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Presenting a continuous risk monitoring model in the banking field based on structural equations

Soroosh Shanaki Bavarsad[a], Saeed Nasiri[a,*], Ahmed Kaab Omair[a], Allah Karam Salehi[b]

[a]Department of Accounting, Ahvaz Branch, Islamic Azad University, Ahvaz, Iran

[b]Department of Accounting, Masjed Soleyman Branch, Islamic Azad University, Masjed Soleyman, Iran

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Abstract

The purpose of this research is to present a continuous risk monitoring model in the banking sector utilising structural equations. It is a type of behavioural research, specifically exploring the interplay between analytical data concerning banking risks and the behaviour patterns of internal auditors. Smart PLS software was used for analysis. Employees working in all banks and credit, and financial institutions of the private and public sectors have been considered as the statistical population research. A questionnaire, focusing on risk aspects in the banking industry, was developed in collaboration with ten experts. The most important assessment criterion used to evaluate the structural model is the coefficient of determination. which shows the amount of prediction of the model. A model is suitable when it predicts the indicators of latent endogenous variables. The general model includes both the measurement and structural model parts, and by confirming its fit, the fit check in a model is complete. The results of the research indicate that there is a positive and significant relationship between market risk and its components (stock risk, exchange rate risk, and securities risk). Similarly, there is a positive and significant relationship between credit risk and its components (centralised facility risk and facility applicant risk. While market and credit risks are well-recognised, operational risk is still unclear for managers. Unlike market and credit risks that exist in specific areas of business, operational risk is a part of all business processes. Additionally, there is a positive and significant relationship between the liquidity risk and its components (the risk of not performing the crisis test, non-commitment of liquidity coverage and other risks).

Keywords: continuous monitoring, banking field, structural equations
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1 Introduction

Effective and efficient use of resources to achieve organisational goals, value addition, transparency and accountability are the main management strategies of banks. With the ever-increasing scope and complexity of activities, the intensification of competition, rapid changes in the economic environment, the need to diversify the sector and provide new services, information technology and mechanised systems, banks are exposed to various types of risks. He has faced credibility, market and operations in achieving organisational goals. Establishing and maintaining a powerful

*Corresponding author
Email addresses: shanaki.soroosh@gmail.com (Soroosh Shanaki Bavarsad), saeed-nasiri@iauahvaz.ac.ir (Saeed Nasiri), ahmad-kaabomeir@iauahvaz.ac.ir (Ahmed Kaab Omair), a_k_salehi@yahoo.com (Allah Karam Salehi)

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internal control system in the bank provides the possibility of efficient and effective management of the organisation and the aforementioned risks for its management. In the face of rapid changes in the economic and competitive environments and changes in customer demand and taste, and the restructuring of the structure for future growth, the management uses the internal control system to be able to react on time. show appropriateness [1]. An effective internal control system requires recognising, evaluating and determining how to deal with major risks, which adversely affect the achievement of the bank's goals. These risks include credit risk, market risk, accounting risk, executive risk, legal and fiscal risk, human resources compliance risk, information technology risk, and business and reputation risk. In the field of risk recognition and assessment, the internal audit management, to prioritise the audits of operating cycles and headquarters activities based on risk, assesses the risks of said cycles and activities [16].

Banks use two methods or perspectives based on the type of method and operational process they use. The first perspective is a conservative strategy. Most of the concern in a financial institution is caused by non-repayment of loan instalments that it has given to its customers. In fact, the bank loses both its income and has destroyed its capital. In these banks or financial institutions, if this view is maintained, it is more likely to consider strict conditions for loan payments. Because there may be customers who cannot repay the loan instalments. Of course, due to the implementation of such strict criteria, the bank will lose many of its customers. In fact, by implementing such strict criteria, the bank will have a low risk tolerance. Also, due to the existence of these criteria, there may be a good customer for the bank, but the bank may lose it. In such a policy, the incomes of these banks will decrease, and at the same time, it includes less risk. On the contrary, the second view is that the strategy is daring or daring. Managers of bold banks have such a view that fueling claims is a part of our business and business environment. Therefore, they consider easier policies and policies to give credit to customers. In this case, they will attract more customers and therefore the income of these banks will increase, but at the same time, the risk of non-collection of claims or even the fueling of claims will increase. The conclusion of these views is valid when the banks are 100% private and that financial institution or bank has the power of all its policies, in which case it is possible to consider a conservative or bold policy. In our country, banks, even private banks and institutions, are subject to government and central bank policies. And in fact, these private and government banks give credit to their customers completely based on the regulations and sections of the central bank. Therefore, the management of the country's banks does not have much involvement in the implementation of bold or conservative policies, and in fact, they implement the macroeconomic policies of the government. Sometimes, contractionary policies are considered to make the terms of loan payment difficult so that loans and credits are not paid. Sometimes, expansionary policies are considered in the macroeconomy of the country, which facilitate the payment terms. Banks should identify and evaluate those operational risks that are considered an inseparable part of all important products, activities, processes and systems. In addition, it is necessary to make sure of the existence of sufficient evaluation procedures regarding the operational risk inherent in these items before introducing and entrusting the commitment regarding the provision of new products, activities, processes and systems. In addition to identifying risks that have a lot of negative power, banks need to assess their vulnerability to such risks. Effective risk assessment provides the possibility for the bank to have a better understanding of its risk situation and to pay attention to risk management resources in the most effective way. Operational risk monitoring in banks and financial institutions is a tool that helps them to evaluate the capability of control systems and their efficiency. If the bank's control systems have sufficient efficiency, its risk situation will improve. Therefore, the bank should have a continuous and consistent system for monitoring operational risks and reporting risk-related matters. Bank risks are related to losses caused by non-repayment or delayed repayment of the principal or sub-loan from the customer. The risk can be caused by the possibility of postponement, questionable collection or non-collection of facilities provided to customers. In fact, because the repayment of loans is either delayed or not collected, it has led to problems in the circulation of cash in banks. When the economy is in a period of prosperity, the stock market index It also has a positive trend with economic growth, and the desire to enter the stock market increases due to its profitability compared to holding assets in cash, and this increase in demand for investment in the stock market leads to a change in the composition of deposits. Banks will go towards runaway deposits and withdrawal of deposits, and finally lack of liquidity and an increase in liquidity risk. But during the recession, the yield of bank deposits is more attractive than the income generation of assets such as gold, currency and the like, so due to the decrease in demand and the desire to enter the stock market, banks will not face the problem of lack of liquidity. Also, the fluctuation of the inflation rate has a positive effect on the liquidity risk of banks and actually leads to its increase, which is also fully consistent with the theoretical foundations and empirical evidence, because the increase in the fluctuation of the inflation rate leads to the fluctuation of the total value of assets (cash assets), and the return rate of assets and therefore, in such a situation, the composition of bank deposits has changed (from term deposits to volatile deposits) and the demand of depositors to withdraw their deposits and enter parallel markets increases, this sudden withdrawal Deposits from banks lead to problems caused by lack of liquidity and expose banks to higher liquidity risk.

