

USING THE QUANTITATIVE MODEL “Z-SCORE” TO PREDICT THE FINANCIAL STABILITY FOR SAMPLES OF IRAQI PRIVATE COMMERCIAL BANKS

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Abstract

The aim of this research is to shed light on the efficiency of the banking system in Iraq to interact with the variables of the international environment in order to achieve financial and banking stability, and to assess the financial soundness of a group of Iraqi private commercial banks based on the use of the (Z-Score) model, if we know that the Central Bank of Iraq has obligated the private Iraqi commercial banks to increase their capital to (250 billion Iraqi dinars) to consolidate financial solvency and financial stability. The research reached a set of conclusions, including the absence or achievement of the financial stability of the study sample banks and for the period of the study, as the results of the z-value analysis of financial stability showed that the Iraqi Credit Bank in the time period (2011-2015), it was located in the financially safe area, while the rest of the banks are in the high-risk insolvency area. As for the time period (2016-2020), all the sample banks are located in the dangerous financial insolvency area.

Keywords: Financial and banking stability, financial safety, (Z-Score) model

INTRODUCTION

In light of the developments that keep pace with the various economic sectors, and the challenges of globalization, trade openness and investment in various sectors, the banking sector is one of the most important sectors that contribute to supporting these developments as the main source of funds, since the banking business environment is characterized by dynamism and instability, preserving the financial stability of this sector is one of the urgent priorities to continue providing various banking services. In addition to being quickly affected by the external environment and the contagion of crises that strike the financial markets, so the international regulators worked, the most important of which is the International Committee for Control and Supervision (Basel), and the International Monetary Fund to issue guidelines and recommendations that would strengthen financial stability. Among the most important of these guidelines is the emphasis on raising the capital adequacy ratio to meet the challenges of financial crises. Therefore, this research sought to test the reality of the financial stability of four private Iraqi commercial banks. These are the National Bank, The United Bank,

Investment Bank, Credit Bank, and for the period from 2011 to 2020, and through four topics, the first topic included the research methodology and the second topic the theoretical framework, while the third topic included the applied framework, and the fourth topic included conclusions and recommendations.

The first topic

Research methodology and previous studies

First: the research problem:

Financial stability is one of the priorities of the banking business and an indicator of the ability of banks to absorb the shocks that the banking sector may be exposed to, whether in the scope of its internal or external environment, and that instability or factors of weakness constitute a threat and an indicator of exposure to bankruptcy. In light of the guidelines provided by the International Committee for Control and Supervision (Basel), which emphasized the need for banks to support the capital adequacy ratio to strengthen their financial capabilities to maintain financial stability, the problem of this research stemmed from the following question:

“Did the increase in the percentage of capital in Iraqi private banks contribute to achieving financial stability?”

Second: Research objectives

The objectives of the study can be summarized in the following points:

1. Highlight the importance of maintaining the safety and stability of the banking sector.
2. Evaluating the financial soundness of a group of Iraqi private commercial banks based on Z-Score model.
3. Evaluation of the efficiency of the banking system in Iraq to interact with the variables of the international environment in order to achieve financial stability.

Third: the importance of research

The importance of research emerges from the nature of the pioneering role that banking activity plays in supporting and developing the economies of different countries, and in light of the repercussions of financial crises and their repercussions on financial institutions, and the tendency of most of those countries to fortify their financial and banking sectors and to enhance the safe environment, this research comes to shed light on the reality of financial stability, this is for the performance of banking activity in Iraq, especially since this sector constitutes the main pillar in financing projects and attracting foreign investments, especially since this sector, like other economic sectors, suffered under the circumstances of the wars that Iraq witnessed, which were negatively reflected and formed a gap and a challenge in keeping pace with developments that world is witnessing.

Fourth: Research Hypothesis:

In light of the instructions of the Central Bank of Iraq to all private commercial banks to increase their capital to (250 billion Iraqi dinars as a minimum), and this gave them a strong capital base that contributed to a high capital adequacy ratio. One hypothesis was adopted *“It provides for achieving financial stability by increasing the capital adequacy of the study sample banks”*.

Fifth: Research Methodology:

The study relied on the analytical descriptive approach in presenting and analyzing the components of the research, as it is considered more appropriate for the study of the phenomenon, as it describes the phenomena, provides data and information about them, and shows their analysis, with the aim of reaching results after which conclusions and recommendations can be made.

Sixth: Sources of data and information collection:

The study was based on collecting data and information related to the theoretical and applied framework of the study on the following:

1. **Theoretical side:** In writing the theoretical framework of the study, the researcher relied on a group of Arabic and foreign books, research, and articles, in addition to the laws, regulations, and legislation in force.
2. **The applied side:** The applied side: the researcher relied on measuring the indicators of the study variables on the annual financial reports of the final accounts related to the Iraqi banks for the study sample, represented by (The Board of Directors' report, the auditor's report, the balance sheet, as well as the bulletins and reports issued by the Central Bank of Iraq).

