):

$$CSCORE_{it} = \beta_3 = \mu_1 + \mu_2 SIZE_i + \mu_3 MTB_i + \mu_4 LEV_i \tag{2.4}$$

$$GSCORE_{it} = \beta_2 = \theta_1 + \theta_2 SIZE_i + \theta_3 MTB_i + \theta_4 LEV_i \tag{2.5}$$

where SIZE is determined as the natural logarithm of the company's stock market value, LEV is the company's leverage; Because the ratio between total debt and market value of equity and MTB is the ratio of market to book value. CSCORE is an annual measure of conservatism and GSCORE is a constant year measure when detecting good news. To estimate CSCORE and GSCORE and following Khan and Watts [22], firstly equation (2.4) and (2.5) are replaced as regression equation: To obtain the annual cross-sectional regression model, we will have the following equation:

$$\begin{aligned} NI_i = \beta_0 + \beta_1 D_{it} + (\theta_1 + \theta_2 SIZE_i + \theta_3 MTB_i + \theta_4 LEV_i) R_{it} + (\mu_1 + \mu_2 SIZE_i + \mu_3 MTB_i + \mu_4 LEV_i) DR_{it} \\ + \delta_1 SIZE_i + \delta_2 MTB_i + \delta_3 LEV_i + \delta_4 D_i SIZE_i + \delta_5 D_i MTB_i + \delta_6 D_i LEV_i \varepsilon_i \end{aligned} \tag{2.6}$$

Therefore, it is estimated every year to obtain estimates of Ui and $i\theta$.

CSCORE and GSCORE are as follows:

$$\widehat{CSCORE} = \widehat{\beta}_{3i,t} = \widehat{\mu}_{1,t} + \widehat{\mu}_{2,t} SIZE_{i,t} + \widehat{\mu}_{3,t} MTB_{i,t} + \widehat{\mu}_{4,t} LEV_{i,t} \tag{2.7}$$

$$\widehat{GSCORE}_{it} = \widehat{\beta}_{2i,t} = \widehat{\theta}_{1,t} + \widehat{\theta}_{2,t} SIZE_{i,t} + \widehat{\theta}_{3,t} MTB_{i,t} + \widehat{\theta}_{4,t} LEV_{i,t} \tag{2.8}$$

in equation (2.7) and (2.8), it will be different in companies through cross-sectional changes in company year characteristics (SIZE, MTB and LEV) and over time through changes between time Ui and $i\theta$ [22].

Considering that the measurement of conservatism (CSCORE) may be subject to measurement error, every year its raw values are converted into deciles by ranking companies based on CSCORE. Therefore, the first decile companies have the smallest conditional conservatism value. This variable will be represented by CSCORE RANK.

Also, alternative measures of conservatism are calculated and the timeliness of detecting bad news (BNEWS) at the company year level is obtained as follows (first measure):

$$\widehat{BNEWS} = \widehat{CSCORE} + \widehat{GSCORE}$$

The second measure was proposed by Gassen et al. [14] called "BASU" measure and is a modification of the measure by Pope and Walker [33].

The "BASU" measure controls the likelihood that profits will respond to bad and good news. The "BASU" criterion at the level of the company year is calculated as follows:

$$BASU\_metric = arctang(\widehat{CSCORE} + \widehat{GSCORE}) - arctang(\widehat{GSCORE})$$

- Measuring corporate governance

  The components of corporate governance and their operational definition in this research are described in the following table:

Table 1: Operational definition of corporate governance variables

Name of the component	**Operational definition**
Independence of the board of directors - use of non-commissioned members in the board of directors	The ratio of non-executive members to the total members of the board of directors
Concentration of ownership	The highest percentage of shareholder ownership (major)
Ownership by institutional shareholders	Percentage of shares held by institutional owners
Property management	Percentage of shares held by board members
Ownership of real shareholders	The percentage of shares held by real owners

In order to determine the ranking of the corporate governance system, first, the companies will be ranked based on the above components and according to the quartile. In this way, the number 4 will be assigned to the observations that are in the main quartile, and the number 1 will be assigned to the observations that are in the first quartile. Then, from the sum of the ranks obtained based on the mentioned components, the rank of the corporate governance system is calculated for each company-year.

