

ANALYSIS AND EVALUATION OF CREDIT RISK INDICATORS TO LIMIT INCREASE IN THEIR SIZE AND ITS REFLECTION ON FINANCIAL STABILITY OF BANK / APPLIED RESEARCH FOR A SAMPLE OF IRAQI PRIVATE BANKS

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ABSTRACT

Research aims to know the analysis and evaluation of indicators that banks can use to reduce and limit the amount of credit risks and thus their reflection on their financial stability. Thus, there are many risks and failures witnessed by banking industry in Iraq, which resulted in financial discouragement, that eventually led to bad loans and some other financial factors to which bank is exposed, most notably credit risks. The research problem emerged with extent of the impact credit risk indicators faced by the research sample banks in process of granting bank credit and limiting the increase in its size on their financial stability and determining the level of credit risk measures that must be put in place to ensure financial stability, Using a set of credit and financial measures and their impact on financial stability, as measured by the Altman Z-Score model, by applying them to research community of 37 private Iraqi banks listed in Iraqi Stock Exchange, for a period of (2006-2015). As well as using statistical program (SPSS V.24) and (Panel Data) through the program (EViews V.9).

Keywords: Credit Risk and its indicators, Total Loans, Total Deposits, Loan Provision Losses, Financial Stability, Z-Score Profitability Target.

INTRODUCTION

Studies indicate that most of the financial crises that occurred previously were the most important causes of credit risks, as credit risks are one of the most important and most dangerous risks to which banks are exposed, which prompted officials in banking sector and financial institutions to give these risks and their indicators great importance in terms of their management, and the practices followed by credit risk management to reduce the negative effects that the bank may bear, so this reflected in its financial instability. The role of banks promotes rapid economic growth and financial stability in any country by providing support in particular to the real sector of the economy. Financial stability is vital for any country, so banks and financial deposits must be properly managed in right ways. Credit risk refers to the borrower's inability to pay his agreed upon obligations, for banks to adopt an ill-considered credit policy, and a lack of good evaluation of credit risk indicators leads to increased risks and consequently a financial failure in the bank and its instability in its environment, as these risks are the most important types of risks. Although there are other types and indicators of risks such as operational risks, credit risks cannot be dealt with separately from other risks. Hence the idea of research emerged in analyzing and evaluating indicators that banks can use to reduce and limit the amount of credit risks and thus its reflection on their financial stability, using a set of credit and financial measures and its impact on financial stability as

measured by the Altman Z-Score model, and using the statistical program (SPSS V.24) and (Panel Data) through the program (EViews V.9).

METHODOLOGY

Research Problem

Banking risks are the main factor that affects financial and banking behavior, and these risks have a negative impact on performance banks. An effective and efficient management of these risks is necessary to reduce them or reduce their effects. Therefore, it is one of the factors that causes bank crises and thus bank is exposed to bankruptcy due to lower value of its assets than value of its liabilities as a result of customers not paying obligations they owed to bank. The research problem is embodied in following questions:

1. What are the indicators of credit risk?
2. How can credit risk indicators be measured?
3. What is the impact of evaluation credit risk indicators on measuring financial stability of banks?

Research Importance

The importance of the research is reflected in the following:

1. The importance of research is reflected in the knowledge and analysis of basic concepts of research variables (indicators of credit risk, and financial stability as measured by the Altman Z-Score model).
2. The importance of evaluating and measuring credit risk indicators and limiting their increase in size.
3. The importance of the research is reflected in the use of the Altman Z-Score model, the financial stability of banks and the knowledge of whether the bank will face financial insolvency, which indicates that the bank's assets are less than liabilities or not?

Research Objectives

The research aims to achieve the following:

1. Analyzing and measuring credit risk indicators and measuring the extent of their impact on the financial stability of the research sample banks.
2. Evaluation of the research sample banks in terms of their financial stability and the state of financial stumbling that they will face by applying the Altman Z-Score model
3. Classifying the credit risk indicators from the highest to the lowest affecting the stability of the research sample banks to limit the increase in their volume.

Research Hypothesis

The research stems from a general hypothesis (The analysis and evaluation of credit risk indicators results the importance in reducing the amount of increased risks to which the research sample banks are exposed and their impact on the financial stability of banks), subdivided into the following (Fraser & Simkins, 2010):

H₀: There is no statistically significant effect of the loan-to-equity ratio on financial stability Z-Score.

H₀: There is no statistically significant effect of the total loans to total deposits ratio on financial stability Z-Score.

H₀: There is no statistically significant effect of the ratio of total loans to total assets on financial stability Z-Score.

H0: There is no statistically significant effect of the loan loss ratio to total loans on financial stability Z-Score.

Research Community and it's Sample

The research community was represented by the Iraqi private banks listed in the Iraq Stock Exchange, and the research sample was represented by 8 banks out of 37 banks for the period (2006-2015), the sample was chosen after excluding a number of banks as they are newly established and do not have data covering the approved research period. There were some banks under guardianship and under liquidation and other banks for which no data are available for the year 2015. Table 1 shows the research sample banks:

	Bank name	Year of incorporation	Capital at incorporation	Current capital
1	Baghdad Bank	1992	100 million	250 billion
2	Iraqi Commercial Bank	1992	150 million	250 billion
3	Iraqi Investment Bank	1993	100 million	250 billion
4	Middle East Bank	1993	400 million	250 billion
5	National Bank of Iraq	1995	400 million	250 billion
6	Babel Bank	1999	500 million	250 billion
7	Sumer Commercial Bank	1999	400 million	250 billion
8	Gulf Commercial Bank	2000	600 million	300 billion

Source: Bank reports for the research sample banks.

