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RESEARCH ARTICLE

Effect Some of the Financial Indicators in The Banking Efficiency of Listed Banks Sample in The Iraq Stock Exchange

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ABSTRACT

The research aims to measure and analyze the impact of financial indicators on the banking efficiency of a sample of banks listed on the Iraq Stock Exchange using the Fixed Effects Model for Panel Data for the period (2005-2022). To obtain the research results, banking efficiency was measured using the Data Envelopment Analysis method for banks according to the Variable Returns to Scale model with directional output, and financial analysis models (financial ratios) were used to measure the financial indicators of banks. The research reached several conclusions, the most important of which is the existence of a significant positive relationship between (return on assets, return on equity, return on deposits, and employment ratio) and banking efficiency.

INTRODUCTION

Banking efficiency is one of the fundamental factors that affect the performance of banks and their ability to succeed in the banking services market. Banking efficiency relates to how banks effectively and intelligently use the available resources, whether financial or human resources. Banking efficiency represents an important element for the sustainability of growth and development in the banking services sector. When banks can achieve the highest levels of efficiency, they can gain competitive advantages that help attract more customers and increase market share. Banks can achieve banking efficiency by reducing costs and improving the quality of banking services through improving internal banking processes and adopting advanced technology in banking operations. On the other hand, financial indicators are important tools for evaluating and monitoring the performance of the banking sector as they provide quantitative and qualitative information that contributes to. Understanding the financial situation and operational performance of banks can help in determining the extent to which banks achieve their financial goals, as well as identifying their risk tolerance and strengths and weaknesses in financial performance.

LITERATURE REVIEW

Ziyad Ahmed (2020) assessed the determinants of operational efficiency in commercial banks operating in Algeria, showing statistically significant inverse relationships between return on equity and liquidity, asset utility, and operational efficiency, as well as a strong negative statistically significant relationship between capital adequacy ratio and return on assets and operational

efficiency. Bana Mahmoud (2023) estimated the determinants of banking efficiency in Arab banks using DEA and Tobit analysis. The study results showed that capital adequacy ratio, loan-to-deposit ratio, profitability index represented by return on equity, and operating expenses to operating revenues ratio have a significant positive impact on the three types of efficiency: technical efficiency with constant returns to scale, technical efficiency with variable returns to scale, and scale efficiency. However, the revenue diversity index represented by non-interest income to total income negatively affects technical efficiency and has no significant relationship with scale efficiency. As for the net interest margin index, it has no significant impact on different types of efficiency. The results also showed that credit risk has a significant positive impact on technical efficiency with constant returns to scale and no impact on other types of efficiency. Nazmoon Akhter, (2018) assessed the impact of liquidity and profitability on the operational efficiency of commercial banks**.** The study in Bangladesh showed that liquidity and profitability together explain about 66.23% to 98.85% of the operational efficiency of banks**.**

METHODOLOGY

The importance of research is highlighted by the importance of banks as the backbone of the financial system in any country, as they play a significant role in mobilizing savings directing them towards productive investments, and creating added value through optimal utilization of financial resources and their proper deployment. Therefore, it is necessary to shed light on the topic of efficiency in banks as an indicator or measure to determine the success or failure of banks, on which performance is evaluated, in addition to identifying the factors influencing bank efficiency, which is very important in formulating policies and plans for management and resource allocation in the best possible way**.**

The research aims to achieve the following**:**

- Measure and analyze the impact of financial indicators on the banking efficiency of the research sample banks**.**
- Identify which financial indicators have the most impact on improving banking efficiency**.**

The main research problem is formulated through the following question**:**

To what extent do financial indicators affect the banking efficiency of a sample of banks listed on the Iraq Stock Exchange**?**

The research starts from a main hypothesis that the increase in the values of financial indicators reflects an increase in banking efficiency. There is a significant positive impact of financial indicators on the banking efficiency of a sample of banks listed on the Iraq Stock Exchange.

