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Original Research

Does Risk Disclosure Affect Firm's Cost of Capital?

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Abstract

Risk disclosure refers to providing information to the user to inform of any opportunities or threats .Theoretically, disclosure mainly aims to reduce the information asymmetry as well as investor uncertainty, thereby indirectly lowering the equity cost. An advantage of risk disclosure is its effectiveness in reducing the equity cost. Therefore, risk disclosure can help decrease investor uncertainty, thus diminishing the equity cost. This project mainly investigates the relationship between risk reporting and cost of capital in 174 firms listed on the Tehran Stock Exchange for the period 2012-2018. This is an applied research study in terms of purpose and descriptive-correlational in terms of methodology. In this study, the variable of risk disclosure was collected by analyzing the content of financial statements, explanatory notes, and board of director reports. The cost of capital was calculated in three ways: cost of debt, cost of ordinary shares, and weighted average cost of capital (WACC). Thus, the relationship between risk disclosure and cost of capital was examined in the form of three individual hypotheses. The results demonstrated no significant relationship between risk disclosure and cost of debt; therefore, the first hypothesis is rejected. It was also suggested that there is a statistically significant negative relationship between risk disclosure and cost of common equity; thus, the second hypothesis was confirmed. Finally, risk disclosure appeared to have a statistically significant negative relationship with WACC; therefore, the third hypothesis was confirmed.

Keywords: Risk disclosure, cost of debt, cost of ordinary shares, weighted average cost of capital.

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Introduction

The cost of capital is not only a measure of investment but also is used in the evaluation of the financial performance of the board of directors. The recognition of the factors that affecting the cost of capital can help executives increase the stock value of the company. Thus, it is essential to explore the factors affecting the cost of capital. The equity cost is a crucial indicator for corporate performance evaluation, which needs to be addressed in terms of the corporate life cycle as well. The equity cost occupies a prominent place in accounting and financial management research. It is utilized to estimate equity risk premium, evaluate corporate performance, capital budgeting, and investment management. Its value depends on the solvency of companies, industry dynamism, and the general conditions of the national economy (Fama & French, 1993). The research result suggests that size, financial leverage, financial strength, disclosure level, and the company's overall risk are among the determining factors of the cost of equity capital. The cost of capital significantly contributes to making decisions on investment, capital budgeting, performance measurement, and business valuation through facilitating discounted cash flow (DCF).

On the other hand, one of today's most critical needs of humans is the ways in which information requirements are stated and met. Among the problems that could extend the range of corporate communications is "risk disclosure," which companies face during their operation, especially regarding their survival. Enterprise risk can be defined as the probability of a future adverse effect on the company's economic status. Within the current framework, risk management has turned into an essential part of the control of the domestic organization and corporate governance, as well as a fundamental element of businesses. Nevertheless, non-transparent disclosure of risk information is due to the lack of norms and uniform measures, among other factors. Financial transparency is one of the most important aspects of corporate transparency that is to say, the higher the level of voluntary disclosure, the healthier and higher-quality the structure of corporate governance, thereby reducing the conflict of interest. Therefore, the information requirements of all stakeholders will be appropriately met if these mechanisms perform well. Accordingly, corporate governance researchers have always been concerned with the relationship between corporate governance mechanisms and disclosure level and financial transparency. Financial risks directly affect the profitability of companies and even overwhelm the company. Changes in financial price lead to financial risk.

Risk disclosure has become increasingly important because of the effect of the different enterprise risks on investors' decisions in the correct evaluation and valuation of enterprises (Florio & Leoni, 2016). The disclosure of risk-related information minimizes the information gap between executives and investors regarding business uncertainty. Risk disclosure can help investors evaluate the future performance of the company. Managers can also benefit from risk disclosure. They can manifest the good status of their enterprise through appropriate risk identification and disclosure and reap more benefits than the managers who avoid appropriate risk disclosure (Elshandidy, Fraser, & Hussainey, 2013). Several studies have demonstrated that risk disclosure is not a highly efficient task and does not provide investors with reliable information (Schrand & Elliott, 1998) .Some others argue that risk disclosure is not beneficial and devoid of

genuine management (Campbell, Hilscher, & Szilagyi, 2008); (Davies, Moxey, & Welch, 2010); (Clarkson , 2008).

On the other hand, risk reporting can be a source of information for decision-making models (Biddle, Z. Ma, & Song, 2010) (Chang, Christoffersen , & Jaco, 2013). If a decision-making model includes a set of uncertain conditions and outcomes, the uncertainty of these outcomes will lead to restricted decision-making conditions (Chang, Christoffersen , & Jaco, 2013). Thus, the information provided in risk reporting predicts the probability of the occurrence of such conditions as well as the probability of outcomes. Empirical studies have also asserted that risk disclosure is highly useful for investors (Kravet & Muslu, 2013). This is because risk disclosure can reduce the cost of capital (Kollmann, 2016) as well as information asymmetry (Chang, Christoffersen , & Jaco, 2013) and regularize risk management efforts (Korteweg & Nagel, 2016). In general, it can be concluded that risk reporting can help create a stable environment for investors and capital accumulation.

