Impact of the use of credit analysis indicators on banking risk reduction

Field study on a sample of Iraqi banks

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Abstract: The present study aims to understand, clarify and test the impact of credit analysis indicators on the reduction of banking risks, as well as propose best methods, practices and methods of credit analysis using its financial indicators to analyse credit-seeking clients' financial statements to reduce credit risks, thus representing the independent variable of financial indicators in their dimensions: (liquidity indicators, indebtedness indicators, profitability indicators and activity indicators), representing the bank risk variable, and the search community is one of all Iraqi banks whose financial statements span the period of time from (2012 to 2020), where 20 banks were selected on the basis of their importance in the Iraqi banking system and the volume of available data, and the banks' data were used and analysed using the statistical programme (EViews), where the study tool used panel data analysis As a key statistical tool for analysing the financial data of selected Iraqi banks, this tool has been adopted because it allows for the integration of cross-sectional data with time data, thereby contributing to improved accuracy of the results and increasing the strength of the analysis. A range of statistical methods have been used, including statistical analysis of the financial data through a comprehensive exploratory analysis (Exploratory Data Analysis), as well as diagrams, regression models, sectional self-association and linear association. The study eventually came up with a series of findings, the most important of which are: The existence of a statistically significant correlation between liquidity and capital adequacy in Iraqi banks, where the liquidity variable factor (LTA) in the fixed effects model (0.1264) indicated that an increase in the ratio of liquid assets by one unit increased the ratio of capital adequacy by 0.1264 units, while other factors were consistent.

Keywords: financial indicators, banking risks, liquidity indicators, indebtedness indices.

Introduction:

Undoubtedly, the leading role of banks in the practice of granting bank credit and credit facilities is the essence of the credit process and before it begins, we need to learn about the concept of bank credit and credit facilities of its types, standards and conditions and the stages of making credit decisions about it. Bank credit is the main function of banks, which loses its core function as a financial intermediary and thus the bank loses its presence. In addition, the return on credit activity is the main component of a bank's income, regardless of the diversity of its revenue sources from other banking activities.

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Credit provided by banks to different economic sectors and individuals to contribute directly to the economic and social development process creates new competitive opportunities through the establishment of many existing businesses or enterprise or business development to contribute to increasing the capacity of individuals and economic institutions to increase their market shares. The credit granted also contributes to meeting the financial need of existing and potential customers by obtaining funds in the form of goods and services. The bank's credit activity is one of the most profitable on the one hand, and the most risky on the other.

In the event that bank credit customers are unable to meet their liabilities for payment of the principal and profits of the amount, the failure of bank credit portfolios results in losses that may directly affect the bank's business results and its ability to continue to perform its activities. Banks are now moving towards establishing and complying with bank credit risk management services. In addition, many international bodies such as the Basel Banking Oversight Committee and the Islamic Financial Services Council have been interested in establishing bank credit risk control standards since their inception. They encouraged banks to use the most advanced methods of measuring and managing the risk of credit operations.

Customer credit analysis is critical for banks because it is linked to their invested funds whether their own resources are shareholders' equity their internal funds sources or clients' deposits their external funds sources. Since banks practise their profession in trading third parties' funds, bank credit risks must be placed at the forefront of their concerns to avoid losses resulting from the failure of customers to pay bank credit to ensure their continuity. Banks must therefore use financial indicators for credit analysis in analysing the financial statements of the client enterprise requesting bank credit or credit facilities to reduce their bank risks before granting them bank credit or credit facilities.

Through the foregoing, the problem of the study can be formulated to what extent Iraqi banks rely on the use of credit analysis indicators to reduce banking risks.

The importance of the study highlights the economic role played by banks in granting bank credit and credit facilities. Therefore, it requires them to exercise caution in order to achieve an optimal balance between the exercise of credit activity on the one hand and the preservation of depositors' funds on the other. The study also demonstrates the importance of using financial indicators for credit analysis to rationalize bank credit decisions to reduce banking risks.

The objectives of the study are to apply the best methods, practices and methods of credit analysis using its financial indicators to analyze the financial statements of credit-seeking clients to reduce banking risks s bank risk monitoring process for banks to rely on their results to rationalize credit decisions, Thus, banking risks are reduced with a view to protecting banks from distressed debt as an indicator of the extent of exposure to banking risks The study also aims to demonstrate the role of the use of financial indicators for credit analysis by banks, Liquidity, activity, indebtedness, profitability, as a tool and method of banking risk reduction, finally seeks to examine factors that can limit the use of financial indicators for credit analysis in measuring banking risk levels for bank credit customers.

In the light of the achievement of the study's objectives, the following main hypothesis will be: there is a statistically significant correlation between the use of credit analysis indicators and the reduction of banking risks, with hypotheses as follows:
First hypothesis: There is a statistically significant correlation between the use of liquidity indicators and the reduction of banking risks.

Second hypothesis: There is a statistically significant correlation between the use of activity indicators and the reduction of banking risks.
Third hypothesis: There is a statistically significant correlation between the use of indebtedness indicators and the reduction of banking risks.
Hypothesis 4: There is a statistically significant correlation between the use of profitability indicators and the reduction of banking risks.

Research First: Conceptual Framework of the Study

1. Risk of banking financial operations.

The concept of risk: There is no specific and clear concept of the term risk, but it can be defined as: a feeling or condition that affects a person when they feel a particular threat, the form and degree of impact of the threat varies from one person to another depending on the person's nature, and the different manner of dealing with the risk. What is dangerous for someone can be considered safe for another person. The idea of danger is linked to many other concepts, the most important of which are: Fear, suspicion and uncertainty are generally classified as sudden events, most of which are unexpected in advance and are out of control. There are types of risk whose results can be avoided or minimized by pre-setting, and by attempting to predict and avoid negative results, banking risk: There are several definitions of banking risk. This difference is due to the notion of risk, to the environment to which each researcher belongs, and to the goal he seeks to achieve.

It is known that returns are irregular, fluctuating in value, or in proportion to invested capital, that constitutes the element of risk, and the process of regularization of returns is mainly due to uncertainty about future forecasts.

Financial risks are the bottom line of all past risks as all of the above risks affect any enterprise's financial performance and therefore the most significant financial risks facing banks have been selected. (Hudan, 2017, P.12.11) defines risk in banking as: Risk is defined as the risk of financial losses caused by changes in economic, political, legal, technical or operational conditions. (Aslan,2022,p12) It is also defined as: "A future potential that may expose the Bank to unforeseen and unplanned losses that may affect the achievement of its objectives and their successful implementation". It also states: "The risk of loss either directly through losses to the Bank's results, capital or indirectly through restrictions on its ability to achieve its objectives". (Shanafa and Others, 2021, p. 173) are the totality of the projected losses to the Bank directly such as stumbling over funding operations, or indirectly through internal factors such as weak internal or external audit systems such as the Bank's reputation and lack of updates. (Jalal, 2013, p. 2) Risk management is defined as: a comprehensive and integrated system to reestablish appropriate conditions and tools used in the process of anticipating potential risks to the bank's existence and currency, in addition to assessing its revenues and developing appropriate plans for what can be done to reduce or minimize these risks if it is unable to eliminate its sources. The banking meaning of risk: The term risk in the bank is defined as "fluctuations in the market value of the bank and is also associated with the uncertainty that the lending capital will be recovered in the fullest future expected profit" (Bushin,

2015, p. 47). From a financial perspective: risk is defined from a financial perspective as the possibility of a future deviation so that the desired outputs are different than expected. or "lack of certainty about the future financial output of a decision by the current economic individual based on the results of the study of the behaviour of the natural phenomenon in the past. (Ben Ali, 2010, pp. 331-332)

In the researcher's view, banking risks are: the bank's risk of being exposed to unplanned, unplanned problems and losses or the potential fluctuation of return on a specific investment, which affects the bank's obligation to achieve its goals and requirements, and the lack of control and control may cause bankruptcy and demise of the bank.

2. Credit Analysis:

Credit analysis is the process of assessing a client's eligibility for borrowing, assessing the degree of his or her risk before granting credit, Credit analysis is the process of investigating and gathering the necessary information about the client before deciding to grant him credit. and its objective is to identify, evaluate and base its decision on the risks faced by the Bank in its relationship with the debtor, To identify strengths, weaknesses, opportunities and threats facing the client. (Khadija, 2016, p. 34).

