



Research Paper

## Presenting a Model of the Relationship Between Monetary Policies, Capital Structure, and Banks' Risk-Taking

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### ABSTRACT

The main objective of this study is to investigate the relationship between monetary policies, capital structure, and risk-taking of listed banks in the Tehran Stock Exchange. In this study, to measure the monetary policies, the indicator of legal reserve rate has been used. The sample consists of 21 banks listed on Tehran Stock Exchange in the period from 2012 to 2018. In this study, the data were extracted from the Rahavard Novin 3 software and then classified by Excel software, and after calculating the variables, finally, through Eviews10 software, the multivariable regression model and panel data were used to test the hypotheses. The results showed that there is a significant negative relationship between monetary policies and banks' risk-taking within a 95% confidence level. In addition, other findings indicated the existence of a significant positive relationship between monetary policies and bank capital structure. However, the research results show that there is no significant relationship between bank capital structure and banks' risk-taking.

## 1 Introduction

Banks are among the most important financial institutions in the country, which have a huge amount of the country's financial resources and it is impossible to do many businesses and economic activities without them. These financial institutions face risks in performing their duties [1-3]. Basically, every economic activity is associated with some risk. The profitability or survival of a company depends on several factors, some of which are within the control and some are beyond the control of the company. A production company can control the size of the company, the number of employees, the amount of production, and other such things, but it has little control over other factors such as future prices, exchange rates, political conditions, and the activities of competing companies. Therefore, risk can never be completely eliminated [4-5]. One of the important factors that cause people to make different decisions in almost similar situations is the different attitudes they have towards risk. In general, people

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are divided into three groups according to their attitude toward risk: risk-averse, risk-neutral, and risk-taking [6,7]. Bank managers, like other managers, make decisions by relying on inner beliefs and values that appear in the form of personal behaviors. The heads of bank branches, due to the fact that they are part of the managers of the operational levels of the bank and have a large executive role, their decision-making in conditions of uncertainty and instability can play a decisive role in the implementation of the general policies of a bank [8]. On the other hand, by applying the contractionary monetary policy by the central bank, while increasing the interest rate, increasing the legal reserve rate, the value of the banks' shares will increase. The increase in bank shares leads to an increase in the demand for bank assets and the price of bank assets increases. As a result, banks increase their risk assets in order to increase their profitability, and the same issue increases banks' risk-taking. In fact, banks react to an increase in interest rates by reducing their debt ratio. On the other hand, the decrease in the value of bank shares due to the implementation of expansionary monetary policy reduces the value of bank assets and exposes banks to bankruptcy [9-10]. In general, the central bank's available monetary policies can provide an effective mechanism to curb moral hazard in banks, which causes lending booms and asset price bubbles. Therefore, it is suggested that central bank monetary policies (instead of limiting the number of bank bonuses implemented in some advanced countries) should be applied in situations of excess liquidity. Especially in developing and emerging countries where financial markets and products are less complex [11].

In general, according to the characteristics of banks, they are constantly exposed to all kinds of risks. Part of it is due to managers' decisions and part is related to the uncertainty regarding the occurrence of an event. Banking operations have inherent and unavoidable risks and it is the duty of bank management to keep all risks at an acceptable level in order to preserve the value and profit of the bank. Therefore, banks must control and reduce risks in order to continue their existence, and for this purpose, identifying factors affecting various risks will be very helpful. By examining the relationship between monetary policies, capital structure, and risk-taking of banks, suggestions can be made to improve the state of risk management of the country's banks.

## 2 Theoretical Foundations

Every activity, especially in the field of economy, is associated with some type of risk. Any activity that does not have a 100% chance of success is risky and the best way to deal with it is risk management. Risk management is a logical method of identifying, analyzing, evaluating, reflecting, and controlling all risks that may threaten assets, resources, or opportunities to increase profits [12]. Banks and financial institutions face risks like any other economic enterprise. The nature of financial activities and they're dealing with concepts such as credit, payment systems, and different rates put such institutions in front of special risks [13-14]. The banking system, along with the stock exchange, is one of the main pillars of the financial markets and plays an important role in attracting and guiding depositors' funds. Most of the bank's activities are faced with risk, but among the banking activities, for the bank, the service of granting facilities brings more risk. In different countries, to deal with this type of risk, various regulations have been established, including deposit insurance (to protect the depositor against bank risks) and capital restrictions. But according to various banking crises, such as the credit crisis of 2007-2008 in American banks, which originated from the granting of loans without support, it is clear that the banking sector needs more financial regulations and special attention regarding its future risks [15]. On the other hand, there are two types of monetary policy: expansionary monetary policy and contractionary monetary policy which affect the country's economy through different channels. These

