International Journal of Educational Review
Volume 5 (1) 2023, 38-57
E-ISSN 2685-709X, P-ISSN 2685-905X

A Proposed Model for Predicting Financial Tumble and Financial Economics

Rawaa Yasir Mahdi Al Ethari[1]
[1]Ministry of Planning, Iraq

Corresponding author e-mail: rawaayaser1990@gmail.com

Article History: Received on 08 February 2023, Revised on 15 March 2023
Published on 03 June 2023

Abstract: The study aimed to address the concept of financial and banking defaults and to identify performance indicators and their role in predicting financial defaults in the research sample banks. Developing a standard model consisting of a set of financial ratios capable of distinguishing between troubled banks and non-performing banks. And testing the ability of the proposed model to distinguish between troubled and non-performing banks. Logistic regression model was used to test the research data. The statistical method was used logistic regression analysis to interpret the relationship between a set of variables, and then apply the stepwise selection method through which models can be generated and the best model can be selected from the sum of financial indicators that can be applied and distinguish between troubled and non-performing banks, as the classification related to banks being (in troubled, not in troubled) showed that the total non-performing Iraqi banks are (6) and the non-performing banks are (9) out of the total (15) banks within the years of the research. The study concluded that financial stumbling has a great impact on many parties and parties, as financial stumbling affects the banks themselves as well as the owners and creditors, and it can result in large losses that lead the bank to bankruptcy. This is in addition to the pressures faced by the administration, foremost of which is the relinquishment of the position to a new administration.
Keywords: Bank Tumble, Financial Ratios, Logistic Regression Analysis, Prediction.

A. Introduction

The efficiency of financial activity is one of the most important determinants of companies' ability to achieve their goals of survival and continuity. As the facility's mismanagement of the financial aspect may expose it to what is known as financial failure. This applies to all types of companies, regardless of their legal form or the nature of their activities. This is in addition to the negative effects on the economy as a whole (Al Hamdani & Qatan, 2013). Financial distress is considered one of the most important challenges facing companies, because of its impact on decision makers, such as investors, creditors, and others. Although companies are committed

to preparing financial statements, in accordance with the requirements of accounting standards, representing a source of information for decision-makers, the information of these lists remains insufficient to provide them with a complete and clear picture of the establishment, especially with regard to its future (Al Hamadani and Qatan, 2013). Specifically, matters related to the company's ability to continue as a going concern remain opaque, which are not easy to judge based on the information required by the standards. Therefore, it is necessary to rely on other ways to assess the financial position of companies and the surrounding risks, and thus predict the possibility of their failure (Hantono, 2019). Increasing the ability to predict the future of the company and its ability to continue, would be in the interest of the parties related to the company Stakeholders and enhance aspects of governance in it (Mohammed and Kim-Soon, 2012), especially after the bankruptcy of giant companies such as WorldCom and Enron.

There is a set of models presented by the accounting literature, such as the Altman model and the Sherrod model, which are used to predict the financial future of companies and their ability to continue. These models showed remarkable success in predicting the future of companies in terms of continuity, through studies that were carried out and applied to companies from different countries. These models are based on a set of ratios that are developed based on the information contained in the financial statements.

Iraq suffers from political and economic problems that negatively affect the performance of companies and increase the challenges they face (Abu Alia et al., 2019; Alia et al., 2020). Where the Iraqi economy, and specifically the industrial sector, is exposed to many obstacles resulting from the Israeli occupation policies, which are represented by harassment and the imposition of unfair economic protocols and agreements such as the Paris Agreement. It is also vulnerable to challenges resulting from the turmoil that is reflected in the nature of the political and social climate, which makes investors in a state of constant review of the monetary situation of the investee companies (Kutum, 2015).

B. Methods

This topic deals with the research methodology by defining the research problem, the importance of the research, the research objectives, the research hypothesis, as well as the temporal and spatial limits of the research, data collection methods, and the research model as follows:

Research problem

Due to the inadequacy of the traditional financial statements (income statement and statement of financial position) prepared on the accrual basis in presenting the real reality of the cash flows of the company's operational, investment and financing activities. Therefore, the accrual basis is not sufficient in providing adequate and true indicators for evaluating the company's performance and its ability to pay, and thus financial failure because the main objective for any economic unit, there is

continuity, growth, and balance, and that the company does not continue if it is subjected to financial failure.

Therefore, the research problem can be represented crystallized in the mechanism of developing a model through which the bank's financial failure can be early predicted and by asking the following questions:

1. What is the ability of the proposed model to predict early bank failure?
2. How effective is the proposed model in predicting bank failure?

The importance of research

The importance of the research is evident through an attempt to identify the dangers associated with the financial failure of banks and their impact on the Iraqi national economy and on the base of those dealing with banks and those interested in the situation of the banking sector who are affected by the situation of this sensitive sector.

From this standpoint, the development of a standard model using financial ratios through logistic regression analysis as an early warning indicator about the risk of financial failure in Iraqi banks, the research sample, and thus will benefit all users of the financial statements of banks, which enhances confidence in them and the consequent decisions that serve them. The banking system itself and the Iraqi national economy.

Research objectives

The researcher seeks through his research to achieve the following goals:

1. Addressing the concept of financial and banking defaults.
2. Identify performance indicators and their role in predicting financial failure in the research sample banks.
3. Developing a standard model consisting of a set of financial ratios capable of distinguishing between troubled banks and non-performing banks.
4. Testing the ability of the proposed model to distinguish between troubled and non-performing banks.

Research hypothesis

To achieve the objectives of the research and to find appropriate formulas, treatments, and solutions to the problem contained in it, the following hypothesis was identified:

The financial distress of banks can be predicted through the use of logistic regression analysis.

Research sources and data collection methods.