1_ Conceptual Framework for Financial Indicators and Banking Efficiency

1_1 Concept of financial indicators

Financial indicators are defined as "the relationships between the accounting values listed in the financial statements, arranged and organized to serve as a means of evaluating the performance of a specific activity at a specific point in time" (Al-Tamimi and Al-Nuaimi, 2007:77). Financial indicators are also defined as "the study of the relationship between two variables, one representing the numerator and the other representing the denominator, i.e., the study of the relationship between an element (or several elements) and another element (or several other elements)" (Mohammed et al., 2000:52; Rashid et al., 2023). Another definition of financial indicators is that they are "a means of analyzing and understanding financial matters better, allowing for comparisons between periods or with other companies. They enable the determination of the efficiency and profitability of the establishment and can be used to detect trends in profitability and efficiency, as well as the

availability of liquidity to meet financial obligations and to determine investment returns" (Al-Maamouri,2023:19)1.1 The Concept of Financial Indicators.

1_2 The most important financial indicators used in our research

Return on equity, return on assets, return on deposits, and operating ratio were all used as independent variables in the research.

1. Rate of return on equity

The return on equity is considered one of the indicators that is measured using the published financial statements, unlike earnings per share, which is measured using generally accepted accounting standards. The return on equity is measured by dividing the net profit from the income statement by the equity from the balance sheet (Al-Ja'abri, 2014:53).

"Return on Equity = (Net Profit After Tax / Equity) × %100"

2. Return on Assets

This indicator measures the efficiency of the institution in utilizing assets to generate profits and is calculated using the following equation (Rosikah et al, 2018:7)

Return on Asset = (Net Profit Tax)/(Total Assets)×%100

The higher the return on assets, the more efficient the institution's investment and operation policy (Abdullah and Al-Sahlawi, 2017:77).

3. Return on Deposits

This ratio reflects the efficiency of banks in utilizing customer deposits in investment activities and is calculated using the following equation (Ad-Douri and Jawad,2023:169)

Return on Deposits = (Net Profit Tax)/(Total Deposits)×%100

4. Operating Ratio

This ratio measures the efficiency of banks in utilizing available funds in various areas, such as providing different services to customers, including loans, and is calculated by dividing cash credit by deposits (Al-Karawi, 2020:8)

Operating Ratio = (Cash Credit)/(Total Deposits)×%100

1_3 Bank Efficiency

Efficiency is defined as "the state in which one thing is equal to another" and is defined as "the optimal way to use resources" (Al-Quraishi, 8:2007). From another perspective, efficiency is defined as "the ratio of effective outputs of a system to total inputs, in other words, the system's ability to achieve the highest possible value from the inputs used, and this ratio is used to measure the effectiveness of the system's production process or resource utilization, and achieving greater outputs with fewer inputs is an indicator of high efficiency" (Robert, 1995:41; Jam et al., 2018). Bank efficiency is also defined as "the extent of banks' ability and efficiency in utilizing their financial inputs to ensure the their customers To ensure the best financial returns" ".best outputs that meet the needs of (AbdulRida et al., 202

4_1 Types of Banking Efficiency

Banking efficiency is divided into several types: Technical Efficiency**,** Allocative efficiency, and Scale Efficiency.

1. Technical Efficiency

Defined as the bank's ability to produce the maximum amount of outputs using a specific amount of inputs, or achieve the maximum possible production using available production elements (Coelli et al, 2005:11; Kanval et al., 2024). It also means the bank's ability to maximize the production of banking services (outputs) by using specific inputs (bank inputs) or the ability to minimize inputs while maintaining the level of production of banking services (outputs). Therefore, measuring productivity efficiency has an input-oriented or output-oriented approach (Sareeh, 2018:51).

2. Allocative Efficiency

Functional efficiency refers to the ability to use the optimal mix of inputs within production prices and technology, in other words, it refers to the bank's ability to use the optimal mix of inputs while taking into account input prices and available production technologies (Sareeh, 2018:53).