A great body of research has been conducted on the economic implications of disclosing accounting information. From a theoretical standpoint, higher disclosure primarily leads to reduced information asymmetry (Kim & Verrecchia, 1994) and reduced investor uncertainty. Almost all the studies have analyzed the relationship between the cost of equity capital and information disclosure. In addition, disclosure of more additional and arbitrary information, compulsory or indirect disclosure of accounting information, can be highly effective in bridging the gaps in deciding on this information. Consequently, it is critical to study the effect of disclosing different types of information on the cost of equity. Risk is one of the factors contributing to the reduction of the shortage of accounting information. For years, accounting information has emphasized various research studies on the necessity of risk disclosure. In this sense, the UK Association of Chartered Certified Accountants (ACCA) (Charitou, Lambertides, & Trigeorgis, 2015) rejects the necessary limits for earnings forecast and encourages companies to disclose risks to enable users to consider the potentially effective factors. Risk disclosure has often been studied by content analysis (Lajili & Zeghal, 2005); (Elshandidy & Neri, 2015); (Kim & Zhang, 2017); (Abraham & Cox, 2007). An advantage of risk disclosure is its effectiveness in reducing the cost of capital. Risk perception in corporate risk disclosure is the most important factor determining the cost of capital incurred on a given company. Hence, risk disclosure can help reduce investor uncertainty, thereby mitigating the desired enterprise risk. However, scant research has been carried out on risk disclosure and the cost of capital. In this connection, the only citable research is that by (Kiani, Fareed, & Sadeghi, 2015), which analyzed the effect of risk disclosure on the cost of debt. This study looks at the relationship between risk disclosure and the cost of capital from a different angle, which is predictably beneficial to investors. The research aims to determine whether the cost of capital and risk disclosure are correlated or not.

Given the changes induced by financial risk in all areas, it can also affect the cost of capital. The cost of capital refers to the minimum acceptable rate of return (MARR), which must be acquired to maintain the market value of the company.

Thus, this study investigated the relationship between risk disclosure and the cost of capital in the companies listed on the Stock Exchange.

Theoretical foundations

In financial literature, the cost of capital is one of the basic concepts, which plays a crucial role in financing and investment decisions. The company's manager must specify the cost of financing and its effects on the company's risk and return to determine appropriate financial resources.

The cost of capital has been considered as a critical factor in decisions about investment, capital budgeting, working capital management, the establishment of an optimal financial structure, performance assessment, and the firm value by helping to reduce cash flows. Nowadays, one of the primary human needs is how to express and meet information needs. According to the previous studies, factors such as the level of corporate financial risk disclosure determine the cost of stock capital. Financial risks directly affect corporate profitability and can even bankrupt a company. Variations in financial prices raise the financial risk. Given the changes caused by financial risk in all fields, it can also affect the cost of capital.

One of the hot topics in the field of financial management is to make decisions and judgments regarding the most appropriate investment strategies to maximize shareholders' wealth. Tin this regard, two appropriate strategies are to enhance the return on investment and minimize capital. Accordingly, having information about the cost of capital has always played a critical role in corporate decisions. The achievement of an appropriate cost rate is of paramount importance in determining the optimal composition of the corporates' financial structure, especially in obtaining the best results from operations in profitability and increased stock prices. Several studies have examined the role of selecting appropriate policies with the aim of minimizing the cost of capital in obtaining the best results from operations. According to these studies, the grounds will be provided for shareholders' wealth if the risk does not change, and if the return on investment exceeds the cost of capital. Moreover, the additional return of investment over the cost of capital leads to the acquisition of extra return for shareholders. The return will belong to the ordinary shareholders in the absence of a special kind of distinguished shareholders. To put it in simple terms, the cost of capital is the minimum rate of return, which does not change the corporate value. Managers, as the representatives of the shareholders, should spare their efforts to adjust the corporate's capital structure to minimize the corporate's capital and maximize the corporate value and shareholders' wealth. The cost of capital is an influential factor in almost all managerial and financial decisions.

Uncertainty is one of the prominent features of any economic environment, which essentially affects companies' approach to risk, transaction decisions, and market prices. Decisions are made based on information describing or at least helping to detect risks and uncertainty. Financial reporting is the most significant part of an information system in each economy. When a company provides information about its financial condition and performance to external users, it willingly or unwillingly directs the effect of different risks on its assessment indicators, net profit, and cash flows. On the other hand, disclosure principle is one of the accounting principles affecting all financial reporting aspects. This principle necessitates the proper reporting of all facts about the corporate's events and financial measures. According to this principle, the basic financial statements must

encompass all relevant, important, and timely information. This type of information must be presented in an understandable and even complete format to enable users to make informed decisions. On the other hand, provided the information should confuse the users of financial statements in terms of quantity and quality (Malafronte, Grazia Starita, & Pereir, 2017).

Investors and analysts have considered the effect of information risk on companies' gross cost of debt and ordinary shares' adjusted cost (Bao & Datta, 2014). Noteworthy, companies must reduce investment risk to decrease the cost of their capital and increase shareholders' wealth. Financial theories assume that high-quality financial information reduces the cost of common stock in two ways: 1.Increasing market liquidity and thus reducing transaction costs by increasing demand for a company's securities, 2. Decreasing investors' information risk in addition to investment risk. Information risk is also one of the factors affecting the cost of capital.