2.1 Research models

First model:

$$\begin{aligned} COEC_{it} = {} & \beta_0 + \beta_1 CSCORE_{it} + \beta_2 CSCORE_{it}^2 + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 ROA_{it} \\ & + \beta_6 ROE_{it} + \beta_7 RTVOL_{it} + \beta_8 EARVOL_{it} + \beta_9 MTB_{it} + \beta_{10} AUDIT_{it} + \varepsilon_{it} \end{aligned} \tag{2.9}$$

Second model:

$$\begin{aligned} COEC_{it} = {} & \beta_0 + \beta_1 CSCORE_{it} + \beta_2 CSCORE_{it}^2 + \beta_3 CSCORE_{it}^2 \times NUMBER \\ & + \beta_4 CSCORE_{it}^2 \times \text{MANAGER OWNERSHIP} + \beta_5 CSCORE_{it}^2 \times \text{FUND OWNERSHIP} \\ & + \beta_6 CSCORE_{it}^2 \times \text{MAX OWNERSHIP} + \beta_7 CSCORE_{it}^2 \times \text{INDIVIDUAL OWNERSHIP} \\ & + \beta_8 NUMBER + \beta_9 \text{MANAGER OWNERSHIP} + \beta_{10} \text{FUND OWNERSHIP} + \beta_{11} \text{MAX OWNERSHIP} \\ & + \beta_{12} \text{INDIVIDUAL OWNERSHIP} + \beta_{13} SIZEit + \beta_{14} LEV_{it} + \beta_{15} ROA_{it} + \beta_{16} ROE_{it} + \beta_{17} RTVOL_{it} \\ & + \beta_{18} EARVOL_{it} + \beta_{19} MTB_{it} + \beta_{20} AUDIT_{it} + \varepsilon_{it} \end{aligned} \tag{2.10}$$

3 Findings

The zero hypothesis and the opposite hypothesis in this test are as follows.

H_0 : The model with random effects is suitable

H_1 : The model with fixed effects is suitable

If the probability value for the above test is less than 0.05, the null hypothesis is rejected at the 95% confidence level, that is, the model with fixed effects is suitable.

And otherwise, the null hypothesis is not rejected at the 95% confidence level, that is, the model with random effects is appropriate. In this section, the appropriate model is selected from among the models (integrated model, model with fixed effects or model with random effects). The results of the Chow and Hausman test to identify the appropriate model are presented in the following table:

Table 2: Chow test and Hausman test to select the appropriate model

Models	**Hausman test**			**Chow or Lemer test**			**Result**
	Chi-square value	**Freedom degree**	**p-value**	**value**	**Freedom degree**	**p-value**	
First model	104.00	9	0.000	5.61	184.1293	0.000	Fixed effects model
				872.66	184	0.000	
Second model	62.28	19	0.000	4.30	183.1141	0.000	Fixed effects model
				705.46	183	0.000	

The probability value of Chow's test for the first and second models is all equal to 0.000, which is less than 0.05, therefore, the models used are the type of models with effects. According to the Hausman test, the probability values for the first and second models are less than 0.05, which indicates a model with fixed effects. In the following, the model with fixed effects has been used to examine the hypotheses.

First model:

The following model is used for investigation.

$$COEC_{it} = \beta_0 + \beta_1 CSCORE_{it} + \beta_2 CSCORE_{it}^2 + \beta_3 SIZE_{it} + \beta_4 LEV_{it} + \beta_5 ROA_{it} + \beta_6 ROE_{it} + \beta_7 RTVOL_{it} + \beta_8 EARVOL_{it} + \beta_9 MTB_{it} + \beta_{10} AUDIT_{it} + \varepsilon_{it}$$

The null hypothesis and the opposite hypothesis in this model are as follows:

$$\begin{cases} H_0 & : \beta_1 = \beta_2 = ... = \beta_{10} = 0, \\ H_1 & : \beta_i \neq 0 \ i = 1, 2, ..., 10 \end{cases}$$

$$\begin{cases} H_0 : & \text{There is no meaningful model.} \\ H_1 & \text{There is a meaningful model.} \end{cases}$$

The significant probability value of F is equal to 0.000. This value is less than 0.05, so the null hypothesis is rejected at the 95% confidence level, that is, there is a significant model at the 95% confidence level. The coefficient of determination is equal to 0.51, that is, about 51% of the changes in the dependent variable are expressed by the independent and control variables.

The value of the Durbin-Watson statistic is equal to 1.76, which indicates the absence of autocorrelation between the residuals. The VIF values for the variables are less than 2.98, which is less than about 10, so there is no collinearity between the variables.