The process of granting bank credit is subject to many credit risks Where these risks begin with the granting of credit and continue until the customer repays it at the agreed time, As a result, banks avoid granting credit with a high degree of risk and adopts a specific approach to the measurement of credit risk in order to study and identify factors affecting the client's ability to pay, This curriculum is a credit analysis that involves investigating and collecting the necessary information about the client requesting credit before making a grant decision.

It therefore avoids the risk to which the bank may be exposed, evaluates them using measurable and non-measurable elements against which credit is approved or rejected, and affects the determination of the amount and terms of credit.

Experience and practice play a role that cannot be overlooked in determining the credit status of the customer. However, this does not in any way mean that determining the credit status of the customer depends solely on the experience of the credit management of the bank and its practice is focused on the skill of the credit managers of the bank to use these criteria efficiently in determining the credit positions of the bank's clients and does not come from any other source.

The determination of the client's credit status depends on a staggered set of criteria (factors) essentially involves measuring the extent of the bank's credit risk if it decides to grant a client credit facility. It also involves an objective and technical assessment of all funding policies. financial analysis plays a significant role in this evaluation; Determining a client's credit position does not depend on financial analysis alone and there are other factors affecting the determination of the client's credit position. Customer's personality, reputation, social status, market position and reputation in banks, Prior to its dealings, the determination of the customer's credit status requires the bank to collect data and information on the bank credit applicant, Its activity and analysis, and the Banking Inquiry Department plays a very important role in collecting and making this information available to the credit researcher and

decision maker and the credit status of the applicant is determined in the light of the criteria and principles established by the bank's credit policy. (Abboud, 2017, p. 27-28).

Loan default risk is one of the most important credit risk investment decisions, whether in kind or financial investments, are generally characterized by the investor's inability to determine with certainty the expected return on such investment, This is due to the state of inability to take stock in the form of the future s ability to meet its obligations to repay the principal and interest of the loan. Fatemi and ohter,2006, P227-233))

As is known in fiscal studies, the financial decision is based on the identification of two critical variables, the expected return and the degree of risk, which is known as the exchange between return and risk. optimal and sound decision is one in which management feels that the return it will generate is equivalent, or greater risk, so investors seek a return equal to or greater than the risk to which they are exposed, and the higher the risk, the higher the return required. In this approach, credit management's activity is determined in its credit decisions. The principle is the balance between the yield variable and the risk variable. The balance is intended to be that the expected return of the credit decision is sufficient to compensate the bank for the risks surrounding the return that credit management requires on the funds it provides to credit seekers.

It can be said that credit problems are caused by common factors that consider banks, customers and the State as a result of incompatibility or conformity with legislation issued by monetary authorities (Central Bank), as a result of ambiguity in laws and contracts and lack of precise clarification of rights and obligations resulting in problems and disputes between the Contracting Parties (Armand de Servigni et autres, 2003, P163), Moreover, it is fair to recognize that banks, with their specialized administrative and technical organs, consider the chief official or the party involved in creating or fabricating such problems as the controlling party in the injection of funds to clients, In the light of credit studies that should be prepared with professionalism, inclusiveness and transparency and informed by market research, economic conditions, query reports and risk centralization, taking into account all considerations and takes into account all the hedges of potential variables, and recognizes the importance of proper implementation of credit decisions and works to operationalize the roles of credit monitoring and control, and seeks to affirm adherence to the regulations, rules, customs and instructions governing credit and prompts credit cadres to respect the charters and behaviours of the profession and to move away from the course of experience and error in credit decision-making, implementation and preparation and training of cadres.

The process of issuing loans at the level of individuals, companies and enterprises usually needs to assess the various factors affecting this decision. This process is called the process of credit analysis. Through the credit analysis process, the bank seeks to assess the sources of risk expected by the bank, which may impede the enterprise's ability to repay loans granted during a future period. This includes examining the extent to which the enterprise has in the past been able to repay its loans and obligations to others, as well as the financial situation, transactions with others and the customer's credit history. The credit analysis process is one of the most important pillars of the decision to grant bank credit, by which the quality of the borrower is usually classified with an assessment of the risk level surrounding the loan requested by the borrower, against which the loan applicant's fate will be determined by approval or rejection, and

thereafter, if the application is approved, the interest rate will be determined as well as the type of guarantees or guarantees to be provided.

An important matter to be considered by a credit officer or officer should not limit its interest solely to the examination of the financial statements provided by the borrower customer, the determination of the derivation limit of the financial ratios provided by the borrower customer and the determination of the derivation limit of the traditional accepted financial ratios to assess the customer's ability to meet the principal and interest of the loan, Rather, it must pay more attention to another type of analysis, known as risk analysis. (Abboud, 2017, p. 29-30).

Thus, credit analysis is increasingly important in today's world, as an important instrument for concealing losses incurred by commercial banks due to non-performing loans. The focus on credit analysis has begun. Here, the credit officer should take into account in his study of the loan application a set of key elements in order to ensure the achievement of his objectives of providing the basic requirements and data for the right decision-making. These elements can be limited to the following general framework:

- Clear description of the loan
- Credit Risk Analysis
- Sources of financial information
- Strategic information sources.
- Analysis and interpretation of financial information.

In order for commercial banks to make the right decision on the borrowing request. (Badarin, 2019, pp. 30-31).

Research II: Applied Framework and Standard Analysis

1. Study tool: The study tool in this research was the use of Panel Data analysis as the main statistical tool for analysing the financial data of selected Iraqi banks in the sample. This tool has been relied upon because it allows the integration of CT data with time data, contributing to improved accuracy of results and increased strength of analysis. Analysis of panel data is a powerful tool in financial research, allowing the impact of independent variables such as liquidity, profitability, activity, and indebtedness on the subordinate variable of banking risk, to be studied over multiple time periods and within several institutions. The researcher used the statistical program EViews to perform the necessary statistical analyses, as it was used to analyze the relationships between variables, conduct the tests necessary to verify stability and association, and apply appropriate regression models to predict banking risks. The program also helped estimate fixed and random models, and selected the most suitable model using tests such as the Hausman test, allowing the researcher to reach accurate and interpretable results about the impact of financial variables on banking risks.

Using the analysis of panel data through EViews has added an accurate scientific dimension to the study, enabling the researcher to effectively exploit available data and achieve a high level of confidence in the findings.

2. Society and Sample Study: The research community in this study consists of a group of Iraqi banks whose financial statements extend over the period of time from 2012 to 2020. These banks were selected on the basis of their importance in the Iraqi banking system and the volume of data available

about them, allowing for the analysis of financial relationships between independent variables such as liquidity, profitability, indebtedness and activity and their impact on banking risks. These banks' data were used to analyse dashboard data using the statistical software EViews, where the data collected was analysed to draw accurate and objective findings.

3. Analysis of diagrams and metadata of variables: Before authorizing analysis of relationships between variables and estimation of statistical models, it is necessary to undertake an exploratory analysis of data to understand their basic characteristics and distributions. This analysis involves examining the charts of each variable individually, as well as calculating descriptive statistics, such as average, intermediate, standard deviation, twist, fuss, etc. This analysis helps to identify general patterns in data, detect extreme values, and assess the natural distribution of variables. It also provides a basis for understanding potential relationships between variables and identifying appropriate statistical models for analysis. The analysis of the evolution of the banks' ratios as follows:

First: Analysis of Capital Adequacy Ratio: (CAR): The Capital Adequacy Ratio Data (CAR) shows a disparity between Iraqi banks during the period studied. While some banks maintained high capital adequacy ratios, such as Sumar Commercial Bank, Mansour Investment Bank and Hammurabi Commercial Bank, others suffered low ratios, such as Baghdad Bank, Middle East Bank and Commercial Bay Bank.

- Bank of Baghdad: Capital adequacy fluctuated during the period, falling from 15.93% in 2012 to 16% in 2014, then rose to 24.46% in 2017, before falling again to 19.6% in 2020. This fluctuation indicates challenges in managing the bank's capital and risk.
- Sumer Commercial Bank: Sumer Commercial Bank has high capital adequacy ratios, ranging from 71.35% in 2012 to 49.25% in 2020. This indicates the strength of the Bank's financial position and its ability to absorb potential losses.
- Al Mansour Investment Bank: Al Mansour Investment Bank achieved a remarkable growth in capital adequacy, rising from 36.38% in 2012 to 88.43% in 2020. This improvement is attributable to prudent financial policies and effective risk management.
- Hammurabi Commercial Bank: Hammurabi Commercial Bank maintained high capital adequacy ratios, ranging from 72% in 2012 to 64% in 2020. This indicates the stability of the Bank's financial position and its ability to meet economic challenges.