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policies are usually used to achieve a set of goals focused on economic growth and stability, which include things like accelerating economic growth, creating full employment, stabilizing the general level of prices, etc. Despite the risk-taking channel, expansionary monetary policy leads to an increase in banks' risk-taking and therefore the supply of risky loans. As a result of this action, the strength of the banking system is endangered and the financial system may face instability [16]. In addition, by reducing the interest rate (lowering the legal reserve rate) as a monetary policy tool, the demand for cheap loans increases, the risky asset in the banks' asset portfolio and their risk tolerance increase. Mainly there is a mismatch between maturity of assets and liabilities. As a result, the increase in risky assets, which are often long-term assets, leads the bank to face liquidity risk due to the mismatch between the maturity of assets and liabilities, and banks' risk tolerance increases both from the perspective of increasing risky assets and from the perspective of liquidity risk [17].

However, the effect of monetary policy on bank risk-taking depends on many factors that affect the balance between asset portfolio composition and risk transfer. The effect of a change in the interest rate as a monetary policy may not be the same over time or between different banks. The net effect of monetary policy depends on the health and stability of the banking system. When the bank's capital is high, when the bank's profitability is high, the implementation of contractionary monetary policy (increasing the legal reserve rate) increases the bank's risk-taking. However, when the bank does not have the necessary capital or its profitability is low, despite the contractionary monetary policy and the increase in the legal reserve rate, banks will not have much desire to increase risky assets. Because in the conditions of insufficient capital of the bank, and an increase of risky assets, the bank will not have enough security to cover the risk [18]. The amount of reduction in loan supply under the influence of contractionary monetary policies will vary according to the amount of banks' access to excess financial resources. The level of access to financial resources, in addition to factors such as the size of the bank, the amount of capital, and the liquidity of banks, is also influenced by the market power and the level of competition in the banking industry [19]. On the other hand, with increased market power, larger banks will benefit from better access to additional resources such as certificates of deposits and interbank loans. Therefore, it can be said that with the increase in the market share of large banks, a certain decrease in money supply (contraction monetary policy) will have less effect on lending and as a result macroeconomic activities, and the increase in market power will weaken the effect of monetary policy through the channel of lending [20].

The relationship between the characteristics of banks' balance sheets and how they react to monetary shocks can also be explained by comparing the two banks. Consider two similar banks. Both banks are similar to each other in both ways, but one of them has balance sheet items that are more liquid than the other bank. If a contractionary monetary shock occurs, the amount of deposit absorption in both banks will decrease. In this situation, a bank that has balance sheet items with a higher degree of liquidity can avoid a sharp reduction in granted loans by selling its cash assets. On the contrary, a bank that is in an unfavorable condition in terms of liquid assets cannot move between its assets [21]. Hence, contractionary monetary policy can put more vulnerable banks in a worse situation and force banks to increase debt in order to avoid a sharp decline in lending. Capital structure also plays an important role in the activities of banks [22]. The compilers of the standards always state that keeping the capital stable and the capital structure policies are among the problems of the capital market for banks. Some researchers (including [23-24]) found that banks with more stable capital structures protect investors

more, and this stability is a result of their risk-taking or risk-averse behavior. High capital structure can be considered a sign of the high risk-taking behavior of banks.

### 3 Research background

Sari and Nouri [6] conducted research entitled "Effect of ownership structure and legal requirements of capital adequacy on the risk-taking of banks admitted to the Tehran Stock Exchange". To test the hypotheses of this research, 15 banks were selected from among the banks admitted to the Tehran Stock Exchange in the period of 2012-2018, and a multivariate regression model and combined data were used to analyze the data. The results of the hypothesis test showed that the nature of the ownership structure has a positive relationship with the risk-taking of banks, and the level of risk-taking in banks that were private from the beginning is higher than the level of risk-taking of privatized state banks. Also, ownership concentration has a negative relationship with banks' risk-taking, and with the increase of ownership concentration, the bank's risk-taking decreases, which is in line with the hypothesis of active supervision of major owners. Finally, the results of this research showed that bank capital adequacy has a negative relationship with banks' risk-taking.

