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The Effect of Corporate Governance System Theory Tools on Financial Risk Using Generalized Method of Moments (GMM)

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ABSTRACT

The purpose of this article is to investigate the effect of corporate governance system monitoring tools on the financial risk of companies listed on the Tehran Stock Exchange. The statistical sample of the study included 127 companies during the period 2011 to 2018. In this study, three variables of credit risk, illiquidity risk and market risk were used as financial risk and the variables of ownership concentration, institutional ownership, board independence and board size were used as monitoring tools of the corporate governance system. Data were analyzed using unit root tests, kao and generalized method of moments using Eviews software. The results showed that institutional ownership has a significant effect on financial risks and reduces credit risk and illiquidity risk while increases market risk. The results also showed that the concentration of ownership, independency and size of the board had no significant effect on financial risks.

Keywords:

Credit Risk and Illiquidity Risk, Market Risk, Corporate Governance.

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1. Introduction

Due to the instability of the environment and the increasing changes in society and unexpected events, risk has always existed and has been one of the main and important aspects in the survival of human life, especially in management (Johan et al., 2018). Managers must always identify the risks that threaten the company or stock, in order to be able to make appropriate and purposeful decisions, the right decisions require timely planning (Mashayekh et al., 2016). One of the most important issues in the capital market is knowing the level of corporate risk, especially market risk which is uncontrollable but plays an important role in the decision and success of the organization since it is believed that the stock returns of companies is a function of market risk (Bozorg Asl et al., 1397). Routine appraisal methods for projects are often limited to estimating the net present value (NPV) of cash flows from the project, but in practice, project cash flows are subject to fluctuations due to changing assumptions. In such circumstances, considering the probable range of cash flows with respect to changing base assumptions and risk-based decisions due to these fluctuations can lead to more rational investment decisions. One of the factors that can affect the financial risks of companies; It is the monitoring and control tools of the corporate governance system.

The issue of corporate governance is one of the most important issues for developing countries in recent years. This is because these countries do not have a strong infrastructure and financial institutions to address this issue. The main purpose of regulatory and control mechanisms is transparency and accountability (Tan, 2015); therefore, corporate governance is one of the factors that have been considered by companies to fulfill accountability, with emphasis on the establishment of audit and internal audit committees (Rose, 2016). Audit committees, in order to be more efficient and complete their controlling role in the company, establish stronger internal control policies by increasing the quality of financial reporting (James et al., 2015). The scope of the corporate governance system continues from the role of leading and controlling the board of directors to the executive and operational managers and the reassuring role of internal and independent auditors. The audit committee and internal audit are among the management oversight tools that enable better management of activities for decision makers within the organization. Therefore, the audit committee and internal audit are considered as supervisory mechanisms and internal control as a control mechanism are important components of corporate governance. What is important is the need for regulatory and control mechanisms to improve and continuous changes in line with organizational changes (Dasht-e Bayaz et al., ۲۰۱۷).

Given the importance of the role of corporate governance; this study investigated the effect of corporate governance monitoring tools on financial risk using Generalized Method of Moments (GMM). In the following, the existing theoretical foundations and literature are reviewed, then the research methodology is described, and at the end, the data analysis and conclusions are presented.

2. Theoretical Foundations and Research Background

2.1 Corporate Governance System

Nowadays, protecting the public interest, respecting the rights of shareholders, promoting information transparency and requiring companies to fulfill social responsibilities are the most important ideals that have been considered by various regulatory and executive authorities for more than a decade (Shoorvarzi et al., 2015). The realization of these ideals requires the existence of stable criteria and appropriate executive mechanisms, the most important of which is the corporate governance system (Dehghani and Kasiani, 2019). The concept of corporate governance refers to the system by which the organization is controlled and managed (Imann and Farhan, 2016). A board of directors is responsible for leading the company. Corporate governance includes social responsibility, ethical business practices, internal and independent audit issues, and complete transparency of financial results. It is also a mechanism for monitoring the company's operations, which reduces the problems of representation in contracts, includes the interests of shareholders (Dasht Bayaz et al., 2017).