The t value for CSCORE is equal to 9.22 and for $CSCORE^2$ is equal to 8.10. Because these values are in the region of rejecting the null hypothesis, therefore, the relationship between CSCORE and $CSCORE^2$ with the dependent variable is significant and positive. Also, the value of t statistic for SIZE is equal to 2.85, which is significant and has a direct relationship, and for LEV it is equal to -2.04, for ROA it is equal to -2.49 and for MTB it is equal to -4.18. All three variables have a negative and significant relationship with the dependent variable. Other variables have no significant relationship with the dependent variable.

The second model:

Table 3: Estimation and testing of the parameters of the first model

parameters	**The amount of coefficients**	**t value**	**p-value**	**result**	**VIF**
Constant	0.030	0.08	0.937	meaningless	–
CSCORE	0.499	9.22	0.000	Meaningful and positive	1.03
$CSCORE^2$	0.342	8.10	0.000	Meaningful and positive	1.01
SIZE	0.047	2.85	0.004	Meaningful and positive	2.29
LEV	-0.191	-2.04	0.042	Meaningful and negative	1.96
ROA	-0.455	-2.49	0.013	Meaningful and negative	2.98
ROE	0.027	0.52	0.600	meaningless	1.57
RTVOL	0.0006160	0.34	0.738	meaningless	1.16
EARVOL	-0.0000000006	-0.39	0.699	meaningless	1.45
MTB	-0.00000000002	-4.18	0.000	Meaningful and negative	1.29
F p-value	0.000		F-value	7.07	
Durbin Watson	1.76		coefficient of determination	0.51	

The tested model is as follows.

$$\begin{aligned} COEC_{it} = {} & \beta_0 + \beta_1 CSCORE_{it} + \beta_2 CSCORE_{it}^2 + \beta_3 CSCORE_{it}^2 \times NUMBER \\ & + \beta_4 CSCORE_{it}^2 \times \text{MANAGER OWNERSHIP} + \beta_5 CSCORE_{it}^2 \times \text{FUND OWNERSHIP} \\ & + \beta_6 CSCORE_{it}^2 \times \text{MAX OWNERSHIP} + \beta_7 CSCORE_{it}^2 \times \text{INDIVIDUAL OWNERSHIP} \\ & + \beta_8 NUMBER + \beta_9 \text{MANAGER OWNERSHIP} + \beta_{10} \text{FUND OWNERSHIP} + \beta_{11} \text{MAX OWNERSHIP} \\ & + \beta_{12} \text{INDIVIDUAL OWNERSHIP} + \beta_{13} SIZEit + \beta_{14} LEV_{it} + \beta_{15} ROA_{it} + \beta_{16} ROE_{it} + \beta_{17} RTVOL_{it} \\ & + \beta_{18} EARVOL_{it} + \beta_{19} MTB_{it} + \beta_{20} AUDIT_{it} + \varepsilon_{it} \end{aligned}$$

The null hypothesis and the opposite hypothesis in this model are as follows:

$$\begin{cases} H_0 & : \beta_1 = \beta_2 = ... = \beta_{20} = 0, \\ H_1 & : \beta_i \neq 0 \ i = 1, 2, ..., 20 \end{cases}$$

$$\begin{cases} H_0 : & \text{There is no meaningful model.} \\ H_1 & \text{There is a meaningful model.} \end{cases}$$

The significant probability value of F is equal to 0.000. This value is less than 0.05, so the null hypothesis is rejected at the 95% confidence level, that is, there is a significant model at the 95% confidence level. The coefficient of determination is equal to 0.57, that is, about 57% of the changes in the dependent variable are expressed by the independent and control variables.

Durbin-Watson's statistic is equal to 1.73, which indicates the absence of autocorrelation between the residuals. The VIF values for the variables are less than 3.77, which is less than about 10, so there is no collinearity between the variables.

The value of t statistic for CSCORE is equal to 6.61 and for $CSCORE^2$ is equal to 7.83. Because these values are in the region of rejecting the null hypothesis, therefore, the relationship between CSCORE and $CSCORE^2$ with the dependent variable is significant and positive.

The value of t statistic for $CSCORE^2 \times$NUMBER is equal to -2.85 (significant and negative) and for $CSCORE^2 \times$ MAX OWNERSHIP is equal to -3.03 (significant and negative).

Also, the value of t statistic for NUMBER is equal to -5.38 (significant and negative) and for INDIVIDUAL OWNERSHIP is equal to 3.56 (significant and positive).

Finally, the value of t statistic for LEV is -2.47, for ROA it is -2.58 and for MTB it is -4.25. All three variables have a negative and significant relationship with the dependent variable, while the other variables do not have a significant relationship with the dependent variable.