The process of collecting sources and data in the light of which the thesis was completed was as follows:

1. **Sources related to the theoretical side:**
   a. Arabic and foreign books available in the libraries of the faculties of administration and economics.
   b. Arabic and foreign treatises and treatises available in libraries or obtained from websites and internet pages.

c. Arabic and foreign research, periodicals, and articles obtained from libraries or from

Previous studies

There are many previous studies that have been concerned with testing prediction models that have been prepared in different environments, and depending on data dating back to different periods. In this context, the study (Sumaira et al. (2019) proved the accuracy of the Altman model in predicting the future of companies. The study also found that the effectiveness of models in forecasting decreases during financial crises. The study of Samkin (2012) showed the ability of the Altman model to predict the future situation for financial companies in New Zealand. The study recommended that companies calculate the probability of default in their financial statements as part of the published annual reports, as this would increase users' confidence in the financial statements. As for (Altman, 2000), he sought to know the most important financial ratios that contribute to discovering potential financial failure, and to know the conditional weights for each of the ratios to determine the amount of financial failure, and how to determine these weights. To reach the results of the research, he used financial analysis to find financial ratios for five consecutive years for non-industrial companies in America, and then statistical analysis by means of the MDA technique, which is based on dividing the observations into dependent groups based on their individual characteristics, and then he used five measures combined together to reach For the last model, which is the ZETA Score, which is based on the Z-Score, as it has become the basis for dividing companies into financially successful or failed groups. . This model was able to predict financial failure a year before it happened by 93%. The study showed that this developed model from a group of old models is suitable for use by all types of companies. On the other hand, there is a group of studies that tested these models in the Arab world. Al-Farra (2017), for example, tested the possibility of predicting financial failure in Saudi cement companies listed on the financial market. The researcher used the Altman and Springate models, and the results showed a convergence between the results of the two models in predicting financial failure. Al-Rifai (2017) also concluded that the Altman model is able to predict financial failure two years before it occurs. It showed a statistically significant relationship between all components of the Altman model equation as an independent variable and EPS as a dependent variable.

In addition to the above studies, some studies focused on testing Sherrod's model in predicting financial distress. Al-Janabi (2019) concluded that commercial banks in Iraq have good financial positions and will not be subject to financial failure during the next three years. Al-Murshidi (2018) also tried to predict financial failure in Iraqi commercial banks, using the (Sherrod) model, which is based on testing a number of financial ratios that measure the ability of banks to maintain a certain amount of liquidity that is required to pay short-term obligations, as well as achieve the necessary returns as a basis for prediction. Financial failure and knowing the company's ability to continue. The study concluded that predicting financial failure

helps the management to take the necessary corrective and control measures to address the failure before it occurs.

On the other hand, a group of studies sought to predict financial failure through financial ratios. For example, Bunyaminu et al. (2019) Financial Ratios for Predicting Financial Default and Its Determinants for Companies Listed on the Ghana Stock Exchange. The study concluded that profitability ratios, especially return on assets, and solvency ratios are the most accurate determinants of financial failure. Khaliq, Altarturi, Thaker, Harun and Nahar (2014) also found that there is a statistically significant relationship between the components of the Z-Score model and financial distress in semi-government companies in Malaysia. In turn, Wang and Xu (2007) measured the effect of the variable of effectiveness on some financial default prediction models to increase the accuracy of prediction. The effectiveness variable was calculated by evaluating the inputs and outputs of the companies' products, adding this variable to the three evaluation models (MDA, logical regression, and SVMs), and examining the accuracy of prediction in the models with and without the variable. The study proved that the presence of the variable of effectiveness in the equations of the models used in the analysis added the appropriate accuracy to the prediction of financial failure. Al-Ammar and Qusiri (2015) sought to determine the effectiveness of financial ratios in predicting financial failure using financial ratios in Syria. The results of the study showed that the "sample size" criterion is the most reliable and important in the models, and it is available in the Shirata 2002 model.

C. Results and Discussion

Basic knowledge pillars of financial failure

Financial tumble

There is no specific and unified definition of financial failure, as it is a broad concept with many meanings. According to Abdel Nour and Ben Moussa (2017), there are a number of cases that can be described as financial failure, but all of them involve the establishment not paying its obligations. Al-Qaisi (2016) divides the causes of financial failure into internal and external causes. The internal reasons are summarized in the inefficiency of administrative decisions related to operational policies related to purchasing, production, storage, pricing and selling, the level of technological development, financing and investment, and debt collection. As for the external reasons, they may include the unavailability of appropriate financing sources and their high cost, the increase in the degree of competition, and the pessimistic expectations of analysts and investors in the stock market. On the other hand, financial default is one of the phenomena that the establishment may be exposed to during its life. Financial distress refers to the situation in which the facility becomes unable to pay its short-term obligations due to insufficient resources. This usually results from the management's inability to balance the facility's resources with obligations due in the short term. Although there are no specific stages of financial default, which apply to all establishments, as they differ

from one facility to another according to the cause of default and the way the administration deals with it. Failure includes several stages. The first stage represents the stage of acquiring defects, which represents the starting point for stumbling. In the second stage, risks begin to appear, accompanied by the administration's disregard for defects and risks. In the third stage, the risks are exacerbated, with the management continuing to ignore them, and the symptoms of financial failure have begun to appear in a large and clear manner. The fourth stage, which is called the stage of coexistence with default, is considered one of the most dangerous stages, as non-payment of obligations becomes a characteristic of the establishment. In the fifth stage, information about the status of the establishment begins to reach external parties, especially creditors who claim their rights. The final stage involves either working to address the crisis by searching for solutions to it, such as merging with other facilities, or liquidating the facility (Soleimani, 2015).

Financial failure represents a long stage that ends in financial hardship. It is the inability of the entity to pay the obligations in full. The financial hardship leads to the permanent cessation of the work or activity of the establishment. And then reach bankruptcy. On the other hand, financial distress is a preceding stage of financial failure. Non-payment of liabilities on their due dates is the result of a decrease in returns due to the realization of accumulated losses. It does not necessarily lead to financial failure, especially if its causes are addressed (Kamal, 2014).

Forecasting financial default or failure is considered essential because of its positive effects on the decisions of related parties such as investors and lenders. It also reduces uncertainty and helps assess future risks. Therefore, forecasting is of great importance in the survival and continuity of the facility. It is an early warning of the problems that the establishment suffers from, so that they can be remedied before the company deteriorates. As failure to predict leads to stumbling and then failure. Therefore, forecasting is considered one of the most important aspects of administrative work in establishments (Al-Khayyat, 2014).