Recent studies have documented that information risk is a non-modifiable risk in capital markets. According to their findings, information risk emerges because of investors' information asymmetry in determining the cost of capital. Investors with less information face higher information risk than investors with more knowledge. In other words, this non-modifiable information risk makes uninformed investors demand for higher stock returns with more private information. In comparison to (Linsmeier, Thornton, Venkatachalam, & Welker, 2002); (Easley & Hara, 2005) stated that in fully competitive models, the accuracy of information compared to information asymmetry is an information risk measure affecting the cost of capital. (Linsmeier, Thornton, Venkatachalam, & Welker, 2002) defined information accuracy as the quality of the expected cash flow information available to investors. According to him, information dissemination among investors is of no importance; however, information comprehensiveness and accuracy are of great importance. Companies' further disclosure can reduce information asymmetry between the applicants and information users and directly lead to increased stock liquidity and reduced equity costs. According to the literature, voluntary disclosure can generally reduce equity costs; however, some studies (Dario, 2014); (Richardson & Welker, 2001) have provided evidence on a positive relationship between periodic and corporate information and share price. Many accounting institutes, including the Official American Institute of Certified Public Accountants (AICPA, 1994) and Institute of Chartered Accountants in England and Wales (ICAEW, 1997), have been concerned with the benefits of risk disclosure (Anagnostopoulou & Tsekrekos, 2014). In this regard, ICAEW (1997) claims that risk disclosure reduces share costs for companies. Higher risk disclosures enable potentially significant providers to predict future cash flows with less uncertainty. Investors should ask for higher risk premiums with less information risk since the data enabling them to properly assess the corporate risks have been lost.

The present study mainly aimed to investigate the relationship between risk reporting and the cost of capital. Preserving the future economic power of any society depends on the optimal investment made by that society today; hence, optimal investment is the engine of economic and social development. This is an approach not questioned by any school or economic system. Accordingly, economic growth and increased public welfare are not possible in the long run without considering investment and the effective factors

in the investor's environment. One of the most prominent effective factors in deciding to invest in a country is its risk; hence, investors are mainly concerned with risk in their investment decisions. Risk can be considered as a result of incomplete information; hence, if there is no enough information about success, risk will emerge. Transparency, on the other hand, reduces market uncertainty about legislators' future decisions; therefore, it increases the predictability of monetary policies and the efficiency of financial markets. Lack of transparency in decisions and failure in providing relevant information on a regular basis to meet reasonable expectations make private companies promote the modifiability for the value of assets and investments by further examining their own expectations. Accordingly, they need to consider more risk in their investments. Furthermore, the detection of major factors affecting investment risk is of the essence as such investors can consider those factors and their effects to plan for their investment and achieve an optimal investment risk by examining the impact of the quality indicators of financial reporting and agency cost on investment risk. Regarding their impact on market transparency and uncertainty, these factors also have effects on the investment risk.

The study findings are provided based on the risk of investment in the Tehran Stock Exchange; thus, they are of great importance as they show managers, investors, and other decision-makers that the difference in each of the abovementioned indicators should be considered in investment and financial decisions with regard to their role in monitoring and controlling management, transparency of the decision environment, and market uncertainty.

Increasing the cost of capital reduces the company's competitiveness in the business environment. Moreover, the company's risk to continue operating and stay in the competition is highly important as such companies seek to reduce the cost of capital and risk. The corporate governance index, as an indicator of one of the main control and regulatory mechanisms, can be a significant factor to represent the appropriate status of corporate governance. Developing corporate governance indices is a necessity for countries, which are to implement privatization programs, especially issuing shares. The significance of this issue increases in Iran as it is considered as an economic revolution and a model for economic development in Iran's twenty-year vision document and the General Policies of Article 44 of the Constitution. In this regard, the country's economic growth and development, efficient expansion, and the deepening of the capital market, especially the promotion of the stock market and the provision of foreign investment, have been highlighted more.

Regarding the theoretical foundations of the study and the aforementioned points, some relevant studies in this field are as follows:

(Khandelwal, Kumar, Madhavan, & Pandey) studies Indian companies' risk disclosure approached and examined the potential impact of board characteristics on risk disclosure using the data extracted from Indian non-financial companies listed on the Bombay Stock Exchange (BSE). Their findings revealed that the board females have a significant and positive effect on risk disclosure. Moreover, the other corporate governance indices, including board independence, have a significant and positive impact on risk disclosure; however, factors such as board size, CEOs, and independent managers do not significantly affect corporate risk exposure.

(Shivaani & Agarwal, 2020) investigated the impact of the corporate's competitive position on the quality of risk disclosure in annual reporting. Using quantitative factors in disclosure and semantic features (namely the nature, timing, and tone of disclosure), they developed hybrid measurement as an indicator of information disclosure quality. They adopted a sample of more than 4,000 annual reports prepared during a 10-year period from 2005 to 2015. According to their findings, corporates with a favorable competitive position offer wider disclosure. In contrast to the basic principles of the exclusiveness hypothesis indicating that companies lose their competitive advantage because of the disclosure costs and thus avoid information disclosure, the findings of the present study indicated that companies performing well in product markets exhibit their strength by further disclosure to maintain their legitimacy and shareholders. Further analysis also revealed that companies with an acceptable position in the industry tend to be transparent about more risk item.

(Rossi & Agus Harjoto, 2020) researched the effect of corporate governance on the cost of debt and cost of capital in German listed companies and investigated corporate governance from three dimensions (namely financial information quality, ownership structure, and board structure). Their findings indicated that family companies and companies with a high level of financial transparency and reward plans are exposed to less systematic risk. Corporate governance also affects the cost of capital; however, such an effect is significant in state-owned or other companies. This is while there is no significant effect in family companies.