4 Conclusion

In this research, the non-linear relationship between accounting conservatism and the cost of equity and some of the most important mechanisms of corporate governance, were investigated. Based on the literature on the subject, it was expected that there would be two types of linear and non-linear (U-shaped) relationships, and also that there would be positive and negative relationships between the corporate governance mechanisms and according to their effect on the corporate governance structure and accounting conservatism. In this regard, the inverted U-shaped relationship

Table 4: Estimation and testing of the parameters of the second model

parameters	**The amount of coefficients**	**t value**	**p-value**	**result**	**VIF**
Constant	1.067	2.69	0.007	meaningless	–
CSCORE	0.394	6.61	0.000	Meaningful and positive	1.07
$CSCORE^2$	0.359	7.83	0.000	Meaningful and positive	3.68
$CSCORE^2 \times NUMBER$	-0.321	-5.38	0.000	Meaningful and negative	3.77
$CSCORE^2 \times$ MANAGER OWNERSHIP	-4.366	-0.89	0.375	meaningless	3.19
$CSCORE^2 \times$ FUND OWNERSHIP	-0.003	-0.12	0.908	meaningless	2.17
$CSCORE^2 \times$ MAX OWNERSHIP	-0.011	-3.03	0.003	Meaningful and negative	2.71
$CSCORE^2 \times$ INDIVIDUAL OWNERSHIP	-0.140	-1.25	0.210	meaningless	2.75
NUMBER	-0.323	-2.85	0.005	Meaningful and negative	1.34
MANAGER OWNERSHIP	-2.493	-0.41	0.680	meaningless	1.54
FUND OWNERSHIP	0.026	0.89	0.372	meaningless	2.32
MAX OWNERSHIP	-0.007	-1.02	0.308	meaningless	2.72
INDIVIDUAL OWNERSHIP	0.501	3.56	0.000	Meaningful and positive	1.42
SIZE	0.019	1.08	0.282	meaningless	2.51
LEV	-0.227	-2.47	0.014	Meaningful and negative	1.99
ROA	-0.477	-2.58	0.010	Meaningful and negative	3.04
ROE	0.058	1.10	0.274	meaningless	1.58
RTVOL	-0.0015050	-0.82	0.411	meaningless	1.21
EARVOL	-0.0000000004	-0.31	0.760	meaningless	1.52
MTB	-0.00000000002	-4.25	0.000	Meaningful and negative	1.36
F p-value	0.000		F-value	7.61	
Durbin Watson	1.73		coefficient of determination	0.57	

occurs when at the lower level of the independent variable, its positive effects on the dependent variable are more than its negative effects, and this relationship is reversed after the independent variable reaches a certain point. Now, when a regression model has both linear form (X) and quadratic variable (2X) as independent variables, naturally, the correlation between the two variables is high.

Also, according to the theoretical research literature, there is a positive and significant relationship between the ratio of non-obligatory managers in the board of directors, the average number of shares owned by board members, the presence of non-obligatory financial experts in the company's board of directors, the main character, the company and the audit authority of financial statements, and conservatism. Also, there is a significant relationship between independence of the board of directors, concentration of ownership, ownership of institutional shareholders, managerial ownership and ownership of real shareholders with conservatism. In accordance with the results of this research, with other domestic and foreign research conducted in this regard, we can refer to the research of Jalili and Asadi [18], Rashidi [35], Fang et al. [11], and Eldersoun et al. [15].

Summary of the results related to the first hypothesis:

There is a non-linear relationship (U-shaped curve) between accounting conservatism and cost of equity. The presence or absence of a non-linear relationship (U-shaped curve) between accounting conservatism and the cost of equity is the hypothesis and the first goal of this research. By examining this variable, we expected two types of linear and non-linear (U-shaped) relationships, when there is a U-shaped relationship (i.e., the coefficient becomes negative), at the lower level of the independent variable, its negative effects on the dependent variable are greater than its positive effects, but after reaching a certain level, its positive effects start to outweigh its negative effects. The inverted U-shaped relationship also occurs when, at the lower level of the independent variable, its positive effects on the dependent variable are greater than its negative effects, and this relationship is reversed after the independent variable reaches a certain point. Now, when a regression model has both linear form (X) and quadratic variable (2X) as independent variables, naturally, the correlation between the two variables is high. In this regard, Table 4 shows that the independent variable ($CSCORE^2$) is less than 0.05 and is equal to zero, which indicates the existence of a statistically significant relationship between conservatism and cost of equity. Also, since the t-statistic is positive, the relationship is positive and significant. In other words, with the increase in the level of conservatism, the cost of equity also increases, and the investigations carried out indicate that there is a direct relationship between these two variables. The U-shaped relationship means that if conservatism increases in a company, the cost of equity decreases first, and after a certain level of conservatism, an increase in conservatism will lead to an increase in the cost of equity. Therefore, it is obvious that the U relationship is the opposite meaning that if conservatism increases in a company, the cost of equity will increase first, and after a certain level of conservatism, an increase in conservatism will lead to a decrease in the cost of equity.