The corporate governance system, above all, targets the life of the company in the long run and in this regard tries to support the interests of shareholders against the managers of companies and avoid the

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unwanted transfer of wealth between different groups and the abuse of public rights and junior shareholders (Iqbal et al.,2015). Corporate governance includes metrics that deliberately increase focus on company control, reduce the power of executives, and improve corporate performance. Optimal corporate governance system allows companies to use their capital effectively, consider the interests of profiteers and the community in which they operate, be accountable to companies and shareholders, and gain trust of investors and attract long-term investments (Mojtahedzadeh et al., 2011)

Corporate governance is the mechanism of leadership and control of the organization that determines various responsibilities and can be the key to attracting financial capital and manpower for successful companies. Therefore, corporate governance as one of the essential infrastructures in the country to improve the business environment, transparency of economic activities and accountability of managers in established organizations and business units provides the grounds for success (Zaharia et al., 2014). Conflict of interest between managers and the main owners of the company, information asymmetry, the possibility of opportunism, and high costs of supervision are among the factors that necessitate the creation of a corporate governance system. Due to the expansion of privatization and increasing financial abuses, corporate governance has become particularly important (Kashif Bahrami, 2013). Corporate governance index as an indicator of one of the most important control and monitoring mechanisms, can be an important factor to show the proper management of companies. Creating a corporate governance index for countries that intend to implement privatization programs, especially through the issuance of shares, is a must (Nikbakht and Taheri, 2014). The importance of this issue in Iran increases when it is mentioned in the20-year vision document of the country's development and official order of the general policies of Article 44th of the Constitution, which is mentioned as an economic revolution and a model for economic development; Special attention has been paid to the economic growth and development of the country, efficient expansion and deepening of the capital market (especially strengthening the stock market position) and providing the possibility of foreign investment (Mehrabanpour and Mirichimeh, 2018)

2.2 Financial Risk

Financial risk is a type of risk, which is imposed on shareholders due to the debt increasment of the company. The additional risk arising from the use of debt in the company, which is discussed under the heading of financial leverage. The more loans a company makes (the more bonds it issues), the lower the company's net profit margin will be and the higher its ordinary stock risk will be (Sarkanian et al., 2015). Risk in the general definition is the probability that a certain action or activity (or inactivity) will lead to harmful or unintended consequences or outcomes. Almost all human endeavors involve some degree of risk, yet some carry more risks. In the financial literature, risk can be defined as unexpected events, usually in the form of changes in the value of assets or liabilities. Firms are exposed to different types of risks, which can generally be divided into two categories: business risks and non-commercial risks (Amihud, 2002).

Credit risk, iliquidity risk and market risk are among the most important business unit risks. Credit risk is one of the most important risks that affect monetary and financial institutions (Arza et al., 2017). When an investor lends to an individual or a company, it is likely that the borrower will default on paying interest payments and repaying the principal of the loan. The probability of default on repaying the principal and paying interest of the loan is called default risk (Chung, 2010). Credit risk management is part of comprehensive management as well as part of the control system. Credit risk can be considered as one of the biggest risks because it is associated with any active business. The purpose of credit risk management is to maintain the productivity of business activities and business continuity (BozorgAsl et al., 2018).

According to Ashut et al. (2010), one of the important factors that should be considered for the risk of an asset is its liquidity. Assets with low liquidity are less attractive for investment, therefore the risk of illiquidity should be considered in investment (Khajavi et al., 2015). Empirical evidence shows that the factor of liquidity has significant impact on decisions making and in recent years more attention has been paid to it that financial researchers are trying to find the best criteria for defining and determining the level of liquidity of financial assets. Illiquidity is the sensitivity of the share price to the unit changes in daily trading.

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Amihood (2002) in his research introduced a ratio to calculate the risk of illiquidity. He believes that the expected illiquidity in the market has a positive relationship with the expected return on liquidity and the illiquidity has a greater impact on the shares of small companies.

Changing in stock price is one of the most important risks in companies and individuals operating in the stock market. Risk includes favorable and undesirable risk. What is important in financial theories in relation to risk and its measurement are undesirable risks and their measurement (Mashayekh et al., 2016). Market risk is defined as the devaluation of an investment due to a sudden drop in prices in the capital market. There are different approaches and alternative measures to financial risk. The traditional approach to measuring risk is to assume the variance framework and financial risk model in terms of variance. This framework is based on the assumption that daily returns are followed by normal distribution. But this assumption has its limitations. However, this assumption is only valid if there is a symmetric distribution, if these conditions are not met, utilizing this assumption is inappropriate and there can be major errors in the analysis (Johan et al., 2018).

2.3. Research background

Nadighomi et al. (2020) in a study entitled *The Study of the Effect of Corporate Governance Mechanisms on Systemic Risk of Financial Institutions Listed on the Tehran Stock Exchange* found that the strength of corporate governance mechanisms on the systemic risk of financial institutions listed on the Tehran Stock Exchange has no effect.