Seventh: previous studies

1. Adoun and Said, (2014) study, banking stability and the mechanisms to achieve it, a comparative study of two banks in Algeria using Z-Score method

This study aimed to highlight the most important proposed mechanisms to achieve banking stability, and then try to assess the role of capital in enhancing this stability. The study raised a question: Does the increase in capital support the stability of the bank?

This study was conducted on two banks located in Algeria, one of which is public BNA and the second is foreign Société Générale, they are differ in terms of origin and capital, which makes it possible to compare the size of capital and its impact on stability, using the z-score function. The study concluded that capital has a fundamental role in achieving stability. However, it is not sufficient if it is not accompanied by high activity results and effective management of assets and risks. The study concluded that the Z-Score model is one of the most used methods for measuring the stability of individual banking institutions, as it focuses on the risks of insolvency and the bank's resort to capital depletion and reserves before bankruptcy, it also links this possibility, along with

the capital, to the risk that the bank suffers from and the returns it achieves. Likewise, the rise in capital is not considered a sufficient indicator of the strength and stability of the bank, If this increases is not commensurate with the value of the assets on the one hand and the results achieved on the other hand, and the management of assets and liabilities and risk management play an important role in achieving and maintaining stability.

2. Study, Joshi, M.K. (2020)

Financial Performance Analysis of Select Indian Public Sector Banks Using Altman's Z-Score Model

This study aimed to assess the financial performance of a selected group of Indian public sector banks, which have the highest level of total non-performing assets using Altman's Z-Score model, it was concluded that all the selected banks were in the safe zone where the average Altman Z-Score value was higher than the maximum specified for the safe zone which is 2.9. There is a significant variance in the Z-score values.

Z-score values vary widely between banks, due to their differing asset sizes; however, when considered individually for each bank, the Z-Score did not show significant variation between years, in the ten-study period. The z-score value was found for the first five-year period, statistically different from the last five-year period when all the banks were pooled together. This may be due to the increase in non-performing assets in the last five-year period. The results of the linear regression analysis indicated that for every 3.1% increase in total non-performing assets, the Z-score decreased by 1%. However, for every 1% increase in net profits, the Z-score increased by about 15.31%. Public sector banks not only have to keep their troubled assets under control, but they also have to come up with innovative ways to increase their profits.

3. Study by Elia et al., 2021

Using Altman Z- Score to Predict Financial Distress: Evidence from Lebanese Alpha Banks

Altman Z-Score was used to predict financial distress: evidence from Lebanese alpha banks. This study aimed to prove the validity of the Altman Z-Score model to anticipate financial hardship in Lebanese Alpha banks during the period 2009-2018. The study adopted the descriptive analytical approach for the financial data of the Lebanese Alpha Banks. The researchers calculated the Altman Z-Score for non-manufacturing companies and emerging markets. The majority of the 10 alpha banks had values below the maximum 1.1 which showed evidence that they were bothered during the period 2009-2018, and based on the results of the Z-score model, it is recommended as an important and effective indicator for any external or internal use, this is to be used in analyzing the financial statements of banks by auditors, financial managers, investors and lenders in order to make the right decisions for the financial hardship or failure of these institutions.

The second topic: the theoretical framework of the research

First: the concept of financial stability

The cognitive literature has dealt with this issue and relied on highlighting the concept of financial instability, which is clearly evident during financial crises, in order to give a concept of financial stability. Ferguson has defined the state of financial instability as

“An abnormal situation or state of discrepancy between the actual prices and the fair prices of financial and real assets, in addition to a significant distortion in the performance of the financial market, a lack of credit availability locally and perhaps internationally, and a significant deviation in total spending from the ability of the economy to produce”. (Ferguson, 2002: 2)

Drffill addressed the definition of financial instability through the concept of financial fragility, describing the situation as such: “The situation in which potential borrowers own little wealth related to the size of their projects, and this situation leads to high organizational costs and impediments to performance in the investment sector and at the level of the economic sector in general.” (Drffill et al., 2005: 5)

In light of this, the concept of financial stability becomes clear in the opposite case of instability, so it can be said that the stability of the financial system and its lack of exposure to imbalances constitutes a form of financial stability.

According to this premise, many writers and researchers have defined financial stability from multiple perspectives, as shown in Table (1) and as follows.