One of the necessary and effective tools for the economic development of the country is the existence of an efficient

banking system. Banks are the pulse of financial activities, and the situation governing them can have an important effect on other economic sectors of a society. Banks, by organising and directing receipts and payments, facilitate trade and commercial exchanges and cause the expansion of markets, economic growth and prosperity. However, in recent years, the banking industry has faced many challenges due to various reasons, such as risk or costs caused by interest rate fluctuations, inflation, currency, or non-repayment of payment facilities. The continuity and severity of such challenges have caused many social crises for the banking industry in the world and countries. The existence of such consequences has prompted the officials of the financial regulatory and executive institutions to pay more serious attention to the risk management of financial institutions, and especially banks. Providing banking services. The main activities of banks include collecting excess funds from capital owners, granting credits to applicants and providing banking services. Credit risk is one of the most important risks in the banking system due to its connection with the operational activities of banks (in the fields of loans, interbank transactions, scrap bonds, currency transactions, ordinary shares, option transactions, issuance of guarantees and swaps). In most cases, the loss related to credit risk is more than other risks. Loans are the biggest and most obvious source of credit risk in banks. In other words, it puts the bank's lending and facilities at risk. The existence of such a risk can adversely affect the performance of banks. One of the basic problems of the banking system in Iran is the credit risk, due to the fact that a lot of monetary resources are provided in the form of loans in the form of credit in private and government banks, and the return of these resources is an obvious necessity for the continued life and development of banks. Therefore, to continue their existence, banks must control risks and reduce their adverse effects, and for this, it is necessary to investigate the effect of credit risk on the bank's performance. On the other hand, in developing economies such as Iran, due to the lack of proper and sufficient development of the capital market and the inefficiencies in this market, in practice, it is the money market that is responsible for the long-term and short-term financing of enterprises and economic activities within the framework of the banking system. . Based on this, it is important to ensure the risk management and proper functioning of the banking system in these countries. It is obvious that the results of the present research, in addition to the academic aspect, in developing theoretical literature and explaining the challenges and tensions faced by the bank in the field of auditing. Internal is valuable and relevant, by explaining the multifaceted nature of internal audit and the systematic homogeneity of internal audit approaches, risk and uncertainty management, and ultimately improving organizational performance, by top managers and the bank's supervisory board (at the levels of planning and strategy formulation), compilation Auditing standards providers are used and benefited from the practical aspect.

In terms of increasing the knowledge of the subject of the research, it is worth mentioning that considering that the internal audit includes the entire process taking into account the technical, behavioral and organizational dimensions, the need to explain the process of continuous risk control is a tangible thing that ultimately leads to the adjustment of many from internal audit positions. In addition to providing appropriate views and solutions in this field, the present research contributes to the development of literature in this field by presenting appropriate views and solutions to increase knowledge and implement systematic risk monitoring and compliance of internal audit with environmental changes appropriate to the activity environment of the banking field, will be effective on increasing competitiveness and improving performance, especially in the field of internal audit and risk management. The current research is innovative from two analytical/thematic and practical perspectives. Because by examining the comprehensive dimensions of risk in the field of internal audit in two classic approaches and by considering the dimension of social responsibility, for which there is no coherent framework in terms of determining the components and indicators of measurement, the capacities that can be developed regarding the theoretical literature in this will create an arena. An approach that has received less attention from an analytical point of view, and this research, based on critical evaluation and Delphi analysis, tries to determine new components and propositions of this concept in order to determine its role in the development of frameworks after theoretical screening through partial least squares analysis. To explore the theory and application of sustainable reporting. From a practical point of view, it is important to mention that providing a continuous risk monitoring model under the existence of stability helps the banking industry to diligently seek to meet the needs of the beneficiaries, and at the same time, from a competitive point of view, due to the creation of more confidence and trust in the capital market, the position to gain a more significant competitive advantage among competitors.

Since in order to carry out any control to deal with damage, the organisation will need to accept a cost that must be based on the formula of the cost of rational benefit, the controls must be on the main chain of risk or risk nodes to justify doing it. to accept Therefore, the decision regarding how to establish costly controls will depend on the assessment of the probability of risk occurrence as well as the amount and importance of the damage caused by it [15].

Since the recent global financial crisis, the risks caused by the liquidity problem have become more evident, and the focus of financial law reforms has been directed to the issue of banks' liquidity. In response to these regulatory pressures, with the introduction of the Frank Wall Street Act and the Consumer Protection Act in July 2010, major

US banks such as JPMorgan Chase and Co have reduced their liquidity and cash holdings in an attempt to reduce concerns about Increased liquidity risk. However, there is uncertainty that the recent emphasis of the requirements proposed by Ball globally and the Dodd-Frank Act in the United States regarding liquidity provision can reduce the risk of banks and make the whole financial system more stable; Therefore, it is very important to better understand the potential relationship between banks' liquidity risk and their risk-taking behaviors in a situation where current regulatory reforms in global banking laws lead banks to be more liquid than before [13].