Overall, the capital adequacy ratio analysis shows the importance of capital and risk management in Iraqi banks. While high capital adequacy ratios indicate strong financial position and resilience to potential losses, lower ratios indicate weaknesses that need to be addressed by the bank's management.

Second: Asset Return Analysis: (ROA) The asset return data (ROA) shows a significant disparity in the profitability of Iraqi banks. While some banks recorded high returns on assets, such as the Union Bank of Iraq, the National Islamic International Bank and the National Bank, others suffered low and sometimes negative returns, such as the Bank of Asia and the United Bank.

- Union Bank of Iraq: The Union Bank of Iraq achieved high returns on assets, ranging from 3.1% in 2012 to 0.72% in 2020. This indicates the Bank's efficiency in using its assets to generate profits.

- National Islamic International Bank: The National Islamic International Bank recorded high returns on assets, ranging from 3.1% in 2012 to 0.7% in 2020. This shows a strong performance in asset management and profitability.
- National Bank: The National Bank has high returns on assets, ranging from 0.85% in 2012 to 0.34% in 2020. This indicates the Bank's success in achieving good profitability from its assets.
- Bank of Asia: Bank of Asia suffered negative returns on assets in most years, ranging from -0.015% in 2012 to 0.0379% in 2020. This indicates difficulties in asset management and profitability.
- United Bank: The United Bank recorded negative returns on assets in most years, ranging from -0.027% in 2012 to 0.0011% in 2020. This indicates significant challenges in achieving profitability.

The asset return analysis shows a significant disparity in the profitability of Iraqi banks. This points to the importance of efficient asset management and resilience to economic changes for sustainable profitability.

Third: Liquid Asset Ratio Analysis: (LTA) Liquid Asset Ratio Data (LTA) shows a marked variation between Iraqi banks. While some banks maintained high ratios of liquid assets, such as the Iraqi Credit Bank, the Investment Bank and the Baghdad Bank, others suffered low ratios, such as the Ashore Bank, the Mansoor Investment Bank and the Gulf Commercial Bank.

- Iraqi Credit Bank: The Iraqi Credit Bank has high liquid asset ratios, ranging from 0.672 in 2012 to 1.033 in 2020. This indicates the bank's ability to meet its short-term obligations easily.
- Investment Bank: The Investment Bank maintained high liquid asset ratios, ranging from 0.751 in 2012 to 0.87 in 2020. This indicates the bank's resilience to short-term financial requirements.
- Baghdad Bank: The proportion of liquid assets in Baghdad Bank has fluctuated, ranging from 0.543 in 2014 to 0.729 in 2020. This indicates changes in the Bank's liquidity management policies.
- Ashore Bank: Ashore Bank suffered from low liquid asset ratios, ranging from 0.059 in 2020 to 0.409 in 2017. This indicates the potential for difficulties in meeting short-term commitments.
- Al Mansour Investment Bank: The proportion of liquid assets in Al Mansour Investment Bank fluctuated, ranging from 0.145 in 2013 to 0.43 in 2020. This indicates changes in the Bank's liquidity management policies.
- Gulf Commercial Bank: The Gulf Commercial Bank maintained low liquid asset ratios, ranging from 0.271 in 2012 to 0.409 in 2020. This indicates the importance of reviewing the Bank's liquidity management policies.

Analysis of the ratio of liquid assets shows the importance of maintaining an appropriate level of liquidity to meet short-term financial liabilities. High ratios of liquid assets indicate the Bank's resilience to economic challenges, while low ratios indicate that difficulties can be encountered in meeting financial obligations in a timely manner.

Fourth: Analysis of the debt-to-equity ratio: (D/E) The debt-to-equity ratio data (D/E) show a discrepancy in the capital structure of Iraqi banks. While some banks relied heavily on external financing, such as the Baghdad Bank, the Commercial Gulf Bank and the Middle East Bank, others maintained low indebtedness ratios, such as the Sumer Commercial Bank, the Hammurabi Commercial Bank and the Mansour Investment Bank.

- Bank of Baghdad: The debt-to-equity ratio at Bank of Baghdad has declined markedly, from 5.28 in 2012 to 3.55 in 2020. This indicates an improvement in the bank's capital structure and a decrease in its reliance on external financing.
- Gulf Commercial Bank: The Gulf Commercial Bank maintained high indebtedness ratios, ranging from 2.125 in 2016 to 2.856 in 2012. This indicates a significant reliance on external financing and an increase in the Bank's financial risk.
- Middle East Bank: The Middle East Bank's debt-to-equity ratio fluctuated, ranging from 1.134 in 2012 to 2.744 in 2013. This indicates changes in the Bank's financing policies.
- Sumer Commercial Bank: Sumer Commercial Bank has low indebtedness ratios, ranging from 0.401 in 2012 to 0.849 in 2020. This indicates greater reliance on private capital and a reduction in the bank's financial risk.
- Hammurabi Commercial Bank: Hammurabi Commercial Bank maintained low indebtedness ratios, ranging from 0.385 in 2012 to 0.58 in 2020. This indicates the strength of the Bank's financial position and its low dependence on external financing.
- Al Mansour Investment Bank: Al Mansour Investment Bank has low indebtedness ratios, ranging from 0.263 in 2013 to 0.298 in 2020. This indicates greater reliance on private capital and a reduction in the bank's financial risk.

The analysis of the debt-to-equity ratio shows the importance of maintaining a balanced capital structure in Iraqi banks. While external financing can contribute to the bank's growth, overreliance increases the bank's financial risk.

Fifth: Asset turnover ratio analysis: (AT) The asset turnover ratio data (AT) shows a discrepancy in the efficiency of Iraqi banks in using their assets to generate revenue. While some banks have achieved high turnover ratios, such as Al Mansoor Investment Bank, Al Ahliya, and Real Estate Trading, others have experienced low turnover ratios, such as Bank of Asia, Bank Ashore and Bank of Baghdad.

- Al Mansour Investment Bank: Al Mansour Investment Bank has high turnover ratios, ranging from 3,596 in 2013 to 4,312 in 2020. This refers to the Bank's efficient use of its assets to generate revenue.
- Al Ahli: Al Ahli maintained high turnover rates, ranging from 0.798 in 2015 to 0.837 in 2020. This refers to the Bank's efficient asset management and revenue generation.
- Real Estate: The turnover of real estate assets has fluctuated, ranging from 0.495 in 2014 to 0.746 in 2012. This refers to changes in the bank's activity and credit policies.
- Bank of Asia: Bank of Asia experienced low turnover ratios, ranging from 0.008 in 2012 to 0.038 in 2020. This indicates difficulties in using the Bank's assets to generate revenue.
- Ashore Bank: Asset Bank recorded low turnover ratios, ranging from 0.0225 in 2012 to 0.1677 in 2020. This indicates challenges in asset management and revenue generation.
- Bank of Baghdad: Bank of Baghdad's asset turnover declined from 0.457 in 2014 to 0.273 in 2020. This indicates a decline in the Bank's activity and credit policies.

The asset turnover ratio analysis shows the importance of efficient use of assets in Iraqi banks. Higher asset turnover ratios indicate the Bank's ability to generate good income from its assets, while lower ratios indicate opportunities to improve the efficiency of asset management and increase revenue. To provide a more comprehensive picture, we calculate the descriptive statistics of the variables and find:

Table (1): Descriptive statistics of study variables

	Banking Risks (Capital adequacy ratio)	Profitability Index (Return on assets)	Liquidity Index (Ratio of liquid assets)	Indebtedness Index (debt-to-property ratio)	Activity indicator (asset turnover ratio)
	CAR	ROA	LTA	D_E	AT
Mean	0.470126	0.332441	0.475833	1.423800	0.529510
Median	0.410500	0.016400	0.458000	1.500000	0.435000
Maximum	0.884300	3.440000	1.033000	5.280000	4.312000
Minimum	0.159300	-0.032600	0.059000	0.180000	0.008000
Std. Dev.	0.172178	0.894686	0.193873	0.933547	0.801769
Skewness	0.259320	2.826135	0.545660	1.400579	3.748358
Kurtosis	2.098210	9.451925	2.951890	6.442034	16.98594
Jarque-Bera	8.116593	551.8162	8.949703	147.7056	1888.554
Probability	0.017278	0.000000	0.011392	0.000000	0.000000
Observations	180	180	180	180	180

First: Banking Risk: Capital Adequacy Ratio - CAR: Analysis of Capital Adequacy Ratio (CAR) descriptive statistics shows that the average ratio for all banks during the period studied was 0.4701, equivalent to 47.01%. This indicates that Iraqi banks generally maintain a good level of capital adequacy, with the average exceeding the minimum required by the Bank of International Settlements (Basel III), which is 8%. The median (0.4105) is close to the average, indicating an almost identical distribution of data. The standard deviation (0.1721) shows an average discrepancy in capital adequacy ratios between banks, with ratios ranging from 0.1593 to 0.8843. Twist (0.2593) and twist (2.0982) values indicate that data distribution is close to normal distribution, which is supported by the Jarque-Bera test, where there is no strong evidence to reject the natural distribution hypothesis (Probability = 0.0172).