Moradi et al. (2017) in a study investigate the nonlinear relationship between ownership concentration and financial risk with the mediating role of family control in companies listed on the Tehran Stock Exchange using 106 companies during the period 2012-2017. The results show that there is an inverse relationship between controlling ownership concentration and financial risk and there is no inverse relationship between controlling ownership concentration and financial risk with the mediating role of household control and there is a direct relationship.

Roodpashti and Zandi (2019) examined the effect of CEO power on companies' financial risk using a sample of 150 companies listed on the Tehran Stock Exchange during the period 2010 to 2017. The results showed that the more the CEO's power increases, the more the corporate capital structure and the financial risk ratio will move in a negative direction and will reduce the debt in the corporate capital structure.

Mehrabanpour and Mirichimeh (2015) in a study entitled *The Effect of Corporate Governance Index on Cost of Capital and Risk of Companies* concluded that there is a negative and significant relationship between corporate cost of capital with corporate governance index which shows the existence of effective and strong corporate governance will reduce information asymmetry and ensure accurate and correct reporting by management, increase transparency and gain the trust of shareholders and consequently reduce the cost of capital. Also, another result of the study showed that there is a positive and significant relationship between the projected systematic risk of the company and the corporate governance index. This finding confirms that firms with shareholder-centered management mechanisms bear more systematic risk, which indicates that good corporate governance is likely to encourage risk rather than prevent risk escalation, leading to high risk-taking.

Tarshizi and Bazzazadeh Torbati (۲۰18) in a study entitled *The Relationship between Corporate Governance and Corporate Risk: The Moderating Role of Social Responsibility*; they concluded that the ratio of non-executive directors, board size and corporate social responsibility have a positive relationship with firm risk. Also, corporate social responsibility has a moderating effect on the relationship between corporate governance criteria and company risk, and with the introduction of the variable of social responsibility, increasing the ratio of non-executive directors and the number of board members leads to reducing risk.

Parvan et al. (۲۰۱۷) in a study entitled *The Effect of Corporate Governance Mechanisms on the Risk-taking Behavior of Companies Listed on the Tehran Stock Exchange* showed that there is a positive and significant relationship between ownership concentration, duration of CEO tenure and related financial risk variables and flow risk cash. This study also showed a significant negative relationship between the percentage of institutional shareholder ownership and the dependent financial risk variables and cash flow risk.

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Pakmaram and Lotfi (2016) in a study entitled *Correlation between Corporate Governance and Financial Performance and Risk of Insurance Companies Listed on the Tehran Stock Exchange* concluded that there is a positive relationship between the composition of the board and financial performance in both dimensions (return rate on assets and equity) and there is a negative and significant relationship between the composition of the board of directors and risk in both dimensions (financial and business risk).

Khodamradi et al. (۲۰۱۴) in a study entitled *The Effect of Corporate Governance on the Financial Risk of Industrial Holding Companies* found that among corporate governance mechanisms only the ownership of institutional shareholders had a significant effect on financial risk, which is also the opposite.

Huang et al. (۲۰۱۶) in a study entitled *Corporate Governance Mechanisms and Its Impact on Corporate Risk and Capital Structure* showed that the more corporate governance mechanisms increase in order to enforce pre-determined rules and regulations, the less they decrease. It will increase the risk and profitability of companies. Also, the results of their research showed that the more efficient and up-to-date corporate governance mechanisms are, the less they will reduce the negative fluctuations of the capital structure.

Su & Lee (2013) in a study examined the effect of internal and external mechanisms of corporate governance on risk acceptance by family companies. The results showed that the use of external managers reduces the negative relationship between family ownership and risk acceptance.

Switzer and Wang (2013) in a study examined the relationship between credit risk and corporate governance of American financial and non-financial companies. The results of the research confirm the hypothesis of the relationship between ownership structure and risk acceptance in non-financial companies. They also found that in non-financial corporations, CEO dualism and credit risk are non-linear.

Nulti et al. (2012) in a study examined the relationship between corporate governance mechanisms and financial and business risks. The results showed that companies with smaller board sizes (less than 8 members) take less financial risk. They also concluded that the independence of the board has no effect on the acceptance of financial risk. In terms of business risk, they also concluded that there is no significant relationship between business risk and corporate governance.

3. Research Methodology

3.1. Research Model and Description of Variables

According to the research literature and the purpose of the research based on the effect of monitoring and control tools of corporate governance system on financial risk, the following regression model is applied.