In the last decade, academic and legal attention has been given to how to reduce bank risk-taking. This is because the high risk-taking of banks endangers the safety and resources of private organisations and the stability of the domestic financial sector. Stolz, [26] claimed that the government and good cooperative supervision play an important role in helping banks to pursue the optimal level. He takes risks to increase the value of the company. The board is broadly required as an important precondition for an effective governance framework. Therefore, the board of directors has risk management and sets the conditions for the bank's risk-taking culture, above and future risk assessment, along with the bank's risk tolerance level. Banks and financial institutions also face risks like any other economic enterprise. The nature of financial activities and dealing with concepts such as credit, payment systems and different rates puts such institutions in front of special risks and On the other hand, the rapid development of financial activities, technical innovations, and the increasing complexity of financial systems have made the principles of risk management an inevitable part of every financial institution. Considering that banks are intermediaries of funds, lending activity is one of the It is considered an important activity of banks. This part of the bank's activities is subject to credit risk and requires the bank to examine the credit status of the borrowers. In order to reduce this type of risk and the costs caused by the increase in deferred claims, banks and credit institutions have paid a lot of attention to the category of credit risk in recent years [3]. Credit risk is actually a type of potential risk based on that the borrower is not able or willing to fulfil their obligations and repay the principal and sub-facilities received according to the terms and conditions contained in the contract. As a result, the repayment of the facilities is either not done or is done with a delay, which causes problems in the circulation of cash and will harm the bank's liquidity, and this in turn leads to the inability of the bank to fulfil its obligations and reduce the ability to create value. It is increased through lending. Liquidity risk, reputation risk and other risks are among the results and consequences of credit risk at the macro level of a bank. Credit risk is important and sensitive in monetary and credit institutions because the resources used for allocation, in The truth is the debt of the monetary institution (lender) to the shareholders, people and banks, which in case of freezing or lack of flow (lack of liquidity), weakens both the crediting power and the ability to pay the debt of the monetary institution (lender), especially In the balance sheet of monetary institutions, credit facilities are considered as deferred claims and deposits of individuals as immediate debt. This means that it is impossible to collect (long-term) claims all at once, but the payment of debts (deposits) is required at the moment, otherwise the financial institution will face bankruptcy [10]. In the discussion of risk, determining the degree of uncertainty in the final capital affects the value of credits and their adjustment, which can reflect negative effects on the market. The control and quality of risk management of interbank transactions in critical conditions focuses on the internal structures of banks, which, if not managed, may cause problems in the banking industry [17]. Therefore, the main research question is: What is the pattern of continuous risk monitoring in the banking field?

2 Theoretical foundations of research

2.1 Continuous risk monitoring

It is a continuous process of identifying, assessing risk, taking action to eliminate or reduce risk, monitoring and reviewing in a rapidly changing environment. Dynamic risk assessment not only makes risk management more comprehensive, stable and beneficial, but also improves risk assessment from a static state to a state in which resource allocation, prioritisation, responsibility determination and monitoring, and strategy formulation and implementation are also carried out [5]. Dynamic risk assessment allows internal audit to use its resources in more accurate and useful ways. The ability to use data and technology to continuously monitor risk types and trends in operations, processes and functions enables internal audit to review key performance indicators, key risk indicators and risk issues. This makes internal auditors check more levels [4].

Due to the nature of its activity, it deals with many risks. The four main risks that banks face are credit risk, market risk, liquidity risk and operational risk. The biggest risk of banks is credit risk, in the sense that the bank's credit customers are unable to repay their facilities or obligations. The high amount of outstanding and questionable claims in banks indicates the high amount of credit risk in the banking system. In some banks, the amount of outstanding claims is much higher than the total capital of the bank. Another important banking risk is liquidity risk. This means that the bank is not able to liquidate its assets to fulfil its short-term obligations. The main assets of banks are granted

facilities and long-term investments. When this facility is delayed or the investments made are in assets whose market is facing recession, such as housing, in this case, the bank will face difficulties in repaying customers' deposits. A look at the state of the country's banks shows that many of them are facing a high liquidity risk, and for this reason, most of them have to repay the deposit interest and principal.

Customers have borrowed from the central bank. Last year's 30%

2.2 Research background

Djebali and Zaghdoudi [9] evaluated the effect of liquidity risk and credit risk on the stability of the banking system. In this article, they used a panel data set of 75 ordinary banks belonging to 11 countries in the period of 2001-2019 to investigate the relationship between liquidity and credit risks and bank stability. The results of their estimation show that the relationship between credit stability-credit risk and the liquidity risk of the bank is non-linear, with the liquidity risk and it is determined by the presence of two optimal thresholds, which are equal to the credit risk of 13.16% and the liquidity risk of 19.03%. Finally, they advised the banks to strengthen their budgets and for Ease of use in its small size, an appropriate renovation. As for the selected countries, they should reform their financial systems in depth and develop the legal framework related to new techniques of external management of banking risks, including securities.

Djebali [8] conducted a study under the title of the threshold effects of liquidity and credit risks on the stability of the banking system. In this article, the relationships between liquidity and credit risks on bank stability were examined for a panel data set of 75 conventional banks belonging to 12 MENA countries from 2001 to 2019. The results of their estimation show that the relationships between bank stability-credit risk and liquidity risk of bank stability are non-linear, and it is determined by the presence of two optimal thresholds, which are equal to 13.16% for credit risk.

In a research with a sample of 63 Islamic banks from 10 countries, Chang and colleagues [6] examined the impact of Islamic supervision and governance structures on the level of operational risk disclosure. It was found that Sharia supervision, the independence of the supervisory board and the quality of governance at the country level have a positive and significant statistical relationship with operational risk disclosure.

Safiullah and Shamsuddin [24] investigated the issue of "Risk in Islamic banking and corporate governance" and examined the difference in risk between Islamic and conventional banks with special attention to the role of the composition of the Sharia Supervisory Board (SSB) in the risk of Islamic banks. Some banks were selected from 28 countries as samples. After testing the hypotheses using the banking risk model, they found that compared to conventional banks, Islamic banks have higher liquidity risk, less credit risk and less non-payment risk, but similar operational risk. Also, by increasing the size of SSB and upgrading the educational qualifications of its members, SSB operational risks and non-payment are reduced, but these risks increase with the increase in Sharia researchers in SSB. SSB features do not have a significant effect on liquidity and credit risks.

Da Silva and Divino [7] conducted a study titled "The role of banking laws in an economy under credit risk and liquidity shock" in the country of Barzabel. The results of this study showed that credit risk is periodic and default risk depends on structural characteristics. Therefore, bank policymakers can reduce output fluctuations by setting policies to promote financial stability and efficiency.

Sadeghi Shabhani et al. [23] investigated the systemic risk in the Iranian stock market banking industry: graph theory and ARMA-gjrgarch-DCCt approach. The results of the research show that, based on the centrality indicators, Bank Mellat is the most important banking institution in the banking network in both periods, and Saderat Bank in the first period and Pasargad Bank in the second period are the second most important institutions in the banking network. In addition, the integrity of the banking network has varied over time, but it has generally increased, and the correlation between the banking network has increased over time, which strengthens the possibility of systemic risk and risk transfer in the network. Also, the size of banks, and the value at risk of banks and specifically, the topology and structure of the country's banking network, are very effective on the occurrence of systemic risk in the banking network.

