Paper Type: Original Article

Bank Stability under Threat: The Effects of Liquidity and Credit Risks

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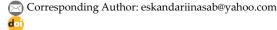
Citation:

Abstract

Forecasting financial risks can have an important effect on decisions related to granting facilities and the profitability of financial institutions. For this reason, researchers are continuously developing financial bankruptcy risk prediction models that investigate the course evolution of these models and show the importance of this issue. In Iran's capital market, like other capital markets in the world, many companies are operating. As a rule, the performance of some companies is strong, and the performance of others is weak. Forecasting financial risks can have an important effect on the decisions related to the granting of facilities and the profitability of financial institutions. For this reason, researchers are continuously developing models for predicting credit risk and liquidity risk, which examines the evolution of these models. It speaks for itself of the importance of this issue. In this regard, it can be said that predicting liquidity and credit risks is one of the most important. The issues are in the field of financial decision-making. When an industry does not have enough liquidity, it is able to increase funds or convert. It is not assets that this inability will affect profitability. According to the available evidence and field studies, it can be said that the main liquidity risk does not match the amount and maturity of debts and assets and, as a result, creates a negative liquidity gap. Our goal in this research is to state that since the effects and role of banks in the executive position of monetary, currency and credit policies play a special role, it is very important that many cases derived from liquidity and credit risks, such as lack of liquidity in the bank, can have consequences. Also, the issue of liquidity is much more vital for every bank than other issues. Our results show that credit risk and liquidity risk do not have a simultaneous economic interaction. However, both risks separately affect the stability of the bank.

Keywords: Risk assessment, Liquidity, Credit, Risk management, Banking system.

1 | Introduction

Considering the recent crises in the bankruptcy of some banks and credit institutions and the negative impact of this on the economy and the stability of the banking system, special attention should be paid to the consequences of financial instability in the economy [1]. In addition to deposit protection, investors are essential to preventing bank failures [2]. As a result, the banking system should create reasons to identify banking instability. Banks, on the other hand, are exposed to numerous financial risks. According to Cecchetti and Schoenholtz [3], these financial risks include the possibility that depositors will suddenly withdraw their deposits. A wide range for the development of reliable methods and techniques for measuring and controlling risk in this field by academics and individuals. Liquidity and borrowers do not repay their loans on time credit risk. The risk category is one of the effective and influential factors. In advancing or not advancing the goals of companies and organizations, environmental uncertainty and the intensity of competition organizations have caused their managers to face many challenges.

Environmental complexity, the intensity of competition, the prevalence of new and advanced technologies, the development of information technology and so on, communication, new ways of supplying goods and services, environmental issues and the orientation of organizations from tangible to intangible assets, etc. It is one of the major factors that has caused organizations and economic enterprises to face many risks during their lifetime which are outside of prediction and inference [4]. For this reason, in order to reduce risk and compensation for the losses caused by it today in the scientific literature, types of risk management such as company risk management, business risk management, strategic risk management, etc raised, and each has a special place [5]. The occurrence of the final financial crisis in the late seventies, the early eighties, and the late nineties created a huge wave of changes in the international arena [6]. This crisis increased the vigilance of banks and regulators to monitor more types of heads at the level of financial and banking institutions [7]. Weaknesses in the country's banking system, the possibility of sanctioning the country's banking system in international forums, requirements Wing Committee, reduction of government support, risk of crisis and attack on banks, losses from transactions, fluctuation of asset and liability rates foreign exchange, increasing uncertainty in the market, excessive holding of cash assets in bank balance sheets, increasing the bankruptcy process of companies. The largest creditor in the country, the increase in risk factors in banks and credit institutions due to economic relations caused by globalization and the development and innovation of monetary and financial instruments are problems that threaten the country's banking institutions [8]. With regard to the problems faced by banking institutions, risk management should be considered as a factor that plays an effective role in gaining a competitive advantage. It is important to be highly regarded in these and other financial and credit institutions [9].

Measuring market risk is important information about possible risks in the value of institutions' assets. Financial institutions provide this information, and senior managers of financial institutions can use it to know the status of their trading portfolio earnings. Also, awareness of market risk helps managers to limit trading positions for traders who adopt this institution to avoid the effects of possible losses [10]. Predicting key factors in decision economic measures and success in forecasting require intervention in the actual formation of the tags in a favourable way. The prediction draws the horizon of the future and creates a framework for decision-making among the unknown. Different decision-making groups, such as investors, creditors, management and other people, rely on predictions and expectations in their decisions [11].