1) $FR_{it}=\beta_0 + \beta_1 CON_{,it} + \beta_2 INS_{it} + \beta_3 COMP_{it} + \beta_4 BSIZE_{it} + \varepsilon_{it}$

The Dependent Variable

Financial risk (FR) is a dependent variable that in this study, three variables of credit risk and illiquidity risk and market risk have been used as financial risk. To calculate credit risk such as Murcia et al. (2014), Al-khawaldeh (2013), Tansel and Yardakol (2010), Arza and Seifi (2020), Shahrokhi et al. (2015), Khajavi et al. (2014) and Amiri et al. (2012) credit rating of companies listed on the stock exchange is required. First it is required to identify the criteria for ranking. Therefore, the literature on credit rating, including the methodologies of rating and research on credit rating institutions was studied to identify the indicators that determine the credit rating, then according to the research team, the indicators that determine the credit rating have been extracted from them. The following are the indicators that affect credit risk:

Credit rating was done with the help of the technique for order of preference by similarity to ideal solution (TOPSIS) which is one of the multi-criteria decision making models. The basis of this technique is based on the concept that the chosed option should have the shortest distance from the positive ideal solution (best possible case) and the greatest distance from the negative ideal solution (worst possible case). Companies that earn more points stand at the top of the rankings and have less credit risk. The TOPSIS model is briefly described here:

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Table 1. Effective indicators in determining credit risk

Indicators	
Corporate governance	Effects of ownership
	Transparency (reliability)
	Transparency (timeliness)
Industry factors	Industry presence in international markets
	Industry growth
	Concentration ratio in industries
	Barriers to entry into the industry
	Product supply and demand gap in the industry
Company Factors	size of the company
	Company market share
Liquidity ratio	Current ratio
	Quick Ratio
	Cash ratio
Activity ratio	By receivables collection period
Leverage ratio	Debt ratio
	Interest coverage ratio
Profitability ratio	Gross profit margin
	Net profit margin
Other quantitative factors	Net working capital
	Financing policy index
	Profit before Tax (PBT)
	Before tax profits change to changes in fixed assets
	before tax profits Changes to total debt changes

Step 1: Convert the decision matrix (D) to the normal decision matrix applying the following equation:

$$2)\quad n_{ij} = \frac{r_{ij}}{\sqrt{\int {r^2}_{ij}}}$$

Step 2: Calculate the normal matrix or weighted scale; to perform this step, a weight must be assigned to each of the indicators. The weight of the indicators can be obtained through various methods such as entropy method, least squares, AHP and questionnaire. In this article, a nine-choice paired questionnaire was prepared. The indicators determining the credit rating of companies were graded from the perspective of experts; after collecting the questionnaire data, at first Cronbach's alpha was used to evaluate the reliability of the questionnaire. Cronbach's alpha was equal to 0.869, which indicates that the test has acceptable reliability. In order to estimate the validity of the questionnaire, according to the answers of experts, which include university faculties, CEO and board members, senior director, and receiving their opinions, the questionnaire seems to have the necessary validity. Then, with Friedman test, the determined indicators are confirmed based on their importance. According to Friedman test, the value of Chi-square has been equal to 207.96 with a freedom degree of 30 and a significance level of 0.00. Given that the significance level is less than 20%; Therefore, the indicators do not have the same priority in determining the credit rating, and the higher the average rating of each indicator, the more important it is in determining the credit rating. Moreover, utilizing SPSS software, the average of each index was determined, which was used for the weight of the indicators in the TOPSIS model.

Step 3: Determine the hypothetical options of positive ideal and negative ideal; because of the purpose of this paper companies are ideal based on earning more credit points, therefore some indicators are more ideal based on gaining more credit points; they will have a positive and negative nature.

Step 4: Distance from positive and negative ideals and calculate the ideal solution:

$$3)\quad \boldsymbol{d_j^+} = \sqrt{\int_{j=1}^{n}\left(\boldsymbol{V_{ij}} - \boldsymbol{V_j^+}\right)^2} \qquad \text{i=1, 2, …, m}$$

$$4)\quad \boldsymbol{d_j^-} = \sqrt{\int_{j=1}^{n}\left(\boldsymbol{V_{ij}} - \boldsymbol{V_j^-}\right)^2} \qquad \text{i=1, 2, …, m}$$

Step 5: Calculate the scores (proximity ratio to the ideal option); is equal to:

$$5)\quad CL_i = \frac{d_i^-}{d_i^- + d_i^+}$$

One of the factors affecting asset risk is its liquidity ability. Liquidity means the ability of a business unit to convert assets into cash with sufficient volume without reducing its price (Islami Bidgoli and Saranj, 2008). In this paper, the Amihud criteria is used to calculate the risk of illiquidity. The measurement of liquidity per share is calculated on a daily basis based on trading volume and returns, which are as follows:

$$6)\quad liquidity_{s,t} = \frac{|R_{s,t}|}{Vol_{s,t}}$$

$R_{s,\,t}$ is the share return of s on day t and $Vol_{s,\,t}$ is the trading volume of share s on day t.