In a research, Khodkari et al. [14] investigated the liquidity risk crisis test in Iran's banking system: calculating the loss distribution of banks' liquidity risk with the use of Monte Carlo simulation. The results of the research show that among the shocks of macroeconomic variables, the exchange rate shock and the stock market price index have the greatest impact on banks' liquidity risk. Because of the attractiveness of parallel markets, the withdrawal of deposits from banks and finally the liquidity risk of banks will increase. Therefore, by considering the factors affecting shocks, not only can financial crises be controlled, but this issue can be a precursor to the empowerment of banks before the occurrence of any type of shock in macroeconomic conditions.

Heydarzadeh Moghadam et al. [11] in a research paper presented a model of risk management in digital banking - a rational approach. By choosing the grounded-theory research method and literature review, this research explains and develops the conceptual model of risk management in digital banking. After coding the interviews, based on the compiled concepts, he presented the conceptual model of risk management in digital banking. Using the expert-fuzzy method and distribution of questionnaires in three stages, experts' opinions on the importance of risk management indicators in digital banking, expert consensus and prioritisation of research indicators were investigated. The results and findings of the research provide an evaluation of the risk management model in digital banking in the country's banking industry.

Pendar and Veysi [18] in a research investigated the measurement of types of risk in the interest-free banking system (combined method of Dimtel and interpretive structural modelling). The findings show that base rate and government risks are at the highest level (fourth) as the most effective type of risks in the existing banking system. Credit, liquidity and sharia risks formed the third level and capital adequacy risks, price and investment in proprietary instruments formed the second level. Other risks were placed at the lowest level and are affected by higher-level risks.

Now, according to the theoretical foundations and backgrounds presented, the main question of the research is raised as follows: What is the appropriate model for continuous monitoring of risk in the banking sector based on structural equations?

3 Research methodology

Because the purpose of the research is to provide a continuous risk monitoring model in the banking field, therefore, the current research is behavioural. Behavioural research in the continuous monitoring of risk and banking includes the investigation of theories and methods of behavioural science that examine the relationship between the analytical information of banking risks and the behaviour structure of internal auditors. From the point of view of practical purpose and in terms of nature and descriptive-survey method, it is of correlational type, and also in terms of field method, and in terms of gathering the theoretical framework and background of the research, it is considered to be comparative and library type. The data collection and the final result, to test the rejection or acceptance of the hypotheses, have been done inductively and through the tool used to measure the research variables, that is, the questionnaire. For summary and calculations, Excel software and research components were analysed by the structural equation modelling method using Smart PLS software. According to the purpose of the statistical population research, employees working in all banks and credit and financial institutions of the private and public sectors have been considered. To prepare the questionnaire, first by collecting, taking notes and analyzing domestic and foreign articles, books, statements of Basel and the Central Bank of the Islamic Republic of Iran and published reports of the performance of the risk committee in different banks of Iran, the concept of risk in the banking industry and its dimensions were identified. Based on this, four main dimensions of risk (including operational, credit, liquidity and market risks), twelve main components, seventeen sub-components and one hundred and eighteen indicators were compiled. To determine the validity of the questionnaire, face and content validity were used. The face validity of the questionnaires before distribution by the researcher was checked based on the opinion of 5 university experts (the scoring range was from a minimum of 1 to a maximum of 5).

4 Research findings

To check the content validity of the questionnaire, the Lawshe method was used in the form of two coefficients of content validity ratio (CVR) and validity index (CVI). And with the help of 10 experts, the content of the questionnaire was provided to the elites of the risk field in the banking industry in terms of additional questions or modifications of the questions.

In the next step, since the statistical population of this research is employees working in all banks and credit and financial institutions of the private and public sector, after modifying and revising the questionnaire by experts in the field of risk in the banking industry, the questionnaires were distributed. Considering that the statistical population in this research is unlimited, therefore, Cochran's formula was used to determine the sample size, assuming an unknown statistical population. Based on this, the number of statistical samples is 384 people, after distributing 400 questionnaires, 298 questionnaires were returned.

The results of the demographic information of the sample of the statistical population are presented in Table 1.

The results indicate that 73% of the target sample are men and 27% are women. Also, a large part of the sample has a master's degree or higher or is a master's student. Also, the job sector information shows that almost all jobs

Table 1: demographic information of the sample

Percent	Number	Items	Variable	Percent	Number	Items	Variable
44	131	delivery man	Job	73	217	Man	gender
9	28	Internal auditor and inspection		27	81	Female	
4	13	Deputy branches		2	7	Ph.D.	education
6	19	Head of Fund Circle		32	97	MA	
26	77	branch manager		3	8	Doctoral student	
8	21	Head of facilities department		45	133	Masters' student	
3	9	currency circle		18	53	Masters	
16	47	Less than 5 years	Work experience	92	274	Accounting	Academic discipline
28	85	Between 6 and 10 years		5	16	audit	
34	102	Between 11 and 15 years		3	8	Economy	
19	55	Between 16 and 20 years					
3	9	More than 20 years					

in the banking sector have participated in this questionnaire, and the job dispersion is very high, which makes the questionnaire more effective. Also, a major part of the statistical sample (131 people, about 44%) is engaged in delivery work.

4.1 Data fit tests in factor analysis

In conducting factor analysis, first, it should be ensured whether the data can be reduced to a few hidden factors or not. For this purpose, the Kaiser-Meir-Olkin and Bartlett tests were used. Table 2 shows the results of the test.

Table 2: data fit test results

meaningful	Degrees of freedom	statistics	Test type	statistics	Test type
< 0.000	5253	64699.622	Bartlett's sphericity test	0.964	Kaiser test

Considering that the values of Keyser's test statistic are higher than 70%, so the appropriateness of the data for factor analysis was confirmed. Also, according to the significance of Bartlett's corvit test, we can see that the correlation matrix is not the same and there is a correlation between the variables, and it is possible to perform factor analysis.

4.2 Measurement model fit

In the current research, the questionnaire is the best tool for collecting information and measuring variables. Therefore, measuring the construct validity and reliability of the questionnaire is also of particular importance. Reliability of research is a criterion or test for the reliability of any research. In other words, reliability is a degree of agreement between two independent and separate measurements of the same thing in the research process and tool. This agreement is usually measured in the form of a correlation coefficient between the two (reliability is the degree of correlation between the results obtained from two measurements that are independently and separately performed on the applicants). With the help of reliability, you can understand the amount of error.