A stable banking system is a system that, in addition to removing the ability to efficiently allocate economic resources and create economic processes such as economic growth, public welfare and asset density, proper management in the field of financial risks, even in crises, has foreign. Banking stability needs to be addressed from different perspectives [12]. Stability banking can represent the structure of banking resources and the financing of bank assets. According to the literature on the health and banking stability of basic capital, it can help banks compensate for financial losses and capital as a factor that reduces the transmission of shocks and risk. The lending process of banks is [13].

On the other hand, the increase in resource costs leads to a decrease in the profitability of banks. It is possible that, as a result, the bank's capital has decreased, and banks, in this case, should consider a profitable lending opportunity. It will also lead to an increase in the interest rate. The increase in the interest rate in banks is to prevent the bank's capital reduction in the future [14]. Liquidity problems affect the income and capital of banks and can cause bank bankruptcy in acute situations [15].

Banks may have to borrow cash from the market at a relatively high interest rate during a liquidity crisis. Their study shows that the liquidity risk and banks' performance have a bi-directional relationship, which means that both liquidity risk and banks' profitability have significant effects on each other [16]. It is worth mentioning that risk should not necessarily be observed with a general and negative view, but in many cases, its proper guidance and measurement. Being on time can not only prevent many costs but ultimately improve productivity by achieving profitability. Sufficient knowledge based on correct operational information and data of customers' financial activities and line adoption basic policies for accepting customers and conducting appropriate research and continuous monitoring of this process and reflecting them to senior managers and the board. In order to approve strategic policies, the managers of the organizations have provided the means to improve the administrative and operational health systems of the organizations. It will bring the utmost reputation and credibility and improve the indicators.

2|Research Method

In accordance with [17], liquidity risk is considered to be a benefit-reducing cost. Loan default, cash risk increases due to the decrease in incoming cash flow and its value decrease. In the banking approach, which exists in the Monty Klein model of banking organizations [18], there are relationships between liquidity and credit risk. According to the report [19], show that the assets of Perri Sek Bank, bank shocks provoke. According to these models, liquidity and credit risk should be positively related and jointly related to instability. Diamond and Rajan [20] show that there is a positive relationship between liquidity and risk. They state that if many economic projects are financed with loans, the bank cannot demand depositors provide. Therefore, these depositors will get their money back if the value of these assets decreases. This means that liquidity and credit risk increase simultaneously.

The bank uses all the loans and reduces the total cash flow. The result is that higher credit risk accompanies higher liquidity risk with depositors' demand. Financial companies increase debts that must be constantly renewed and used to finance assets. A bank provides a higher risk to the bank [21]. According to the investigations carried out, there is a positive and significant relationship between credit and liquidity [22].

The relationship and effects of credit and liquidity risks on banks are investigating the possibility of default. This study includes questionnaires for a sample of eighty designated respondents. They found that there is a positive relationship between liquidity risk and credit risk [15]. The relationship between Liquidity risk and credit risk was tested in US banks, including a sample of all commercial banks in the US during the period 1998-2010. Banks may, in times of liquidity crisis, be forced to borrow cash from the market at a relatively high interest rate. This ultimately leads to a decrease in bank income. In addition, excessive borrowing from banks also puts their capital at risk, according to the investigations' assumptions. The research includes:

I.   Credit risk has a significant effect on banking stability.

II.   Liquidity risk has a significant effect on banking stability.

3|Modelling and Econometric Data

We use complementary methods to evaluate the effect of credit and liquidity risks on bank stability. First, we examine the relationship between credit risk and liquidity. This analysis addresses the problem that the direction of penetration is not known and has attracted a lot of attention over the past years to consider possible interrelationships or delays between variables. We use the simultaneous equation approach and the

PVAR model. Second, using the Generalized Method of Moment (GMM), we examine the effect of liquidity and credit risk on banking stability.

3.1 | Two-Stage Least Squares

To investigate the causal relationship between credit risk and liquidity, we use the simultaneous equation approach.

$$CR_{i,t} = C + \beta1 CR_{i,t-1} + \beta2 LR_{i,t} + \sum \beta_j \, Bank \, i_{j,t}, j = 1,$$

$$LR_{i,t} = C + \beta1 LR_{i,t-1} + \beta2 CR_{i,t} + \sum \beta_p \, Bank \, p_{i,t}, p = 1,$$

where i=1...N, indicating bank and t=1. . . N represents the period, and CRit and LRit indicators represent the credit risk and liquidity risk of bank i at time t, respectively. Bank j(i,t) and Bank p(i,t) show bank-specific control variables; these variables include bank size, Return On Assets (ROA), Return On Equity (ROE), Capital, Adequacy Ratio (CAR), profit margin, liquidity gap, asset growth, income diversification and efficiency. These variables have been established by research conducted in the areas of credit risk and liquidity risk.