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The concept of value at risk as a new model of risk measurement has been widely used since the early 1990s as a tool for measuring risk. Two common methods for measuring adverse market risk are: Value at risk (VaR) is a simple, concise measure of potential portfolio losses due to market risk. One of the main problems of value at risk is the inconsistency of this criterion. Therefore, in recent years, conditional value at risk (CVaR) has been introduced in order to develop value-at-risk. This criterion estimates the expected loss equal to or greater than the value at risk, at a specified confidence level. Hence, this view is more conservative than the previous one. The conditional value at risk was introduced by Chornous & Ursulenko (2013) and Rockafellar & Uryasev (2000). Jorion (2000) in his research proposes the criterion of conditional value risk. This criterion is defined as the average of risks that are greater than the value at risk. Pflug (2000) shows that (VaR) is a logical measure of risk that has many positive features and includes convexity. In this research, conditional value risk has been used to calculate market risk, which is calculated as follows:

$$7) \quad CVaR_a = \int_{-\infty}^{\infty} z dF_x^{\infty}(z)$$

Then,

$$8) \quad F_x^a(z) = \begin{cases} 0 \\ \frac{F_x(z)-a}{1-a} \end{cases}$$

when $z < VaR_a(X)$, when $z \geq VaR_a(X)$.

Independent Variable

Corporate governance system monitoring tools are considered as an independent variable. In this study, the following indicators were used as corporate governance system monitoring tools:

Concentration of Ownership (CON): Concentration of ownership is measured using the Herfindahl-Hirschman index. In this regard, the percentage of shares owned by the shareholder in the company. In this study, the percentage of ownership is considered greater than or equal to 5% in the calculation of the Herfindahl-Hirschman index. Higher index shows more concentration and presence of a small number of major shareholders in the ownership structure of the company, and vice versa.

Institutional Ownership (INS): Defined as the percentage of ownership of a company's stock by shareholders of institutional ownership relative to the company's total stock. The higher the INS, the greater the stability of institutional shareholders (ownership). Institutional investors are large investors such as banks, insurance companies, and investment companies. It is generally thought that the presence of institutional investors may lead to a change in corporate behavior. This stems from the regulatory activities that these investors carry out.

Board Independence (COMP): To calculate the board independence, the ratio of the number of non-executive directors to the total board members is used.

Board Size (BSIZE): To calculate the size of the board, the number of members on the board of directors of companies is calculated.

3-2- Society and Statistical Sample

The ranking industry in Iran is nascent, so the number of experts in this field is small. In this research, an attempt has been made to obtain the opinion of most experts as much as possible. The selection of experts was done in consultation with the research team, each expert instructed other experts. Sample respondents included university faculties, CEOs and board members, senior managers and senior experts of companies, and all those with expertise in financial matters.

The elimination method has been used to select companies in this section. For this purpose, members of the community who met the following conditions were removed:

1) Companies that have a trading interval of more than 6 months in the research period.
2) Companies that have changed the financial year during the research period.
3) Their financial period should not end on March 20. The reason for choosing this criterion is that in calculating the variables, the time periods should be as similar as possible and the seasonal conditions and factors should not affect the choice of factors and variables.
4) Companies that do not have accessible data for analyzing. It is obvious that if the required data is not available, research will not be possible.

According to the above conditions, the companies that had the necessary conditions include 127 companies,

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which constitute the statistical sample of the research. The period for research was considered from 2009 to 20017.

3-3- Data Analysis Method

In most researches in the field of corporate governance system, *2SLS* method has been used. It is necessary to use this method to find the appropriate tool variable to solve the problem of endogenous corporate governance indicators. However, this method faces limitations such as the difficulty of finding suitable tool variables and the limitation of these variables. Also, this method can not solve the correlation between explanatory variables and reduce or eliminate the alignment (Nadiri and Mohammadi, 2011). Generalized Method of Moments (GMM) of Dynamic panel data (DPD) is one of the appropriate econometric methods to solve or reduce the problem of endogenous corporate governance indicators.