Cronbach's alpha method is the most important and widely used method for calculating the reliability of the questionnaire, which was used in this research. In the reflective measurement model, the evaluation of convergent and divergent validity is the most important tool for evaluating construct validity. Convergent validity refers to the degree of correlation that an indicator has with other indicators of the same variable. In this research, to check the convergent validity, the criteria of the external loadings of the coefficients, combined reliability and average variance extracted have been used. According to Zhang [33], in social science research, it is recommended to retain identifiers with values between 40 and 70 percent if it does not harm the validity of the variable content and the combined reliability and average variance extracted and increases the mentioned criteria. It is worth pondering. Also, values greater than 0.5 for average variance extracted (AVE) and greater than 0.7 for composite reliability (CR) indicate the appropriate fit of the measurement models and that they are convergent in terms of reliability and validity [32]. Table 3 shows the results of the first and second-order confirmatory factor analysis.

After conducting a confirmatory factor analysis, the results of which are shown in Table 3, it was found that all the items have a factor loading above 0.4, average extracted variance above 0.5, and composite reliability above 0.7, which shows the appropriateness of this criterion and the appropriate reliability of the measurement models.

Table 3: Spectral bands used in multispectral corrected images

Reliability of the main structure			**Reliability of components**			**Reliability of sub-components**			**Factor loads**			**Collinearity (VIF)**	**objects**	**Subcomponent**	**Components**	**The main risk**
Cronbach's alpha	C.R	AVE	Cronbach's alpha	C.R	AVE	Cronbach's alpha	C.R	AVE	Third time	second time	first time					
0.763	0.864	0.681	–	–	–	0.758	0.86	0.673	–	0.856	0.877	1.757	QU1	Stock risk	–	Market risk
											0.726	1.393	QU2			
											0.850	1.609	QU3			
						0.832	0.899	0.748		0.877	0.858	1.884	QU4	Exchange rate risk		
											0.875	1.887	QU5			
											0.861	1.994	QU6			
						0.737	0.847	0.65		0.875	0.74	1.403	QU7	Price risk of fixed income bonds		
											0.80	1.485	QU8			
											0.873	1.505	QU9			
0.803	0.885	0.720	–	–	–	0.892	0.915	0.607	–	0.952	0.781	2.226	QU10	Concentration of bank credit facilities	–	Credit risk
											0.683	2.226	QU11			
											0.709	1.582	QU12			
											0.718	2.120	QU13			
											0.839	2.834	QU14			
											0.852	2.899	QU15			
											0.852	2.823	QU16			
						0.837	0.891	0.672		0.897	0.876	3.064	QU17	The risk of applicants for facilities		
											0.798	1.781	QU18			
											0.781	1.592	QU19			
											0.822	2.637	QU20			
0.776	0.870	0.692	–	–	–	0.886	0.922	0.747	–	0.852	0.903	3.978	QU21	Other risks	–	Liquidity risk
											0.931	4.537	QU22			
											0.792	1.884	QU23			
											0.824	1.961	QU24			
						0.860	0.899	0.641		0.922	0.833	2.138	QU25	Failure to implement the liquidity crisis test		
											0.839	2.661	QU26			
											0.746	1.712	QU27			
											0.795	2.240	QU28			
											0.785	1.857	QU29			
						0.912	0.928	0.619		0.913	0.758	3.791	QU30	Non-compliance with the liquidity coverage ratios of J.A.A		
											0.834	3.384	QU31			
											0.826	3.421	QU32			
											0.712	3.126	QU33			
											0.735	3.262	QU34			
											0.796	3.605	QU35			
											0.775	3.964	QU36			
											0.847	3.257	QU37			
0.928	0.940	0.610	0.841	0.904	0.759	–	–	–	–	0.901	0.874	3.039	QU53	–	Violation of public safety	operational risk
											0.824	1.527	QU54			
											0.913	3.419	QU55			
			0.776	0.856	0.599	0.890	0.917	0.648	0.939	0.922	0.763	4.378	QU38	Communication and access to information	Technology and infrastructure	
											0.882	3.959	QU39			
											0.727	4.024	QU40			
											0.794	2.361	QU41			
											0.830	2.485	QU42			
											0.823	2.860	QU43			
						0.871	0.921	0.795		0.872	0.894	2.234	QU44	Information Technology		
											0.886	2.319	QU45			
											0.895	2.375	QU46			
						0.799	0.866	0.621		0.867	0.854	4.163	QU47	System failure		
											0.872	4.287	QU48			
											0.716	2.617	QU49			
											0.694	2.576	QU50			
			0.767	0.896	0.811	0.913	0.929	0.652	0.935	0.874	0.829	4.141	QU56	Internal fraud	Risk of fraud	
											0.772	3.108	QU57			
											0.800	3.548	QU58			
											0.787	3.715	QU59			
											0.770	1.796	QU60			
											0.849	4.372	QU61			
											0.843	4.041	QU62			
						0.877	0.925	0.804		0.950	0.832	1.679	QU63	Foreign fraud		
											0.934	4.890	QU64			
											0.921	4.602	QU65			
			0.843	0.906	0.762	0.804	0.883	0.716	0.907	0.936	0.809	1.775	QU66	Violations in recruitment processes	Violations in recruitment processes and personnel supervision	
											0.871	1.994	QU67			
											0.857	1.596	QU68			
						0.808	0.872	0.631		0.851	0.831	2.159	QU69	Manpower training		
											0.842	1.788	QU70			
											0.750	1.359	QU71			
											0.750	1.809	QU72			
						0.786	0.870	0.691		0.740	0.848	1.381	QU73	Health and safety of employees		
											0.829	2.021	QU74			
											0.817	2	QU75			
						0.728	0.843	0.643		0.917	0.855	1.451	QU76	Union protests		
											0.829	1.515	QU77			
											0.714	1.370	QU78			
						0.962	0.971	0.869		0.927	0.941	4.013	QU79	Violation of supervision		
											0.930	2.747	QU80			
											0.948	3.218	QU81			
											0.921	2.578	QU82			
											0.922	3.713	QU83			
						0.934	0.949	0.759		0.912	0.930	2.386	QU84	Registration and maintenance of transactions and reporting		
											0.954	1.334	QU85			
											0.938	2.539	QU86			
											0.936	2.815	QU87			
			0.913	0.939	0.792				0.947						Defects in implementation and banking processes	