**Table 1: the opinions of some researchers in defining financial stability
(Prepared by the authors)**

No.	Reference	Definition
1.	(Schinasi, 2008: 4)	The situation in which the financial system is able to allocate economic resources efficiently, with the ability to manage financial risks and maintain the performance of the main tasks such as saving, investing, lending and borrowing, creating and distributing liquidity, and determining asset prices.
2.	(Allen & Wood, 2006:153)	It is the situation in which a group of sectors such as the financial sector, companies, individuals and governments suffer from financial crises, which have negative effects on the overall economy.
3.	(Ben Sheikh, 2009: 66)	It is the situation in which the financial sector is able to deal with the various disturbances in the economy so that this sector is able to carry out mediation operations, settlement of payments, and redistribution of the pattern in a sound manner.
4.	(Al Habib, 2010: 72)	Ensure that the elements of the financial system do not enter into a series of cyclical imbalances that threaten economic efficiency
5.	(Shaqrash, 2016: 39)	Is to avoid the occurrence of financial crises.
6.	(Zarir and Al-Hamwi, 2016: 310)	It is the state of banking safety that is accompanied by a

		stable level of profits.
7.	(Adoun and Ami Saeed, 2017: 16)	It is the possibility of conditions in which the financial system is able to absorb shocks and financial imbalances.
8.	(Mubarak and Lahlih, 2018: 250)	It is the state of stability in which the financial system performs its main functions efficiently, and is able to manage them in the event of shocks and stress situations.
9.	(Qali and Nabila, 2020: 33)	It is the ability of the financial sector to hedge against internal and external crises, with the possibility of continuing to perform its functions in directing financial resources to investment opportunities efficiently during the occurrence of financial crises.
10	(kaouther,2021:368)	Those operations that relate to identifying, dividing and managing financial risks, while continuing the ability of the financial system to perform its financial functions such as savings and investment.

Through the opinions expressed in the definition of financial stability in the table above, we can summarize the most prominent forms of financial stability as follows:

- ❖ The possibility of identifying financial risks and ways to confront them and limit their effects.
- ❖ The ability to hedge in the face of financial crises, achieve security, and continue to perform the main job tasks efficiently.
- ❖ The ability to absorb financial imbalances, provide a state of safety and achieve a level of stable profits.

Second: the importance of financial stability

The financial stability represents the basic foundation for any economic growth, and the financial and banking sector is considered the backbone of economic life, which works to feed it with funds that constitute the driving and driving force for all economic activities. The importance of financial stability emerges as it reflects the soundness of the financial system, which in turn greatly affects the enhancement of confidence in the system and reduces the occurrence of risks that could threaten economic stability. In this regard, financial instability affects growth and causes serious disturbances, as a result of which financial risks and excessive fluctuations in asset prices increase and end in financial and banking crises. (Yilmaz, 203: 2-3)

On the other hand, the importance of financial stability is highlighted by the great interest of the international financial institutions in preserving it, given that financial turmoil stands at the top of the risks that threaten global economic stability, and the financial stability has become one of the most important basic goals that the International Monetary Fund and the World Bank are trying to achieve for member states and their intervention in many cases in order to restore it, as in the case of the two crises in Mexico 1994, and Asian tigers 1997 (Al-Orabi and Abdul Majeed, 2016: 9).

We can also realize the importance of financial stability by looking at the painful experiences of the crises that occurred, especially during the past two decades, in all

parts of the world. These experiences revealed important facts that financial instability has serious effects for most developed and developing global economies at all levels. On the financial side, financial markets witnessed successive collapses, and many banks around the world were subjected to faltering and large losses as a result of financial crises, and credit grant rates declined, which necessitated central banks to pay more money to mitigate the turmoil. On the economic side, financial crises negatively affected the main macroeconomic indicators. The mortgage crisis, for example, left long-term economic and social costs, as millions of workers lost their jobs, many companies closed, and financial markets collapsed. Therefore, we can say through the above, that the negative effects that resulted from financial instability in many countries of the world and at all levels highlight to us the importance of financial stability and the effects resulting from its loss.

It has become clear that the lack of soundness and stability of the financial system leads to financial crises, because the financial fragility and internal weakness of the financial system resulting from weak supervision and regulation by the regulatory authorities which was evident in the recent global financial crisis in excessive real estate lending and that the lack of regulation of money markets was the main reason for the outbreak of the crisis, on the other hand, enhancing the safety and stability of the financial system helps absorb financial shocks that occur as a result of financial or banking crises, and this indicates a clear relationship between financial stability or between financial instability and the occurrence of financial crises and the ability of financial systems to deal with them (Al-Sabawi et al., 2012: 70).

Third: the concept of financial safety

The financial safety in the last decade of the last century sparked a lot of ideas in searching for ways to strengthen the global banking system, and as a result, the International Monetary Fund asked its members to assess the soundness of the banking system in their countries as part of its supervisory work, which includes preparing means to assess the soundness of the financial system, Therefore, financial safety in terms of the supervisory function is defined as the specialized evaluation of the stability of the financial system in order to determine the state of any weakness in it and in any period of time (Financial Stability Review, 2006: 103).