A simple autoregressive model with distributed intervals is shown in the following figure:

$$9) \quad y_{it} = \alpha\, y_{i,t-1} + \beta\, X_{it} + \mu_i + \varepsilon_{it}$$

$$i = 1, 2, \dots, N$$
$$t = 2, 3, \dots, T$$

y_{it} is a dependent variable, X_{it} is a vector of explanatory variables, μ_i is the individual or fixed effects of companies, ε_{it} is a component of the equation disorder, and i and t represent the company and the time period, respectively. If, as in Equation no. (9), a variable dependent on intermittent values enters the model, it will cause a correlation between the explanatory variables (regressors) and the disruptive sentences, and as a result, using the ordinary least squares method, the results will be biased and inconsistent. μ_i is a source of inconsistency of estimates that one of the appropriate methods to eliminate the fixed and individual effects of companies will be to use the first-order differentiation method. Since the average of μ_i is equal to itself, the differentiation will be removed from the equation and the source of the inconsistency of the *OLS* estimates will be removed. After differentiating the first order of Equation no. (9), we have:

$$10) \quad \Delta y_{it} = \alpha\, \Delta y_{i,t-1} + \beta\, \Delta X_{it} + \Delta \varepsilon_{it}$$

But differentiation from the original equation provides an unignorable correlation between the interval of the dependent variable and the component of the converted error (Bond, 2002). Therefore, it is necessary to use tool variables in the model to solve this problem. Therefore, the moment for Equation (10) will be defined as follows:

$$11) \; E(y_{it-s}\, \Delta \varepsilon_{it}) = \quad s \geq 2; t = 3, 4, \dots, T$$

$$12) \; E(X_{it-s}\, \Delta \varepsilon_{it}) = 0 \qquad s \geq 2; t = 3, 4, \dots, T$$

To estimate the parameters, the following tool variables are used:

$$13) \; Z_i = diag\,(y_{i1}, y_{i2}, \dots, y_{it-2}, X_{i1}, X_{i2}, \dots, X_{it-2})$$

Therefore, the generalized torque method estimators, denoted by $\hat{\delta}$, are defined as follows:

$$14) \; \hat{\delta} = \left(\acute{B} z A_N \acute{z} B\right)^{-1} \acute{B} z A_N \acute{z} Y$$

After estimating the coefficients, it is necessary to check the validity of instrumental variables through Sargan-Hansen test statistics. The statistics of this test asymptotically have a distribution of χ^2 with a degree of freedom equal to the number of exceeded limits. Hypothesis zero is the correlation of wastes with instrumental variables. If the hypothesis zero is rejected, the validity of the used instrumental variables is confirmed. In order to determine that there is no serial correlation other than perturbations, the second-order absence of serial correlation test is performed on the remnants of the first-order difference equation. The first-order differentiation method for eliminating fixed effects is a suitable method if the degree of autocorrelation of the disturbance sentences is not from the second order (Arellano & Bond, 1991).

Using the GMM method of dynamic panel data has advantages such as taking into account individual inequalities and more information, eliminating biases in cross-sectional regressions, resulting in more

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accurate estimates, with higher efficiency and less alignment will be due to the use of variable interrupt in GMM. The main advantage of dynamic GMM estimation is that all regression variables that are not correlated with the disruption component (including intermittent variables and differential variables) can potentially be instrumental variables and solve the problem of endogenous corporate governance variables (Greene, 2008).

4. Findings

Before estimating the research model, it is necessary to test the significance of the variables used in the estimates. It is necessary to use at least one of the five Levin, Lin & Chu tests, the Im, Pesaran & Shin test, the generalized Fisher - ADF test, the Fisher - PP test, and the Hadri test for the panel unit root test. These tests are called panel unit root tests and the process of checking the stationarity is all the same except for the Hadri method, and by rejecting H_0, the non-stationarity is rejected and indicates the stationarity of variable. Therefore, by rejecting the H_0 hypothesis, the non-stationarity or the root of the unit is rejected, which in order to detect this part, the probability that it should be less than 5% is considered. In this study, Levin, Lin & Chu test, generalized Fisher - ADF test, and Fisher - PP test were used to evaluate the durability of the variables.

The results of Table (2) and the study of the values of the calculated statistics and the probability of their acceptance show that all variables except the risk of illiquidity are at the level of stationerity and the variable of the risk of illiquidity is stationary with one-time differentiation.

In the next stage of the test, the existence of long-term economic relationships is tested with panel integration test. The main idea in integration analysis is that although many accounting time series are non-stationary (containing random trends); But in the long run, the linear combination of these variables may be stationary (without random trend). Cointegration analyzes help to test and estimate the long-run equilibrium relationship. To test the aggregation of panel data, there are several tests such as Kao test, Pedroni test and Fisher test, which in the present study used kao test; because it will not be possible to perform the Pedroni test due to the large number of variables and also the Fisher test due to insufficient data.