It is divided into (Al-Hamzawy, 1997, 354):

1- Economic Failure:

The concept of economic failure revolves around the fact that the bank's success does not only mean its ability to pay its obligations or achieve profits. Rather, the bank's success means achieving operational and investment returns on its assets that exceed the cost of financing these assets. Therefore, the bank cannot achieve a moderate return on its investments in the event of economic failure. Or, when the net capital is negative, when the book value of the bank's liabilities and assets is more than the book value of its assets.

2- Financial Failure:

In this case, the bank cannot pay its obligations to creditors and fulfill its debts owed to it, and some researchers went to distinguish between financial stumbling and financial failure, given that financial stumbling is a condition that precedes financial failure, but it may not necessarily lead to it, and they used the criterion of

financial flexibility, and it is possible to distinguish between the two terms As follows:

1. Financial stagnation: means a lack or cessation of returns, and the inability to pay financial obligations on time.
2. Financial failure: It means stopping completely from paying obligations, which leads to bankruptcy and cessation of activity.

2-2 Reasons for financial tumble:

The causes of financial tumble are of two types: External causes of tumble and Internal causes of tumble.

a. **External causes of tumble: (Saleh, 28, 2011)**

These are the reasons that are related to the external circumstances and environment of the bank, and therefore they are circumstances beyond the control of the bank and its ability to control them. Among the most important of these external reasons:

1) The prevailing economic conditions: such as recessions and recessions that negatively affect the bank's ability.
2) The issuance of some new government decisions: such as the issuance of tax laws and the customs tariff.

b. Internal causes of tumble:

These are the most important reasons for the occurrence of bank defaults and are confined to mismanagement, i.e. the inefficiency of management in banks in terms of performing their duties, whether at the higher or executive levels. The following is an explanation of mismanagement for both levels (Al-Shamaa, 1999, 12):

1) Poor senior management: It results in poor performance of management at the higher levels due to its lack of sufficient scientific and practical administrative experience, which enables it to perform its functions in planning, organizing, leading, directing and controlling.
2) Poor executive management: The weakness of this administration in the exercise of its functions through misapplication of orders and directives of senior management will be reflected in the efficiency in performance at the bank level.

2-3 Stages of Financial tumble:

Financial stumbling does not happen all at once, but rather it goes through several stages to reach the stumbling stage, and therefore those stages must be known in order to follow up on financial stumbling in its early stages before it becomes in its critical final stages, and from these stages (Al-Khudairi, 1996,37):

1- The stage of accidental occurrence: which is the real beginning of financial stumbling, as a "some" accidental event occurs and this represents a test for the bank's management. Unplanned commitments that do not give a quick return.

2- The stage of ignoring the status quo: This is the stage in which those in charge of managing the bank are alerted to the seriousness of the causes and motives affecting the defaulting process, but they ignore it out of negligence and belittling it.

3- The stage of continued stumbling and underestimating its seriousness: At this stage, the situation gets worse, and those in charge of the bank increasingly ignore the seriousness of the situation, and their lack of initiative to solve the problem.
4- The stage of coexistence with defaulting: This stage is the most dangerous stage of all, as defaulting becomes the daily nature of life within the bank, and the bank is on the verge of bankruptcy, and during this stage new investments are stopped.
5- The stage of the devastating crisis: In this stage, news of the bank's failure reaches its clients, and the process of financial claims begins.

Research model, description of variables, and application of the model
Search form:

The logistic regression model was relied upon to test the research data, according to the following formula:

$$\mathbf{Yi} = \frac{e^{P_i^*}}{1+e^{P_i^*}}$$

$$P_i^* = ß0 + ß1\ X1 + ß2\ X2 + ß3\ X3 + ß4\ X4 + ß5\ X5 + ß6\ X6 + ß7\ X7 + ß8\ X8 + ß9\ X9 + ei$$

Since:
Yi: the dependent variable in the logistic regression function model, which represents bank default expressed by (0,1) as a dummy variable.
P_i^*: It is the natural logarithmic value that represents a probability value after taking the logarithm for the purpose of giving homogeneity between the independent variables and the dependent variable relative to the regression model according to the following formula:

$$P_i^* = log\left(\frac{p_i}{1-p_i}\right)$$

$$p_i = \frac{ri}{ni}$$

ri: Represents the frequency of cursors (stuttered, not stuttered)
ni: Represents the total indicators (slowing, non-slowing)
ß0: fixed limit.
ß1 - ß9: represent the parameters of the model, which is the amount of change in financial default Y when X changes by one unit.
X1 - X9: represent the nine independent variables (represented by 9 financial ratios).
ei = amount of error in estimation.

The research model consists of a dependent variable and a set of independent variables that affect it. And the dependent variable, which is (the state of the bank) (Yi), which is considered a dummy variable, that is, it takes two possibilities expressed as (0, 1). This means that the model takes the dependent variable (the state of the bank) within two cases, the first is the probability that the banks are not defaulted (1), the second is the probability that the banks are in default (0).

As for the independent variables (X9, X8, X7, X6, X5, X4, X3, X2, X1), they are the financial ratios on which the research relied, and they are:
X_1: Capital Adequacy Ratio = Paid-up Capital to Risk Weighted Assets.
X_2: return on assets ratio = net profit to total assets.
X_3: Return on Equity Ratio = Net Profit to Equity.
X_4: net income interest margin ratio = net profit to operating assets
X_5: the ratio of net non-performing loans to total loans.
X_6: the ratio of total deposits to total loans.
X_7: Ratio of interest rate sensitive assets to total assets
X_8: the ratio of liquid assets to total assets.
X_9: the ratio of liquid assets to short-term liabilities.