Second: Profitability: Return on assets - ROA: Analysis of asset return (ROA) metadata statistics shows that the average ratio for all banks during the period studied was 0.3324, equivalent to 33.24%. This indicates that Iraqi banks generally make a good return on their assets. However, there is a significant discrepancy in profitability ratios among banks, with standard deviation ranging from 0.8946, and ratios ranging from -0.0326 to 3.44. The broker (0.0164) shows that half of banks earned a return on assets of

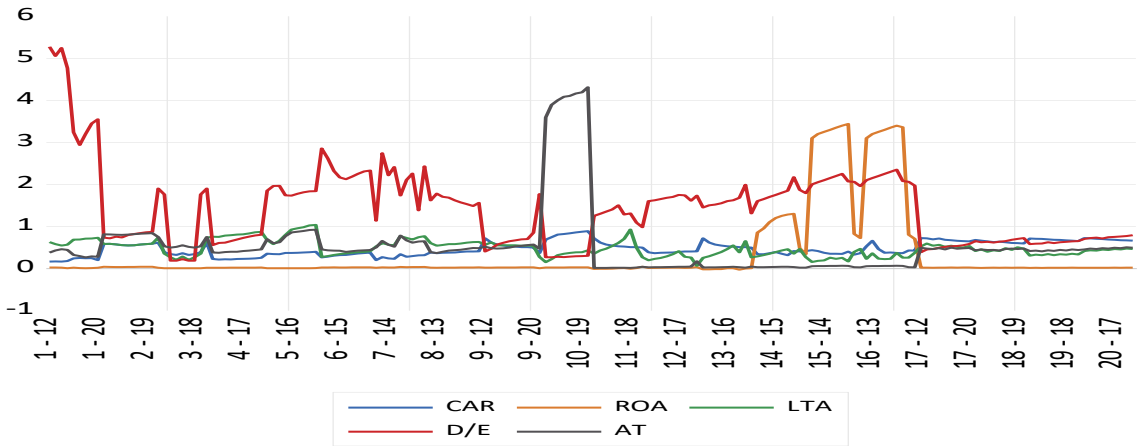
less than 1.64%, indicating a significant disparity in banks' profitability. Twist (2.8261) and fuss (9.4519) values indicate that data distribution is skewed to the right with a long tail, which is confirmed by the Jarque-Bera test, where there is strong evidence to reject the natural distribution hypothesis (Probability = 0.0000)

Third: Liquidity: Ratio of Liquid Assets - LTA Analysis of Metadata Statistics of Ratio of Liquid Assets (LTA) shows that the average ratio of all banks during the period studied was 0.4758, equivalent to 47.58%. This indicates that Iraqi banks generally maintain a good level of liquidity, with liquid assets representing approximately half of their total assets. The median (0.458) is close to the average, indicating an almost identical distribution of data. Standard deviation (0.1938) shows an average discrepancy in liquidity ratios between banks, with ratios ranging from 0.059 to 1.033. Twist (0.5456) and dispersion (2.9518) values indicate that data distribution is close to normal distribution, which is supported by the Jarque-Bera test, where there is no strong evidence to reject the natural distribution hypothesis (Probability = 0.0113).

Fourth: Indebtedness (debt-to-equity ratio - D/E): The analysis of descriptive statistics of the debt-to-equity ratio (D/E) shows that the average ratio of all banks during the period studied was 1.4238. This indicates that Iraqi banks generally rely on external financing for a greater proportion of their own capital. The median (1.5) is close to the average, indicating an almost identical distribution of data. Standard deviation (0.9335) shows a significant discrepancy in indebtedness ratios between banks, with ratios ranging from 0.18 to 5.28. Twisting (1.4005) and splitting (6.442) values indicate that data distribution is skewed to the right with a long tail, which is confirmed by the Jarque-Bera test, where there is strong evidence to reject the natural distribution hypothesis (Probability = 0.0000).

Fifth: Activity asset turnover ratio - AT: Analysis of asset turnover ratio metadata (AT) shows that the average ratio for all banks during the period studied was 0.5295. This indicates that Iraqi banks generally have an average level of efficiency in using their assets to generate revenue. However, there is a significant discrepancy in activity ratios between banks, with standard deviation ranging from 0.8017, and ratios ranging from 0.008 to 4.312. The broker (0.435) shows that half of banks achieved an asset turnover of less than 0.435, indicating a significant disparity in the efficiency of asset use between banks. Twisting (3.7483) and splitting (16.9859) values indicate that data distribution is heavily skewed to the right with a very long tail, which is confirmed by the Jarque-Bera test, where there is strong evidence to reject the natural distribution hypothesis (Probability = 0.0000).

Shape (1): Evolution of variables



The chart shows the evolution of the five variables from 2012 to 2020. Overall, an upward trend in capital adequacy (CAR) ratio is observed during the period, with some minor fluctuations. As for the debt-to-equity ratio (D/E), a downward trend is observed during the period, indicating a decrease in banks' reliance on external finance. AT, significant fluctuations are observed during the period, with some sharp rises in some years. There is also a cross-cutting between the turnover of assets and the capital adequacy ratio in some years, which may indicate a correlation between these two variables. The liquidity ratio (LTA) is observed to fluctuate in its values during the period, with some minor highs and lows. There is also a cross-cutting between liquidity ratio and capital adequacy ratio in some years. As for the return on assets (ROA), significant fluctuations are observed in their values during the period, with some sharp rises in some years. There is also a cross-cutting between asset return and capital adequacy ratio in some years. In general, the chart shows different trends and intersections between variables, indicating complex relationships between these variables.

Analysis of data, through both the statistical table and the chart, shows a diversity in the performance characteristics of selected Iraqi banks during the period 2012 to 2020. Descriptive statistics indicate significant differences in profitability, activity and indebtedness among banks, while capital adequacy and liquidity ratios show relative stability. The chart confirms this diversity, noting different trends and intersections between variables, indicating complex relationships between these indicators. These findings highlight the importance of an in-depth analysis to understand the factors affecting the performance of Iraqi banks and the need to develop effective strategies to improve the efficiency of asset management, liquidity and profitability, while maintaining an appropriate level of capital adequacy to reduce banking risks.

Examination of linear, sectional and stable association: Before going into analysis of relationships between variables and estimation of statistical models, it is necessary to thoroughly examine the characteristics of the data to ensure their integrity and suitability for analysis. This examination involves examining the linear correlation between independent variables, which indicates a strong linear relationship between two or more variables, which may affect the accuracy of the model's estimation. The examination also involves the verification of a cross-section link, which indicates a relationship between the cross-section units (the banks in this case), which may affect the validity of the analysis's results. Finally, the examination includes a data stability test, which refers to the constant characteristics of variables over time, a prerequisite for validity of analysis results and avoidance of what is known as "false

regression." This inspection aims to ensure the quality and integrity of the data, thereby ensuring the accuracy and reliability of the results from the analysis.

Table (2): Linear Multiplicity Test

Variance Inflation Factors			
Included observations: 180			
	Coefficient	Uncentered	Centered
Variable	Variance	VIF	VIF
AT	0.000144	1.634988	1.136513
D_E	0.000112	4.015143	1.202470
LTA	0.002659	4.683513	1.230396
ROA	0.000136	1.522824	1.337175

The Variety Inflation Factors (VIF) table shows the results of the linear multiplicity test among independent variables in the study model. The VIF coefficient indicates the extent to which the dip coefficient varies as a result of a linear correlation with other independent variables. VIF value is equal to 1 indicates no linear link, while VIF values greater than 5 indicate a linear link. In general, VIF values are larger than 5 or 10 evidence of a linear pluralism problem. In this table, we note that VIF values for all variables are below 5, indicating that there is no linear multiplicity problem among independent variables. VIF values range from 1.1365 for AT variant to 4.6835 for LTA variant. These results indicate that the autonomous variables in the study model are relatively independent of each other, and there is no strong linear relationship between them. Thus, these variables can be used in the regression model without worrying about the impact of linear multiplicity on the accuracy of the model's estimation.