3. Scale Efficiency

Measures the efficiency of the scale, the degree to which the institution can expand according to its operations, or measures the change in production as a result of changing production elements at the same time. The institution can operate at a decreasing, increasing, or constant returns to scale. If the use of production elements increases by a certain percentage and production increases by the same percentage, we are dealing with constant returns to scale. If the percentage increase in the use of production elements is greater than the percentage increase in production, this means dealing with decreasing returns to scale. In the case of achieving an increase in the percentage of production element use The production elements are greater than the percentage increase in production, which means dealing with the diminishing returns to scale. In the case of achieving an increase in the percentage of using production elements by one percentage and a greater increase in production, we are dealing with increasing returns to scale (Batal, 2016:9), which means that scale efficiency refers to the bank's ability to match its activities and services with the optimal size and actual productivity. By measuring scale efficiency, we can determine the lost output due to inefficiency (Wezel, 2010:7).

2_2 Standard analysis to study the impact of financial indicators on banking efficiency

1. Stability Test

Three statistical tests were applied: the LCC test proposed by Levin, Lin, and Chu, the IPS test proposed by Im, Pesaran, and Shin, and the expanded Dickey-Fuller Fisher ADF-Fisher chi-Square test. Table (1) shows the results of the stability test for the research variables, and the results of the LLC test indicate the stability of the return on equity (ROE), return on assets (ROA) and return on deposits (ROD) variables at both the fixed level and the direction and the fixed level and without the fixed level and direction. As for the banking efficiency (BEF) variable, it stabilized at the level with the fixed level and direction and without the fixed level and general direction but did not stabilize with the fixed level. The employment ratio (OR) variable stabilized at the level with the fixed level and without the fixed level and direction, and did not stabilize with the fixed level and direction.

The results of the Im, Pesaran, and Shin tests indicate the stability of all variables at the level with the fixed level and general direction

It is also noted that the results of the ADF-Fisher chi-Square test indicate the stability of all variables at the level with the fixed level. The constant only and with the presence of the fixed limit and the general direction

Table 1: Stability Test Results of the

test type	Levin,Lin and chu (LLC)								
Variable	Individual intercept			Individual intercept and trend			None		
	Statistic	Prob	Result	Statistic	Prob	Result	Statistic	Prob	Result
BEF	-0.97243	0.1654	Unstable	-2.43931	0.0074	Stable	-2.08794	0.0184	Stable
ROE	-5.71432	0.0000	Stable	-4.66902	0.0000	Stable	-9.10997	0.0000	Stable
ROA	-8.01719	0.0000	Stable	-8.13026	0.0000	Stable	-8.44612	0.0000	Stable
ROD	-5.55811	0.0000	Stable	-7.59813	0.0000	Stable	-6.17148	0.0000	Stable
OR	-3.37779	0.0004	Stable	-1.34323	0.0896	Unstable	-2.05987	0.0197	Stable
test type	Im,Pesaran and shin (IPS)								
Variable	Individual intercept			Individual intercept and trend			None		
	Statistic	Prob	Result	Statistic	Prob	Result	Statistic	Prob	Result
BEF	-0.97718	0.1642	Unstable	-3.29505	0.0005	Stable	_	_	_
ROE	-3.62922	0.0001	Stable	-3.62964	0.0001	Stable	_	_	_
ROA	-5.78907	0.0000	Stable	-7.02680	0.0000	Stable	_	_	_
ROD	-4.22473	0.0000	Stable	-5.35297	0.0000	Stable	_	_	_
OR	-3.40926	0.0003	Stable	-2.21077	0.0135	Stable	_	_	_
test type	ADF-Fisher Chi-square								
Variable	Individual intercept			Individual intercept and trend			None		
	Statistic	Prob	Result	Statistic	Prob	Result	Statistic	Prob	Result
BEF	33.9136	0.0267	Stable	46.6677	0.0007	Stable	22.3543	0.3216	Unstable
ROE	50.3895	0.0002	Stable	51.1902	0.0001	Stable	90.3381	0.0000	Stable
ROA	69.5862	0.0000	Stable	78.1755	0.0000	Stable	70.1068	0.0000	Stable
ROD	51.9524	0.0001	Stable	61.9218	0.0000	Stable	59.0568	0.0000	Stable
OR	49.2096	0.0003	Stable	39.8106	0.0053	Stable	26.0811	0.1631	Unstable

Source: Prepared by the researcher according to the outputs of the statistical program (Eviews:12)

2. Residual Cross-Section Dependence Test

From the results of Table (2), it is observed that the values of (Prob.) for all three tests - Breusch-Pagan (LM), Pesaran Scaled (LM), and Pesaran CD - are greater than (0.05). Therefore, the null hypothesis cannot be rejected, meaning that there is no correlation between the cross-sections of the studied variables.