Financial stability is also defined as the ability of the financial institution to resist crises, absorb shocks, and recover from them quickly (Manna and Mawlood, 2014: 223).

Mishkin defined safety from the point of view of risk management as a focused evaluation of all banking operations and activities through risk control (Mishkin 2005: 523), he indicated that there are four factors for proper risk management:

1. The quality of the conditions of supervision and control by the banks' board of directors.
2. Adequate policies and precautionary measures for all activities that contain significant risks.
3. The quality of the control and supervisory systems on risks.

4. The adequacy of internal control in limiting illegal activities.

From the researcher's point of view, we can define banking safety as a set of activities and precautionary measures used to hedge and maintain the integrity of the bank's financial position, thus contributing to its ability to absorb banking crises.

Fourth: The importance of the soundness of the financial and banking system:

The financial sector is the most important economic sector and the most sensitive to the conditions and changes in the business environment, the banking sector constitutes the heart of the financial system. Banks are the focus of lending, financial intermediation, and investment guidance. The safety and strength of the banking system depends on a good analysis of risks by banks and the extent of government interference in banking decisions, and the extent of the independence of the supervisory authorities and their ability to maintain a banking system in accordance with effective control and supervision procedures, by ensuring the availability of the elements of the continuity of banking institutions and identifying the necessary corrective measures (IMF, 2009: 5).

In order to achieve this, central banks and regulatory authorities should be able to oblige banks to maintain their solvency, by increasing their capital and reserves in accordance with the decisions of the Basel Committee on Banking Supervision, with the availability of banking laws and rules that enable control and management of banking risks ((Abd al-Hamid, 2013: 62-63).

The results of the performance of the banking sector institutions are directly reflected in the economic situation in general and in drawing up the financial policies of the countries and preparing their budgets directly, in the event that the financial and banking system is not sound and the banking system as a whole fails which requires the state, in the event of financial failure in some banking institutions or the entire banking system, to act by providing financial and technical support in order to save all or some of the banks and pay the necessary compensation for the deposits that have been insured and guaranteed.

Likewise, the impact of the failure of the banking system extends to affect the financial resources of the state indirectly, due to the deterioration of the economy and the decline in growth rates in the gross domestic product due to weak banking safety and the weak ability of the banking system to financial mediation and attract and move domestic and foreign savings to the productive sectors and the impact of that is reflected negatively on the financial resources of the state (Yousif, 2019: 52-53).

Fifth: Mechanisms to achieve financial stability

Interest in banking stability is a priority for central banks in most countries, and one of their main goals. To achieve this goal, they work to strengthen the sector's performance based on international practices and their constant keenness to monitor and supervise the constituent units of this apparatus. Achieving stability for the banking system is necessary to achieve financial stability, since the banking system can be exposed to risks as a result of factors that inherent weakness in it, or as a result of its inability to

face negative shocks in the local or international business environment, or through risks that occur in sectors borrowed from the banking sector, in addition to the risks of economic and financial policies, therefore, prejudice to banking and financial stability will have direct effects on economic stability (Udun and Saeed,2014: 13).

The inability to predict, control and confront crises by strengthening the financial safety net contributes to the increase in fragility that characterizes it where banking stability is maintained through the financial safety net, which includes a set of mechanisms and procedures, which take multiple forms that overlap with each other. It can be defined as:

"A set of procedures and policies designed to protect the financial intermediation of banks, protect their capital and prevent them from collapsing", The financial safety net is necessary to maintain the integrity of the banking system (Segoviano & Goodhart, 2009: 7) And (Udun and Saeed, 2014: 16) and these mechanisms are:

1. Banking supervision and safety instructions: Banking supervision and prudential regulation aims to achieve banking stability, as establishing reliable and appropriate banking foundations characterized by interaction with the supervisory authorities helps in coordination with foreign supervisory authorities to achieve efficiency and effectiveness in banking supervision. Supporting a standard regulatory system will achieve safety for depositors and investors in the banking system as a whole, stability in the financial markets, and enhance the confidence of individuals in the banking system and its ability to fulfill its obligations towards them, prudential regulation and supervision of the banking system is one of the main factors that contribute to reducing bank failures and financial crises.

2. Capital adequacy to achieve banking stability:

Capital adequacy is one of the most important prudential regulation tools, as capital is considered a preventive tool that allows achieving stability in the banking system, and this is what made the Basel Committee emphasize banks by increasing capital retention ratios for its role in achieving banking stability, therefore, the relationship between banking stability and prudential regulation depends largely on capital requirements, in addition to a good assessment of risks.