Table (3): Sectional Link Test

Cross-Section Dependence Test			
Series: CAR			
Null hypothesis: No cross-section dependence (correlation)			
Test	Statistic	d.f.	Prob.
Pesaran CD	0.390280		0.6963

Series: AT			
Pesaran CD	0.772029		0.5441

Series: D_E

Pesaran CD	**0.007011**		**0.9944**

Series: LTA			
Pesaran CD	**0.830625**		**0.4911**

Series: ROA			
Pesaran CD	**0.661922**		**0.5229**

The Cross-Section Dependence Test table shows the results of the Pesaran CD test, which is used to verify a cross-sectional link between cross-section units (sinks in this case) in the study model. The hypothesis of nowhere in this test indicates the absence of a cross-link, while the alternative hypothesis indicates a cross-link. In this table, we note that the probability values (Prob.) for all variables are greater than the level of morale (0.05), which means that the notion of nowhere can be rejected. Consequently, there is no statistical evidence of a cross-sectional link between banks in the study model. Probability values range from 0.4911 for LTA variant to 0.9944 for D/E variant.

These results indicate that each bank's performance, in terms of measured financial indicators, is relatively independent of that of other banks. This means that the factors affecting each bank's performance are its own and are not significantly influenced by the factors affecting the performance of other banks. This result can be explained by several factors, including:

- Diversity of banking activities: where each bank has a different focus in its activities, resulting in differing factors affecting its performance.
- Competitive environment: Banks face different competition in the markets in which they operate, affecting their performance independently.
- Management policies: Each bank's management policies vary, resulting in a difference in its response to external factors.

This result enhances the reliability of findings from the study model, indicating that data do not suffer from the problem of cross-linkage, and therefore results can be relied upon to infer relationships between variables.

Table (4): Stabilization Test

Null Hypothesis: Unit root (individual unit root process)		
Series: CAR		
Method	**Statistic**	**Prob.****
PP - Fisher Chi-square	**184.234**	**0.0000**
PP - Choi Z-stat	**-7.22613**	**0.0000**

Series: AT		
Method	**Statistic**	**Prob.****
PP - Fisher Chi-square	**89.4376**	**0.0000**
PP - Choi Z-stat	**-6.11418**	**0.0000**

Series: D_E		
Method	**Statistic**	**Prob.****

PP - Fisher Chi-square	118.874	0.0000
PP - Choi Z-stat	-3.56800	0.0002

Series: LTA		
Method	Statistic	Prob.**
PP - Fisher Chi-square	122.520	0.0000
PP - Choi Z-stat	-3.64906	0.0001

Series: ROA		
Method	Statistic	Prob.**
PP - Fisher Chi-square	115.228	0.0000
PP - Choi Z-stat	-2.32382	0.0101

The table shows the results of the Unit Root Test using the PP-Fisher Chi-square and PP-Choi Z-stat methods to verify the stability of the time-tested variables. The hypothesis of nowhere in this test indicates the existence of a unit root, i.e. the variable is unstable, while the alternative hypothesis indicates that there is no unit root, i.e. the variable is stable. In this table, we note that the probability values (Prob.) for all variables are below the morale level (0.05), meaning that the nowhere hypothesis can be rejected. Thus, there is strong statistical evidence that all studied variables are stable over time.

These results indicate that the characteristics of the financial variables examined (capital adequacy, asset turnover, debt-to-equity ratio, liquid asset ratio, return on assets) did not materially change during the period studied. This means that the factors affecting these variables are relatively stable over time. This result enhances the reliability of the findings from the study model, indicating that data do not suffer from the problem of instability, and therefore results can be relied upon to infer relationships between variables without concern about the impact of "false regression". The stability of the variables indicates that the performance of the selected Iraqi banks was continuous during the period studied, and that the changes in their performance were relatively minor.

Test hypotheses and estimate the model: After examining the characteristics of the data and ascertaining their integrity and suitability for analysis, it is the role of testing the hypotheses of the study and estimating the statistical model that represents the relationship between the variables. This phase aims to determine whether there is a statistically significant relationship between independent variables (profitability, liquidity, indebtedness, activity) and dependent variables (banking risks). Hypotheses are tested by estimating the regression factors in the model and determining whether these transactions are statistically significant. Panel data is used in this study, which allows the model to be estimated in more ways than one, including the combined model, the fixed effects model, and the random effects model. The most suitable model is selected based on the characteristics of the data and the results of diagnostic tests. The results of the model assessment help to understand the nature of the relationship between variables and identify factors affecting banking risks in Iraqi banks.

Table (5): Combined Model

Dependent Variable: CAR
Method: Panel Least Squares
Sample: 2012 2020
Periods included: 9
Cross-sections included: 20

Total panel (balanced) observations: 180				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AT	0.054723	0.011985	4.566112	0.0000
D_E	-0.099429	0.010587	-9.391275	0.0000
LTA	-0.201250	0.051569	-3.902514	0.0001
ROA	-0.007738	0.011650	-0.664196	0.5074
C	0.681050	0.030815	22.10116	0.0000
Root MSE	0.118904	R-squared		0.520426
Mean dependent var	0.470126	Adjusted R-squared		0.509465
S.D. dependent var	0.172178	S.E. of regression		0.120591
Akaike info criterion	-1.365445	Sum squared resid		2.544868
Schwarz criterion	-1.276752	Log likelihood		127.8901
Hannan-Quinn criter.	-1.329484	F-statistic		47.47688
Durbin-Watson stat	1.965201	Prob(F-statistic)		0.000000

The table shows the results of the Pooled estimate using the normal micro-square method (OLS). The determination coefficient (R-squared) indicates that the model explains about 52% of the variability in the capital adequacy variable (CAR). The value of F-statistic (47.47688) indicates that the model as a whole is statistically significant, i.e. there is a relationship between the autonomous variables and the dependent variable. The Durbin-Watson coefficient (1.965201) indicates that there is no first-class self-bonding problem in the thickness. As for regression factors, we note that AT, D/E and LTA variables are statistically significant, while the ROA variant is not statistically significant. These preliminary findings indicate a correlation between these variables and capital adequacy, but final conclusions can be drawn only after the most appropriate model is selected based on data characteristics and diagnostic test results.

Table (6): Lagrange multiplier for differentiation between combined and random model

Lagrange Multiplier Tests for Random Effects			
Null hypotheses: No effects			
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided			
(all others) alternatives			
	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	298.3347	1.995641	300.3303
	(0.0000)	(0.1578)	(0.0000)
Honda	17.27237	-1.412671	11.21450
	(0.0000)	(0.9211)	(0.0000)
King-Wu	17.27237	-1.412671	8.216837
	(0.0000)	(0.9211)	(0.0000)
Standardized Honda	19.93305	-1.261193	8.800866
	(0.0000)	(0.8964)	(0.0000)
Standardized King-Wu	19.93305	-1.261193	5.573094
	(0.0000)	(0.8964)	(0.0000)
Gourieroux, et al.	--	--	298.3347
			(0.0000)

The table shows the results of the Lagrange Multiplier Test test to test for random effects in the plate data model. The hypothesis of nowhere in this test indicates the absence of indiscriminate effects, while the alternative's hypothesis indicates the existence of indiscriminate effects. In this table, we note that the probability values (Prob.) for all cross-section tests are below the morale level (0.05), which means that the nowhere hypothesis can be rejected. Thus, there is strong statistical evidence of random effects in the panel data model. As for time tests, we note that probability values are greater than the level of morale, which means that the hypothesis of nowhere can be rejected. Thus, there is no statistical evidence of time effects in the panel data model.

Based on the results of the Lagrange multiplier test, it is preferable to use Random Effects Model instead of Pooled Model. This choice is justified by strong statistical evidence of random effects in the panel data model, which means that the combined model does not accurately represent the relationship between variables. The random effects model assumes that individual effects (related to each bank) are not associated with autonomous variables, and are added as random variables to the extent of the model's random error. This model helps to more accurately estimate the relationship between variables than the combined model, especially in the case of random effects.