Soltani Nesab [7] conducted research entitled "Investigation of the effect of choosing an audit firm on the bank's risk-taking". The geographical area of this research was the banks admitted to the Tehran Stock Exchange and the time area was between 2013 and 2018. In this research, the choice of audit firm was considered as the independent variable and risk tolerance as the dependent variable. The current research is in the category of applied research, if the classification of types of research based on nature and method is considered, the current research method is in the category of descriptive research in terms of nature, and in terms of method, it is considered in the category of correlational research. In this research, library method was used to collect data and information. In the data section, the research was done by collecting the data of the sample banks by referring to the financial statements, explanatory notes and the stock exchange monthly. Based on the systematic elimination method, 15 banks were selected as a statistical sample. In order to describe and summarize the collected data, descriptive and inferential statistics have been used. In order to analyze the data, first, pre-tests of heterogeneity of variance, Flimer test, Hausman test and Jarek-Ber test and then multivariate regression test were used to confirm and reject the research hypotheses (Eviuse software). The results showed that the choice of audit firm has an effect on the bank's risk-taking. In such a way that by choosing large audit institutions (audit organization), the risk-taking of banks is reduced.

Dehqandhanvi et al. [3], in research entitled "Determinants of banks' risk-taking in Iran with an emphasis on ownership structure", examined the effect of the factors determining banks' risk-taking in Iran's banking industry with special emphasis on the variable of banks' ownership structure. The findings of this study, which uses a panel data sample including 18 banks during the years 2009-2014, showed that, in general, banks with a high concentration of ownership are exposed to more risk. The concentration of ownership in private banks increases the risk and decreases the stability index, and in state banks, it increases the risk (like private banks but with less intensity) and increases the stability index (unlike the behavior of private banks). Also, other results showed that bank size, profitability, productivity and the ratio of equity to assets have a significant effect on the credit risks and stability of banks. Pushari [9], in research entitled "Investigating the effect of ownership structure on the risk-taking behavior of private and state-owned banks in Iran (dynamic panel data approach)" investigated the effect of bank ownership structure and its changes on the risk-taking behavior of specialized and commercial state banks, private commercial banks and the privatized banks (based on Article 44 of the

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Constitution), consisting of 15 banks, paid for the period of 2014-2014. For this purpose, two models have been used to estimate the experimental model using the method of dynamic panel data and generalized torque estimator. In the first model, the type and general structure of ownership on the risk-taking of banks have been investigated, and in the second model, the effect of changes in the ownership structure and transfer of state-owned banks to the private sector on their risk-taking has been investigated. The estimation results of the model indicate that state banks are exposed to more risk than private banks. While ownership concentration does not have a significant effect on banking risk. Also, privatized banks have experienced a significant reduction in risk in the post-privatization period. This is despite the fact that competing banks (other private and government banks) have not had significant changes in risk tolerance during this period. Therefore, it can be said that the changes in banks' risk were caused by their privatization. Pakizeh et al. [1], in research entitled "Investigation of the effect of concentration of ownership on the risk-taking of private commercial banks in Iran" examined the effect of the concentration of ownership of shareholders on the risk-taking of private banks in the country during a 7-year period from 2007 to 2013. The dependent variable of the research, risk tolerance, was calculated using the z-score index, and the independent variable, the concentration of shareholders' ownership, was calculated using the Herfindahl criterion. Also, the variables of bank size, net interest margin, the ratio of interest activities, ratio of capital adequacy and ratio of non-current facilities were considered as control variables of the research. The result of the research showed that the effect of the concentration of shareholders' ownership on the risk-taking of private banks is inverse and significant. Also, among the control variables; The size of the bank and the ratio of non-current facilities have a direct and significant effect; and the capital adequacy ratio has an inverse and significant effect on the risk-taking of private banks. The effect of the variables of net interest margin and the ratio of interest activities on the risk-taking of private banks has not been observed.

Boateng et al. [14], in research entitled "The effect of CEO compensation and excess reserves on bank risk-taking: the moderating role of monetary policy" examined the final sample consisting of 88 Chinese commercial banks during the period from 2003 to 2014. The results of the research showed that the incentives in CEO bonus contracts and excess reserves have a significant positive effect on risk-taking and credit risk. However, the positive effect of CEO compensation and excess reserves on risk-taking is destroyed by the interaction of CEO compensation and excess reserves. In addition, the results showed that the central bank's monetary policy works to curb the interaction effect between CEO compensation and excess reserves on risk-taking and credit risk.

Hasan et al. [18], in research titled "Comparability of financial statements and bank risk-taking", examined the final sample consisting of 6798 annual observations of US banks during the period from 1994 to 2014. The results of the research showed that banks with greater comparability of financial statements have a significant relationship with banks' lower risk-taking. Also, the results showed that the negative relationship between the comparability of financial statements and risk-taking is more prominent for companies that have agency problems and more severe moral hazards. In addition, the results indicate that the relationship between the comparability of financial statements and the bank's risk-taking is stronger for smaller banks than for larger banks. Finally, the evidence indicated that the role of comparability of financial statements in limiting risk-taking in periods without a global financial crisis is more prominent than during the global financial crisis. Bukair [15], in research titled "Factors affecting the capital structure of Islamic banks in developing economies", investigated a sample of 45 Islamic banks in the countries of the Persian Gulf Cooperation Council during the years 2009-2011.