3. Deposit insurance:

Insurance has a major role in maintaining the integrity of the banking system, as it provides protection for customers, and on the other hand, insurance contributes to enhancing confidence, which is the most important in the framework of reducing systemic risks and the occurrence of a collapse in the banking system. The element of trust is considered a major element in the establishment of the banking system and its continuity in performing its functions as deposit insurance reduces the fear of depositors and protects banks from increasing the risk of deposit withdrawals.

4. Borrowing from Central Banks:

The financial and banking crises showed the role that the central bank can play in restoring banking and financial stability, through its intervention and pumping liquidity.

The problem of liquidity shortage is the starting point for financial turmoil, which if not quickly contained, turns into a financial crisis, asset sales, along with lack of liquidity and inability to manage risks, are among the main causes of systemic crises, however, the Central Bank, by playing this role, can limit these effects, by providing liquidity in the market.

Eighth: Z-Score model

This model was used in the United States of America and developed by Professor Edward Altman at New York University in 1995. The model adopts ratios of financial data and multiple analyses to predict financial soundness or financial failure (Kurniawan & Daryanto (2022:293).

The Z-Score model is among the best methods used to assess the financial health of banks (Farida and Al-Zahra, 2017: 222) and with the increasing use of the model, the model gained credibility in the field of measuring the financial soundness of banks, and the popularity of this model in that it is inversely related to the probability of bankruptcy of the bank, i.e. the probability that the value of the bank's assets is less than the value of the debts incurred by it (Mahboob and Sanussi, 2020: 413). This indicator is one of the most important modern measures that are used to measure the degree of financial stability of commercial banks at the individual level, and this indicator increases with the increase in levels of profitability and capital, and decreases in the event that the state of stable returns is not achieved, and this is shown by the high value of the standard deviation of the return on assets whenever the value of this indicator is high, this indicates that the bank under study is farther from the possibility of hardship or financial failure, and closer to achieving financial stability (Nguyen et al. (2012:11).

This model is known as a composite index used to measure financial stability in banks, based on the idea that the return on assets (ROA), mean normal distribution (μ ROA), and its deviation (σ ROA) and the ratio of bank capital to total assets is ($K=TAPE$), it is distributed around the arithmetic mean of return on assets (μ ROA) as shown in the following equation: (Frank, 2014: 2-4)

$$Z = (K + \mu\text{ROA}) / \sigma\text{ROA}$$

Whereas:

$K=TA/E$ represents shareholders' equity + total reserves / total assets;

μ ROA is the average return of total assets;

σ ROA is the standard deviation of return on assets as an indicator of return volatility.

The results of this indicator are classified according to what is shown in the figure 1.

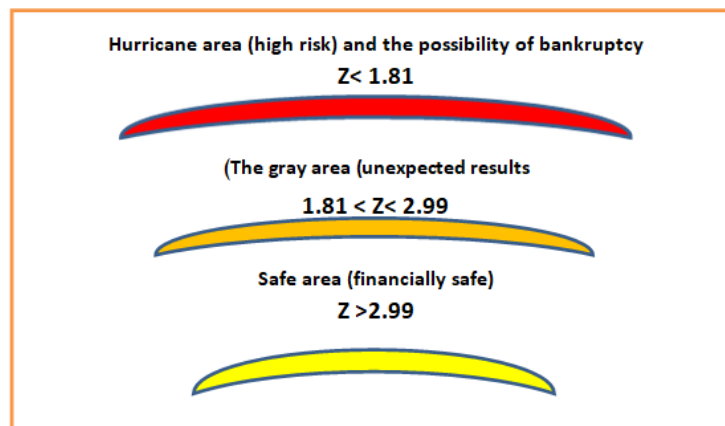


Figure 1: Index value results of Z-Score

“Source: Morten Reistad Aasen, Applying Altman’s Z-Score to the Financial Crisis - An Empirical Study of Financial Distress on Oslo Stock Exchange, Norwegian School of Economics ,Bergen , 2011, p16”

The third topic: the applied side of the research

To conduct the applied side of the research, a sample of four private commercial banks operating in the Iraqi banking sector was selected and listed in the Iraq Stock Exchange. The following is an overview of the establishment of the study sample banks.

1. **The National Bank for Investment and Finance:** This bank was established according to the establishment license No. M. S / 580. On February 1, 1995 with a capital of 400 million dinars and obtained the approval of the Central Bank of Iraq on April 28, 1995 to practice banking business in the name of the National Bank for Investment and Agricultural Finance. On October 25, 1997, the Central Bank of Iraq allowed private banks to amend their founding contracts to enable them to practice comprehensive banking, and the number of its branches reached 13 branches and with a capital of 250 billion Iraqi dinars as of December 31, 2020.
2. **The United Bank for Investment:** This bank was established according to the incorporation certificate numbered M / S / K 5762 dated August 20, 1994 issued by the Companies Registrar Department in the Ministry of Commerce, with a capital of one billion dinars. The bank obtained the approval of the Central Bank of Iraq to practice banking business on November 5, 1994, and the number of its branches reached 26, with a nominal capital of 300 billion dinars as of December 31, 2020.
3. **The Investment Bank of Iraq:** The Investment Bank of Iraq was established as a private joint stock company with a capital of 100 million Iraqi dinars according to the incorporation certificate numbered M.S / 5236 dated July 13, 1993 and issued by the Companies Registrar Department in the Ministry of Commerce. The bank obtained a license from the Central Bank of Iraq / General Directorate of Banking and Credit Control to practice banking business in its letter No. 10 / 3 / 942 / 5 on September