Second: Statistical Method:

Model Logistic Regression is one of the cases of non-linear models that are used when the dependent variable is a descriptive variable that takes two values expressed as (0, 1), which are known as dummy variables with binomials, while the independent variables are quantitative variables. Accordingly, a homogeneity process is carried out between the descriptive and quantitative data using the logistical model by giving estimated probability values for the dependent variable, which is symbolized by the symbol (pi^*() to represent the estimation of the disagreement ratios for each of the independent variables in the model to obtain information about the chance of the phenomenon occurring for the case particular case compared to another, as the discordance ratios are one of the measures of correlation in the compatibility tables, and they are also a basic parameter in the parameters of the logistic regression models, as follows (Hosmer & Lemeshow, 2000, 46):

1. Classification of banks into two groups (distressed and non-defaulting) in order to identify the case of Bank (Y) through the use of (9) a financial ratio according to which the case of the banks in the research sample was revealed, whether they were defaulted or non-defaulting. The purpose of the classification is to reach a logistic regression model that enables us to predict the financial failure of the research sample banks.
2. Using the stepwise selection method, which generates models by adding independent variables one after the other until the strongest predictive model is formed with the highest possible accuracy.
3. Using the Logistic Regression Model in processing the financial data, which was represented by the financial ratios of the banks in the research sample.

Application of the logistic regression model to predict the financial failure of the research sample banks

There are two steps that need to be followed in order to arrive at an interagency logistic regression model: Classification of banks and Use the stepwise selection method to find the best model.

1- Classification of banks:-

In order to be able to apply the logistic regression model, banks must be classified into two groups (performing and non-performing).The classification is carried out according to what is reflected in the financial ratios of the research sample banks, and the classification can be presented through the following table (1).

Table 1. Classification of banks into two groups (performing and non-performing) according to the financial ratios.

N	Banks	Capital adequacy ratio = 1		Profitability ratio = 3		Credit risk ratio = 2 *		Interest rate risk ratio = 1*		Liquidity risk ratio = 2 *		Total		Result
		Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	
1	Iraqi Commercial Bank		1		3	1	1	1			2	2	7	Tumble
2	Middle East Bank		1	1	2	1	1	1			2	3	6	Tumble
3	Al-Mansour Investment Bank		1	1	2	1	1	1		1	1	4	5	Tumble
4	Baghdad Bank		1	1	2		2	1		1	1	3	6	Tumble
5	Iraqi Islamic Bank	1		1	2	2			1		2	4	5	Tumble
6	The National Bank of Iraq		1	2	1	2		1			2	5	4	Non Tumble
7	Kurdistan Bank		1	2	1	1	1	1			2	4	5	Tumble
8	Ashur International Bank		1		3	1	1	1		1	1	3	6	Tumble
9	Sumer Commercial Bank	1		3			2		1	2		6	3	Non Tumble
10	Gulf Commercial Bank		1		3	1	1	1		2		4	5	Tumble
11	Iraqi Middle East Investment Bank		1	1	2	1	1		1	2		4	5	Tumble
12	Warka Investment Bank	1		2	1	1	1	1		1	1	6	3	Non Tumble
13	Dar Al Salam Investment Bank		1	2	1	1	1	1		2		6	3	Non Tumble
14	Bank of Babylon		1	2	1	2		1		2		7	2	Non Tumble
15	Dar Al Salam Investment Bank		1	2	1	1	1	1		1	1	5	4	Non Tumble

Source: prepared by the researcher based on the financial indicators of the research sample banks

The banks were classified according to what was shown by the financial ratios, as the first step was to carry out the financial analysis of the ratios and then extract the average ratios for the research sample years 2018, 2022, 2021, 2020, 2019, and then calculate the sectoral average of the ratios (according to their classification within the ratio group) And comparing the average ratio of the banks with the sectoral average for each of the variables, and the second step was to develop two hypothetical groups of banks (distressed, non-performing) and any bank that has a ratio less than the sectoral average or a negative ratio was considered among the

non-performing banks, and vice versa for non-performing banks. And then calculate the negative and positive ratios and classify banks accordingly.

After classifying the banks into two groups (distressed, non-defaulting) using the financial ratios and as shown in Table (1), the following question must be asked: Is there a correlation between the financial ratios, because the correlation between the ratios may give misleading results, so the research was based on the work of a matrix A correlation between these ratios, and the following table (2) shows the correlation between the financial ratios that were used in the classification.

Table 2. The correlation between the financial ratios of the research sample banks

The correlation between the financial ratios of the Iraqi banks, the research sample									
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9
X_1	1	.223	-.210-	.678**	.200	.277	-.841-**	-.098-	.178
X_2		1	.691**	.171	.627*	-.220-	-.078-	-.237-	.480
X_3			1	.071	.059	-.244-	.138	-.108-	-.113-
X_4				1	-.115-	-.034-	-.875-**	.134	-.058-
X_5					1	.037	.035	-.057-	.652**
X_6						1	-.300-	.315	-.278-
X_7							1	-.205-	-.056-
X_8								1	-.110-
X_9									1

Source: Prepared by the researcher based on financial data and computer output.

It is clear from Table (2) that there is no linear correlation (overlap) between the financial ratios used by the research. If there is a linear correlation between the ratios, the results will be misleading and unreal, in addition to that one of the most important conditions of the analysis is the absence of any linear correlation or overlap between the independent variables. Correlation occurs when the values (1) are equal to the correct one, that is, if the value of one of the financial ratios is (1) and the value of another ratio corresponds to it as well (1), then this indicates a correlation between the two ratios. As for the complete correlation between the ratios, it can be observed when there is a value or values that approach It is the correct one if it is positive or negative (1,-1).

Means and standard deviations for the used ratios:

The research relied on a combination of financial ratios, which amounted to (9) ratios, for the purpose of reaching a model through which it is possible to predict the financial failure of the research sample banks, by analyzing these ratios, and then identifying the ratios that are considered more influential in the research.