The results of the research showed that according to the forecasts, the size of the bank, liquidity, and the age of the company have a positive relationship with the leverage ratio of the Islamic banks of the Persian Gulf Cooperation Council. However, inconsistent with the theoretical predictions, the results showed that profitability, tangible assets and growth have a positive but insignificant relationship with the level of leverage, which indicates that these are not important factors in capital structure decisions. Lin et al. [22], in research, investigated the effect of macroeconomic variables on the risk-taking behavior of Islamic and non-Islamic banks in Indonesia during 2008-2015. The results of the research showed that the exchange rate and liquidity have the greatest effect on the risk tolerance of Islamic banks and the risk tolerance of non-Islamic banks is higher compared to Islamic banks. Ashraf et al. [13], in research entitled "Effect of national culture on bank risk-taking behavior", presented a theory regarding the direct influence of national culture on bank risk-taking behavior by providing conditions for human participation decision-making. This study tested the direct effect of national culture on the bank's risk-taking behavior using an international sample size from 75 countries. In this research, national culture is evaluated and measured using four dimensions - power distance, individualism versus collectivism, uncertainty avoidance, ethnography versus feminism - from Hofstede's national culture framework. The results of the research showed that in countries with cultural values, high individualism, low uncertainty avoidance, and low power distance, the bank's risk tolerance is higher.

Dong et al. [17] used a sample of 108 Chinese banks between 2003 and 2011 in order to investigate the effects of state and private ownership on the risk-taking of Chinese banks. They used the ratio of overdue loans and the ratio of capital adequacy as variables to measure the degree of riskiness of banks and considered the variables of bank ownership (government or private) and ownership concentration as independent variables. The findings of this research showed that state banks expose themselves to more risk than private banks. Also, ownership concentration in state-owned banks causes more risk-taking, but in privately-owned banks, ownership concentration and risk-taking have a negative relationship. Sariri [24], in research entitled "Ownership structure and risk-taking behavior of Islamic and conventional banks: member countries of the Middle East and North Africa region" examined the effect of bank ownership from two aspects, its nature and focus on banks' risk-taking. In this research, the risk-taking of three different types of banks in terms of ownership, i.e. private banks, corporate banks, and state banks, were compared in these countries from 2005 to 2011. The results of this study showed a negative relationship between ownership concentration and risk-taking. Also, different layers of shareholders are different in risk acceptance. Private or family banks are more risk-averse. In contrast, state banks are riskier, and compared to other banks, a significant amount of their loans are uneconomical. By comparing Islamic and conventional banks, it was shown that private Islamic banks are stable like their counterparts in the conventional system; This is while Islamic banks are less prone to credit risk compared to conventional banks.

#### **4 Research methodology**

The present research method is descriptive-correlational. In terms of purpose, it is practical and in terms of direction, it is one of post-event research. The theoretical foundations and background of the research were collected by the library method and the data for the hypothesis test were also collected by the library method from the financial reports available in the archives of the Central Bank of Iran, and to analyze the data, first, the variables were measured and then with The use of correlation test, analysis of variance and regression analysis after ensuring the characteristics of the regression test such as normality, linearity, independence of model errors, stationarity of research variables with the help of

Eviews10 software with an error level of 5% have been used to accept or reject the hypotheses. The geographical scope of the current research is the companies admitted to the Tehran Stock Exchange in the period from 2011 to 2017. By applying the limitations of the research, the financial information of 21 banks admitted to the stock exchange was used.

**Research hypotheses:** The theoretical foundations of the current research have provided the necessary evidence to propose the following hypotheses.

The first hypothesis:

There is a significant relationship between monetary policies and banks' risk taking.

The second hypothesis:

There is a significant relationship between bank capital structure and banks' risk taking.

The third hypothesis:

There is a significant relationship between monetary policies and bank capital structure.

**Models used in research:** The current research model is derived from the model of Sophie Barana et al. which has been modified according to the characteristics of the country's capital market and accessible information.