Table (7): Fixed Effects Model

Dependent Variable: CAR				
Method: Panel Least Squares				
Sample: 2012 2020				
Periods included: 9				
Cross-sections included: 20				
Total panel (balanced) observations: 180				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AT	0.127333	0.014648	8.692555	0.0000
D_E	-0.113217	0.011499	-8.279739	0.0001
LTA	0.126400	0.040806	3.097556	0.0023
ROA	0.098791	0.010807	2.813488	0.0072
C	0.344214	0.025011	13.76256	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Root MSE	0.045134	R-squared		0.930900
Mean dependent var	0.470126	Adjusted R-squared		0.920712
S.D. dependent var	0.172178	S.E. of regression		0.048482
Akaike info criterion	-3.091677	Sum squared resid		0.366681
Schwarz criterion	-2.665950	Log likelihood		302.2510
Hannan-Quinn criter.	-2.919063	F-statistic		91.37387
Durbin-Watson stat	1.996411	Prob(F-statistic)		0.000000

The table shows the results of the fixed effects model estimate (Fixed Effects) using the "Least Squares" method. The determination coefficient (R-squared) indicates that the model explains about 93% of the variability in the capital adequacy variable (CAR), a very high ratio that indicates the model's ability to

explain changes in the dependent variable well. The F-statistic value (91.37387) indicates that the model as a whole is highly statistically significant, i.e. there is a strong correlation between independent variables and dependent variables. Durbin-Watson's coefficient (1.996411) indicates that there is no first-class self-bonding problem in the thickness. As for regression factors, we note that all variables (AT, D/E, LTA, ROA) are statistically significant. These preliminary findings indicate a strong correlation between these variables and capital adequacy, but, as mentioned earlier, final conclusions can be drawn only after the most appropriate model is selected based on data characteristics and diagnostic test results, and compared with the random effects model.

Table (8): Comparison of fixed and combined effects

Redundant Fixed Effects Tests			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	48.772884	(19,156)	0.0000
Cross-section Chi-square	348.721766	19	0.0000

The table shows the results of the Redundant Fixed Effects Tests, which are used to compare the fixed effects model with the Pooled model. The hypothesis of nowhere in this test indicates that the combined model is the most appropriate, while the alternative hypothesis indicates that the fixed effects model is the most appropriate model. In this table, we note that probability values (Prob.) for both the F test and the Chi-square test are below the morale level (0.05), meaning that the nowhere hypothesis can be rejected. Thus, there is strong statistical evidence that the fixed effects model is the most appropriate model compared to the combined model.

Based on excess fixed effects test results, it is preferable to use the fixed effects model rather than the combined model. This choice is justified by strong statistical evidence that the fixed effects model represents the relationship between variables better than the combined model. The fixed effects model assumes that individual effects (related to each bank) are fixed over time, but vary between banks. This model helps to more accurately estimate the relationship between variables than the combined model, especially in the case of significant differences between cross-section units (sinks in this case).

After selecting the fixed effects model as a preferred model compared to the combined model, it should be compared with the random effects model previously selected as a preferred model compared to the combined model as well. This is done through the Hausman test, which helps to determine which of the two models (fixed effects or random effects) are best suited to represent the relationship between variables.

Table 9: Assessment of random effects

Dependent Variable: CAR
Method: Panel EGLS (Cross-section random effects)
Sample: 2012 2020
Periods included: 9

Cross-sections included: 20				
Total panel (balanced) observations: 180				
Swamy and Arora estimator of component variances				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
AT	0.117806	0.013424	8.775691	0.0000
D_E	-0.017307	0.010759	-1.608691	0.1095
LTA	0.107121	0.039382	2.720022	0.0072
ROA	0.008904	0.010239	0.869685	0.3857
C	0.378456	0.034055	11.11315	0.0000
	Effects Specification			
			S.D.	Rho
Cross-section random			0.107987	0.8322
Idiosyncratic random			0.048482	0.1678
	Weighted Statistics			
Root MSE	0.050493	R-squared		0.357442
Mean dependent var	0.069581	Adjusted R-squared		0.342755
S.D. dependent var	0.063167	S.E. of regression		0.051210
Sum squared resid	0.458923	F-statistic		24.33724
Durbin-Watson stat	0.572681	Prob(F-statistic)		0.000000
	Unweighted Statistics			
R-squared	0.181464	Mean dependent var		0.470126
Sum squared resid	4.343580	Durbin-Watson stat		0.060507

The table shows the results of the Random Effects model assessment using the generalized micro-square method (Generalized Last Squares). The determination coefficient (R-squared) indicates in weighted statistics that the model explains about 35.7% of the variability in the capital adequacy variable (CAR), which is lower than that obtained in the fixed effects model. The value of F-statistic (24.33724) indicates that the model as a whole is statistically significant, i.e. there is a relationship between the autonomous variables and the dependent variable. As for regression factors, we note that AT and LTA variables are statistically significant at the level of 1% and 5% respectively, while the ROA variant is not statistically significant, and the D/E variable is statistically significant at the level of 10%. The Rho coefficient (0.8322) indicates that a large proportion of variability in the dependent variable is explained by random effects. These preliminary findings indicate a correlation between some variables and capital adequacy, but, as mentioned earlier, final conclusions can only be drawn after the most appropriate model is selected based on data characteristics and diagnostic test results, and compared with the fixed effects model using the Hausman test.

Table (10): Comparison of random and constant

Correlated Random Effects - Hausman Test			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	24.243292	4	0.0001

The table shows the results of Hausman's test, which is used to compare Random Effects with Fixed Effects. The hypothesis of nowhere in this test indicates that the random effects model is the most appropriate, while the alternative hypothesis indicates that the fixed effects model is the most appropriate

model. In this table, we note that the probability value (Prob.) is 0.0001, which is well below the morale level (0.05). Consequently, the hypothesis of nowhere is rejected.

Based on Hausman's test results, it is preferable to use a fixed effects model rather than a random effects model. This choice is justified by strong statistical evidence that the fixed effects model provides more consistent and efficient estimates than the random effects model, where the rejection of the nowhere hypothesis indicates a correlation between individual effects (related to each bank) and the model's interpretative variables. Based on all the tests performed, in particular the Hausman test, the fixed effects model is the most appropriate model to represent the relationship between variables in this study. The results of this model can now be analysed in detail to draw conclusions on factors affecting the adequacy of Iraqi banks' capital.

Hypothesis test results by fixed effects:

First hypothesis: There is a statistically significant correlation between the use of liquidity indicators and the reduction of banking risks.

Test results: Static effects model results show that the liquidity variable coefficient (LTA) is positive and statistically significant at a level of 0.05 (coefficient = 0.1264, t-Statistic = 3.097556, p-value = 0.0023). Coefficient 0.1264 indicates that an increase in the ratio of liquid assets by one unit increases the ratio of capital adequacy by 0.1264 units, with other factors firming. The t-Statistic value (3.097556) indicates that this coefficient is significantly different from zero, i.e. the relationship between liquidity and capital adequacy is not random. p-value (0.0023) indicates that the likelihood of obtaining these results by accident is less than 0.23%, which is well below the level of morale (5%), supporting the rejection of the nowhere hypothesis and acceptance of the hypothesis of a relationship between liquidity and capital adequacy.

These results indicate acceptance of the first hypothesis. The positive coefficient indicates a correlation between liquidity and capital adequacy, which means that increased liquidity increases capital adequacy, thereby reducing banking risks. This relationship can be explained by high liquidity banks' ability to meet their financial obligations in a timely manner, thereby reducing their likelihood of financial problems such as loan default or abrupt withdrawal of deposits. This finding also indicates that Iraqi banks that maintain a good level of liquidity, by holding an adequate proportion of liquid assets such as cash and negotiable securities, are less vulnerable to financial risk.

Second hypothesis: There is a statistically significant correlation between the use of activity indicators and the reduction of banking risks.

The results of the constant effects model show that the activity variable coefficient (AT) is positive and statistically significant at 0.01 (coefficient = 0.127333, t-Statistic = 8.692555, p-value = 0.0000). Coefficient 0.127333 indicates that an increase in the turnover ratio of assets by one unit increases the capital adequacy ratio by 0.127333 units, with other factors firming. The t-Statistic value (8.692555) indicates that this coefficient is significantly different from zero, i.e. the relationship between activity and capital adequacy is strong rather than random. The p-value (0.0000) indicates that the likelihood of obtaining these results by accident is less than 0.01%, which is well below the morale level (1%),

supporting the rejection of the nowhere hypothesis and acceptance of the hypothesis of a strong relationship between activity and capital adequacy.