LITERATURE REVIEW

Credit Risk

Credit risk is one of the most important and most dangerous risks faced by banks, as studies indicate that most of financial crises that occurred previously due to credit risks, which prompted officials in the banking sector and financial institutions to attach great importance to these risks (Brown & Moles, 2016). These risks refer to the borrower's inability to pay the agreed-upon obligations, as it is one of the most important types of risks and credit risk cannot be dealt with separately from other risks such as operational risk, liquidity risk, market risk, reputation and legal (Fabozzi et al., 2002).

Types of Credit Risk

Credit risk occurs as a result of the customer's inability to pay his obligation with the bank, and credit risk is classified into several types, including the following:

1. **Customer Risk:** It occurs as a result of the customer's inability to repay the loan or the financial obligation incurred by him as a result of granting the loan, as this type is related to the activity in which the customer works and his financial position. When an imbalance occurs in the customer's financial position, this leads to his failure to pay the financial dues he owes, which causes major problems in the bank (Asfaw & Veni, 2015).
2. **Economic Risks:** the economic conditions greatly affect the banks through their impact on the securities. These conditions are represented by financial policy of country in which bank operates and its monetary policy, in addition to inflation and other economic indicators. This type of credit risk occurs as a result of the borrower's inability to repay the obligation due to impact of financial or economic policy of the country to which he belongs (Tang et al., 2018). There are those who call it currency fluctuation risk, as this type of credit risk occurs as a result of bank's being affected by fluctuations in foreign exchange rates, as banks face large losses as a result of the depreciation of

country's currency against foreign currencies, and this negatively affects bank's assets, which decrease in proportion to obligations that it On the Bank (Lan et al., 2015).

3. **Financial Derivatives Risk:** It is risk that occurs as a result of counterparty possibility of financial institution failing to fulfill its obligations in accordance with terms agreed upon in financial derivative contracts, as bank deals with financial derivatives to reduce risks through; (a) Hedging losses that occur to other party by paying value to purchasing party (bank) in event of a credit default.(b) Attempting to reduce concentration risk and provide diversification in credit portfolio.(c) Insurance cover in terms of reducing risks associated with assets.

Key Controls that Help Reduce Credit Risk: bank must hedge against risks that exposed it by setting several basic controls to preserve funds of depositors, owners and financial stability:

1. Existence of a strong control system and activation of internal inspection systems so that bank can bypass errors in advance and work to correct errors that may occur during the application (Jelda, 2011).
2. Bank rates loan, by determine the amount of loan Which he gives and prevailing interest rate in markets, and other administrative expenses (Gup, 2011).
3. Developing work systems in bank to contribute reaching correct credit decisions by setting instructions and controls.
4. Constant follow-up of bad debts, as the follow-up process and monitoring of debtors' conditions and guarantees and developments in their financial capabilities begins periodically through process of collecting information and updating this information on query system (Joseh, 2011).
5. Putting insurance on guarantees provided by borrowing customers in order to avoid risks that guarantees may be exposed to, and to preserve them and rights of bank and follow up the insurance procedures (John & Marcia, 2011).
6. Defining policies to limit unwanted credit expansions and applying banking and financial procedures in connection with implementation of bank's policies in profitability, liquidity and security, and adherence to the instructions, regulations of the Central Bank, which it constantly announces through its memoranda to banks (Saunders & Allen, 2016).

Credit Risk Indicators

1. Loans to Equity Ratio: This ratio indicates that bank grants loans with its own balance (its own capital). Any increase in granted loans leads to an increase in non-performing loans and an increase in credit risk of bank. It is measured by the equation (1) (Rose & Hudgins, 2010): **Total Loans to Equity Ratio = Loans/ Equity.....(1)**
2. Total loans to Total Deposits Ratio: This ratio used to measure loans that bank can grant to borrowers based on deposits it obtains from its customers who are depositors. It is considered an important measure of credit risk because in event of an increase in this ratio, the bank will be exposed to many crises and risks as well as credit risks, and this ratio is measured through the equation (2) (Al_shakrchy, 2017):
Total Loans to Total Deposits Ratio = Total Loans / Total Deposits.....(2)
3. Total Loans to Total Assets Ratio: This ratio represents bank assets that can be employed in loans, as its rise negatively affects bank's liquidity, because it reduces bank's liquidity, As well as the difficulty in obtaining necessary financing in case the loan is not repaid within specified period, which leads to emergence of problems and risks that negatively affect the bank's conduct of its operations, and this ratio is measured through the equation(3) (Saeed, 2014):
Total Loans to Total Assets Ratio = Gross Loans / Total Assets.....(3)
4. Loan Provisions to Total Loans Ratio: The provision for loan losses can be determined by evaluating the customer loan portfolio, bank deducts the losses resulting from loan defaults from it. The higher the loan loss provision rate, the higher the bad loans, and consequently, the higher credit risk. This rate is measured through the equation (4) (Asfawesen, 2017): **Loan Provision Losses Rate = Provision losses loan / total loans.....(4)**

Financial Stability

Financial stability is defined of its ability to facilitate and enhance economic operations, and the ability of risk management to absorb shocks (Fikirini & Ronald, 2018),

Financial stability is important for central banks because the objectives of monetary policy and financial stability are interrelated. Risk and leverage increase the likelihood of systemic problems that can threaten the performance of financial system, and real economic activity, which generates an economic exhausted with costs. There are several widely known measures of financial stability such as capital adequacy ratio, liquidity coverage ratio, fixed earnings coverage ratio, total debt-to-equity ratio, fixed-interest coverage ratio, long-term debt-to-equity ratio, leverage ratio and equity ratio. There are differing opinions among scholars on the superiority of one indicator over the other as a good financial measure of stability in banks. Similarly, any indicator or combination of indicators can be used to measure financial stability of banks according to objective of the analyst (Fan & Yijun, 2014), as well as one of the six factors of CAMELS that CBN uses to measure financial stability of deposits in banks which are capital, liquidity and profits, Thus, Capital, Liquidity and Earnings are represented in Financial Stability Report of Central Bank of Canada as Capital Adequacy Ratio, Liquidity Coverage Ratio, Constant Earning Coverage Ratio which provides a measure of soundness of Bank for example (CBN, 2018).