First hypothesis model:

$$Risk_{i.k.t} = \mu_i + \lambda_1 MP_{k.t} + \lambda_2 Equity_{i.k.t-1} + \lambda_3 LCR_{i.t} + \lambda_4 Size_{i.t} + \varepsilon_{i.t}$$

Second hypothesis model:

$$Risk_{i.k.t} = \mu_i + \lambda_1 BCS_{it} + \lambda_2 Equity_{i.k.t-1} + \lambda_3 LCR_{i.t} + \lambda_4 Size_{i.t} + \varepsilon_{i.t}$$

Third hypothesis model:

$$BCS_{it} = \mu_i + \lambda_1 MP_{k.t} + \lambda_2 Equity_{i.k.t-1} + 3LCR_{i.t} + \lambda_4 Size_{i.t} + \varepsilon_{i.t}$$

#### 4.1 Research variables

Risk taking of banks ( $Risk_{i.k.t}$ ): The Z index is used to measure banks' risk tolerance as described below.

$$z = \frac{\mu(ROA) + EA}{SD(ROA)}$$

In this regard,  $\mu(ROA)$  is the average return on assets in the last three years, EA is the ratio of equity to assets, and SD (ROA) is the standard deviation of the three-year return on bank assets [3]. The Z index shows the level of bank stability and its inverse expresses the probability of bankruptcy [7]. High values of Z index indicate low risk and high stability for the bank, and low values indicate low stability and high risk tolerance. The Z index is divided into two separate parts, which indicate two types of risk [12]. The first part, which is the ratio of the return on assets to its standard deviation (ROA/SDROA), shows the risk of the bank's asset portfolio, and the second part, which is the ratio of equity to the standard deviation of the return on assets (EA/SDROA), also shows the risk of the bank's leverage. [18] analyze the composition of the constituent elements of the Z index in such a way that this index measures the risk of bankruptcy through the interactions of earning capacity, the potential amount of shock transmission over time periods, and the amount of capital reserves available to deal with shocks. It shows suddenly. Because the return on assets reflects the capacity to earn income, and its average standard deviation also shows the degree of transfer of income shocks between time periods, and on the other hand, the ratio of equity to assets also shows the strength of the bank's shield in dealing with risks and shocks. Bank capital structure ( $BCS_{it}$ ): Bank capital structure: To measure the bank capital

structure, the ratio of total liabilities to total assets of banks is used as described in the following model [23].

$$BCS_{it} = \frac{TL}{TA}$$

Where

TA: Total assets of the bank

TL: Total bank debt

*Monetary policies: (MP):* In the field of monetary policies, existing tools are classified into two categories: direct tools and indirect tools. Direct instruments are generally issued in the form of circulars or instructions of the central bank to control the amount or price (interest rate) of deposited funds, and indirect instruments are issued according to the discretion of the central bank on the behavior of financial institutions by influencing the balance sheet of the central bank. Or the price of this bank's facility (interest rate) is valid. In Iran's economy, monetary policy is mainly applied through direct tools (controlling bank interest and setting credit limits) and indirect tools (legal deposit ratio, Central Bank's participation bonds and special deposits of banks with the Central Bank) [21]. In this research, in order to calculate monetary policies (MP), the legal reserve rate has been used from the indicators of monetary policy applied in Iran, following [14,18]. Legal reserves are a percentage of the debts of commercial and specialized banks, especially the deposits of individuals, which banks are required to keep with the central banks.

Control variables are as follows:

*Equity<sub>i,k,t-1</sub>:* The ratio of total assets to equity.

*LCR<sub>i,t</sub>:* Liquidity coverage ratio as total assets to total liabilities.

*Size<sub>i,t</sub>:* bank size; Natural logarithm of bank assets.

## 5 Research findings

The findings of the current research were considered by the researchers in two parts of descriptive and inferential statistics, the results of descriptive statistics of the research in figure 1 and the results of inferential statistics, i.e. correlation of variables, statistical assumptions of regression, results of Chow and Hausman test and hypothesis testing in figures 2, 3, 4, and 5 are presented.

**Table 1:** Descriptive statistics of research variables

Variables	Symbol	mean	mode	max	min	Std. Dev.
Risk taking of banks	Risk <sub>it</sub>	0/054	0/059	0/143	-0/045	0/029
Bank capital structure	BCS <sub>it</sub>	0/929	0/936	1/423	0/201	0/131
Monetary policies	MP <sub>it</sub>	0/059	0/049	0/116	0/011	0/032
Assets to equity	Equity <sub>it</sub>	12/72	11/87	95/01	-37/88	16/37
Liquidity coverage ratio	LCR <sub>it</sub>	1/130	1/068	4/966	0/702	0/468
Bank size	SIZE <sub>it</sub>	8/46	8/555	9/532	6/605	0/591



### 5.1 Descriptive Statistics

According to Figure 1, the average cost of equity of the sample companies is equal to 0.22 and its lowest and highest value is equal to 0.08 and 0.49. Examining the skewness and skewness of this variable, which should be 0 and 3 respectively for the variable to have a normal distribution, shows that this variable does not have a normal distribution. The mean, median, standard deviation, minimum and maximum, and the amount of skewness and elongation of other variables are presented in this picture.