(Mehrabanpour & Sadat Mir, 2018) examined the impact of corporate governance on the risk-taking of companies involved in the list of 7015 companies reported by the Shareholder Services Institute. They found out a significant and negative relationship between corporate governance score and companies' risk-taking. In other words, companies with effective leadership adopt fewer risky strategies. Although managers tend to make risky decisions, corporate governance decreases risk-taking. In this regard, companies with strong corporate leadership tend to adopt low-risk strategies. Effective corporate governance seems to contribute to controlling companies' risk-taking.

According to (Malafronte, Grazia Starita, & Pereir, 2017), since profit decline risk indicates the probability of a company's loss of lower profits in the next year, companies are more inclined to finance from equity rather than debt as financing debt increases the cost of capital.

(Kollmann, 2016) argues that the higher the profit decline risk in a company, the more investors consider it a relevant indicator in valuation and are obliged to purchase further relevant information to better understand it. This would, in turn, increase the final cost of the investor, and investors purchasing more expensive information ask for a higher rate of return; hence, the cost of capital increases. They also reported a significant relationship between the risk of profit decline and different risk criteria. Moreover, it is revealed that the risk of profit decline, compared to other risk measures, contains increasing information content explaining variations in the cost of capital.

(Jang, Rhee, & Yoon, 2016) noticed a positive relationship between downside risk and cost of capital and a negative relationship between skewness risk and the cost of capital.

(Iqbal, Strobl, & Vähämaa, 2015) reported a positive and significant relationship between corporate governance and systematic risk, implying that financial institutions have a high systematic risk by focusing on the governance-corporate shareholder-centered structure. According to the research findings, appropriate corporate governance may increase systematic risk in financial institutions. In the 2008 financial crisis, the failure of financial institutions had impacts on other institutions and their financial systems. Given that the effect of firm size on corporate performance is well-documented in the literature, few studies have explicitly dealt with corporate risk-taking with regard to the board size.

In their study, (Semper & Beltrán, 2014) empirically investigated the relationship between risk disclosure and shared cost to detect whether the cost of capital is related to disclosing financial and non-financial risks. The findings revealed no statistically significant relationship between non-financial risk and the cost of capital, as well as a statistically positive relationship between the cost of capital and the disclosure of financial risks. This finding indicates that the company's information disclosure instead of updating information about known enhances the likelihood of unknown risk factors.

(Feng, Indra, & Shiguang, 2014) studied the effect of information risk on gross debt cost and adjusted common share price and noticed that the four dimensions (namely accruals quality, profit modifiability, profit predictability, and income smoothing have a significant and inverse relationship with the cost of capital. Although the relationship between discretionary accruals and equity costs is significant, a negative relationship was not expected. Moreover, no significant relationship was found between the common agent and the cost of equity.

(Desender, 2007) investigated companies' risk-taking with regard to the board size. In this study, a list of Chinese companies' panel data from 2003 to 2011 was selected as the research sample. This study focused on the board size and the selection of companies' policies regarding management rewards, investment, leverage, profit management, and total future risk. The main finding of this study is that Chinese companies with centralized ownership are less likely to be involved in a risky investment.

(Ramzanpoor, Gholizadeh, & Hajar, 2017) researched the effect of corporate governance on the financial performance and risk-taking behavior of companies listed on the Tehran Stock Exchange. In their study, corporate governance components were the ratio of non-executive board members, the percentage of institutional investors' ownership, ownership concentration, and companies' free float percentage. Furthermore, the dependent variables were performance (return on assets, return on equity, the profit of each Share and stock returns) and risk (beta coefficient of the sensitivity of stock returns to market returns), and stock returns deviation. The research findings indicated the significant impact of some corporate governance components on companies' financial performance and risk-taking behaviors.

(Nikbakht & Taheri, 2014) examined the relationship between corporate governance mechanisms and systematic risk and noticed a significant relationship between the percentage of institutional shareholders, as one of the elements and mechanisms of corporate governance and systematic risk. The relationship between the percentage of

non-executive board members and the systematic risk was inverse at the general level and not significant at other corporate levels.

In their study, (Ahmadzadeh, Badavarnehndi, & Hassanzadeh Brothers, 2013) researched the relationship between the quality characteristics of auditing and the cost of equity. Auditor expertise in the industry and the auditor's tenure were considered to determine the audit quality, and Gordon's model was used to calculate the cost of equity. They used a correlational and post hoc causal approach and tested the research hypothesis using correlational and regression testing. They reported a negative relationship between the auditor's expertise in the industry and the auditor's tenure with the cost of equity.

(Khodamipour, Hosseini Nasab, & Hayati, 2015) carried out a study entitled "On the relationship between management profit forecasting features and equity costs of companies listed on the Tehran Stock Exchange." The profit forecasting features included bad news, income smoothness, profit stability, and managers' forecast horizon. The testing results of the research hypotheses confirmed a significant relationship between bad news, income smoothness, and profit stability with equity cost; however, they found no significant relationship between management forecast horizon and equity cost. Among these features, only the bad news seemed to have a positive relationship with equity cost, and smoothness and stability negatively affected equity cost.