Z-Score Profitability Target

The Altman model is considered one of the best models for measuring financial stability of banks, as it shows if bank will face financial insolvency, which indicates that bank's assets are less than its liabilities, and a model can be applied to commercial banks, The z_score of banks is determined as follows (Strobel, 2010):

$$Z=V1X1+V2X2+V3X3+V4X4$$

The (Z) indicator is considered as a basic variable dependent on several independent variables to measure bank's possibility of bankruptcy, measure the stability and safety of the bank, and predict the bank's exposure to bankruptcy within two years. This model is inversely related to the possibility of bankruptcy of bank, meaning that value of assets is less than liabilities, meaning that the greater Z value, the greater degree of stability bank and the less likely it will be exposed to bankruptcy and vice versa (Brigham & Houston, 2007). Altman reached the use of multiple discriminatory analysis method to the following model, which is used for service organizations, including banks, because it is an indicator to measure financial stability bank, and shows if the bank will face financial failure through the lack of bank's assets to its liabilities, and this model is expressed in the mathematical formula (Pradhan, 2014):

$$Z=6.56 X1+3.26 X2+6.72 X3+1.05 X4$$

whereas:

Z: profitability target, X1: Current Assets - Current Liabilities / Total Assets

X2: Retained Earnings / Total Assets, X3: Profit before interest and taxes / total assets

X4: book value equity/total liabilities

Z-score was used as a tool for evaluating performance of study sample banks, where the variables of this model can be explained through the following (Sim et al, 2010):

1- Current Assets - Current Liabilities / Total Assets

a- Current Assets - Current Liabilities: This indicator is calculated by subtracting short-term liabilities from current assets that can be converted into cash in short term.

b- Total Assets: They are all assets in bank's balance sheet, whether current or fixed.

2- Retained earnings / total assets

a- Retained earnings: This variable is calculated by subtracting taxes and dividend from total profits, and it represents all profits obtained by bank.

3- Earnings before interest and taxes/total assets

a- Profit before interest and taxes: It is represented by revenues generated from activities of bank, and this variable is represented by profits before tax and interest.

4- Book value of equity / total liabilities

a- Book value of equity: This variable is calculated by dividing equity by short-term liabilities.

b- Total liabilities: They are represented by short-term and long-term liabilities.

ANALYSIS AND DISCUSSION

Analyze credit Risk Indicators

Total Loans to Equity Ratio: Table 2 shows results of analysis for research sample banks according to equation (1), and it is noted that the general average for ratio of total loans to the Equity by banks for the period (2006_2015) amounted to (0.587), as the Middle East Bank achieved the highest percentage of total loans to Equity, amounting to (0.826), as for banks that achieved an average ratio of total loans to equity capital greater than the general average were (Investment Bank of Iraq, Baghdad Bank and Iraqi Commercial Bank), the average for these banks was (0.821, 0.820, 0.667), this indicates a high credit risk for these banks due to the reliance on the owned capital in granting loans, so bank expects a loss if the loans granted are not repaid in the specified period. While Iraqi Commercial Bank achieved lowest average ratio of total loans to Equity, which amounted to (0.108), while the banks (National Bank of Iraq, Babel Bank and Sumer Commercial Bank) achieved the average ratio to reached (0.472, 0.482, 0.5), This indicates a decrease in credit risk of banks that achieved the lowest average, Because of its dependence on a small percentage of owned capital in granting loans, as well as not expecting a large loss, as the loans granted by customers are not repaid Because using its capital to cover bad loans.

Bank name	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	average
Baghdad Bank	0.727	0.691	0.488	0.711	1.521	1.043	0.662	0.714	0.775	0.877	0.820
Iraqi Commercial Bank	0.394	0.356	0.151	0.079	0.003	0.006	0.016	0.02	0.025	0.033	0.108
Iraqi Investment Bank	1.367	0.587	0.228	0.328	0.856	0.991	1.523	1.31	0.583	0.439	0.821
Middle East Bank	0.559	0.335	0.243	0.844	1.693	1.369	1.051	1.019	0.611	0.541	0.826
National Bank of Iraq	0.266	0.25	0.303	0.316	0.673	0.465	0.436	0.685	0.627	0.706	0.472

Babel Bank	0.65	0.498	0.192	0.145	0.179	0.329	0.284	1.072	0.873	0.603	0.482
Sumer Commercial Bank	0.076	0.438	0.336	0.792	0.649	0.712	0.47	0.536	0.55	0.441	0.50
Gulf Commercial Bank	0.588	0.5	0.434	0.535	0.554	0.568	1.122	0.792	0.709	0.872	0.667
average	0.578	0.456	0.296	0.468	0.766	0.685	0.695	0.768	0.594	0.564	0.587

Total Loans to Total Deposits Ratio: Table 3 shows results analysis for research sample according to equation (2), and it is noted from Table 3 that general average of total loans to total deposits ratio for period (2006_2015) amounted to (0.447), Sumer Commercial Bank achieved the highest average ratio of total loans to deposits, which amounted to (0.996). As for banks that achieved the average ratio of total loans to total deposits greater than the general average were (Babylon Bank, Iraqi Investment Bank, National Bank of Iraq), the average in these banks was (0.566, 0.492, 0.465), respectively. This indicates that the risk in these banks is high compared to other banks because of their reliance on a large percentage of deposits in granting loans, which may cause credit risks if the loan amounts are not repaid by borrowers on the due date, and this may lead to large losses. While the Commercial Bank of Iraq achieved the lowest average ratio of total loans to total deposits, which amounted to (0.098), While banks like (Baghdad Bank, Middle East Bank, Gulf Commercial Bank) achieved an average ratio of total loans to total deposits less than the general average, as it reached (0.294, 0.311, 0.360), respectively. This means that risk in these banks is low Because it does not provide loans to its customers, except for a small percentage, which means a low credit risk, as bank is able to return deposits on demand and not face problems.