### 5.2 Correlation test

In this part, by using Pearson's correlation coefficient, we have investigated the non-linearity of the relationship between the independent variables, according to the picture (2), the results have confirmed the absence of a linear relationship between the research variables.

**Table 2:** Correlation between research variables

Risk <sub>it</sub>	1					
BCS <sub>it</sub>	0/030	1				
MP <sub>it</sub>	-0/089	0/117	1			
Equity <sub>it</sub>	0/445	0/059	-0/151	1		
LCR <sub>it</sub>	0/003	0/132	-0/102	-0/229	1	
SIZE <sub>it</sub>	-0/109	-0/165	0/005	-0/106	-0/490	1
<i>Variables</i>	Risk <sub>it</sub>	BCS <sub>it</sub>	MP <sub>it</sub>	Equity <sub>it</sub>	LCR <sub>it</sub>	SIZE <sub>it</sub>

### 5.3 Hypothesis Test Results

The test related to the statistical assumptions of the regression model

In order to measure the validity of the model and check the assumptions of classical regression, it is necessary to perform tests related to the normality of the residuals, homogeneity of variances, independence of the residuals, and the absence of model specification error (linearity of the model). To test the normality of the error sentences, the Jarquio-Bera test was used. The results of the Jarkio-Bera test indicate that the residuals obtained from the estimation of the research model have a normal distribution at the 95% confidence level, so the probability of this test (0.5872) is greater than 0.05. Another statistical assumption of classical regression is the homogeneity of variance of the residuals. If the variances are unequal, the linear estimator is not unbiased and will not have the least variance. In this research, Pagan cut test was used to check the homogeneity of variances. According to the significance level of this test, which is less than 0.05 (0.0243), the null hypothesis of homogeneity of variance is rejected and it can be said that the model has a problem of heterogeneity of variance. In this study, the generalized least squares (GLS) estimation method was used to solve this estimation problem. Also, Durbin-Watson (D-W) test was used in this research to test the non-correlation of residuals, which is one of the assumptions of regression analysis and is called autocorrelation. According to the preliminary results of the estimation model, Durbin-Watson's statistic value is equal to 1.51 and since it is between 1.5 and 2.5, it can be concluded that the residuals are independent of each other. In addition, to test that the model has a linear relationship and whether the research model is correctly explained in

terms of its linear or non-linear relationship, Ramzi's test was used. Due to the fact that the significance level of Ramzi's test (0.8852) is greater than 0.05, therefore, the null hypothesis of this test based on the linearity of the model is confirmed and the model does not have a clear error. The summary of the results of the above tests is presented in Table 3.

**Table 3:** The results of the tests related to the statistical assumptions of the regression model

statistic Ramsey		statistic Durbin-Watson		statistic Breusch-Pagan		statistic Jarque-Bera	
<i>P – Value</i>	<i>F</i>	<i>D – W</i>	<i>P – Value</i>	<i>F</i>	<i>P – Value</i>	$\chi^2$	
0/8852	4/6639	1/51	0/0243	4/2584	0/5872	1/6563	

### 5.4 The results of the first sub-hypothesis test

The first hypothesis of the research is to test the relationship between monetary policies and banks' risk taking. For this purpose, multivariable regression has been used using the panel data model, and the results of the relevant test are presented in Figure 4.

$H_0$  : There is no significant relationship between monetary policies and banks' risk taking.

$H_1$  : There is a significant relationship between monetary policies and banks' risk-taking.

**Table 4:** Results of the regression model test of the first sub-hypothesis based on the fixed effects model

Number of observations: 147 years - dependent variable bank: banks' riskiness					
variable description		Symbol	coefficient	t	Prob
Constant		C	0/158	9/900	0/0000
Monetary policies		MP <sub>it</sub>	-0/014	-2/605	0/0066
The ratio of total assets to equity		Equity <sub>it</sub>	0/0003	4/887	0/0000
Liquidity coverage ratio		LCR <sub>it</sub>	-0/005	-2/764	0/0072
Bank size		SIZE <sub>it</sub>	-0/0116	-6/0781	0/0000
Chow Test		Hausman Test			
F	p-value	$\chi^2$	d.f	p-value	
4/3759	0/0406	3/0724	4	0/0031	
Adjusted R-squared		D-W	F	p-value.(F)	
0/183		1/51	5/281	(0/0008)	