(Setayesh, Kazem Nejad, & Zolfaghari, 2011) examined the effect of disclosure quality on stock liquidity and cost of capital in 105 companies listed on the Tehran Stock Exchange during 2004-2008. According to the findings, a significant and positive relationship existed between the firm size and its current and future liquidity; however, there was no significant relationship between the disclosure quality and the firms' current and future liquidity. Moreover, a significant negative relationship was noticed between the disclosure quality and the cost of capital with firms' current and future equity shares. Moreover, they reported no evidence of a significant relationship between firm size and the cost of current and future equity capital.

Considering the research theoretical foundations and research background, the following research hypotheses were formed.

Hypothesis 1: Risk reporting has a significant relationship with the cost of capital in companies listed on the Tehran Stock Exchange.

Hypothesis 2: Risk reporting has a significant relationship with the cost of debt in companies listed on the Tehran Stock Exchange.

Hypothesis 3: Risk reporting has a significant relationship with the cost of equity in companies listed on the Tehran Stock Exchange.

Hypothesis 4: Risk reporting has a significant relationship with the weighted average cost of capital in companies listed on the Tehran Stock Exchange.

Research methodology

This study was applied in terms of objective, descriptive in terms of methods, and correlational in terms of descriptive research. The post-hoc approach (using data of past events) was used in this study. Multivariate regression method was used to test the research hypotheses. Default regression tests were also used to ensure the reliability of the findings.

The research population encompassed all companies listed on the Tehran Stock Exchange during 2012-2018, from which a sample of companies meeting the following inclusion criteria was selected: Being listed on the Tehran Stock Exchange before 2012, having the end of their fiscal year on March 20, not changing or terminating their financial period during the study period, and not belonging to banks and financial institutions (investment companies, financial intermediaries, holding companies, banks, etc.). Regarding the inclusion criteria, 176 companies were included to be studied during 2012-2018.

Measurement model of research variables

Risk reporting

Risk disclosure was measured by content analysis method using coding. According to (Elshandidy, Fraser, & Hussainey, 2013) the number of statements on the risks presented in the performance report of the board of directors and the notes accompanying the financial statements was used to measure risk closure in this study. Moreover, the level of risk disclosure, but not the disclosure quality, was considered.

Previous studies on risk disclosure adopted content analysis methods to detect the level and features of risk disclosure (Korteweg & Nagel, 2016); (Elshandidy, Fraser, & Hussainey, 2013). Following (Korteweg & Nagel, 2016) the content analysis method was used in this study to detect risk disclosure in the notes attached to the financial statements and the reports on the performance of the board of directors. Risk disclosure refers to the provision of information, which informs the audience of any opportunity, threat, risk, or exposure that has affected or may affect the company and suggests how to manage those opportunities, threats, risks, and exposures (Korteweg & Nagel, 2016). The units of analysis in different studies were items such as words, sentences, page proportions, and paragraphs. Words cannot be interpreted without considering the topic of the sentences In contrast, sentences are recommended to be used as a unit of analysis. Accordingly, this study used sentences as an analysis unit following the previous studies (Korteweg & Nagel, 2016). Given the subjectivity of content analysis, the "coding" approach was used to determine risk disclosure (Korteweg & Nagel, 2016).

Cost of capital

Weighted average cost of capital (WACC)

How to calculate the weighted average cost of capital (WACC): The companies' cost of capital encompasses two components: the cost of debt and the cost of equity for the

ordinary shareholders of the company. In this study, the cost of capital used by the company is obtained from the weighted average of these two components. The WACC formula is as follows:

$$WACC = WD \times KD\,(1-t) + We \times Ke$$

WACC	*Weighted average cost of capital*;
WA	*Percentage of interest-bearing debts in total capital*
We	*Percentage of ordinary equity in total capital*
Kea	*Cost of pre-tax interest-bearing debts*
ke	*cost of equity*
t	*corporate tax rate*

To calculate the real annual tax rate for each of the companies (t), the ratio of paid tax to pre-tax profit was considered.

$$t = \frac{\text{paid tax}}{\text{pre} - \text{tax profit}}$$

The following formula was also used to calculate the cost rate of pre-tax interest-bearing debts (k),

$$Kd = \frac{financing\ costs}{long\ term\ debt\ + Current\ interest - bearing\ debts}$$

Gordon's growth model was also adopted to calculate (ke):

$$Ks = \frac{D\,0\,(1+g)}{P0} + g$$

Do	*Cash earnings per share in the last year*
P	*market price per share at the beginning of the year*
g	*It is the growth rate of the annual dividend, which, assuming the relative stability of the ratio of earnings accumulation and return on equity, is calculated as follows:* *X ROE × Accumulation rate of dividends*

Accumulation rate of dividends = 1- $\frac{\text{Cash earnings per share}}{\text{earnings per share}}$

The percentage of each component (cost of debt and cost of common equity) in all capital is calculated as follows:

Book value of interest-bearing debts + market value of common equity-total resources

Market price per share × Number of common issued shares - the market value of common equity

Current interest-bearing debts + long-term debts - book value of interest-bearing debts

$$Wd = \frac{Book\ value\ of\ interest\_bearing\ debts}{total\ resources}$$

$$We = \frac{the\ market\ value\ of\ common\ equity}{total\ resources}$$

Cost of debt

COST DEBT (Gross cost of corporate debt): the ratio of financial cost (pre-tax adjustment) in year t to the sum of interest-bearing debts in year t = 1

Cost of common share capital

The ratio of profit to the cost of company j per year to the median of the profit to the cost of the companies in the industry was considered the cost of common share capital since this ratio maintains the significance of profits which are small compared to prices and represent the high quality of the accruals. It is an approved indicator of the cost of capital observed in the market as such, shareholders expect profits to increase in the near future as prices rise. According to previous studies, (Bao & Datta, 2014)used the ratio of profit to adjusted industry prices as an indicator to compare the features of risk, return, and corporate growth as well as the cost of common share capital.