Bank name	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	average
Baghdad Bank	1.231	0.313	0.313	0.117	0.224	0.208	0.131	0.149	0.151	0.262	0.294
Iraqi Commercial Bank	0.319	0.241	0.241	0.076	0.004	0.009	0.02	0.04	0.059	0.1	0.098
Iraqi Investment Bank	0.356	0.299	0.299	0.172	0.454	0.62	0.934	0.861	0.644	0.475	0.492
Middle East Bank	0.083	0.506	0.506	0.14	0.307	0.373	0.32	0.374	0.524	0.452	0.311
National Bank of Iraq	0.518	0.32	0.32	0.406	0.577	0.647	0.435	0.32	0.49	0.687	0.465
Babel Bank	0.644	0.391	0.391	0.073	0.078	0.217	0.168	1.042	1.475	1.477	0.566
Sumer Commercial Bank	0.129	0.707	0.707	1.618	1.274	1.459	0.711	1.002	1.054	1.261	0.996
Gulf Commercial Bank	0.263	0.134	0.134	0.169	0.185	0.309	0.641	0.577	0.539	0.685	0.360
average	0.442	0.363	0.363	0.346	0.387	0.480	0.42	0.545	0.617	0.674	0.447

Total Loans to Total Assets Ratio: Table 4 shows results analysis for research sample according to equation (3), and it is noted that the general average of this indicator is (0.201), Sumer Commercial Bank achieved the highest average ratio of total loans to total assets (0.313). As for banks that achieved an average ratio of total loans to total assets greater than the general average, they were (Iraqi Investment Bank, Babel Bank, National Bank of Iraq, and Gulf Commercial Bank), as the average for these banks was (0.272, 0.238, 0.222, 0.214), respectively. This explains the high credit risk of these banks due to their reliance on loans for a large percentage in the investment of their assets. While Iraqi Commercial Bank

achieved lowest average ratio of total loans to total assets with an average of (0.04), while banks (Baghdad Bank, Middle East Bank) achieved less than general average of (0.130, 0.177), respectively ratio of total loans to total assets.

This means that credit risks are low in these banks Because of low use of loans in investing assets so that bank was able to face any risks that occur to it.

Table 4
RESULTS OF TOTAL LOANS TO TOTAL ASSETS RATIO

Bank name	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	average
Baghdad Bank	0.13	0.144	0.083	0.096	0.188	0.166	0.105	0.117	0.124	0.152	0.130
Iraqi Commercial Bank	0.152	0.109	0.049	0.031	0.002	0.003	0.007	0.011	0.015	0.021	0.04
Iraqi Investment Bank	0.254	0.174	0.067	0.107	0.307	0.354	0.475	0.469	0.296	0.224	0.272
Middle East Bank	0.066	0.041	0.027	0.114	0.245	0.282	0.24	0.267	0.275	0.222	0.177
National Bank of Iraq	0.159	0.136	0.133	0.174	0.331	0.265	0.2	0.212	0.268	0.343	0.222
Babel Bank	0.309	0.213	0.062	0.047	0.053	0.129	0.104	0.525	0.532	0.411	0.238
Sumer Commercial Bank	0.045	0.251	0.216	0.494	0.41	0.449	0.276	0.339	0.34	0.314	0.313
Gulf Commercial Bank	0.173	0.1	0.074	0.122	0.129	0.195	0.394	0.308	0.3	0.345	0.214
average	0.161	0.146	0.088	0.148	0.208	0.230	0.225	0.281	0.268	0.254	0.201

Loan Provisions to Total Loans Ratio: Table 5 shows results analysis for research sample according to equation (4), It is noted that general average of loan provision losses to total loans ratio of the same banks for the period (2006-2015) amounted to (0.701), The Iraqi Commercial Bank is only the one that achieved highest average ratio, as it reached (4,560), This is because the bank settled the suspended amounts and discovered an amount that had been embezzled, The entire allowance was taken to cover the disability ,so bank has taken administrative and legal measures for everyone who contributed to this embezzlement, and Central Bank was informed of this incident. The high credit risk of this bank as a result of using entire provision compared to loans granted, as the bank expects to lose in event of its inability to collect loans from customers. As for other banks, research sample, the average ratio of loan loss allowance to total loans achieved is lower than general average of the ratio. We note that Babel Bank achieved lowest rate of allocation for loans losses to total loans amounted to (0.085), while the banks (National Bank of Iraq, Sumer Commercial Bank, Gulf Commercial Bank, Baghdad Bank, Middle East Bank, Iraqi Investment Bank) achieved lower average rate than general average with averages of (0.118, 0.134, 0.137, 0.145, 0.176, 0.255) respectively. This indicates in lower credit risk for these banks compared to the Commercial Bank of Iraq Because of the low rate of provision for loan losses, as well as we find that banks did not expect losses that would result from the bank's inability to collect loans from customers.

Analysis of Financial Stability Indicators Z-Score

Z-Score model is one of the most important models in measuring financial stability because it shows whether banks will face financial failure or not, which indicates that the value of assets is less than liabilities and thus the bank is approaching financial failure. Z-Score model has been applied to 66 US institutions, of which 33 are successful and the rest

are unsuccessful. Table 6 shows the classification of banks according to the value of the Z-Score indicator, as follows:

Bank name	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	average
Baghdad Bank	0.169	0.198	0.307	0.18	0.083	0.116	0.123	0.081	0.074	0.127	0.145
Iraqi Commercial Bank	0.417	1.002	1.532	0.204	23.329	10.291	3.971	2.312	1.393	1.158	4.560
Iraqi Investment Bank	0.204	0.414	1.325	0.451	0.002	0.025	0.076	0.011	0.022	0.025	0.255
Middle East Bank	0.183	0.502	0.603	0.14	0.063	0.05	0.052	0.05	0.055	0.069	0.176
National Bank of Iraq	0.143	0.243	0.181	0.104	0.069	0.076	0.061	0.065	0.115	0.128	0.118
Babel Bank	0.037	0.048	0.261	0.25	0.067	0.038	0.033	0.025	0.026	0.07	0.085
Sumer Commercial Bank	0.674	0.168	0.221	0.077	0.064	0.031	0.024	0.024	0.031	0.032	0.134
Gulf Commercial Bank	0.106	0.258	0.343	0.208	0.194	0.108	0.043	0.034	0.036	0.049	0.137
average	0.241	0.354	0.596	0.201	2.983	1.341	0.547	0.325	0.219	0.207	0.701

Degree of Bankruptcy	Z value
Stable Banks	$Z > 2.6$
Banks are Hard to Judge	$1.1 < Z < 2.6$
Unstable Banks	$Z < 1.1$

Source: Pradhan, Roli (2014), Z Score Estimation for India banking Sector international Journal of Trade, Economics and Finance, Vol. L-S. No 6 December

Table 6 shows that the institutions in which Z-Score value is less than 1.1 are very dangerous and likely to fail, while the institutions in which Z-Score value is greater than 2.6 are successful institutions, and Z-Score value that is between (1.1, 2.6) is difficult to predict, this means when measuring value Z-Score it must fall within the three values shown in Table 6.

As for Table 7, it shows the most important restrictions placed on banks and degree of their exposure to bankruptcy according to Z value.

Degree of Bankruptcy	Z value
Bank is not Subject to Bankruptcy	$Z > 2.6$
Little Chance of Bankruptcy	$2.0 < Z < 2.6$
Difficult to Predict Bankruptcy	$1.5 < Z < 2.0$
Bank is at Risk of Bankruptcy	$Z < 1.0$

Source: GUP, BENTONE (2011), Banking and Financial Institutions, A Guide for Directors, Investors, and Counterparties, Published by John Wiley & Sons, Inc. Printed in the United States of America p: 155

Table 7 shows that institutions in which Z-Score value is less than 1.0 are very risky and likely to fail. Institutions with a Z-Score greater than 2.6 or between (2.0, 2.6) are

successful or have a very low risk of bankruptcy. As for Z-Score value is between (2.0, 1.5) it is difficult to predict, this means that when measuring Z-Score value it must fall within the three values shown in Table 7. Table 8 shows indicators of Z-Score model for banks in research sample.

Bank name	6.56 X1	3.26 X2	6.72 X3	1.05 X4	Z-Score
Baghdad Bank	1.321	0.06	0.237	0.205	1.823
Iraqi Commercial Bank	3.047	0.063	0.223	1.086	4.419
Iraqi Investment Bank	2.084	0.104	0.391	0.608	3.187
Middle East Bank	0.803	0.06	0.379	0.33	1.572
National Bank of Iraq	3.032	0.123	0.241	1.05	4.446
Babel Bank	2.175	0.075	0.396	0.939	3.585
Sumer Commercial Bank	3.604	0.036	0.153	1.689	5.482
Gulf Commercial Bank	1.6	0.11	0.444	0.479	2.633

We note from Table 8 the results of Z-Score values, that banks can be classified into stable and unstable banks and banks that are difficult to judge as follows:

- Stable banks or banks that are not prone to bankruptcy:** The results in Table 8 indicate that banks (Sumer Commercial Bank, National Bank of Iraq, Iraqi Commercial Bank, Babel Bank, Iraqi Investment Bank and Gulf Commercial Bank) achieved financial stability, reaching (5.482, 4.446, 4.419, 3.585, 3.187, 2.633) respectively, which is greater than value Z-Score model, which is (2.6)
- Unstable banks or banks prone to bankruptcy:** results in Table 8 indicate that when the value of Z is less than 1.1, the bank is financially unstable. Therefore, there are no unstable banks, so Z value of all banks in research sample achieved more than (1.1).
- Banks that are difficult to judge:** Results in Table 8 indicate that banks that are difficult to judge whether they are stable or unstable banks are (Middle East Bank and Baghdad Bank), which amounted to (1.823, 1.572), respectively, located between standard Z -Score value model of (2.6, 1.1) and (1.5, 2.0). Table 9 shows classification of banks into stable and unstable banks and banks that are difficult to judge.

Stable Banks Z > 2.6	Unstable Banks	Banks are Hard to Judge
Sumer Commercial Bank	Z < 1.1	1.1 < Z < 2.6
National Bank of Iraq	--	Middle East Bank
Iraqi Commercial Bank	--	Baghdad Bank
Babel Bank	--	
Iraqi Investment Bank	--	
Gulf Commercial Bank	--	

Table 10 shows the classification of research sample banks in terms of exposure to bankruptcy.

Bank is not Subject to Bankruptcy Z > 2.6	Little Chance of Bankruptcy	Difficult to Predict Bankruptcy	Bank is at Risk of Bankruptcy
Iraqi Commercial Bank	2.0 < Z < 2.6	1.5 < Z < 2.0	Z < 1.0
Iraqi Investment Bank	--	Middle East Bank	--

National Bank of Iraq	--	Baghdad Bank	--
Babel Bank	--		--
Sumer Commercial Bank	--		--
Gulf Commercial Bank	--		--

Research Hypothesis Testing

Two types of statistical methods were used to analyze, test and measure the data. The first is to test the hypotheses of effect between research variables for each research sample bank separately to know the effect of each indicators independent variable (ratio of total loans to the equity, ratio of total loans to total deposits, Ratio of total loans to total assets, ratio of loan loss provisions to total loans) in the dependent variable indicator of financial stability (profitability objective Z-Score), as it will be tested by using the Multiple Regression Analysis through the statistical program (Spss V .24). The second type of statistical methods is panel data analysis, which is cross-sectional observations over a period of time, and this data combines time series and cross-sections of units. The best efficiency, according to this analysis, will cover the study period (2006-2015) with the research sample represented by the eight banks and through the statistical program (E Views V.9) Among the most important basic models for analyzing tablet data are: Aggregate Regression Model (OLS), Fixed Effects Model (LSDV) and Random Effects Model (EGLS).