The results of the test of the first hypothesis of the research in the above table related to the Chow model test at the significance level (0.0406), indicate that the panel data method can be used. Also, the Hausman test and the significance level of this test, which is less than 0.05, shows the necessity of estimating the model using the fixed effects method. Because the probability value of F statistic is 0.0008 and this amount is less than 0.05, the significance of the whole model is confirmed with 95% confidence. Also, the results of Durbin Watson's test with a rate of 1.51 show that the variables are completely independent of each other. And the coefficient of determination of the model shows that 18% of risk acceptance is explained by the variables included in the model. Since the t statistic of the

monetary policy variable is equal to -2.605 and its significance level is less than 0.05. Therefore, it can be claimed that there is an inverse and significant relationship between monetary policies and banks' risk-taking. In other words, it can be said that with the increase of monetary policies, the risk-taking of banks decreases. Finally, the estimated form of model (1) will be as follows:

$$Risk_{i.k.t} = 0.158 - 0.014(MP_{k.t}) + 0.0003(Equity_{i.k.t-1}) - 0.005(LCR_{i,t}) - 0.0116(Size_{i,t}) + \varepsilon_{i,t}$$

### 5.5 The results of the second sub-hypothesis test

The second hypothesis of the research is to test the relationship between the capital structure and the risk-taking of banks. For this purpose, multivariable regression has been used using the panel data model, and the results of the relevant test are presented in Table 5.

$H_0 =$  :There is no significant relationship between bank capital structure and banks' risk taking.

$H_1 =$  : There is a significant relationship between bank capital structure and banks' risk taking.

**Table 5:** Results of the regression model test of the second sub-hypothesis based on the fixed effects model

Number of observations: 147 years - dependent variable bank: banks' riskiness					
variable description		symbol	coefficient	t	Prob
Constant		C	0/115	2/669	0/0097
Bank capital structure		$BCS_{it}$	-0/007	-0/700	0/4861
The ratio of total assets to equity		$Equity_{it}$	0/0002	3/952	0/0002
Liquidity coverage ratio		$LCR_{it}$	-0/001	-0/842	0/4026
Bank size		$SIZE_{it}$	-0/006	-1/535	0/1297
Chow Test			Hausman Test		
F	p-value	$\chi^2$	d.f	p-value	
4/5217	0/0375	3/0826	4	0/0031	
Adjusted R-squared		D-W	F	p-value.(F)	
0/378		1/80	4/312	(0/0000)	

As can be seen in the above table, the significance level of Chau's test is 0.0375 and less than 0.05, indicating that the panel data method can be used. Also, the Hausman test and its significance level, which is less than 0.05, shows the necessity of estimating the model using the fixed effects method. Because the probability value of F statistic is 0.0000 and this amount is less than 0.05, the significance of the whole model is confirmed with 95% confidence. Also, the results of Durbin Watson's test with a rate of 1.80 show that the variables are completely independent of each other. Also, the value of the coefficient of determination of the model shows that 37% of banks' risk-taking is explained by the variables included in the model. Since the t-statistic of the bank capital structure variable is equal to 0.700 and its significance level is greater than 0.05, therefore, no significant relationship was observed

between the bank capital structure and banks' risk-taking. Finally, the obtained model is as follows. :  
 $Risk_{i.k.t} = 0.115 - 0.007(BCS_{it}) + 0.0002(Equity_{i.k.t-1}) - 0.001(LCR_{i.t}) - 0.006(Size_{i.t}) + \varepsilon_{i.t}$

### 5.6 The results of the third sub-hypothesis test

The third hypothesis of the research is to test the relationship between monetary policies and the capital structure of banks. For this purpose, multivariable regression has been used using the panel data model, and the results of the corresponding test are presented in Table 6.

$H_0 =$ : There is no significant relationship between monetary policies and bank capital structure.

$H_1 =$  : There is a significant relationship between monetary policies and bank capital structure.

**Table 6:** Results of the regression model test of the third sub-hypothesis based on the fixed effects model

Number of observations: 147 years - dependent variable bank: bank capital structure				
variable description	symbol	coefficient	t	Prob
Constant	C	0/567	4/124	0/0001
Monetary policies	$MP_{k.t}$	0/158	2/849	0/0059
The ratio of total assets to equity	$Equity_{it}$	-0/0006	-4/264	0/0001
Liquidity coverage ratio	$LCR_{it}$	0/0249	2/962	0/0043
Bank size	$SIZE_{it}$	0/0393	2/513	0/0146
Chow Test		Hausman Test		
<b>F statistics</b>	p-value	$\chi^2$	d.f	p-value
<b>3/3686</b>	0/0212	4/8090	4	0/0000
Adjusted R-squared		D-W	F	p-value.(F)
<b>0/389</b>		1/51	4/4619	(0/0000)