Table 2: Residual Cross-Section Dependence Test Results of the

Residual Cross-Section Dependence Test			
Null hypothesis: No cross-section dependence (correlation)			
Pool: BANKS			
Periods included: 18			
Cross-sections included: 10			
Total panel observations: 180			
Note: non-zero cross-section means detected in data			
Cross-section means were removed during computation of correlations			
Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	58.07586	45	0.0914
Pesaran scaled LM	1.378316		0.1681

Pesaran CD	0.293195		0.7694

Source: Prepared by the researcher according to the outputs of the statistical program (Eviews:12)

3. the problem of multicollinearity Test

It is observed that the VIF and Tolerance values according to the results of Table (3) are small and less than (10) for all variables, so the model does not suffer from the problem of multicollinearity.

Table 3: the problem of multicollinearity Test Results of the

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.431	.031		13.835	.000		
	ROE	.011	.002	.381	5.347	.000	.681	1.469
	ROA	.018	.008	.165	2.248	.026	.640	1.563
	ROD	.012	.003	.282	4.287	.000	.800	1.251
	OR	.001	.000	.190	3.092	.002	.912	1.097
a. Dependent Variable: BEF								

source: Prepared by the researcher according to the outputs of the statistical program SPSS.

4. Cointegration Test

The Pedroni Cointegration Test was applied to test the common integration between the variables of the Panel Data model. It is noted from the results in Table (4) that all values of (Prob.) are greater than (0.05), therefore the conclusion is that there is no common integration, meaning there is no long-term equilibrium relationship between the model variables.

Table 4: Cointegration Test Results of the

Pedroni Residual Cointegration Test						
Series:BEF ROA ROD ROE OR						
Date: 04/04/24 Time: 22:32						
Sample: 2005 2022						
Included observations: 180						
Cross-sections included: 10						
Null Hypothesis: No cointegration						
Trend assumption: Deterministic intercept and trend						
User-specified lag length: 1						
Newey-West automatic bandwidth selection and Bartlett kernel						
Alternative hypothesis: common AR coefs. (within-dimension)						
				Weighted		
		Statistic	Prob.	Statistic	Prob.	
Panel v-Statistic		-1.25259	0.8948	-2.68807	0.9964	
Panel rho-Statistic		1.802669	0.9643	2.27353	0.9885	
Panel PP-Statistic		-4.19513	0	-1.54959	0.0606	

Panel ADF-Statistic		0.078783	0.5314	0.21092	0.5835	
Alternative hypothesis: individual AR coefs. (between-dimension)						
		Statistic	Prob.			
Group rho-Statistic		3.158282	0.9992			
Group PP-Statistic		-5.43659	0			
Group ADF-Statistic		1.415188	0.9215			

Source: Prepared by the researcher according to the outputs of the statistical program (Eviews:12)

5. Panel Data Model Estimation

The results of the estimation of the three Panel Data models (Pooled Regression Model (PRM), Fixed Effects Model (FEM), and Random Effects Model (REM)) are shown in tables (5), (6), and (7) respectively.

Table 5: Pooled Regression Model Estimation Results

ADependent Variable: BEF				
Method: Panel Least Squares				
Date: 04/04/24 Time: 22:45				
Sample: 2005 2022				
Periods included: 18				
Cross-sections included: 10				
Total panel (balanced) observations: 180				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROE	0.011148	0.002085	5.346596	0.0000
ROA	0.018184	0.008087	2.248467	0.0258
ROD	0.012346	0.00288	4.287028	0.0000
OR	0.001077	0.000348	3.091716	0.0023
C	0.430832	0.03114	13.83545	0.0000
Root MSE	0.220856	R-squared		0.394335
Mean dependent var	0.649956	Adjusted R-squared		0.380491
S.D. dependent var	0.284579	S.E. of regression		0.223989
Akaike info criterion	-0.12706	Sum squared resid		8.779936
Schwarz criterion	-0.03836	Log likelihood		16.43496
Hannan-Quinn criter.	-0.09109	F-statistic		28.48462
Durbin-Watson stat	0.930486	Prob(F-statistic)		0.000000