28, 1993, The number of its branches has reached (15), with a nominal capital of (250) billion dinars up to December 31, 2020.

4. **The Iraqi Credit Bank:** The Iraqi Credit Bank was established in 1998 with a capital of 200 million Iraqi dinars according to the certificate of incorporation numbered M / U / 6615 in July 25, 1998, and obtained a license to practice comprehensive banking from the Central Bank of Iraq on October 6, 1998, and the number of its branches reached five, with a nominal capital of (250) billion dinars as of December 31, 2020, and based on the data of the annual financial reports of the banks, the research sample, and for the period from (2011) to (202) and using the SPSS statistical program and applying the equations for extracting adequacy ratios, and the Z-score selection model, the following results were obtained:

First: The capital adequacy ratio for banks, the study sample: To obtain the capital adequacy ratio, the capital adequacy equation approved by the International Committee for Control and Supervision (Basel III) was used, and as shown in the following equation:

Capital adequacy ratio

$$= \frac{\text{capitalist base}}{\text{assets that are wightened for credit, market and operational risks}}$$

As the calculation of the capital base or the total capital represents the sum of each of (basic and supporting capital as well as medium-term loans), as for the credit risk-weighted assets, it is calculated by summing all the risk-weighted assets inside and outside the balance sheet, and the assets are weighted in accordance with the requirements of Basel (III). Table (2) shows the capital adequacy ratio of the study sample banks.

Table 2: The capital adequacy ratio of the study sample banks

Bank name	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Arith Mean	St. Dev.
Al Ahly	110%	160%	85%	102%	82%	92%	93%	71%	23%	24%	84%	40%
United	50%	33%	35%	34%	47%	30%	33%	37%	38%	37%	37%	6%
Investment	63%	54%	59%	110%	127%	132%	111%	95%	97%	114%	96%	28%
Credit	56%	43%	39%	56%	78%	62%	84%	252%	266%	180%	112%	87%
Arith Mean	70%	73%	55%	76%	84%	79%	80%	114%	106%	89%	82%	****
St. Dev.	24%	51%	20%	32%	29%	38%	29%	82%	96%	63%	****	*****

(Source: prepared by the researchers based on the data of the financial reports of the study sample banks)

It is clear from reviewing Table (2) that the general average of the capital adequacy ratio for the study sample banks for the period 2011-2020 has reached (82%). This ratio is high compared to the standard ratio of the minimum capital adequacy according to the Basel III standard (10.5%) and the standard ratio of the minimum capital adequacy according to the Central Bank of Iraq (12%). This is due to the increase in the basic capital of private commercial banks, as the Central Bank of Iraq obliged all private

commercial banks to increase their capital to (250 billion Iraqi dinars as a minimum), this gave it a strong capital base that contributed to a high capital adequacy ratio. And all the banks in the study sample had achieved an adequacy ratio that exceeded the calculated general average.

Second: Testing the financial stability index (Z-score) for the research sample banks: The researcher used the (Z-score) model to predict indicators of financial stability or insolvency and financial failure of the study sample banks, and for the purpose of obtaining more accurate results. The time series for each of the banks in the study sample was divided into two periods, the first from (2011 to 2015), and the second period from (2016 to 2020) for the purpose of making a comparison between them and based on the data of the annual financial reports of the banks in the study, the data were subjected to the Z-score function model test, based on the idea that the return on assets (ROA) has a normal distribution with an average (μ ROA) and a deviation (σ ROA) and that the ratio of bank capital to total assets ($K = TA / E$) is distributed around the arithmetic mean of the return on assets (μ ROA) and as shown in the equation below. The results indicated for each bank were reached, as shown in Tables No (3) and up to Table No. (6).

$$Z = (K + \mu ROA) / \sigma ROA \dots\dots\dots(Z\text{-score}) \text{ equation}$$

Whereas:

$K = TA/E$: represents shareholders' equity + total reserves/total assets

μ ROA is the average return of total assets

σ ROA Standard deviation of return on assets as an indicator of return volatility

1. The Z-score test of the National Bank: Based on the data of the National Bank, the results related to the (Z) test appeared, which are indicated in Table (3) and as follows:

Table 3: Z-Score value for the National Bank of Iraq for the period 2011-2015 and for the period 2016-2020

The National Bank of Iraq (first period)	proprietary capital	total assets	Return	The National Bank of Iraq (Second period)	proprietary capital	total assets	Return
2011	105416986	184664516	2904494	2016	287838883	578847033	23501801
2012	154660445	337248547	18195673	2017	285704651	603213751	2857958
2013	168479898	542405926	16610177	2018	257849745	524948213	-7912541
2014	263429187	615235071	9075725	2019	256641507	632803150	9164205
2015	264352677	592200000	2207476	2020	307483051	893964966	19907518
Total	956339193	2271754060	48993545		1395517837	3233777113	47518941
Average return	St. Dev.	K	Z	Average return	St. Dev.	K	Z
9798709	7459638.489	0.42096951	1.31356358	9503788.2	12765117.06	0.43154422	0.74451245

(Source: prepared by the researcher based on the annual financial reports of the National Bank of Iraq)

Based on what was proposed in the theoretical aspect regarding the value of the Z score, if the value of z is less than (1.81), then the bank is located in the insolvency zone, i.e. heading towards instability, while if its value is greater than (1.81) and less

than (2.99), this means that the bank is in the gray area (unexpected results), and if the value of (Z) is greater than (2.99), then the bank is in the safe area and has financial stability. Based on the foregoing, we note from Table No. (4-25) that the value of the Z score for the National Bank in the first period is equal to (1.31), which is less than (1.81), which means that the bank is located in the zone of insolvency or failure and does not enjoy financial stability and may become unable to fulfill its financial obligations. As for the second period (2016-2020), where the Z score was equal to (0.74), this means that the bank's financial instability continues.

2. The test of measuring the Z score function of The United Bank: Depending on the data of The United Bank, the results related to the (Z) test appeared, which are indicated in Table (4) and as follows:

Table 4: Z-Score value for the United Bank of Iraq for the period 2011-2015 and for the period 2016-2020

The United Bank of Iraq (first period)	proprietary capital	total assets	Return	The United Bank of Iraq (Second period)	proprietary capital	total assets	Return
2011	408379529	655825769	49303986	2016	301703155	527820770	1058973
2012	310264563	706408071	57830132	2017	297437697	519396085	-3130871
2013	338833264	754864898	44660614	2018	303730081	515535375	-16798612
2014	316915074	543486780	26333903	2019	303471678	604313972	-2057722
2015	321716551	581243597	19831113	2020	303817559	699274183	520464
Total	1696108981	3241829115	197959748		1510160170	2866340385	-20407768
Average return	St. Dev.	K	Z	Average return	St. Dev.	K	Z
39591949.6	15960206.53	0.52319506	2.48066653	-4081553.6	7319952.968	0.5268600	-0.5575928

(Source: Prepared by the researcher based on the data of The United Bank)

We note from Table No. (4) That the value of the Z score for The United Bank in the first time period (2011-2015) was equal to (2.48), this value is greater than (1.81) and less than (2.99), i.e. it falls in the gray area with unexpected results. As for the second period (2016-2020), which witnessed a decline in the bank's revenues, the value of (z) declined to (-0.55), and this value is less than 1.81, which means that the bank is located in the high-risk insolvency zone and does not enjoy financial stability.

3. Test measuring the Z score function of the investment bank: Depending on the data of the investment bank, the results related to the (z) test appeared, which are indicated in Table (5) as follows:

Table 5: Z-Score value for the Iraqi Investment Bank for the period 2011-2015 and for the period 2016-2020

The Iraqi Investment Bank, (first period)	proprietary capital	total assets	Return	The Iraqi Investment Bank, (Second period)	proprietary capital	total assets	Return
2011	117107674	327719084	11678862	2016	283082677	577870247	10179000
2012	118557667	378276838	3416950	2017	283083000	573706556	3995000
2013	186356658	520596472	31539943	2018	283102000	607085000	338964
2014	283749256	558655517	34841656	2019	260626000	529830000	17000
2015	279554000	550025727	17498000	2020	265274450	571480175	4673584
Total	985325255	2335273638	98975411		1375168127	2859971978	19203548
Average return	St. Dev.	K	Z	Average return	St. Dev.	K	Z
19795082.2	13263992.33	0.42193139	1.4923925	3840709.6	4116260.07	0.48083273	0.93305817

(Source: Prepared by the researcher based on the data of the Investment Bank)

We note from Table No (5) that the value of the Z score for the investment bank in the first time period (2011-2015) was equal to 1.49, this value is less than 1.81, i.e. it is in the insolvency zone with high risks, and it does not enjoy financial stability. As for the second period (2016-2020), where the Z score for the investment bank reached 0.93, this value indicates a continued decline in the level of performance, which means that the bank is located in the high-risk insolvency zone and does not enjoy financial stability.