Research hypothesis testing model

This study aimed to investigate the relationship between risk reporting and the cost of capital. Since the cost of debt and the cost of common capital and the weighted average cost of capital are used to estimate the cost of capital, three hypotheses were tested in this study in line with the research objective.

To test the research hypotheses, the following general models were used in accordance with each hypothesis.

$$Rit\ =\ \alpha + \beta 1\ IRRit\ +\ \beta 2\ LMCit\ +\ \beta 3\ LEV\ it\ +\ \beta 4\ BTMit\ +\ Eit$$

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Table 1: variables of the regression model of the research hypothesis

Symbol	Type of variable			Name of the variable	Calculation method
	Dependent	Independent	control		
R it	✓			Cost of debt	$Kd = \frac{financial\ cost}{long\ term\ debt + \text{Current interest} - \text{bearing debts}}$
				Cost of ordinary shares	$Ks = \frac{D\,0\,(1+g)}{P0} + g$
				The weighted average cost of capital (WACC).	WACC = W d×Kd(1-t)+We× Ke
B1IRRit				risk disclosure index	Risk disclosure by analyzing the content company of board of director reports
LMCit		✓		Equity	Equity algorithm of company
LEVit			✓	financial leverage	The ratio of total corporate debt to corporate assets
			✓	Ratio of market value to book value	Ratio of ordinary shares market value to book value
Є it			✓		Residue part or error

Data analysis

Descriptive statistics of research variables

Table 2. presents the descriptive statistics of the research variables for sample companies, which include both central tendency indicators such as mean and median and relative dispersion statistics indicating the distribution of the observations. Since 176 companies were investigated during 7 years ranging from 2012-2018, there were 1232 cases of observations in the panel data.

Table 2**.** Descriptive statistics of research variables for sample companies

Variables	Symbol	No.	Mean	Median	Max	Min	Std. deviation
Cost of deb	KD	1232	0.018187	0.035275	0.651570	0.0000	0.772386
Cost of ordinary shares	KS	1232	0.117927	0.052285	1.904540	0.0000	0.174407
The weighted average cost of capital	WACC	1232	0.059897	0.060040	0.773710	0.0000	0.646278
Risk disclosure index	IRR	1232	11.48709	9.000000	97.00000	0.000000	9.979234
Equity	LMC	1232	13.63289	13.41885	19.38762	8.355850	1.782474
Financial leverage	LEV	1232	0.562565	0.582780	0.996720	0.011720	0.228125
Ratio of market value to book value	M/B	1232	11.54873	4.981280	73.6640	0.65510	39.67311

As briefly mentioned, dispersion indices indicate the degree of data distribution or variation. There may be distributions with identical means but different dispersion around the mean. Standard deviation is one of the most valid dispersion indicators addressed in this analysis, which is the positive root of the data variance and is preferable to other dispersion statistics. Moreover, when comparing two or more populations, the one with a smaller standard deviation value is more homogenous in terms of the concerned trait. If there is high scattered, the standard deviation will be larger. The descriptive results of this study, including mean, median, standard deviation, and minimum and maximum number of observations, are presented in the following tables. The small difference between the mean and median implies that the variables are normal. The small standard deviation of the research variables also confirms the uniform distribution of the data.

Unit root test of the research variables

In contrast to what is common with time-series data, it is impossible to use augmented Dickey-Fuller and Dickey-Fuller tests to test panel data's unit root. However, it is necessary to test the variables collective significance; hence, the Hadri test should be used for this purpose. Accordingly, the Hadri test assumes that there is a single unit root so that pi is the same for cross-sectional data. Table (3) shows the results of the Hadri test.

Table 3: Results of Hadri test

Variables	Symbol	P - value	Statistic
Cost of deb	KD	***0.0000	28.6312
Cost of ordinary shares	KS	***0.0000	10.4094
The weighted average cost of capital	WACC	***0.0000	28.6802
Risk disclosure index	IRR	***0.0000	20.6493
Equity	LMC	***0.0000	18.6675
Financial leverage	LEV	***0.0000	19.7296
Ratio of market value to the book value	M/B	***0.0000	28.7801

Note: *** denote significance at 1 percent confidence

Tests to determine the panel data model estimation method

Before fitting the regression model and testing the research hypothesis, it needs to be checked which regression model is suitable for testing the hypotheses. To determine which one of the integration data model, fixed-effects model, or random-effects model should be used, the generalized Chow test (F), Lagrange coefficient, and Hausman test are employed.

The following tests were used to determine the model estimation method:

1. Generalized Chow test (Chow): The test was used to determine whether integration data model (PLS) or fixed-effects model (FE) is used. If $p \leq 0.05$, the EF model is used; otherwise, the integration data model is adopted.