First Hypothesis: Table 11 shows the effect of of loans to capital owned ratio on the profitability goal of (8) banks and for the period (2006-2015), as the number of observations reached (80) views. Using Panel Regression model, and panel data was used by applying three models: Aggregate Regression Model, Fixed Effects Model and Random Effects Model.

	Sample: 2006 – 2015				Cross-sections included: 8				Total panel (balanced) observations: 80			
Financial Stability	Random Effects Model				Fixed Effects Model				Pooled Regression Model			
	Prob.	t-Statistic	Std. Error	Coefficient	Prob.	t-Statistic	Std. Error	Coefficient	Prob.	t-Statistic	Std. Error	Coefficient
Constant	0.00	11.402	0.082	0.943	0.000	6.5436	0.110	0.723	0.000	11.772	0.084	0.992
X1	0.00	6.076	0.523	3.179	0.000	5.961	0.574	3.423	0.000	5.292	0.593	3.139
X2	0.017	-2.441	0.482	-1.178	0.0756	-1.804	0.502	-0.906	0.040	-2.086	0.568	-1.187
R-square	0.4138				0.6402				0.4364			
R-squared Adj.	0.3907				0.5880				0.4141			
F-statistic	17.887				12.277				19.619			
Prob (F-statistic)	0.00000				0.00000				0.00000			

(OLS) model appears from Table 11 that the estimated model was significant according to the probabilistic value of the F (Prob. F-statistic) test, which is (0.000), which is less than significant level (5%), and all indicators of the independent variable were significant according to value of (Prob.) at a significant level (5%, 10%). In addition, the value of coefficient determination (R^2) is (0.436), That is, the model explains 44% of its impact by the approved variable represented by financial stability according to (OLS), and the rest of percentage is explained by other factors that are not included in regression model. As for the

(LSDV) model it appears from Table 11 that the estimated model was significant according to probabilistic value of F-test (Prob. F-statistic), which is (0.000), which is less than significant level (5%), and there are also two indicators of independent variable that were Their value is significant according to value of (Prob.), which is X1, X2 at a significant level (5%, 10%). Except for the third indicator, which was not statistically significant at the moral level and according to the value of (Prob.). In addition, value of the coefficient determination (R^2) is (0.640), meaning that model explains 64% of its impact by dependent variable represented by financial stability according to fixed effects model (LSDV), and the rest of percentage is explained by other factors not included in regression model. As for (EGLS), It appears from Table 11 that the estimated model was significant according to probabilistic value of F (Prob. F-statistic) test, which is (0.000), which is less than moral level (5%), and all indicators of independent variable were significant. According to value of (Prob.) at a significant level (5%, 10%). In addition, value of coefficient determination (R^2) (0.414), meaning that the model explains 41% of its effect by the approved variable represented by financial stability according to the random effects model (EGLS), and the rest of percentage is explained by other factors not included in the regression model.

We conclude from this, the rejection of first hypothesis (the null hypothesis) according to the three models of its significance at levels (5%, 10%), that is, the acceptance of the alternative hypothesis. Despite significance of these three models in varying degrees, it is necessary to use the selection methods between these models to show the most suitable for variables and sample of the research according to this test, through restricted F and Hausman tests. After using restricted F test equation and based on table above and the research sample, it was found that restricted F value (5.586), which is greater than the tabular F (7.69) of (2.145) at a significant level (5%) and (1.806) at a significant level (10%), This means that e cumulative regression model is the least appropriate than the fixed effects according to this test, and in estimating the impact of financial risk indicators on the market value of the stock. While the results extracted according to the Hausman test, it is clear that the statistical value of Chi-Sq. Statistic was (21.685), which is greater than tabular amount (7.815), so it is significant at a level less than (5%) and with a degree of freedom (3), which depends on number of indicators for the independent variable, That is, the fixed effects model is the appropriate model when compared to random effects, and Table 12 illustrates this. Accordingly, the most suitable model according to this hypothesis and results is the fixed effects model, for its superiority according to restricted F and Hausman tests over other two models.

Test type	Test value	Prob.	d.f.
Test Hausman	21.684	0.0001	3

Second Hypothesis: Table 13 shows the overall loan-to-deposit ratio indicator in financial stability, (OLS) It appears from Table 13 that estimated model was significant according to probabilistic value F (Prob. F-statistic) test of (0.000) which is less than significant level (5%), and there are two indicators of independent variable whose value was significant according to the value of (Prob.) is X1, X2 at two significant levels (5%, 10%). In addition, value of coefficient determination (R^2) is (0.259), meaning that the model explains 26% of its impact with approved variable represented by financial stability according to the aggregative regression model (OLS) and the rest of the ratio is explained by other factors not included in regression model. (LSDV) appears from Table 13 that the estimated model was significant according to probabilistic value F (Prob. F-statistic) test, which is (0.000), which

is less than significant level (5%), and there are also two indicators of independent variable whose value was significant. According to the value of (Prob.) which is X1, X2 at a significant level (5%) Except for second indicator, which was not statistically significant at moral level and according to value of (Prob.). In addition, the value of coefficient determination (R^2) is (0.513), That is, the model explains 51% of its impact by dependent variable represented by financial stability according to the fixed effects model (LSDV), and the rest of percentage is explained by other factors that are not included in regression model. The (EGLS) appears from Table 13 that the estimated model was significant according to probabilistic value of F (Prob. F-statistic) test, which is (0.000), which is less than significant level (5%), and there are also two indicators of independent variable whose value was significant. According to the value of (Prob.) which is X1, X2 at a significant level (5%) Except for the second indicator, as it was not statistically significant at significant level and according to the value of (Prob.). In addition, the value of coefficient determination (R^2) (0.260), That is, the model explains 26% of its impact by approved variable represented by financial stability according to random effects model (EGLS), and the rest of percentage is explained by other factors that are not included in regression model.