							0.741	3.908	QU88			
							0.687	3.614	QU89			
			0.888	0.932	0.820	0.975	0.825	1.685	QU90	Customer acquisition and documentation		
							0.946	3.544	QU91			
							0.940	3.276	QU92			
			0.954	0.966	0.878	0.880	0.887	3.288	QU93	legal claims		
							0.958	2.071	QU94			
							0.950	3.116	QU95			
							0.952	3.283	QU96			
			0.980	0.986	0.945	0.903	0.966	2.645	QU97	outsourcing		
							0.973	4.767	QU98			
							0.974	1.060	QU99			
							0.975	1.679	QU100			
0.901	0.928	0.725	–	–	–	0.913	0.681	2.351	QU51	–	Customers, products and business practices	
							0.719	2.490	QU52			
							0.944	2.908	QU101			
							0.935	1.384	QU102			
							0.939	2.024	QU103			

4.3 Finding the structural model

The most important value used to evaluate the structural model is the coefficient of determination. which shows the amount of prediction of the model. This coefficient is obtained from the square of the relationship between the endogenous variables and the predictor variables. According to [29, 30], three values of 0.19, 0.33 and 0.67 are considered as the criteria for weak, medium and strong values. Also, the predictive power of the structural model proposed by Warner and DeFleur [28] shows the appropriateness of the model's prediction. In fact, a model is suitable when it predicts the indicators of latent endogenous variables. In this research, the Q criterion was used to perform this test. Three values of 0.02, 0.15 and 0.35 are considered as the criteria for weak, medium and strong values.

Table 4: values of coefficient of determination (R^2) and coefficient of predictive power (Q^2)

Q^2	R^2	**t statistic**	**factor load**	**subcomponents**	Q^2	R^2	**t statistic**	**factor load**	**Components**	Q^2	R^2	**t statistic**	**factor load**	**The main structure**
0.479	0.732	33.524	0.856	Stock risk										
0.566	0.768	46.365	0.877	Exchange rate risk				–		0.494	0.731	31.616	0.855	Market risk
0.474	0.765	46.719	0.875	Price risk of fixed income securities										
0.532	0.906	226.887	0.952	Risk of centralized facilities										
0.529	0.804	60.403	0.897	The risk of applicants for facilities				–		0.586	0.810	70.849	0.900	Credit risk
0.498	0.833	96.668	0.913	Non-obligation of liquidity coverage ratios										
0.533	0.850	83.168	0.922	The risk of not doing the crisis test				–		0.566	0.828	78.051	0.910	Liquidity risk
0.532	0.726	46.338	0.852	Other risks										
			–		0.596	0.811	82.402	0.901	Violation of public safety					
					0.597	0.833	91.152	0.913	Their customers, products and business methods					
0.604	0.849	80.333	0.922	Communication and access to information	0.525	0.818	78.086	0.939	Technology and infrastructure	0.418	0.793	83.062	0.891	operational risk
0.538	0.759	49.790	0.872	Information Technology										
0.485	0.751	47.800	0.867	System failure										
0.728	0.902	105.566	0.950	Foreign fraud risk	0.655	0.875	102.837	0.935	Risk of fraud					
0.438	0.762	71.939	0.874	Internal fraud risk										
0.529	0.875	158.750	0.936	Violations in the employment process	0.548	0.823	82.831	0.907	Violations in recruitment processes and personnel supervision					
0.416	0.723	56.759	0.851	Manpower training										
0.364	0.546	29.313	0.740	Safety and health										
0.399	0.841	99.365	0.917	Union protests										
0.666	0.858	98.957	0.927	Violation of supervision										
0.579	0.831	101.814	0.912	Registration and maintenance of transactions and reporting	0.694	0.897	185.980	0.947	Violations in implementation and banking processes					
0.728	0.815	81.052	0.903	outsourcing										
0.641	0.774	70.351	0.880	legal claims										
0.734	0.951	226.514	0.975	Customer acquisition and documentation										

The results of both tests, based on table 4, show a relatively strong fit of the model concerning the endogenous variables. The standard of goodness is appropriate. The overall model includes both measurement and structural model parts, and by confirming its fit, checking the fit of a model is complete. To check the fit of the overall model, the Goodness of Fit (GOF) criterion of Turco [27] is used:

$$GOF = \sqrt{\overline{AVE} \times \overline{R^2}} = \sqrt{0.717 \times 0.809} = 0.762$$

Considering that the GOF value is higher than 0.36, the overall fit of the model is strong. The significant coefficients of the variables are shown in figures 1 and 2. Considering that the significant coefficients of the variables are more than the absolute value of 1.96.

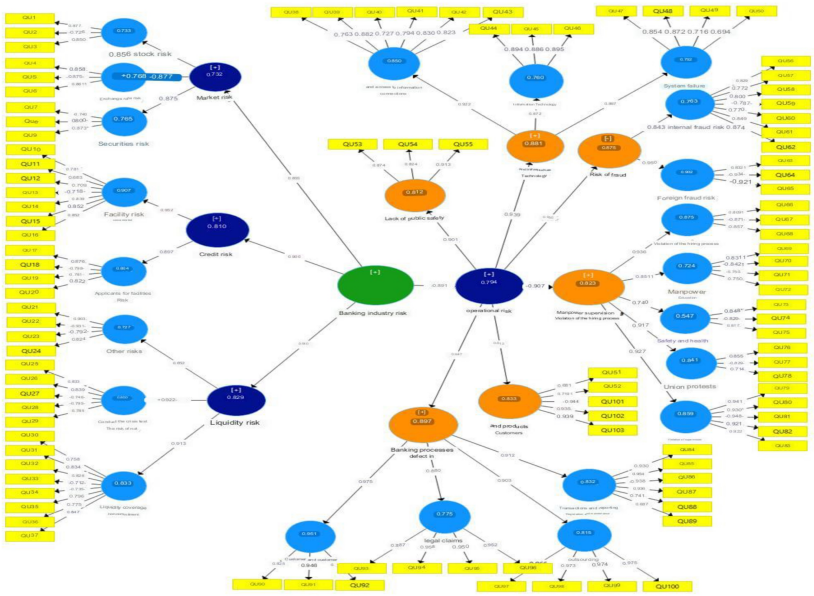

Figure 1: the path coefficients related to the causal relationships of the research variables

In the figure 1 above of this research, the path coefficients related to the causal relationships of the research variables are presented. The path coefficient expresses the existence of a linear causal relationship and the intensity and direction of this relationship between two latent variables. In fact, it is the same regression coefficient in the standard mode that we used to see in simple and multiple regression models. It is a number between -1 and +1, which, if equal to zero, indicates the absence of a linear causal relationship between two hidden variables. It should also be said that if the value of the path coefficient between the independent latent variable and the dependent latent variable is positive, we conclude that with the increase of the independent variable, we will see an increase in the dependent variable. And vice versa, if the value of the path coefficient between the independent variable and the dependent variable is negative, we conclude that with the increase of the independent variable, we will see a decrease in the dependent variable. In this section, as the model is reflective, it shows the relationships and coefficients and influence between the variables.