Panel Vector Autoregression model

Here, to investigate the relationship between credit risk and liquidity risk, we use the Panel Vector Autoregression (PVAR) model developed by Love and Zicchino [23] to investigate the causal relationship between credit risk and liquidity risk. The function of PVAR is that by introducing the fixed effects of important banking indicators (ui), it calculates them at the level of variables. This model is written as follows:

$\Theta(L)$ is the delay operator, and $y_{(i,t)}$ is the vector of variables so that: $y_{i,t} = u_{i,t} + \Theta(L)y_{i,t} + \mathcal{E}_{i,t}$

Model ROA$_{it}$

The following standard model analyses the effect of credit and liquidity risks on the financial performance of Iranian banks during the period 2015-2022 through the fixed effect model [24], [25] as follows:

$$ROA_{it} = \beta_0 + \beta_1 IV_1 it + \beta2 LIV_2 it + \beta3 IV_3 it + DU + \varepsilon_{it},$$

ROA: return on total assets (dependent variable and index to measure financial performance).

IV1: capital adequacy ratio (independent variable and index based on credit risk measurement).

IV2: volume of non-current loans (variable and independent index to measure credit risk).

IV3: liquidity ratio (independent variable and index to measure liquidity risk.

i: bank.

t: year.

β0: fixed duration.

β1, β2, β3: coefficients of independent variables

L: natural logarithm.

ε: random error.

DU: COVID-19.

Z-score modeling

In this article, the experimental specifications provided by Imbirovich and Rauch [15] are used, which can be stated as follows:

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$$z - \text{score}_{it} = \beta_0 + \beta_1 Z - \text{score}_{it-1} + \beta_2 \text{ liquidity risk}_{it} + \beta_3 \text{ credit risk}_{it} + \beta_4$$
$$\text{liquidity risk* * credit risk}_{it} + \beta_5 \text{ size}_{it} + \beta_6 \text{ ROA}_{it} + \beta_7 \text{ CAR}_{it} + \beta_8 \text{ loan growth}_{it} +$$
$$\beta_9 \text{ efficiency}_{it} + \beta_{10} \text{ income diversity}_{it} + \beta_{11} \text{ Inf}_t + \beta_{12} GDP.$$

t represents time, and (our time frame is 2015-2022.) Z-score stands for the stability of the banking system at time t, and also 1(-Zscore(it) is the first dependent variable with a delay that shows the continuity of banking stability over time. β_0 is a parameter that must be estimated. ROA represents a ROA, CAR capital adequacy ratio, Inf inflation rate, and other factors such as GDP real GDP growth and crisis are also specified in the above relationship. $\beta_1... \beta_{12}$ represents estimation coefficients. In fact, these variables are created by articles on banking risk and bank stability, such as Cole and Gunter [26], Acharya and Yeswanathan [21], Cole and White [27], and He and Xiong [28] for accounting. The increase in Z-score shows a decrease in the probability of bank bankruptcy. *Table 1* briefly presents the different variables and their respective specific criteria.

Table 1. Different variables and special criteria.

Calculation Method	Variable
Total assets	Bank size
Cash assets in proportion to total assets	Liquidity risk
Fueled loans/gross loans	Credit risk
Net income/total assets	Asset return rate
Assets/capital	Capital adequacy ratio
log(assets − liabilities)	Liquidity gap
(loan(t)- loan (1-t))/ Loan(1-t)	Loan amount
In the financial study period, that is, from 2015	Crisis variable
Gross loans to total assets	Loan asset
Cost in proportion to income	Efficiency
(1-(Net profit -Other income)/ total operating income	Diverse income
Customer price index	Inflation rate
GDP growth ratio	GDP rates

4|Findings

First of all, the relationship between credit risk and liquidity should be analyzed; in *Table 2*, the estimated results are presented using Two-Stage Least Squares (2SLS) regression, in which credit risk with the ratio of non-current facilities to total facilities and liquidity, with the ratio of liquid assets, it is approximated to the total assets. The Durbin-Woo-Hausman test is used to advance. According to the estimates of the parameters of the fixed effect model (ROA: dependent variable), the results obtained can be deduced according to *Table 2*.

Table 2. Moled's results.

Probability	T-test	Error STD	Coefficient	Variable
0.01	1.60100	2.78345	4.45632	IV_1
0.05	-2.17719	0.53478	-1.16432	LIV_2
0.05	-2.61304	0.83478	-2.18132	IV_3
0.10	-6.87408	0.71879	-4.94102	DU
			0.78	Detection coefficient
			0.75	Adjusted coefficient of determination
Results obtained			4.690245	Test F
			0.028313	Probability based on test F

In this research, liquidity risk was used as a dependent variable, and credit risk and capital adequacy were independent variables in the research data.