The following table (3) presents the set of ratios used in the research, including averages and standard deviations:

Table 3. Financial ratios, their averages, and standard deviations for the research sample banks

N	Financial ratios	Non Tumble bank		Tumble bank	
		Mean	standard deviation	Mean	standard deviation
1	Capital Adequacy = Capital paid into risk	1.193	0.412	0.096	0.064

N	Financial ratios	Non Tumble bank		Tumble bank	
		Mean	standard deviation	Mean	standard deviation
	weighted assets				
2	Return on assets = net profit to total assets	0.036	0.009	0.017	0.006
3	Return on Equity = Net Profit to Equity	0.163	0.047	0.046	0.031
4	Interest margin on net income = net profit to operating assets	2.189	2.095	0.041	0.027
5	Net non-performing loans to total loans	0.047	0.018	0.387	0.281
6	Total deposits to total loans	1.157	0.238	0.684	0.194
7	The ratio of interest rate sensitive assets to total assets	0.722	0.050	0.302	0.220
8	liquid assets to total assets	0.208	0.045	0.111	0.040
9	liquid assets to short-term liabilities	0.443	0.312	0.172	0.067

Source: Prepared by the researcher based on the annual reports of banks and computer outputs.

It is clear from Table (3) above that some ratios are close or slightly different between the two types of banks and some of them showed a clear discrepancy, for example:

1- It is noted from table (3) above that the credit risk ratios showed a large dispersion in values, especially in non-performing banks, compared to non-performing banks whose values were more consistent, which indicates the difficulty for stable banks not to pay all or part of the interest due or The principal debt or both together for loans according to what is agreed upon, and the credit risk according to by observing and calculating the assets ratio of medium quality loans, and since the loans represent the largest part of the banks' investments and assets, therefore, special attention must be paid to the quality of the assets and relate to the size of the risks or the possibility of loss in the assets of the bank. If the size of these risks is small, the quality of the assets is considered good, and when these risks appear to a large extent, they are considered not good and have high risks compared to troubled banks.

2- While we find that the credit risk ratio was consistent in the Iraqi banks, and this indicates that the quality of assets is good in the research sample banks.

3- While the values of the non-performing Iraqi banks are more consistent compared to their non-performing banks, the ratio that reflects this is: (the ratio of sensitive assets to total assets).

4- We also note from Table (3) that the indicators of liquidity risk were somewhat consistent in values, especially the values of non-performing banks, compared to the non-performing banks of the Iraqi banks, the research sample. The liquidity risk is that the bank does not have sufficient funds to meet the cash needs, due to the withdrawal of deposits and the increase in the demand for loans with the actual or

expected sources of liquidity, whether it is from selling the assets in the possession of the bank or what can be achieved from additional liabilities. When depositors demand present cash, the bank must either borrow additional money or sell assets to meet the depositors' requests to withdraw their money. The most liquid assets are cash, and this asset can be used to meet the direct requests of depositors to withdraw their money, despite the fact that banks reduce their cash assets because they earn interest. The ratios that reflect this are:

a. Liquid assets to total assets.
b. Liquid assets to short-term liabilities.

Table 4 a statistical description of the set of financial ratios included in the research form:

Table 4. Shows the set of ratios included in the model for the research sample banks, and the two ratios

Iraqi banks research sample	Non Tumble loans net to total loans	liquid assets to short-term liabilities
Iraqi Commercial Bank	0.183	0.236
Middle East Bank	0.018	0.167
Mansour Investment Bank	0.037	0.208
Baghdad Bank	0.018	0.229
Iraqi Islamic Bank	0.204	0.153
The National Bank of Iraq	0.161	0.023
Kurdistan Bank	0.059	0.172
Ashur International Bank	0.056	0.315
Sumer Commercial Bank	0.042	0.254
Gulf Commercial Bank	0.047	0.27
Iraqi Middle East Investment Bank	0.065	0.372
Warka Investment Bank	0.667	1.143
Dar Al Salam Investment Bank	0.059	0.374
Bank of Babylon	0.723	0.376
Dar Al Salam Investment Bank	0.072	0.195
Sumer Commercial Bank	0.160	0.299

Source: Prepared by the researcher based on the annual reports of banks and computer outputs.

2- Stepwise selection method:

After it became clear to us that there are no complete correlations between the financial ratios, it became possible to apply the stepwise selection method, through which models can be generated, as we stated previously.

Through the aforementioned method, two financial ratios were reached for the Iraqi banks, the research sample, as they were considered the most important ratios

in the logistical model, on which the prediction of bank failure was built. The following is a presentation of the research model:

P_i^* = - 186.042 + 1069.633(X5) + -108.015(X9)

The previous form can also be expressed as an exponential function:

P_i^*= Exp (- 186.042 + 1069.633(X5) + -108.015(X9))

Based on the basic equation, the logistic model will be as follows:

$$P_i^* = P(y=1) = = \frac{\text{Exp}\ (-186.042 + 1069.633\,(X5) + -108.015\,(X9))}{1+\text{Exp}(-186.042 + 1069.633\,(X5) + -108.015\,(X9))}$$

Logistic regression model arrived at by stepwise selection method:

A logistical regression model was reached to predict the financial failure of the research sample banks, which includes:

- Two financial ratios out of (9) financial ratios for Iraqi banks and these ratios are:

1. The ratio of net non-performing loans to total loans.
2. Liquid assets to short-term liabilities.

It was statistically proven that these ratios are the best in terms of their ability to predict, as these ratios were chosen according to the value of Wald Statistics, which indicates the importance of the financial ratio of the three models, and examining the financial ratio coefficient if it is significant or not.

It is known that Wald Statistics has a chi-squared probability distribution ((χ^2) with one degree of freedom, as:

$$\text{Wald Statistics} = \left[\frac{\hat{B}J}{S.e\hat{B}J}\right]^2$$

Stepwise selection and Wald statistics for logistic regression model: Wald Stepwise Method:

The following table shows the results of the gradual choice method and the Wald statistic of the logistic regression model, the values of the coefficients of the independent variables and their statistical significance (Ross, 2002, 59):

Table 5. Stepwise selection and Wald statistics for the logistic regression model and the values of the coefficients of the independent variables and their statistical significance Wald Method-Stepwise:

Iraqi banks research sample						
Model number	Variable	Coefficient value	standard error	Wald's statistic	Freedom degrees	P-value
1	Fixed	-272.646	21362.759	0.000	1	0.990
	X5	1409.955	111319.513	0.000	1	0.990
2	Fixed	-186.042	19355.534	0.000	1	0.992
	X5	1069.633	110686.505	0.000	1	0.992
	X9	-108.015	23381.974	0.000	1	0.996

Source: Prepared by the researcher based on computer output.