In Figure 2 above in this research, the value of T-Value) related to the causal relationships of research variables has been proposed. In the standard estimation mode, the factor loadings are shown; the larger the factor loading is and the closer it is to the number one, that is, the observed variable (question) can better explain the underlying or latent variable. If the factor load is less than 0.3, the relationship is considered weak and is ignored. A factor loading between 0.3 and 0.6 is acceptable, and if it is more than 0.6, it is very desirable. In a significant case, the value of t (path coefficient in a significant case) should be greater than 1.96, so that the relationship between each variable and the desired variable should be meaningful. If the value of t for all questions is greater than 1.96, then the relationship between the questions and the desired variable is significant, and therefore, the questions are suitable explanations for the desired variable. Also, to check the significance of the relationship between the variables, the test statistic t or t-value is used. Because significance is checked at the error level of 0.05, so if the amount of factor loadings observed with the t-value test is calculated to be smaller than 1.96, the relationship is not significant, and in the above model, because the value of the coefficient is greater than 1.96, so the level of significance It is less than 5%, so the variables are not randomly related and are meaningfully related. As you can see, the risk of the banking industry has three risks under the title a) market risk (stock risk, exchange rate risk, securities risk) and b) credit risk (centralized facility risk, facility applicant risk) and c) liquidity risk (other risk), the risk of not performing the crisis test, non-commitment of liquidity coverage) that the amount of relationships between the mentioned components and sub-components is greater than 1.96, which shows the significance and impact of the relationships between them.

5 Discussion and conclusion

The purpose of this research is to present a continuous risk monitoring model in the banking sector based on structural equations. Today, the science of psychology in the field of behaviour is not limited to the recognition of interpersonal behaviours and the restoration of people's relationships, and it is far more effective in other economic,

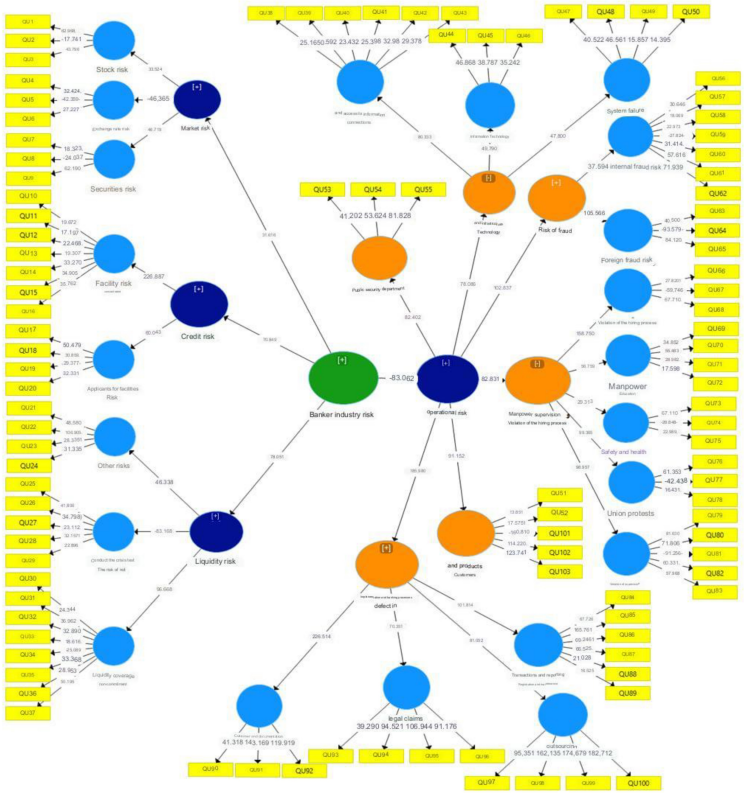

Figure 2: the value of T-Value related to the causal relationships of research variables

political, social and cultural fields. Knowing the personality differences of managers in companies active in the capital markets can help investors and shareholders to better analyse their behavioural functions to make a better inference of the conditions for them [22]. Even though managers are selected from knowledgeable and experienced people in the field of company management and are expected to make rational decisions, studies show that managers' behaviours also affect their decisions [21]. In the traditional financial economy model, it is assumed that decision makers behave rationally and always seek to maximise their utility [12]; But empirical researchers believe that sometimes, to find answers to financial puzzles, the possibility must be accepted that decision makers may not behave completely rationally. In other words, the personality traits of managers can also be involved in their decision-making as one of the important factors [2]. Behavioural finance listens to financial and economic theorists to consider human behaviour along with other variables. In fact, behavioural finance is a paradigm according to which financial markets are studied using models that discard the two main and limiting assumptions of the traditional paradigm of maximising expected utility and complete rationality [20]. In fact, the CEO, as a decision-maker based on the theories put forth during decision-making, can have cognitive distortions that deprive him of making completely rational decisions, and this causes the company's performance quality to decrease with the capital market and with shareholders and investors. found, and the trust and confidence of the market undergo fundamental changes. The weakness of economic theories in explaining the behaviour of people in decision-making situations led to the advancement of psychological theories in the field of why people behave. In the decision-making process, people's minds are generally involved in the unconscious, which systematically distances them from normative rationality. Among the important factors that can reduce the quality of people's decisions, the formation of mental accounts over time is decision making. As we know, the main sources of funding for banks are the deposits they receive from the debt side of their balance sheet. They drive all deposits using resources on the asset side of the balance sheet. Liquidity risk, together with credit risk, leads to the risk of bank default or bankruptcy. The risk manager determines the default risk tolerance. If the credit risk is currently high, the bank will reduce the liquidity risk by investing in highly marketable, low-yield securities to maintain the default risk tolerance level. But if the credit risk is low, the bank has a reliance and can increase the liquidity risk by investing in securities with relatively higher yield and lower liquidity with the same amount of tolerable default risk. Banks need to ensure their stability because they are exposed to various risks. In addition to the usual business risks, banks also face business/withdrawal and credit risks. Banks maintain an interest equalisation reserve to reduce withdrawal risk. They are more cautious to maintain their stability because they are exposed to credit risk that can

destroy the confidence of investors, depositors, and ultimately lead to bank runs and debt defaults. Professionals and academic researchers unanimously agree that banks have relatively fewer opportunities to invest in maintaining additional checks on the safety of their deposits.