These findings indicate acceptance of the second hypothesis. The positive coefficient refers to an expulsive relationship between activity and capital adequacy, which means that increased activity increases capital adequacy, thereby reducing banking risks. This relationship can be explained by the ability of highly active banks to achieve higher profits, through the efficient use of their assets to generate revenue, thereby enhancing their capital base. This finding also indicates that Iraqi banks that manage their assets efficiently and generate high revenues are less vulnerable to financial risk, as realized profits are used to raise capital, thereby enhancing their ability to absorb losses.

Third hypothesis: There is a statistically significant correlation between the use of indebtedness indicators and the reduction of banking risks.

The results of the fixed effects model show that the modulus (D/E) is negative and statistically significant at 0.01 (coefficient = -0.113217, t-Statistic = -8.279739, p-value = 0.0001). Coefficient -0.113217 indicates that an increase in the debt-to-equity ratio by one unit results in a decrease in the capital adequacy ratio by 0.113217 units, with other factors firming. t-Statistic value (-8.279739) indicates that this coefficient is significantly different from zero, i.e. the relationship between indebtedness and capital adequacy is strong rather than random. The p-value (0.0001) indicates that the likelihood of obtaining these results by accident is less than 0.01%, which is well below the morale level (1%), supporting the rejection of the nowhere hypothesis and acceptance of the hypothesis of a strong relationship between indebtedness and capital adequacy.

These findings indicate acceptance of the third hypothesis. The negative coefficient indicates an inverse relationship between indebtedness and capital adequacy, which means that increased indebtedness results in reduced capital adequacy and therefore increased banking risk. This relationship can be explained by increasing the cost of debt servicing, as rising indebtedness means increasing the bank's obligations to creditors, thereby reducing the profits available to raise capital. This finding also indicates that Iraqi banks that rely heavily on external financing are more vulnerable to financial risk, as any deterioration in their financial situation may lead to difficulties in repaying their debts.

Hypothesis 4: There is a statistically significant correlation between the use of profitability indicators and the reduction of banking risks.

The results of the fixed effects model show that the ROA is positive and statistically significant at a level of 0.01 (coefficient = 0.098791, t-Statistic = 2.813488, p-value = 0.0072). Coefficient 0.098791 indicates that an increase in the return on assets by one unit increases the capital adequacy ratio by 0.098791 units, with other factors firming. The t-Statistic value (2.813488) indicates that this coefficient is significantly different from zero, i.e. the relationship between profitability and capital adequacy is strong rather than random. p-value (0.0072) indicates that the likelihood of obtaining these results by accident is less than 0.72%, which is below the level of morale (1%), which supports rejection of the nowhere hypothesis and acceptance of the hypothesis of a strong relationship between profitability and capital adequacy.

These findings indicate acceptance of the fourth hypothesis. The positive coefficient refers to an expulsive relationship between profitability and capital adequacy, which means that increased

profitability increases capital adequacy, thereby reducing banking risks. This relationship can be explained by the ability of high-profitable banks to strengthen their capital base through realized profits, where a portion of these profits can be used to increase dedicated capital. This finding also indicates that highly profitable Iraqi banks are less vulnerable to financial risk, as higher profits enhance their ability to absorb potential losses.

Main hypothesis test result: The results of the fixed effects model show a statistically significant correlation between the use of credit analysis indicators and the reduction of banking risks in Iraqi banks, which supports acceptance of the main hypothesis. The results indicate that all credit analysis variables (liquidity, activity, indebtedness, profitability) have a moral impact on capital adequacy and therefore on banking risks.

The most influential variable: The activity variable (AT) is the most influential variable on capital adequacy, with its factor (0.127333) indicating that an increase in the turnover of assets by one unit increases the capital adequacy ratio by 0.127333 units, with other factors firming.

The least influential variable: The ROA is the least influential variable on capital adequacy, with its factor (0.098791) indicating that an increase in the return on assets by one unit increases the capital adequacy ratio by 0.098791 units, with other factors proven.

These results indicate that efficient asset (activity) management plays a key role in reducing banking risks in Iraqi banks. This can be explained by the ability of banks that manage their assets efficiently to generate higher profits, thereby enhancing their capital base and reducing their risk of loss. As for profitability, although it has a positive impact on capital adequacy, it has less impact than activity. This can be explained by the fact that profitability may not always reflect efficient asset management, as high profitability can be achieved through high-risk activities. Therefore, these findings point to the importance of focusing on efficient asset management to achieve sustainable profitability and reduce banking risks in Iraqi banks.

Quality and diagnosis of the model: After selecting the fixed effects model as the most appropriate model to represent the relationship between variables, it is necessary to conduct diagnostic tests to assess the model's quality and suitability for data. These tests aim to verify the validity of the underlying assumptions underlying the regression model, such as the natural distribution of the protectors, the absence of a problem of subjective or cross-sectional interconnectedness in the remains, and the stability of the retention over time. These tests help to ensure the accuracy and reliability of the results from the model, as any flaw in the underlying assumptions may lead to misleading results. The results of diagnostic tests performed on the fixed effects model will be reviewed in this paragraph, and these results will be analyzed to assess the quality of the model.

Table (11): Natural Distribution of Parcels

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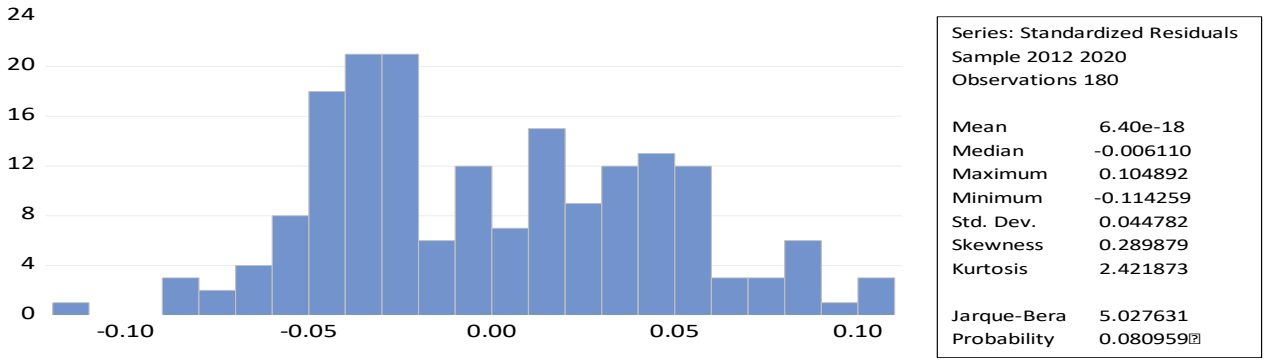


The chart shows the Standard Residuals distribution of the Fixed Effects Model, while the table presents the descriptive statistics of these remains. The Jarque-Bera test is used to verify the hypothesis of natural distribution of the protectors. The hypothesis of nowhere in this test indicates that the retention follows a natural distribution. In this case, we note that the Jarque-Bera test value is 5.027631, and the probability value is 0.080959. Since the probability value is greater than the level of morale (0.05), the hypothesis of nowhere can be rejected. Thus, there is no strong statistical evidence that the remains do not follow a natural distribution. The graph also indicates that the distribution of the remnants is close to normal distribution, taking an almost identical shape around the average. These results indicate that the assumption of natural distribution of the protectors in the fixed effects model is verified, thereby enhancing the reliability of the model's findings.

Table (12): Sectional interconnectedness in baqqa

Residual Cross-Section Dependence Test			
Null hypothesis: No cross-section dependence (correlation) in residuals			
Test	Statistic	d.f.	Prob.
Pesaran CD	0.165204		0.8688

The table shows the results of the Pesaran CD test, which is used to verify a cross-sectional correlation between the protector of the static effects model. The hypothesis of nowhere in this test indicates that there is no sectional interconnectedness in the remains. In this case, we note that the Pesaran CD test value is equal to 0.165204, and the probability value (Prob.) is equal to 0.8688. Since the probability value is much greater than the level of morale (0.05), the hypothesis of nowhere can be rejected. Consequently, there is no statistical evidence of cross-sectional coherence in the constant effects model. This finding indicates that the assumption that there is no cross-sectional interconnectedness is achieved, thereby enhancing the reliability of the results from the model. The absence of a cross-sectional link can be explained by the fact that the factors affecting each bank's containers (i.e. those not explained by the autonomous variables in the model) are independent of the factors affecting the other banks.