As can be seen, the significance level of Chau's test is 0.0212 and less than 0.05, which indicates that the panel data method can be used. Also, the Hausman test and its significance level, which is less than 0.05, shows the necessity of estimating the model using the fixed effects method. Because the probability value of F statistic is 0.0000 and this amount is less than 0.05, the significance of the whole model is confirmed with 95% confidence. Also, the results of Durbin-Watson's test with a rate of 1.51 show that the variables are completely independent of each other, and the coefficient of determination of the model shows that 38% of the bank capital structure is explained by the variables included in the model. Since the t-statistic of the monetary policy variable is equal to 2.849 and its significance level is less than 0.05, therefore, there is a positive and significant relationship between monetary policies and bank capital structure at the 95% confidence level. The third hypothesis test model is as follows:

$$BCS_{it} = 0.567 + 0.158(MP_{k.t}) - 0.0006(Equity_{i.k.t-1}) + 0.0249(LCR_{i.t}) + 0.0393(Size_{i.t}) + \varepsilon_{i.t}$$

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## 6 Discussion and Conclusion

In this research, three hypotheses have been tested. The main purpose of the research, which is presented in the form of research hypotheses, is to investigate the relationship between monetary policies, capital structure and risk-taking of banks. In this research, the legal reserve rate has been used to measure monetary policies. Legal deposit ratio is one of the central bank's monetary policy tools. Banks are obliged to always keep a proportion of the debts created and especially the deposits of individuals with them in the central bank. By increasing the ratio of legal deposits, the central bank shrinks the amount of facilities granted by banks, and by reducing it, it expands the credits of banks. According to Article (14) of the Monetary and Banking Law, the ratio of legal deposit shall not be less than 10% and not more than 30%, and the Central Bank may set different ratios for it according to the composition and type of activity of the banks. The Z index has also been used as a measure of banks' risk-taking. The Z index shows the stability of the bank and its inverse indicates the probability of bankruptcy. Therefore, high values of Z index indicate low risk and high stability for the bank, and low values indicate low stability and high-risk tolerance. Therefore, the negative coefficient of monetary policies variable in the first hypothesis indicates the existence of a positive relationship between monetary policies and banks' risk-taking. Therefore, the results of the first hypothesis of the current research indicate that the increase in the legal reserve rate, when the interest rates are unchanged, causes a decrease in the profitability of the banks, and therefore forces the banks to increase the risk-taking of the banks in order to increase the yield when the interest rate is low.

Capital structure also plays an important role in the activities of banks. In banks with more stable capital structures, investors' interests are more secure. As a result, high capital structure can be considered as a sign of high risk-taking behavior of banks. However, the results of the second research hypothesis did not find a significant relationship between bank capital structure and banks' risk-taking. This issue may be argued that because banks have high liquidity and profitability, therefore, their risk-taking is not prominently affected by capital structure policies. If a contractionary monetary shock occurs, the number of deposits in banks will decrease. In this situation, a bank that has balance sheet items with a higher degree of liquidity can avoid a sharp reduction in granted loans by selling its cash assets. On the contrary, a bank that is in an unfavorable situation in terms of liquid assets cannot move between its assets. Hence, contractionary monetary policy can put more vulnerable banks in a worse situation and force banks to increase debt in order to avoid a sharp decline in lending. As a result, the increase in monetary policies leads to an increase in debt in the bank's capital structure, which the results of the third hypothesis of the present study also confirm.

According to the results of the present research that monetary policies have a positive effect on banks' risk-taking and bank capital structure, some policy recommendations can be made in the field of monetary policy. The central bank can play its role as the lender of last resort and provide the necessary liquidity to these banks in the conditions of monetary contraction in order to prevent the reduction of the lending capacity of such banks. In addition, banks are suggested to diversify their asset portfolio in order to reduce reliance on generating income through granting facilities and, in other words, reducing dependence on monetary policies. In order to ensure the repayment of loan funds, in addition to relying on heavy collateral, banks can move towards the evaluation of economic projects and plans in terms of their profitability and cash flows, and by strengthening their validation process, allocate the granted credits to high-yielding projects.

In the current study, no variables were used as moderator variables. While, there are several potential moderating variables such as information asymmetry, political uncertainty, profitability and liquidity that can play a role in the relationship between monetary policies, capital structure and risk-taking of banks. Therefore, future researchers can use these moderator variables in their research. This research also has limitations. For example, data extracted from bank financial statements is not adjusted for inflation.

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