Table 13
INDICATOR OF TOTAL LOAN TO DEPOSIT RATIO IN FINANCIAL STABILITY

	Sample: 2006 – 2015				Cross-sections included: 8				Total panel (balanced) observations: 80			
	Random Effects Model				Fixed Effects Model				Pooled Regression Model			
	Prob.	t-Statistic	Std. Error	Coefficient	Prob.	t-Statistic	Std. Error	Coefficient	Prob.	t-Statistic	Std. Error	Coefficient
financial stability	0.440	0.775	0.086	0.066	0.697	0.389	0.135	0.052	0.511	0.659	0.101	0.066
Constant	0.005	2.836	0.608	1.725	0.049	1.999	0.702	1.403	0.018	2.413	0.714	1.725
X1	0.587	0.544	0.583	0.317	0.972	0.034	0.614	0.021	0.644	0.463	0.685	0.317
X2	0.25904				0.5130				0.2590			
R-square	0.2297				0.4424				0.2297			
R-squared Adj.	8.8566				7.2689				8.8566			
F-statistic	0.000042				0.00000				0.00004			

We conclude from this that second sub-hypothesis (the null hypothesis) was rejected according to the three models of its significance at levels of (5%, 10%), meaning that alternative hypothesis was accepted. Despite the significance of these three models in varying degrees, it is necessary to use selection methods between these models to show the most suitable for variables and sample of research according to this test, through the restricted F and Hausman tests. After using restricted F test equation and based on table above and research sample, it was found that restricted F value (5.141) which is greater than tabular F (7.69) of (2.145) at a significant level (5%) and (1.806) at a significant level (10%), which means that cumulative regression model is least suitable of fixed effects according to this test, in estimating the impact of one credit risk indicator (the ratio of total loans to total deposits) on financial stability. While the results extracted according to Hausman test, it is clear that statistical value Chi-Sq. Statistic was (34.745), which is greater than tabular amount (7.815), so it is significant at a level less than (5%) and with a degree of freedom (3), which depends on number of indicators for independent variable, that is, the fixed effects model is appropriate model when compared to random effects, and Table (14) shows this. Accordingly, the most suitable model according to this hypothesis and results is the fixed

effects model, for its superiority according to restricted F and Hausman tests over other two models.

Test type	Test value	Prob.	d.f.
Test Hausman	34.745	0.0000	3

Third Hypothesis: Table 15 shows the overall loan-to-deposit ratio indicator in financial stability, (OLS) It appears from Table 15 that estimated model was significant according to probabilistic value F (Prob. F-statistic) test of (0.0003) which is less than significant level (5%), and there are two indicators of independent variable whose value was significant according to the value of (Prob.) is X1, X2 at two significant levels (5%, 10%). In addition, value of coefficient determination (R^2) is (0.218), meaning that the model explains 22% of its impact with approved variable represented by financial stability according to the aggregative regression model (OLS) and the rest of the ratio is explained by other factors not included in regression model. (LSDV) appears from Table 15 that the estimated model was significant according to probabilistic value F (Prob. F-statistic) test, which is (0.000), which is less than significant level (5%), and there are also two indicators of independent variable whose value was significant. According to the value of (Prob.) which is X1, X2 at a significant level (5%) Except for second indicator, which was not statistically significant at moral level and according to value of (Prob.). In addition, the value of coefficient determination (R^2) is (0.546), That is, the model explains 55% of its impact by dependent variable represented by financial stability according to the fixed effects model (LSDV), and the rest of percentage is explained by other factors that are not included in regression model. The (EGLS) appears from Table 15 that the estimated model was significant according to probabilistic value of F (Prob. F-statistic) test, which is (0.0002), which is less than significant level (5%), and there are also two indicators of independent variable whose value was significant. According to the value of (Prob.) which is X1, X2 at a significant level (5%) Except for the second indicator, as it was not statistically significant at significant level and according to the value of (Prob.). In addition, the value of coefficient determination (R^2) (0.230), That is, the model explains 26% of its impact by approved variable represented by financial stability according to random effects model (EGLS), and the rest of percentage is explained by other factors that are not included in regression model.

	Sample: 2006 – 2015 Cross-sections included: 8 Total panel (balanced) observations: 80											
	Random Effects Model				Fixed Effects Model				Pooled Regression Model			
	Prob.	t-Statistic	Std. Error	Coefficient	Prob.	t-Statistic	Std. Error	Coefficient	Prob.	t-Statistic	Std. Error	Coefficient
Financial Stability	0.00	4.521	0.031	0.141	0.011	2.583	0.045	0.116	0.0002	3.966	0.036	0.143
Constant	0.0001	4.197	0.208	0.877	0.0001	4.040	0.234	0.948	0.001	3.409	0.254	0.866
X1	0.262	1.129	0.196	-0.221	0.215	-1.249	0.205	-0.256	0.411	-0.826	0.243	-0.201
X2	0.2303				0.5458				0.2184			
R-square	0.1999				0.4804				0.1875			
R-squared Adj.	7.5807				8.2937				7.0805			

F-statistic	0.000168	0.00000	0.00029
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We conclude from this that second sub-hypothesis (the null hypothesis) was rejected according to the three models of its significance at levels of (5%, 10%), meaning that alternative hypothesis was accepted. Despite the significance of these three models in varying degrees, it is necessary to use selection methods between these models to show the most suitable for variables and sample of research according to this test, through the restricted F and Hausman tests. After using restricted F test equation and based on table above and research sample, it was found that restricted F value (7.121) which is greater than tabular F (7.69) of (2.145) at a significant level (5%) and (1.806) at a significant level (10%), which means that cumulative regression model is least suitable of fixed effects according to this test, in estimating the impact of one credit risk indicator (the ratio of total loans to total deposits) on financial stability. While the results extracted according to Hausman test, it is clear that statistical value Chi-Sq. Statistic was (34.745), which is greater than tabular amount (7.815), so it is significant at a level less than (5%) and with a degree of freedom (3), which depends on number of indicators for independent variable, that is, the fixed effects model is appropriate model when compared to random effects, and Table (16) shows this. Accordingly, the most suitable model according to this hypothesis and results is the fixed effects model, for its superiority according to restricted F and Hausman tests over other two models.