2. Lagrange coefficient test: The test was used to determine whether integration data model (PLS) or random-effects model (RE). If $p \leq 0.05$, the RE model is used; otherwise, the integration data model is adopted.

3. Hausman test: The test was used to determine whether the random effects model (RE) or fixed-effects model (FE) is used. If $p \leq 0.05$, the EF model is used; otherwise, the RE model is adopted.

According to the results in Table 4, the significance level of the generalized F test (Chaw) was $p<0.05$ for the first model; hence, the FE model was selected. In the next step, the Hausman test's significance level was $p<0.05$; thus, the FE model was selected. Accordingly, regarding the aforementioned three models, the FE model was used to fit the first regression model of the research.

Table 4. Test to determine the method of estimating the data model for the first model of the research

Method detection tests	statistics	P-value	Result
F test	1.892424	0.0000	Emphasis on the fixed effects model versus the integrated data model
Hausman test	3.692805	0.04492	Emphasis on fixed effects model versus stochastic effects model
Final result		Emphasis on fixed effects model versus integrated data model and stochastic effects model	

As shown in Table 5, the significance level of the generalized F test (Chaw) was $p<0.05$ for the second research model; hence, the FE model was selected. In the next step, the Hausman test's significance level was $p<0.05$; thus, the FE model was selected. Accordingly, regarding the aforementioned three models, the FE model was used to fit the study's second regression model.

Table 5. Test to determine the method of estimating the data model for the second research model

Method detection tests	statistics	P-value	Result
F test	5.954065	0.0000	Emphasis on the fixed effects model versus the integrated data model
Hausman test	49.447960	0.0000	Emphasis on fixed effects model versus stochastic effects model
Final result		Emphasis on fixed effects model versus integrated data model and stochastic effects model	

According to the results presented in Table 6, the significance level of the generalized F test (Chaw) was $p<0.05$ for the third research model; hence, the FE model was selected. In the next step, the Hausman test's significance level was $p<0.05$; thus, the FE model

was selected. Accordingly, regarding the aforementioned three models, the FE model was used to fit the study's third regression model.

Table 6. Test to determine the method of estimating the data model for the third model of the research

Method detection tests	statistics	P-value	Result
F test	1.953320	0.0000	Emphasis on the fixed effects model versus the integrated data model
Hausman test	7.065532	0.01325	Emphasis on fixed effects model versus stochastic effects model
Final result			Emphasis on fixed effects model versus integrated data model and stochastic effects model

Testing results of the research hypotheses

This study aimed to investigate the relationship between risk reporting and the cost of capital in companies listed on the Tehran Stock Exchange. Three indicators of cost of debt, cost of common capital, and the weighted average of the cost of capital were calculated to measure the cost of capital. Accordingly, the above objective was examined in the form of three separate hypotheses.

The prerequisites for model fitting were first examined to test the hypotheses. Table (7) shows that the significance value of the F statistic is 0.000, indicating the appropriate fit of the model and the significance of the total regression. Moreover, the value of the adjusted coefficient of determination is 0.66, implying that about 66% of the dependent variable is explained by independent variables. Moreover, the Durbin–Watson value of 1.70 within the range 1.5-2.5 indicates the lack of orderly correlation between the model errors. Table (7) also presents that the risk disclosure index (the IRRi variable, t) with a significance level of 0.7411 has no significant relationship with cost of debt. Thus, the first sub-hypothesis was reject.

Table 7: Results of regression test of the first sub-hypothesis

Variable		Coefficient	Std/ Error	t-Statistic	Prob
Risk disclosure index	IRR	2.38E-05	7.20E-05	0.330453	0.7411
Equity	LMC	-0.023698	0.002517	-9.416812	***0.0000
Financial leverage	LEV	-0.065654	0.010677	-6.149149	***0.0000
Ratio of market value to book value	M/B	-6.00E-05	1.67E-05	-3.583497	***0.0004
Fixed coefficient	C	0.378609	0.037372	10.13079	***0.0000
F-statistic		14.38453			
P. value		0.000000			
Coefficient of determination		0.718550			
Adjusted coefficient of determination		0.668597			
Durbin-Watson		1.707244			

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Table 8. shows that the significance value of F statistic is 0.000, indicating the appropriate fit of the model and the significance of the whole regression. Moreover, the value of the adjusted coefficient of determination is 0.69, suggesting that about 69% of the dependent variable is explained by independent variables. Also, the Durbin–Watson statistic with a value of 1.77 within the range 1.5-2.5 indicates the lack of orderly correlation between the model errors. Table 8. also shows that the risk disclosure index (IRR variable i, t) with p= 0.0007 has a significant negative relationship with the cost of common capital. Thus, the second sub-hypothesis was accepted.