It is clear from Table (5) above the importance of the financial ratios in the above models for Iraqi banks, the research sample, and the significance of the coefficients of these ratios, as their statistical significance (level of significance) (p-

value < 0.05) for each of the coefficients of the variables for the two ratios is clear: (X_5, the ratio of net non-performing loans To total loans, X_9 is the ratio of liquid assets to short-term liabilities). As well as the difference in the term in the equation from zero, which indicates the significance of the models for the three banking sectors: (Wald Method: W = 0.000)

In order to compare the morale tests of the logistical models and the quality of their reconciliation and to know the extent of their ability to predict the financial failure of the banks, the research sample, a summary of these tests must be presented, which includes the test of great odds (-2 Log Likelihood), the Chi-square test, Cox and Snell determination coefficient (Cox & Snell-R^2) and the determination coefficient of Nigel Kerke (Nagelkerke -R^2) according to Table (6) below:

Table 6. Results of the quality of fitment of logistical models using the Stepwise/Wald method

Iraqi banks research sample					
Model number	Great odds likelihood	Chi² (χ^2)	p-value	Cox & Snell	Nagelkerke
1	0.000	15.012	0.000	0.632	1.000
2	0.000	15.012	0.001	0.632	1.000

Source: Prepared by the researcher based on computer output.

It is also noted in Table (6) that the Iraqi banks, the research sample, decreased in the value of the amount (-2Log Likelihood), the odds ratio, until it reached its lowest value in model (2), which includes the constant of the logistic regression model at a significant level (0.05), as well as notes The increase in the value of the Cox & Snell determination coefficient, which indicates the effectiveness of the logistic regression model in explaining the changes that occur in the dependent variable (the state of the bank), so it is at its best in model (2) after introducing the variable X_9: the ratio of liquid assets to short-term liabilities, as is evident It has the ability of the last model to predict the financial failure of the banks in the research sample, as: (χ^2 = 15.012, P-value = 0.001 < 0.05) (Ross, 2002,59).

The following are the classification tables for the dependent variable (the state of the bank) of the logistic regression models that were made using the stepwise method in selecting financial ratios and entering them into the model.

Table (7) Classification of the regression model for Iraqi banks, which includes two variables and the regression model constant

Model No. (1)		(Predicted)		
	Bank condition	Unstable banks	Stable banks	Correct %
(Observed) X5	Tumble banks	9	0	100%
	non- tumble banks	0	6	100%
				100%

Model No. (1)		(Predicted)		
Model No. (2)		(Predicted)		
	Bank condition	Unstable banks	Stable banks	Correct %
(Observed) X (5,) X9	Tumble banks	9	0	100%
	non- tumble banks	0	6	100%
				100%

Source: Prepared by the researcher based on computer output.

Table (7) above has been classified into two models, since the regression model for Iraqi banks, the research sample, includes two independent variables and a constant regression ($ß_0$), in Model No. (1) There is one independent variable X_5 and a constant regression, and assuming the occurrence of default with a probability of 50% as a minimum It is clear that the accuracy of the model reached 100% when the constant and the independent variable are present in the model. As for Model No. (2), it contains two independent variables (X_9 X_5) and the regression constant, and assuming that the default event occurs with a probability of 50% as a minimum. in the form.

Classification of the regression model number (1), which includes the variable X5 in addition to the regression model constant (ß0).

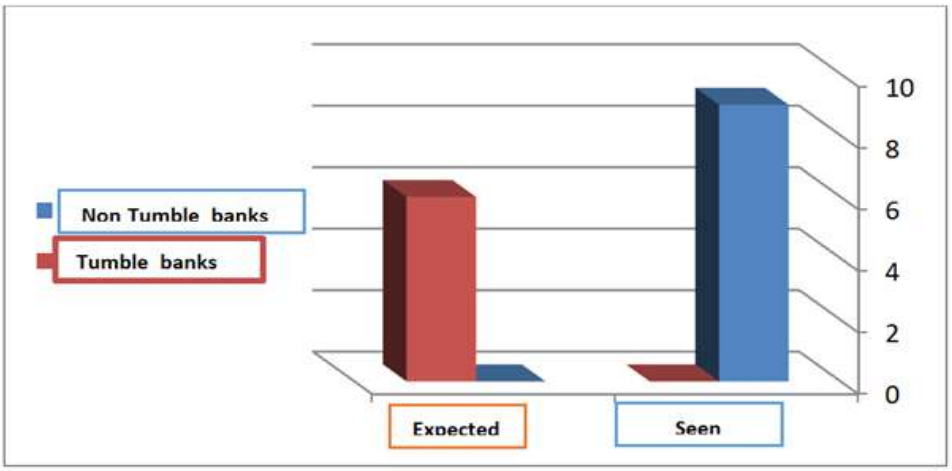
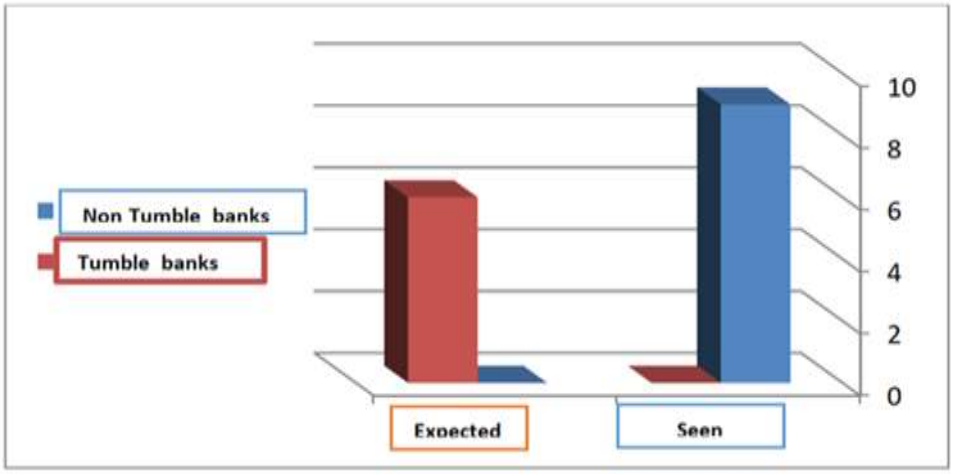