Table (2). Stationarity Test Result for Model variables

Variable	Test	Test at the level of Variables		Test at First-order Difference of Variables		Test Result
		Statistics Value	Probability Level	Statistics Value	Probability Level	
Credit risk	LLC	-14/9	*0/0000*	-	-	Stable at $I_{(0)}$ Level
	Fisher-ADF	359/5	*0/0000*	-	-	
	Fisher-pp	*252/3*	*0/0000*	-	-	
illiquidity risk	LLC	-9/54	0/0038	-11/5	*0/0000*	Stable at $I_{(0)}$ Level
	Fisher-ADF	*28/3*	*0/3862*	118/2	*0/0000*	
	Fisher-pp	*32/6*	*0/289*	*122/5*	*0/0000*	
Market Risk	LLC	-10/61	*0/0030*	-	-	Stable at $I_{(0)}$ Level
	Fisher-ADF	137/3	*0/0158*	-	-	
	Fisher-pp	137/9	*0/0483*	-	-	
Ownership Concentration	LLC	-4/10	*0/0000*	-	-	Stable at $I_{(0)}$ Level
	Fisher-ADF	140/1	*0/0486*	-	-	
	Fisher-pp	*179/7*	*0/0012*	-	-	
Institutional Ownership	LLC	-5/25	*0/0000*	-	-	Stable at $I_{(0)}$ Level
	Fisher-ADF	365/9	*0/0000*	-	-	
	Fisher-pp	*845/5*	*0/0000*	-	-	
Board Independence	LLC	-6/002	*0/0000*	-	-	Stable at $I_{(0)}$ Level
	Fisher-ADF	213/9	*0/0012*	-	-	
	Fisher-pp	*195/9*	*0/0126*	-	-	
Board Size	LLC	-7/32	*0/0000*	-	-	Stable at $I_{(0)}$ Level
	Fisher-ADF	150/5	*0/0000*	-	-	
	Fisher-pp	*265/5*	*0/0000*	-	-	

Source: researcher`s Calculations (all the coefficients are at 95% significance level)

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Table (3). Investigating the existence of co-integration between the variables used in estimating the research model

Dependent Variables	t-statistic	probability
Credit Risk	-4/39	0/0000
Illiquidity Risk	-2/07	0/0184
Market Risk	-4/19	0/0000

Source: Research Findings

According to Table (3), the value of t-statistic, kao test, confirms the existence of aggregate at 95% level and therefore there is a long-run equilibrium relationship between the dependent variable and the independent variables and the regression is not a false estimate.

The results of homogeneity and Hausmann freedoms for Equation 1 are reported in Table (3). Accordingly, the assumption of homogeneity of coefficients versus the assumption of fixed effects is not confirmed; Because the F-statistic calculated in Equation 1 (in three cases of credit risk, illiquidity risk and market risk) according to the results of the table, the null hypothesis is rejected versus the opposite hypothesis and the models are estimated based on the panel data method. Hausmann's freedom also shows that since the probability obtained from Hausmann's freedom in both models is less than 0.05, the null hypothesis is rejected, and in other words, the model with fixed effects versus the model with random effects are confirmed. Therefore, the optimal method for estimating the models is the fixed effects model.

Table (4) shows the effect of corporate governance monitoring tools on financial risk based on the generalized moment method (GMM) of dynamic panel data. Considering that the three variables of credit risk, illiquidity risk and market risk were used as indicators of financial risk, so the research relationship in the form of three models (model number 1 for the dependent variable of credit risk, model number 2 for the dependent variable of illiquidity risk, Model number 3 is estimated for the market risk dependent variable.

Based on the results of Sargan test, the null hypothesis that correlations are correlated with the instrumental variables is rejected, so the instrumental variables used in estimating the model have the required validity. In other words, the results of Sargan test show that in estimating each of the models (1), (2) and (3), which are credit risk, illiquidity risk and market risk, respectively, there is no connection between the error components and the applied tools, thus the validity of the results for interpretation is verified.

Table (3). F-Statistic and Hausmann freedoms Results

	Value			Probability			Result		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
F-Statistic	47/36	37/92	41/62	0/00	0/00	0/00	Panel data model		
Hausmann	85/58	71/35	79/31	0/00	0/00	0/00	Fixed effects model		

Table (4). Estimation of Research Model

Variable			Dependent Variable		
			1st Model	2nd Model	3rd Model
			Credit risk	Iliquidity risk	Market risk
First-order intruption risk			0/32 (0/00)	0/32 (0/00)	0/12 (0/00)
Ownership concentration			0/09 (0/07)	0/09 (0/07)	-0/18 (0/11)
Institutional ownership			-0/38 (0/02)	-0/38 (0/02)	0/09 (0/00)
Board Indepenence			0/34 (0/97)	0/34 (0/97)	-0/13 (0/00)
Board Size			0/27 (0/19)	0/27 (0/19)	-0/07 (0/00)
Sargan Test		J-Statistic	6/69	6/69	24/26
		Prob	0/313	0/313	0/293
Arellano-Bond Test	AR(1)	m-Statistic	-1/87	-1/87	-1/69
		Prob	0/07	0/07	0/09
	AR(2	m-Statistic	-0/31	-0/31	-0/19
		Prob	0/51	0/51	0/75