4. Test measuring the Z score function of the Iraqi Credit Bank: Depending on the data of the Iraqi Credit Bank, the results related to the (z) test appeared, which are indicated in Table (6) and as follows:

Table 6: Z-Score value for the Iraqi Credit Bank for the period 2011-2015 and for the period 2016-2020

The Iraqi Credit Bank, (first period)	proprietary capital	total assets	Return	The Iraqi Credit Bank, (Second period)	proprietary capital	total assets	Return
2011	151965487	444122919	18531525	2016	306898511	513382999	4942763
2012	175547483	561579222	25280166	2017	315456738	476638010	6707465
2013	197079367	602995583	13746219	2018	313498305	497694366	5597616
2014	290171143	625187059	16016080	2019	297126650	522536851	-5121655
2015	301809851	612858579	11638708	2020	293699445	527045441	-3427205
Total	1116573331	2846743362	85212698		1526679649	2537297667	8698984
Average return	St. Dev.	K	Z	Average return	St. Dev.	K	Z
17042539.6	5272483.072	0.39222831	3.23235556	1739796.8	5558707.521	0.60169513	0.31298596

(Source: Prepared by the researcher based on the data of the Iraqi Credit Bank)

We note from Table No. (6) That the value of the Z score for the Iraqi Credit Bank in the first time period (2011-2015) was equal to 3.23 and this value is greater than 2.99, i.e. it is located in the safe zone, meaning that the bank in this period enjoys financial stability and is far from the possibility of bankruptcy. As for the second period (2016-2020), where the Z score value of the Iraqi Credit Bank tended to decline, reaching 0.31, and this value is less than 1.81, which means that the bank recorded a decline in the level of

performance and entered the insolvency zone with high risks and is heading towards and does not enjoy financial stability.

It is clear to us from the results of the results of the value of (Z-score) for the study sample banks that all of them did not witness the achievement of a state of financial stability throughout the two periods, especially in the second period, this indicates a decline in the level of performance and revenue generation for the study sample banks, and it reflects the state of instability that Iraq witnessed at the level of all financial and economic sectors in the period after (2014), which witnessed unstable political conditions, represented by the departure of several provinces from the control of the state, the war on terrorism, and the decline in Iraq's oil exports as a result.

The fourth topic: Conclusions and Recommendations

First: Conclusions

1. The research showed the absence or achievement of the financial stability of the study sample banks and for the study period, Where the results of the z-value analysis of financial stability showed that the Iraqi Credit Bank in the time period (2011-2015) was located in the financially safe area, while the rest of the banks are in the high-risk insolvency area, As for the time period from (2016-2020), all the sample banks are located in the dangerous financial insolvency area.
2. The successive financial crises in the business environment have a negative impact on the situation of financial stability and financial soundness in financial institutions and markets and the sStability is a relative state associated with positive relationships with hedging operations against risks and control and precautionary measures, the higher these precautionary measures, the less likely it is to be exposed to losses, and this is positively reflected in the state of financial stability as a result.
3. Achieving financial stability as a concept should not be limited to how to deal with the financial crisis during its occurrence only, but rather work to rehabilitate the financial sector to absorb and absorb the risks of crises and reduce the chances of spreading its repercussions and limiting its effects and the possibilities of its occurrence in the future.
4. Financial stability represents the mainstay of any economic growth, as it represents the backbone of economic life that feeds it with funds that constitute the driving force for all economic activities.
5. Financial and banking stability reflects the soundness of the banking sector, and the ability to reduce the occurrence of risks that could threaten economic stability, which in turn greatly affects the enhancement of customer confidence in the sector and affects the increase in the volume of bank deposits.

Second: Recommendations

1. In order to achieve the requirements of applying the principle of transparency and disclosure, the Central Bank of Iraq should take measures that will enhance disclosure and transparency as an important part of the requirements for applying international standards of control and supervision, especially as it is a key link in achieving safety and financial stability.
2. The need for the Central Bank of Iraq to play a supervisory role that guarantees the financial soundness of the banking sector, and to follow up on the commitment of banks to apply the directives issued by it, which include commitment to applying the international standards of the International Committee on Control and Supervision, because of their great importance in regulating aspects of banking activities.
3. The need for banks to develop early warning units of financial crises to avoid the possibility of exposure to the risks of those crises and to maintain the integrity of the financial system, and to strengthen these units with modern communication technology and control systems in accordance with the international standards of the International Monetary Fund and the Basel International Supervision and Control Committee.
4. The need to pay attention to the administrative and technical cadres in banks and develop them in line with the developments taking place in the international banking sectors, such as the introduction of modern banking technology in managing the activities of the bank's operations.

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