Table (13): Self-bonding of the guards

Included observations: 160 after adjustments

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.059	0.059	0.5617	0.454
		2	0.026	0.022	0.6710	0.715
		3	0.050	0.047	1.0766	0.783
		4	-0.022	-0.028	1.1589	0.885
		5	-0.080	-0.080	2.2264	0.817
		6	-0.008	-0.001	2.2379	0.897
		7	-0.132	-0.127	5.2028	0.635

The table shows the results of the Autocorrelation, Partial Correlation test and the Ljung-Box (Q-statistic) test. The hypothesis of nowhere in these tests indicates that there is no subjective association in the remains. In this case, we note that all AC and PAC values fall within the acceptable range (between the two intermittent lines) in self-correlation schemes, indicating that there is no self-correlation in the remains. We also note that the probability values (Prob.) of the Ljung-Box (Q-statistic) test are greater than the morale level (0.05) for all delays, supporting the non-rejection of the nowhere hypothesis. Consequently, there is no statistical evidence of subjective association in the protector of the static effects model. This finding indicates that the assumption that there is no subjective correlation in the periphery is achieved, thereby enhancing the reliability of the results from the model. The absence of a subjective correlation can be explained by the fact that the value of the remains in a given period of time does not depend on the values of the remains in previous periods of time.

Table 14: Al-Baqqi Stability

Null Hypothesis: Unit root (individual unit root process)		
Series: RESIDUAL		
Method	**Statistic**	**Prob.****
PP - Fisher Chi-square	101.221	0.0000
PP - Choi Z-stat	-5.88400	0.0000

The table shows the results of the Unit Root Test for protectors using the PP-Fisher Chi-square and PP-Choi Z-stat methods. The hypothesis of nowhere in this test indicates the existence of a single root, i.e. the remains are unstable over time. In this case, we note that the probability values (Prob.) for both PP - Fisher Chi-square and PP - Choi Z-stat are well below the morale level (0.05), which means that the nowhere hypothesis can be rejected. Thus, there is strong statistical evidence that the constant effects model protector is stable over time. This finding indicates that the presumption of stability of the obituary is achieved, thereby enhancing the reliability of the results from the model. The stability of the threshold can be explained by the fact that the factors affecting the protector of the model do not fundamentally change over time, which means that the model provides stable estimates of the relationship between variables.

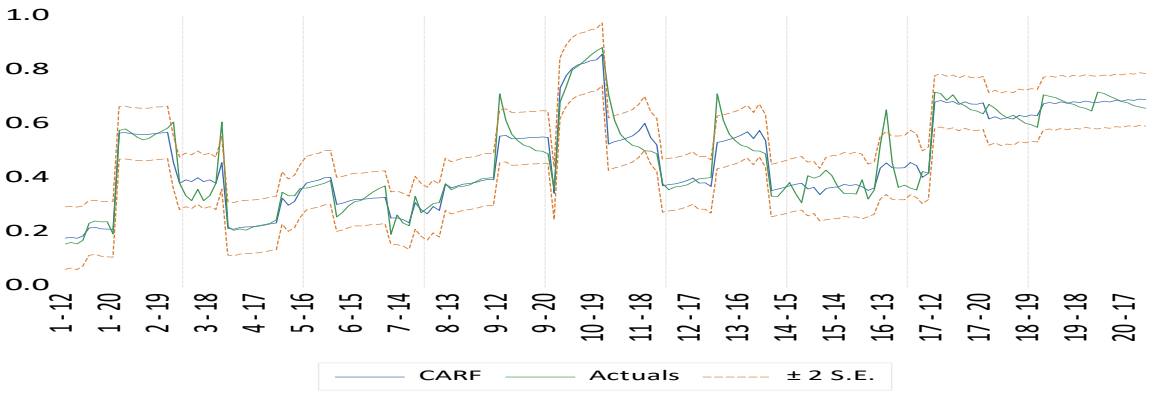
Table (15): Model accuracy indicators

Forecast: CARF
Actual: CAR
Forecast sample: 2012 2020
Included observations: 180

Root Mean Squared Error	0.045403
Mean Absolute Error	0.030749
Mean Absolute Percentage Error	6.916517
Theil Inequality Coef.	0.045450
Bias Proportion	0.000000
Variance Proportion	0.017509
Covariance Proportion	0.982491
Theil U2 Coefficient	0.447217
Symmetric MAPE	6.895525

The table shows a set of indicators of the model's accuracy in forecasting capital adequacy variable (CAR) values. The Root Mean Squared Error (RMSE) value refers to the average standard deflection of the paraphernalia, 0.045403, a small value that indicates good forecast accuracy. Mean Absolute Error (MAE) refers to the average absolute value of the protectors, and is 0.030749, which is also a small value that indicates good accuracy. Mean Absolute Percentage Error (MAPE) refers to the average percentage of absolute error, at 6.916,517%, a low ratio that indicates good prediction accuracy. Theil Inequality Coefficient's value refers to an inequality ratio between predictions and actual values, and is 0.045450, a small value that indicates good accuracy. The values of Bias Proportion, Variance Proportion, Covariance Proportion indicate the components of inequality, with the value of Covariance Proportion (0.982491) indicating that most inequalities are caused by errors in predicting the general direction of the variable. Theil U2 Coefficient refers to a measure of prediction accuracy, with values below 1 indicating good accuracy, 0.447217, a value below 1 indicating good forecasting accuracy. Overall, all model accuracy indicators indicate that the fixed effects model has good accuracy in predicting capital adequacy variable values.

Shape (2): Convergence of actual and capable values



The chart shows the convergence of actual values (Actuals) of capital adequacy values (CAR) with values estimated by the Fixed Effects Model (CARF), as well as the standard margin of error (± 2 S.E.). It is noted from the format that the values estimated by the model are substantially converged with the actual values in most study periods, where the Blue Line (CARF) is very close to the Green Line Line (Ac). It is also noted that most actual values fall within the standard margin of error, indicating the model's high accuracy in forecasting capital adequacy values. This significant convergence of actual and capable values demonstrates the quality of the fixed effects model and its ability to accurately explain changes in capital adequacy. This result enhances the reliability of the results from the model and indicates that the model provides accurate and reliable estimates of the relationship between credit analysis variables and capital adequacy in Iraqi banks.

conclusion

This study aimed to highlight the role of credit analysis indicators in reducing banking risks in Iraqi banks. The study began from a key question about a statistically significant relationship between the use of these indicators and the reduction of risk, with several sub-questions to determine the nature of this relationship and identify the most influential indicators. These questions were tested by testing four sub-hypotheses focusing on the impact of both liquidity, activity, indebtedness and profitability indicators on banking risks, as well as a key hypothesis confirming a statistically significant correlation between the use of credit analysis indicators and the overall reduction of banking risks.

To answer these questions and achieve research objectives, 20 Iraqi banks' annual financial data were collected for the period from 2012 to 2020. This data was analyzed using EViews software, where a set of statistical tests were applied to examine data characteristics, such as linear attachment, cross-link, and stability. Fixed Effects is chosen as the most appropriate model to represent the relationship between variables, after comparing it with both Pooled Model and Random Effects Model using Lagrange Multiplier Test, Redespants Med. A range of diagnostic tests have been applied to assess the quality of the fixed effects model, such as the Jarque-Bera test for natural distribution of the paraphernalia, the Pesaran CD test for cross-sectional interconnection in the constrictor, Autocorrelation schemes, Partial Correlation and the Ljung-Box (Q-Ostatistic) test for conditioning. The results of these tests showed that the regression model assumptions were verified, indicating the accuracy and reliability of the results from the model.

The study found several important findings supporting the acceptance of all research hypotheses which showed a statistically significant correlation between the use of credit analysis indicators and the reduction of banking risks in Iraqi banks, It confirmed that there is a correlation between both liquidity, activity and profitability indicators with capital adequacy s Development ", which means that increasing these indicators increases capital adequacy and thus reduces banking risks. In contrast, the results showed a reverse correlation between indebtedness and capital adequacy, which means that increased indebtedness leads to reduced capital adequacy and thus increased banking risks. Analysis of regression transactions also revealed that the activity variable is the most influential variable on capital adequacy, followed by the liquidity variable, then the indebtedness variable, and finally the profitability variable.

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