Summary of the results of the second hypothesis:

The quality of corporate governance affects the non-linear relationship between accounting conservatism and the cost of equity. In the second hypothesis, we looked for whether the quality of corporate governance has an effect on the non-linear relationship between accounting conservatism and the cost of equity. For this purpose, 5 components of corporate governance, including independence of the board of directors, concentration of ownership, ownership of institutional shareholders, managerial ownership and ownership of real shareholders were investigated. The mentioned 5 components were tested both linearly and non-linearly. The following table shows the results obtained from the test:

Table 5: The results of the second hypothesis test

parameters	**The amount of coefficients**	**t value**	**p-value**	**result**
NUMBER	-0.323	-2.85	0.005	Meaningful and negative
$CSCORE^2 \times NUMBER$	-0.321	-5.38	0.000	Meaningful and negative
MANAGER OWNERSHIP	-2.493	-0.41	0.680	meaningless
$CSCORE^2 \times$ MANAGER OWNERSHIP	-4.366	-0.89	0.375	meaningless
FUND OWNERSHIP	0.026	0.89	0.372	meaningless
$CSCORE^2 \times$ FUND OWNERSHIP	-0.003	-0.12	0.908	meaningless
MAX OWNERSHIP	-0.007	-1.02	0.308	meaningless
$CSCORE^2 \times$ MAX OWNERSHIP	-0.011	-3.03	0.003	Meaningful and negative
INDIVIDUAL OWNERSHIP	0.501	3.56	0.000	Meaningful and positive
$CSCORE^2 \times$ INDIVIDUAL OWNERSHIP	-0.140	-1.25	0.210	meaningless

According to the above table, 4 out of 10 parameters have a significant relationship.

The first parameter of the second hypothesis:

The variable NUMBER (number of board members) shows a significant negative relationship with the cost of equity. In other words, the probability value of the mentioned variable is less than 0.5, which indicates a statistically significant relationship, and since the t statistic is negative, the relationship between these two variables is negative, so that with the increase in the number of board members, the cost of equity will decrease. Also, there is an inverse relationship between independent and dependent variables. This relationship is linear, and the mode of the relationship is significant and negative. That is, with the increase in the number of board members, the relationship between managers' conservatism and the cost of equity weakens. The results of similar studies show that corporate governance variables, including the number of board members, the number of non-executive board members, and the number of major shareholders, have no effect on the return on equity. For example, they used Pearson's coefficient for the relationship between two variables, the number of members and the return on equity. The results show that with the increase in the number of board members, the return on equity decreases, although this coefficient is not strong enough to reject the null hypothesis. Also, according to the theoretical and empirical literature, there is a significant relationship between the cost of equity and the value of the company. Also, the ownership structure of the company has a significant effect on the relationship between the cost of equity and the value of the company. Since the ownership structure is related to the members of the board of directors and their number, there is a significant relationship between the number of members and the cost of shareholders' equity.

The second parameter of the second hypothesis:

The variable $CSCORE^2 \times NUMBER$ (the number of conservative board members) shows a significant negative relationship with the cost of equity. In other words, the probability value of the mentioned variable is less than 0.5, which indicates a statistically significant relationship, and since the t statistic is negative, the relationship between these two variables is negative. In such a way that with the increase of the independent variable, the cost of equity will decrease, and there is an inverse relationship between the independent and dependent variables. The results of this variable also confirm the non-linear relationship between conservatism and the cost of shareholders' rights. In this section, the coefficient of the number of members of the board of directors with the power of the conservatism variable has been used. In this case, the relationship is significant and negative. That is, with the increase in the number of board members, the relationship between managers' conservatism and the cost of equity weakens.