Figure (1)

Figure (1) shows that Model No. (1) of the Iraqi banks, the research sample, which contains one independent variable X_5, the ratio of net non-performing loans to total loans and the regression constant (ß0), through which a high accuracy rate in forecasting reached (100).%), and it did not contain any errors in the classification if the troubled banks were classified into (9) banks within the group of banks, the research sample, and in return it was classified as (6) non-stumbling banks from the group of banks, and the total of troubled and non-stumbling banks became (15), which is the total Iraqi banks as a sample search.

Classification of the regression model No. (2), which includes the variables X_5, X_9 in addition to the regression model constant (ß0).



Source: prepared by the researcher based on the results of the analysis of the research sample banks.

Figure (2)

Figure (2) above shows that Model No. (2), which included the variable: X5, the ratio of net non-performing loans to total loans, and the variable: X9, the ratio of liquid assets to short-term liabilities and the regression constant (ß0), and that the accuracy rate also reached (100%) And it did not contain any errors in the classification if the troubled banks were classified into (9) banks within the troubled banks group, and on the other hand, (6) non-stumbling banks were classified from the non-stumbling banks group, and the total troubled and non-stumbling banks became (15) banks, which is the total Iraqi banks as a sample The search is as shown in Table (8) below:

Table (9). Tumble banks and non- tumble banks, research sample

N	Tumble banks	N	Non- tumble banks
1	Iraqi Middle East Investment Bank	1	Iraqi Commercial Bank
2	Warka Investment Bank	2	Middle East Bank
3	Dar Al Salam Investment Bank	3	Mansour Investment Bank
4	Bank of Babylon	4	Baghdad Bank
5	Dar Al Salam Investment Bank	5	Iraqi Islamic Bank
6	Sumer Commercial Bank	6	The National Bank of Iraq
		7	Kurdistan Bank
		8	Ashur International Bank
		9	Iraqi Commercial Bank

The source was prepared by the researcher based on the output of the electronic computer

E. Conclusion

The conclusion of this research is : (1). The financial default has a great impact on many parties and parties, as the financial failure affects the banks themselves as well as the owners and creditors, and it can result in large losses that lead the bank to bankruptcy. This is in addition to the pressures faced by the administration, foremost of which is the relinquishment of the position to a new administration. (2). There is a significant effect of financial ratios (independent variables) in the case of the bank, and this has been proven after conducting statistical tests. (3). the more significant variables (financial ratios) are added, the more accurate the model will be in forecasting. (4). the two ratios most affected by Iraqi banks, the research sample, are (X_5: the ratio of net non-performing loans to total loans, X_9: the ratio of liquid assets to short-term liabilities) as significant. (5). There were deviations in the values from the arithmetic mean of the financial ratios, and the deviation appeared more in the group of troubled banks. (6). the classification related to banks showed that they are (in default, not in default). The classification was based on the financial ratios after comparing them with the sectoral average of the banks (research sample), as the total number of non-performing Iraqi banks was (6) and non-performing banks (9) out of a total of (15) banks within research years. (7). Liquidity risk indicators were somewhat consistent in values, especially the values of non-performing banks compared to non-performing banks of Iraqi banks, and the ratios that reflected this are: (liquid assets to total assets, liquid assets to short-term liabilities). (8). The high ratio of liquid assets to short-term liabilities reflects a decrease in liquidity risk, but at the same time it indicates a decrease in the banking return due to the bank's focus on keeping the largest amount of its money in the form of liquid assets and short-term financial investments with high liquidity and low returns.

The recommendations of this research is : (1). Paying attention to the loan portfolio, because most cases of default in banks occur due to loan problems, namely the delay in repaying loans and the interest arising therefrom. The revenues generated from loans are the majority of the bank's revenues from its assets, and the ratio that reflects this is (net non-performing loans to total loans). (2). Paying attention to the quality of the assets, due to the size of the risks or the possibility of loss in the assets of the bank. And if the size of these risks is small, the quality of the assets is considered good, and when these risks appear to a large extent, they are considered not good and with high risks compared to the troubled banks, and the ratio that reflects this is (the ratio of sensitive assets to the total assets). (3). The need for banks to hold continuous training courses in financial analysis, especially in the field of forecasting financial defaults, and to encourage employees to take these courses with incentives for employees who prove their competence in how to use and apply models for predicting financial defaults. (4). The need for banks, universities, colleges, institutes and specialized centers to carry out more research and studies in the field of predicting financial failure, and to train graduates of the Department of Banking and Financial Sciences on the practical practice of financial analysis and the use of specialized programs for that. (5). Following up on scientific developments in financial analysis to predict financial failure, and benefiting from

these developments in avoiding any problems that may affect banks before they occur.

References

Abu Alia, M. J. & Mardawi, Z. M. (2021). The Impact of Ownership Structure and Board Characteristics on Corporate Social Responsibility Disclosed by Palestinian Companies. Jordan Journal of Business Administration, 17(2), 254-277.

Abu Alia, M., Ismael, R., Taha, B., & Takrori, N. (2019). The Relationship between Accounting Conservatism and Earnings Management in the Palestinian Corporations Listed on the PEX. Al-Aqsa University Journal, 24(5), 55-79.

AlHamdani, R. I., Yasen, T. Y., & Qatan, A. (2013). Using model Sherrod to measure the financial failure of a public company for the manufacture of medicines and medical supplies in Nineveh. AL-Anbar University journal of Economic and Administration Sciences, 5(10), 449-473.

Alia, A. M., Abdeljawad, I. & Yaaqbeh, M. (2020). Depressing earnings management in Palestinian corporations: the role of audit quality, audit committee, and accounting conservatism. International Journal of Revenue Management, 11(3), 213-236.