Source: researcher`s Calculations (all the coefficients are at 95% significance level)

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Arellano & Bond test statistics were used to determine the degree of autocorrelation of disorder sentences. The results of the study of the degree of autocorrelation between the differentiated disorder sentences are presented in the following tables. Based on the results of Table (4), the null hypothesis that there is no autocorrelation in the differentiated disorder sentences is not rejected and therefore the Arellano & Bond method is a suitable method for estimating the model parameters and eliminating the fixed effects. In other words, with one-time differentiation of disorder sentences, the serial correlation between the components of the disorder sentence is eliminated and the differentiated disorder sentences do not have first and second order autocorrelation.

The results of the estimation test in all three research models show that the concentration of ownership, board independence and board size have no significant effect on financial risks because the level of significance of the estimated coefficients is more than 0.05%. Statistical analysis of the research model shows that institutional ownership in all three estimated models has a significant effect on financial risk so that its effect is negative on credit risk and liquidity risk and has a positive effect on market risk.

5. Conclusions and Suggestions

The policy of free economy and increasing communication between companies has led to their interaction with each other, so managers face a lot of uncertainty in their core operations. To deal with these uncertainties, managers must use the most appropriate management policies, which is possible through the implementation of corporate governance mechanisms. Theoretically, corporate governance mechanisms can be used as a tool to change risk. The purpose of this study was to investigate the effect of corporate governance system monitoring tools on financial risk of companies listed on the Tehran Stock Exchange. The statistical sample of the study included 127 companies during the period 2011 to 2019. In this study, three variables of credit risk, illiquidity risk and market risk were used as financial risk and the variables of ownership concentration, institutional ownership, board independence and board size were used as monitoring tools of the corporate governance system. Data were analyzed applying unit root tests, Kao and generalized moment method using Eviews software. The results showed that among the monitoring tools of the corporate governance system, only institutional ownership has a significant effect on financial risks and reduces credit risk and illiquidity risk and increases market risk.

The existence of a direct relationship between institutional ownership and market risk means that as the percentage of institutional shareholders in a company increases, the effect of market fluctuations on that company's stock will also increase, which are consistant with Prasetyo (2011), Scheifler and Vishny (1997), Jarl Paulsen (1987) and Berkeley et al. (1988) findings. It was also expected that there would be a positive relationship between other corporate governance monitoring tools and the market risk variable, but the findings of the present study are inconsistent with previous studies. The inverse relationship between these two variables in companies with beta between half and one can be justified for reasons such as lack of knowledge and expertise of non-executive members to evaluate the decisions of executives, lack of motivation to challenge decisions, and members who are under the influence of the executive directors. Explaining the negative and significant relationship between institutional ownership and illiquidity risk, it can be said that institutional investors exert effective supervision on investor companies according to the incentives they have to improve their performance. In other words, the presence of institutional investors improves the performance and thus increases the value of the company. Also, the presence of institutional investors can increase the quantity and quality of company disclosures and reduce information asymmetry, thereby reducing the risk of stock illiquidity or, in fact, increae stock liquidity.

In the present study, only the concentration of ownership, institutional ownership, independence of the board of directors and the size of the board of directors have been used as factors of corporate governance. In order to achieve wider results, future studies can examine the relationship between financial risks and other elements of corporate governance, including the dual role of the chairman, the existence of an internal auditor, the existence of independent committees for the board, and number of board meetings. The board of directors of companies is also suggested to provide the ground for adjusting financial risks and value creation for shareholders in the capital

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شرکت های صنایع منتخب بورس اوراق بهادار تهران با استفاده از مدل ترکیبی فازی – AHP – ویکور؛ مطالعه موردی: شرکت های صنایع دارویی، فلزات اساسی و خودرو و قطعات. دانش حسابرسی، دوره ۲۲، شماره ۶۰، صفحه ۲۵-۴۷.

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market by influencing other corporate governance mechanisms. Also, the stock exchange organization should apply a coherent system to evaluate the quality of corporate governance of listed companies, and the information of the corporate governance system, through notes or other tools, should be disclosed to a greater extent so that users can be sure of the quality of the information.

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