Table 8. Results of the regression test of the second sub-hypothesis

Variable		Coefficient	Std/ Error	t-Statistic	Prob
Risk disclosure index	IRR	-0.000361	0.000106	3.397790	***0.0007
Equity	LMC	-0.021913	0.002240	-9.7822133	***0.0000
Financial leverage	LEV	-0.068303	0.014617	-4.672694	***0.0000
Ratio of market value to book value	M/B	0.000208	0.000107	1.939848	*0.0527
Fixed coefficient	C	0.448526	0.035878	12.50157	***0.0000
F-statistic	15.84400				
P. value	0.000000				
Coefficient of determination	0.737675				
Adj. coefficient of determination	0.691117				
Durbin-Watson	1.771652				

Table 9. shows that the significance value of F statistic is 0.000, indicating the appropriate fit of the model and the significance of the whole regression. Moreover, the value of the adjusted coefficient of determination is 0.67, indicating that about 67% of the dependent variable is explained by independent variables. Also, the Durbin–Watson statistic with a value of 1.90 within the range 1.5-2.5 indicates the lack of orderly correlation between the model errors. Table (9) also shows that the risk disclosure index (IRR variable i, t) with p= 0.0000 has a significant negative relationship with the weighted average cost of capital. Thus, the third sub-hypothesis was accepted.

Table 9. Results of the regression test of the third sub-hypothesis

Variable		Coefficient	Std/ Error	t-Statistic	Prob
Risk disclosure index	IRR	-0.001037	0.000177	5.875771	***0.0000
Equity	LMC	-0.038425	0.002182	-17.61230	***0.0000
Financial leverage	LEV	-0.120708	0.007653	-15.77289	***0.0000
Ratio of market value to book value	M/B	3.13E-05	1.61E-05	1.944910	0.0521
Fixed coefficient	C	0.639377	0.031712	20.16219	***0.0000
F-statistic	14.93058				
P. value	0.000000				
Coefficient of determination	0.726024				
Adj. coefficient of determination	0.677397				
Durbin-Watson	1.902070				

Conclusions, Implications, and Recommendations

Regarding the first hypothesis results, risk reporting has no significant positive relationship with cost of debt. This is because cost of debt is not significantly related to risk disclosure, given that financing costs are usually measurable in developing countries with semi-efficient markets, usually at the beginning of each year or each operating cycle. Furthermore, Iran's economy is usually an inflationary economy, mostly experiencing a severe inflationary recession. Economic stability and the continued growth of the economy can significantly decrease the company's operational and financial risks, thereby having a positive impact on the cost of debt. In an attempt to decrease inflation, governments should monitor bank's return rate and keep it constant to stabilize inflation in any market, even though it has no significant relationship with the risk variable.

Moreover, the results of the study's second and third hypotheses revealed a significant negative relationship between risk disclosure and the cost of capital, i.e., the minimum rate of return required to maintain the company's market value. Further disclosure mainly reduces information asymmetry and investment uncertainty. Almost all studies have analyzed the relationship between stock costs and information disclosure. Moreover, the disclosure of additional discretionary information is likely to have a greater impact on reducing gaps in making decisions about such information, where the disclosure of accounting information is mandatory and indirect. Risk reduce the dearth of accounting information. One of the risk disclosure benefits is its impact on reducing the cost of capital. Understanding the risk in disclosing companies' information is the most critical factor in determining the cost of capital imposed on a company. Accordingly, risk disclosure can reduce investors' uncertainty and thus decrease the risk required by the company. The information provided in risk reporting predicts the likelihood of conditions and outcomes. Risk disclosure benefits investors to a great extent as risk reporting can reduce information asymmetry and ultimately reduce the cost of capital. To conclude, risk reporting creates a stable environment for investors and leads to capital accumulation; thus, the negative relationship between risk disclosure and the cost of capital is justified.

The first hypothesis result on the relationship between risk reporting and cost of debt in the Tehran Stock Exchange are in contrast to (Semper & Beltrán, 2014) findings and in agreement with the (Rossi & Agus Harjoto, 2020). Moreover, the second hypothesis results on the relationship between risk reporting and the cost of common capital are in line with those reported by (Khodamipour, Hosseini Nasab, & Hayati, 2015); (Feng, Indra, & Shiguang, 2014); (Bao & Datta, 2014)and in contrast with the findings of (Ahmadzadeh, Badavarnehndi, & Hassanzadeh Brothers, 2013); and (Setayesh, Kazem Nejad, & Zolfaghari, 2011). Finally, the third hypothesis results on the relationship between risk reporting and the weighted average cost of capital are in a similar vein.

According to the study's results, banks are recommended to consider the company's risk reporting when evaluating its risk level. Banks demand interest rates, which are dependent on risk reporting when granting facilities. This is because a company that frequently uses the term 'risk' is definitely a high-risk company. In other words, risk reporting represents a company's greater risk. Since risk reporting is essential and has a direct relationship with the cost of capital, the Accounting Standards Committee is recommended to develop and enforce standards related to risk reporting, or to make them

optional at least for a short period of time and enforce them over time. The reason is that the collection of data on risk disclosure is difficult as they lack a uniform format. Further, the Tehran Stock Exchange Organization is recommended to consider risk reporting indicators while evaluating and accepting companies for initial public offering, and to apply more appropriate disclosure requirements for the involved companies. Further, companies are recommended to provide their quarterly reports on risk with similar formats. Moreover, potential investors are recommended to examine corporate risk reporting according to the indicators concerned in this study.

Finally, some suggestions for future research are provided. Accordingly, further studies on each industry listed on the stock exchange are recommended to control the industry's impact. It is also suggested to include other variables such as corporate risk and inflation as control variables in future research. Moreover, it monthly and quarterly surveys using companies' interim information should be carried out to confirm the findings of the present study. Finally, it is recommended to assess the desirability of accounting regulations by examining long-term changes in the companies' visible risk factors, before and after enforcing significant regulations.

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