Alkhatib, K., & Al Bzour, A. E. (2011). Predicting corporate bankruptcy of Jordanian listed companies: Using Altman and Kida models. International Journal of Business and Management, 6(3), 208—2015.

Altman, Edward I. (2000). Predicting Financial Distress of Companies: Revisiting the Z-Score and ZETA Models. Journal of Banking and Finance.

Anjum, S. (2012). Business bankruptcy prediction models: A significant study of the Altman's Z-score model. Available at SSRN 2128475.

Ashraf, S., Felix, E., & Serrasqueiro, Z. (2019). Do Traditional Financial Distress Prediction Models Predict the Early Warning Signs of Financial Distress? Journal of Risk and Financial Management, 12(2), 55.

Asmar, M., Abu Alia, M. & Ali, F. H. (2018). The Impact of Corporate Governance Mechanisms on Disclosure Quality: Evidence from Companies Listed in the Palestine Exchange. International Journal of Economics, Commerce and Management, 4, 48-71.

Babela, I. S., & Mohammed, R. I. (2016). Business Failure Prediction using Sherrod and Kida Models: Evidence from Banks Listed on Iraqi Stock Exchange (2011-2014). Humanities Journal of University of Zakho, 4(2), 35-47.

Bunyaminu, A., Tuffour, J. K., & Barnor, C. (2019). Assessing the Determinants of Business Failure of Companies Listed on the Ghana Stock Exchange. Journal of Accounting and Finance, 19 (4).

Hantono, H. (2019). Predicting Financial Distress Using Altman Score, Grover Score, Springate Score, Zmijewski Score (Case Study On Consumer Goods Company). Jurnal of Accountability, 8(1), 1-16.

Khaliq, A., Altarturi, B. H., Thaker, H. M., Harun, M. Y., & Nahar, N. (2014). Identifyng Financial Distress Firms: A Case Study of Malaysia's Government Linked Companies (GLC). International Journal of Economics, Finance and Managment.

Kutum, I. (2015). Predicting the Financial Distress of Non-Banking Companies Listed on the Palestine Exchange (PEX). Research Journal of Finance and Accounting, 6(10).

Mahamid, I. (2012). Factors affecting contractor's business failure: contractors' perspective. Engineering, Construction and Architectural Management.

Mohammed, A. A. E., & Kim-Soon, N. (2012). Using Altman's model and current ratio to assess the financial status of companies quoted in the Malaysian Stock Exchange. International Journal of Scientific and Research Publications, 2(7), 1-11.

Samkin, G. (2012). The Use of Z-Scores to Predict Finance Company Collapses: A research Note. Newzeland: ResearchGate. https://www.researchgate.net/publication/261028087_

Tarazi, D. D. (2019). Agency Theory and the Companies' Financial Performance: An Empirical Study with Evidence from Companies Listed in Palestine Exchange (PEX)(2012-2016) (Doctoral dissertation, Al-Azhar University-Gaza).

Xu, Xiaoyan; Wang, Yu. (2007). Financial Failure Predition using efficiency as a predictor. Expert Systems with applications, 36(1), 366-373.

Abu Hamdeh, Hadeel (2015) "Determinants of Wages in the Palestinian Industrial Sector", Gaza Strip - Palestine. https://library.iugaza.edu.ps/book_details.aspx?edition_no=129359

Ahmed, Nabil (2013): An Accounting Model for Predicting Financial Failure Using the Most Influential Financial Ratios: An Applied Study on the Saudi Capital Market, Egyptian Journal of Commercial Studies, 37 (3), pp. 421-462.

Al-Janabi, H. p. (2019). Predicting the financial failure of commercial banks using the Sherrod model (applied research on a sample of banks listed in the Iraq Stock Exchange for the period from 2011-2016). Iraq: The ResearchGate.
https://www.researchgate.net/publication/334762445_altnbw_balfshl_almaly_llmsarf_altjaryt_bastkhdam_nmwdhj_Sherrord_bhth_ttbyqy_ly_ynt_mn_almsarf_almdrjt_fy_swq_alraq_llawraq_almalyt_llmdt_mn_201 1_-_2016

Al-Ammar, Radwan. and Al-Qusairy, Hassan (2015). A comparative study of financial failure prediction models, Tishreen University for Research and Scientific Studies. Series of economic and legal sciences. Volume 37. Issue 5. Syria http://journal.tishreen.edu.sy/index.php/econlaw/article/view/2505

Al-Qaisi, Ahmed Fares. (2016). Do models based on financial ratios have a predictive ability to distinguish between troubled and non-performing companies?: A comparative study between a model derived from the financial ratios of Jordanian industrial companies and Altman's model. Dirasat: Administrative Sciences, 161(3532), 1-23.file:///C:/Users/Hi/Downloads/7602-39797-1-PB.pdf

Al-Murshidi, Abbas Alwan Sharif. (2018). Using the (Sherrod) model to predict the financial failure of private commercial banks in Iraq - applied research in a sample of banks listed in the Iraq Stock Exchange. Journal of University of Babylon for Pure and Applied Sciences, 26(1), 253-275. https://www.journalofbabylon.com/index.php/JUBPAS/article/view/461

Zahraa Saleh Al-Khayyat. (2014). Using the sherrord model to predict bank failure An applied study of a sample of private banks in Nineveh Governorate for the period (2007-2009). Mesopotamia Development, 36(115), 9-20. https://www.iasj.net/iasj/download/b8f5a23a53d5ed64?fbclid=IwAR3edg1tfEw2u0QVuOWpHe_q_JPnntvUYWElpDXUHImRCutUSlvNVAuoVbM

Soleimani, Intisar (2015). Forecasting Financial Failure Using Sherrod's Model: An Empirical Study on Algerian Industrial Enterprises. University of Batna. https://www.asjp.cerist.dz/en/article/35964?fbclid=IwAR1HiQEPaKcVgRtDfp4dyE3FHQa4_R_hkqnzflMbZCOswfiTn5Zw4QOp_xsb