Pollay and Mittal [19] stated that an unstable economic environment, along with inappropriate economic performance and fluctuations in asset prices and exchange rates, are among the main causes of instability in the financial system. Such an environment makes it difficult to accurately assess bank assets and financial risks. . Therefore, according to the role of financial mediation of the bank, as well as the influence of each financial institution (including the bank) on economic changes and market changes, monitoring economic trends and market trends and examining their effects on bank performance and risks to manage risks, including liquidity risk It is very important and significant. To explain the relationship between macroeconomic factors and banks' risk, business cycle models are mentioned. Business cycles are fluctuations that are defined as successive periods of boom and bust. With the occurrence of economic recession and a sharp decrease in economic activities, the banking crisis also began and spread. One of the most obvious signs of the crisis in this era is the loss of trust in financial institutions and the bankruptcy of creditors.

Therefore, due to the existence of the crisis and lack of financial ability of the debtors, which originates from their unemployment or low income, the banks are faced with not receiving their claims, and as a result, their reserves are decreasing, and as a result, with the increase in liquidity risk, they are unable to fulfill their obligations in They are not depositors. In this case, due to the existence of systemic risk in the banking industry, the acute problems and bankruptcy of small banks are transferred to other banks and involve the entire banking system of the country and then the banking system and the economic environment of other countries as well. In this context, we can mention the financial crisis of 2009 in America and the financial crisis of 1998 in Asia. GDP, inflation rate, exchange rate, profit rate and stock price index are among the macroeconomic variables that affect banks' liquidity risk. According to the theory of bank liquidity and financial fragility, whenever the economy exits recession and enters a period of prosperity, economic units, including banks, become optimistic about the future developments of the economy, increase the amount of long-term investment (long-term facilities) and keep less liquid assets. In the same way, during the recession, banks refused to grant facilities, and therefore their liquidity increased and their liquidity problems decreased. Therefore, it is expected that there is a negative relationship between banks' liquidity and business cycles. The inflation rate, including The indicators show economic instability, which affects the motivation of banks to keep cash, because with the increase in the inflation rate, the real value of assets (not only cash, but the real rate of return of all assets) as well as the income and profitability of banks from the place of granting Facilities are reduced and banks face more liquidity risk. An increase in the exchange rate also leads to an increase in the value of foreign currency assets on the one hand and a decrease in the value of the domestic currency on the other hand. The market of foreign exchange assets, which is a parallel market to bank deposits, increases. The exchange rate has become more attractive, and due to the decrease in the value of the domestic currency, it will make depositors more inclined to enter this market. So, with the increase in demand for liquidity and the lack of cash resources to meet obligations, the bank will face liquidity problems and be exposed to liquidity risk.

As we can see, the risk of the banking industry has three risks under the title a) market risk (stock risk) Its amount is 33.524, the amount of exchange rate risk is 46.365, and the amount of securities risk is 46.719 (as well as b) credit risk (where the amount of risk of centralized facilities is 226.887 and the amount of risk of applicants for facilities is 60.043) and also c) Liquidity risk (the amount of other risks is 46.338 and the amount of the risk of not performing the crisis test is 83.168 and the amount of non-commitment of liquidity coverage is 96.668), which shows the significance and the relationship between these variables, which is the most important The components and sub-components are specified. that the results of this research are consistent with the research of Djebali and Zaghdoudi [9], Da Silva and Divino [7], and Shekarkhah et al. [25]. Government budget, capital market fluctuations, housing market developments, etc., can have significant effects on Middle East Bank's balance sheet and its profitability in the coming years. After the withdrawal of the United States from the JCPOA and the reimposition of sanctions against Iran in May 2017, Iran's markets faced severe fluctuations. The unbridled growth of the inflation rate and the serious decrease in the level of GDP in various sectors, especially oil and industry, in 2017 and 2018, were the result of the return of sanctions. Due to the current political conditions, the future horizon regarding the possibility of renegotiation and removal of sanctions is very unclear and therefore in the near future, it seems that the current extremely uncertain conditions will continue. Among the different types of risks that affect financial institutions, Operational risk can have the most destructive power, which is difficult to predict. Credit and market risks are now well known, but operational risk is still unclear for managers. Unlike market and credit risks that exist in specific areas of business, operational risk is a part of all business processes. The results of this research are consistent with the research of Djebali and K. Zaghdoudi [9], Da Silva and Divino [7], and Khodkari et al. [14].

Based on the findings of the research, the following suggestions are presented:

1. Because liquidity risk is one of the main financial risks in the banking system and the most important cause of bank bankruptcy and the main characteristic of recent financial crises, therefore, in general, the managers of the banking system should, to reduce the risk, in addition to They should pay attention to the economic environment and the differences between banks in their decisions regarding the optimal allocation of assets and the fulfillment of their obligations and make decisions based on economic conditions to avoid problems, bankruptcy and the loss of reputation and credibility.
2. Reducing inflationary expectations by creating economic stability and adopting financial and monetary policies appropriate to the conditions of the country, as well as the financial discipline of the government to control inflation, which is one of the factors of creating a crisis and increasing the liquidity risk of banks.
3. Establishing stability in the currency market and preventing the shock of the exchange rate increase to prevent speculation and create attractiveness for the withdrawal of deposits from banks.
4. Increasing the performance of the bank through the examination of banking risks, internal evaluation, planning, risk management and conducting crisis tests.
5. To prevent the occurrence of systemic risk in the country's banking system, it is suggested that the central bank pay attention to the risk assessment of the banking system and apply policy measures by it.
6. Periodically, the risks are reviewed at certain time intervals so that, according to the economic conditions and the emergence of economic shocks, the possibility of discovering the next risks is provided.
7. Establishing and continuing the risk committee and periodically reviewing the risks and providing solutions to eliminate or reduce the created risks.
8. Inspectors should oblige banks to establish an efficient system for detecting, evaluating, monitoring and controlling credit risk as part of the overall approach to risk management. Auditors should have an independent evaluation of the bank's strategies, policies, procedures and performance related to the credit-granting process. In addition to limiting the bank's exposure to individual borrowers or a group of related counterparties, they should consider determining prudential limits. Also, the credit risk policies of a bank should clearly specify how the bank should manage its problematic credits. Banks use different methods and arrangements to manage their problematic loans. According to the size and type of credit and the cause of the problem, the decision-making responsibility for such credits can be assigned to the department that was in charge of doing it from the beginning, or to a specialised problem-solving department, or a combination of the two.

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