Regarding capital adequacy, there is a direct and significant relationship. Also, the ratio (IV1) and the return on total assets (ROA) at a significant level of 1% is interpreted as the higher the capital adequacy ratio, the higher the return on total assets in banks. There is an inverse and significant relationship between the volume of non-current facilities and the return on total assets (ROA) at a significant level of 5%. This means that the smaller the size of the non-current facility, the higher the total ROA in the studied banks.

There is an inverse and significant relationship between the liquidity ratio and total ROA at a significant level of 5%. That is the lower the liquidity ratio, the higher the return on total assets (ROA) in the studied banks.

Due to the coronavirus epidemic (ROA), its effect on the return on total assets (ROA) is negative at a significant level of 10%, and a direct relationship is established. Since there were various closures at the beginning of the coronavirus epidemic, various economic sectors, including Banks, were negatively affected. In general, banks were affected. In this article, the annual banking reports of ten banks from the banks of Iran, which were extracted from the Kodal website, are examined. In this study, we use Z-score as a measure of bank stability that measures the relationship between bank and bankruptcy. According to the approach proposed by [29]–[31], this variable is inversely related to the probability of default. It is characterized as follows: ed during the Corona pandemic, and this effect can be seen in the total ROA. That here $Z = ((u + k)/\sigma)$.

u: average performance of the Bank's assets.

K: equity as a percentage of total assets.

σ: standard deviation.

Descriptive statistics, mean value and standard deviation of these different banking variables are recorded in *Table 3*.

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Table 3. Summary Statistics of Key Variables Related to Liquidity and Credit Risks.

Standard Deviation	Mean	Observation	Variable
0.091	0.09	10	Liquidity
9.815	5.294	10	Credit risk
2.286	0.628	10	Credit risk*liquidity risk
2.533	1.459	10	ROA
1.096	2.57	10	Z-score
0.845	4.029	10	Size
13.429	11.719	10	CAR
1.251	4.461	10	Loan growth
1.339	3.172	10	Diverse income
0.134	1.55	10	Productivity
0.433	0.25	10	Crisis
0.154	0.562	10	Loan amount
27.95	10.992	10	ROE
0.221	0.045	10	NIM
0.842	3.143	10	Liquidity gap
0.071	2.097	10	Inflation
5.087	5.361	10	GNP

Based on the obtained results, the key and most important issues of this research are explained as follows: liquidity and credit risk are two important factors for the survival of banking and play an important role in the stability of the banking system. This research studies the effect of liquidity risk and credit risk on banking stability using the data of 10 selected banks in Iran during the period of 2015-2022. In addition, we found that credit and liquidity risks do not have a simultaneous or delayed relationship when they are economically meaningful; in addition, each risk has a significant impact on banking stability. It should also be noted that the interaction of these two risks has a significant impact on banking stability. Therefore, the results of estimating the importance of credit and liquidity risk in understanding banking stability show its special importance.

Credit departments in banks should request financing requests from customers in accordance with policies related to feasibility studies in such a way that this issue affects the reduction of credit risks affecting financial performance.

Optimum use of liquidity and investment with excess cash, through a committee consisting of independent financial experts in the bank, is recommended to determine and measure the liquidity ratio and its application and to adopt a general framework for managing the liquidity risk of banks, in order to providing liquidity and maintaining the stability of the bank is recommended.

Conclusion

This study highlights the critical importance of forecasting liquidity and credit risks in ensuring the stability and profitability of banks. Our analysis, conducted within the context of Iran's capital market, underscores the distinct yet significant impacts that both liquidity and credit risks have on banking stability. Through the use of Two-Stage Least Squares (2SLS) regression, we examined the intricate relationship between these two types of risks and their effects on financial performance, measured by the Return on Assets (ROA).

The findings reveal that while credit risk and liquidity risk do not exhibit a simultaneous economic interaction, each independently influences the stability of banks. Specifically, inadequate liquidity, characterized by a mismatch between the maturities of assets and liabilities, leads to a negative liquidity gap that can significantly undermine profitability. Similarly, high credit risk, indicated by a higher ratio of non-current facilities to total facilities, poses a substantial threat to financial stability.

Given the pivotal role banks play in executing monetary, currency, and credit policies, managing these risks effectively is paramount. The research underscores that liquidity risk is particularly crucial, as liquidity issues

can precipitate broader financial instability. Therefore, banks must adopt robust risk management strategies to mitigate these risks and enhance their resilience.

In conclusion, this study contributes to the understanding of how liquidity and credit risks independently affect bank stability. It underscores the necessity for financial institutions to prioritize risk forecasting and management to safeguard their operations and ensure long-term profitability. Future research should continue to explore the dynamic interactions between different types of financial risks and their collective impact on the banking sector.

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