The third parameter of the second hypothesis:

The variable $CSCORE^2 \times$ MAX OWNERSHIP (the highest percentage of shareholder ownership) shows a significant negative relationship with the cost of equity. In other words, the probability value of the mentioned variable is less than 0.5, which indicates a statistically significant relationship, and since the t statistic is negative, therefore, the relationship between these two variables is negative in such a way that with the increase of the independent variable, the cost of equity will decrease and there is an inverse relationship between the independent and dependent variables. The results of this variable also confirm the non-linear relationship between conservatism and the cost of shareholders'

rights. In this section, the coefficient of the highest percentage of shareholders' ownership with the variable power of conservatism has been used. In this case, the relationship is significant and negative. That is, with the increase in the ownership percentage of shareholders, the relationship between managers' conservatism and the cost of equity weakens.

The fourth parameter of the second hypothesis:

The variable INDIVIDUAL OWNERSHIP (percentage of shares held by real owners) shows a significant positive relationship with the cost of equity. In other words, the probability value of the mentioned variable is less than 0.5. which indicates a statistically significant relationship, and since the t statistic is positive, therefore, the relationship between these two variables is positive in such a way that with the increase of the independent variable, the cost of equity will also increase, and there is a direct relationship between the independent and dependent variable. The results of this variable support the linear relationship between conservatism and the cost of shareholders' rights. In this section, the results of the percentage of shares held by real owners support the linear relationship between the variable of conservatism and the cost of equity. In this case, the relationship is significant and positive. That is, by increasing the percentage of shares held by real owners, the relationship between managers' conservatism and the cost of equity is strengthened.

Optimal pattern:

In this section, we explain the relationship between the cost of equity and accounting conservatism. According to the first and second hypotheses of the research, there is a non-linear relationship (U-shaped curve) between accounting conservatism and cost of equity.

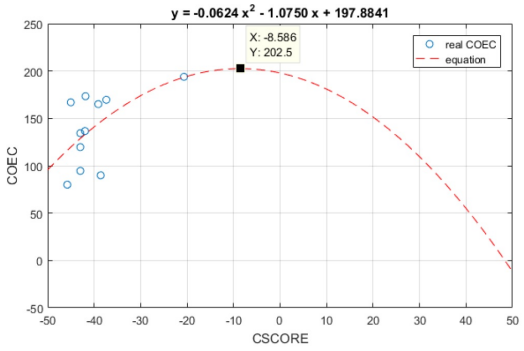

Figure 1: Cost of equity and managers' conservatism

According to Figure 1, the relationship between accounting conservatism and cost of equity is nonlinear and concave. This means that with the increase in managers' conservatism, which first increases with a decreasing slope and reaches the maximum point and then decreases with an increasing slope, the cost of equity first increases and then decreases. The U-shaped relationship means that if conservatism increases in a company, the cost of equity decreases first, and after a certain level of conservatism, an increase in conservatism will lead to an increase in the cost of equity. The inverted U-shaped relationship also occurs when, at the lower level of the independent variable, its positive effects on the dependent variable are more than its negative effects, and this relationship is reversed after the independent variable reaches a certain point.

As can be seen, the reduction of conservatism up to a point (the optimal point) causes an increase in the cost of equity, and in other words, when conservatism increases in a company, the cost of equity increases first. And after a certain level of conservatism, an increase in conservatism has led to a decrease in the cost of equity.

4.1 Practical suggestions

Based on the research results, the following suggestions can be made:

1. According to the results of the research hypothesis that dealt with the issue of the number of board members, it is suggested that the companies admitted to the stock exchange/over-the-counter market should increase the number of non-obligatory members of their board of directors in order to reduce the cost of equity. In addition, this issue can also be spread regarding private joint stock companies.
2. Compilers of accounting standards, considering the importance of conservatism (breathing space) and its impact on the performance of companies, such as the cost of equity, with a clearer view and the inclusion of conservatism

in the theoretical concepts of financial reporting and especially accounting standards, pay more attention to the issue of conservatism. In this regard, it is suggested to pay attention to the differences between conservatism as a macro strategy and a strategic goal in the process of drafting accounting standards and caution as a micro strategy and a tactic at the company level.

3. Considering the results of research hypotheses and the role of corporate governance mechanisms in adopting conservative accounting procedures and the relationship between the two sides of conservatism and corporate governance, taking into account its essence, namely accountability and transparency, It is suggested to the stock exchange organization and legislative authorities considering the wide dimensions of conservatism as one of the components of the qualitative characteristic of reliability (the word caution in the theoretical concepts of financial reporting), give a stronger role to this important component to improve the level of corporate governance in the capital market.

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