Test type	Test value	Prob.	d.f.
Test Hausman	34.724	0.0000	3

Fourth Hypothesis: Table 17 shows the overall loan-to-deposit ratio indicator in financial stability, (OLS) It appears from Table 17 that estimated model was significant according to probabilistic value F (Prob. F-statistic) test of (0.433) which is less than significant level (5%). In addition, value of coefficient determination (R^2) is very weak (0.035), meaning that the model explains 3.5% of its impact with approved variable represented by financial stability according to the aggregative regression model (OLS) and the rest of the ratio is explained by other factors not included in regression model. (LSDV) appears from Table 17 that the estimated model was significant according to probabilistic value F (Prob. F-statistic) test, which is (0.011), which is less than significant level (5%), and there are also two indicators of independent variable whose value was significant. In addition, the value of coefficient determination (R^2) is (0.270), That is, the model explains 27% of its impact by dependent variable represented by financial stability according to the fixed effects model (LSDV), and the rest of percentage is explained by other factors that are not included in regression model. The (EGLS) appears from Table 17 that the estimated model was significant according to probabilistic value of F (Prob. F-statistic) test, which is (0.433), which is less than significant level (5%). In addition, the value of coefficient determination (R^2) (0.035), That is, the model explains 3.5% of its impact by approved variable represented by financial stability according to random effects model (EGLS), and the rest of percentage is explained by other factors that are not included in regression model.

We conclude from this that second sub-hypothesis (the null hypothesis) was rejected according to the three models of its significance at levels of (5%, 10%), meaning that alternative hypothesis was accepted.

	Sample: 2006 – 2015 Cross-sections included: 8 Total panel (balanced) observations: 80											
	Random Effects Model				Fixed Effects Model				Pooled Regression Model			
	Prob.	t-Statistic	Std. Error	Coefficient	Prob.	t-Statistic	Std. Error	Coefficient	Prob.	t-Statistic	Std. Error	Coefficient
Financial Stability	0.851	-0.188	0.767	-0.144	0.818	0.230	1.200	0.277	0.864	-0.171	0.840	-0.144
Constant	0.237	-1.191	5.401	-6.438	0.614	-0.505	6.234	-3.154	0.280	-1.088	5.916	-6.438
X1	0.937	-0.078	5.180	-0.408	0.850	0.189	5.456	1.032	0.942	-0.071	5.674	-0.408
X2	0.0352				0.270009				0.0352			
R-square	-0.0028				0.1642				-0.0028			
R-squared Adj.	0.9254				2.5521				0.9254			
F-statistic	0.4327				0.0110				0.4327			

Despite the significance of these three models in varying degrees, it is necessary to use selection methods between these models to show the most suitable for variables and sample of research according to this test, through the restricted F and Hausman tests. After using restricted F test equation and based on table above and research sample, it was found that restricted F value (3.173) which is greater than tabular F (7.69) of (2.145) at a significant level (5%) and (1.806) at a significant level (10%), which means that cumulative regression model is least suitable of fixed effects according to this test, in estimating the impact of one credit risk indicator (the ratio of total loans to total deposits) on financial stability. While the results extracted according to Hausman test, it is clear that statistical value Chi-Sq. Statistic was (18.299), which is greater than tabular amount (7.815), so it is significant at a level less than (5%) and with a degree of freedom (3), which depends on number of indicators for independent variable, that is, the fixed effects model is appropriate model when compared to random effects, and Table (18) shows this. Accordingly, the most suitable model according to this hypothesis and results is the fixed effects model, for its superiority according to restricted F and Hausman tests over other two models (Ficht, 2004).

Test type	Test value	Test value	d.f.
Test Hausman	18.2289	0.0004	3

CONCLUSION

Credit risk is one of the most important risks that bank faces because of its impact on bank's activities. It was noted that most of banks in research sample are stable according to results of Z-Score values, no bank fell into the unstable rating, except of Middle East bank and Baghdad bank, who were among the banks that are difficult to judge. The credit risk indicators represented by loans to equity ratio by banks in research sample have affected

differently financial stability except for banks (Babylon, Sumer Commercial, and the Middle East). This was demonstrated through the use of multiple regression analysis. As well as effect of total loans to total deposits ratio of research sample banks in a different way on financial stability except for the banks (Baghdad, Sumer Commercial, and National Bank of Iraq), as this was shown through the use of multiple regression analysis. As well as the impact of both the indicator of loans to total assets ratio and the indicator of provisions for loan losses to total loans ratio in a different way on financial stability, except for banks (Sumer Commercial, Iraqi Investment, Iraqi National, Gulf Commercial, and Middle East). This was demonstrated by the use of multiple regression analysis. And through the application of models (cumulative regression model, fixed effects model, random effects model) for the period (2006-2015) Using method of analyzing longitudinal or tablet data, effect of bank credit risk indicators was observed on financial stability of research sample banks. And method of fixed effects model is more appropriate than other models under the restricted F test at the 5% and 10% significance levels according to Husman's test and after comparing them with random effects. Therefore, research recommends the need to work continuously by credit risk management to try to reduce credit risks and reduce losses resulting from them by analyzing and evaluating credit risk indicators, and studying financial situation of customers on an ongoing basis and trying to attract best of them, and he took all measures that raise value of bank's assets compared to liabilities it owes, and to reach a stable rating within Z-Score index.

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