Source: Prepared by the researcher according to the outputs of the statistical program (Eviews:12)

Table (6): Fixed Effects Model Estimation Results

Dependent Variable: BEF		
Method: Panel Least Squares		

Date: 04/04/24 Time: 22:57				
Sample: 2005 2022				
Periods included: 18				
Cross-sections included: 10				
Total panel (balanced) observations: 180				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROE	0.012777	0.001837	6.954795	0.0000
ROA	0.016388	0.006992	2.343715	0.0203
ROD	0.010404	0.002632	3.952444	0.0001
OR	0.002437	0.000408	5.968601	0.0000
C	0.363702	0.031493	11.54859	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
Root MSE	0.17662	R-squared		0.612660
Mean dependent var	0.649956	Adjusted R-squared		0.582327
S.D. dependent var	0.284579	S.E. of regression		0.183917
Akaike info criterion	-0.47408	Sum squared resid		5.615010
Schwarz criterion	-0.22574	Log likelihood		56.66727
Hannan-Quinn criter.	-0.37339	F-statistic		20.19727
Durbin-Watson stat	1.407043	Prob(F-statistic)		0.000000

Source: Prepared by the researcher according to the outputs of the statistical program (Eviews:12

Table 7: Random Effects Model Estimation Results

Dependent Variable:BEF				
Method: Panel EGLS (Cross-section random effects)				
Date: 04/04/24 Time: 23:08				
Sample: 2005 2022				
Periods included: 18				
Cross-sections included: 10				
Total panel (balanced) observations: 180				
Swamy and Arora estimator of component variances				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROE	0.012196	0.001778	6.860364	0.0000
ROA	0.016693	0.006832	2.443466	0.0155
ROD	0.010747	0.00249	4.315905	0.0000
OR	0.001652	0.000338	4.882078	0.0000
C	0.40501	0.032379	12.50827	0.0000
	Effects Specification			
			S.D.	Rho
Cross-section random			0.051328	0.0723
Idiosyncratic random			0.183917	0.9277
	Weighted Statistics			
Root MSE	0.198394	R-squared		0.433123
Mean dependent var	0.41937	Adjusted R-squared		0.420166
S.D. dependent var	0.264237	S.E. of regression		0.201208
Sum squared resid	7.08481	F-statistic		33.42727
Durbin-Watson stat	1.121777	Prob(F-statistic)		0.000000
	Unweighted Statistics			
R-squared	0.382866	Mean dependent var		0.649956
Sum squared resid	8.946185	Durbin-Watson stat		0.888376

Source: Prepared by the researcher according to the outputs of the statistical program (Eviews:12)

In general, it is noticed that there is no significant difference between the three models, as all the variables for the three models are significant because their (Prob.) values are less than (0.05), and the relationship is positive between the independent variables (ROA, ROE, ROD, OR) and the dependent variable (BEF) because all parameter values are positive. However, the estimates of the fixed effects model were the best among the three models as it had the lowest value for (Root MSE) at (0.1766), the highest value for (R2) at (0.6127), and the highest value for the Durbin-Watson test (D.W. = 1.407), which is close to (2), indicating no autocorrelation problem. Table (8) summarizes the results of the estimation of the Panel Data models.

Table 8: Summary of Panel Data Models Test Results

Variable	Pooled Regression Model	Fixed Effects Model	Random Effects Model
ROE	**0.0111**	**0.0128**	**0.0122**
ROA	**0.0181**	**0.0164**	**0.0167**
ROD	**0.1235**	**0.0104**	**0.0107**
OR	**0.0011**	**0.0024**	**0.0017**

C	**0.4308**	**0.0364**	**0.4050**
Root MSE	**0.2209**	**0.1766**	**0.1984**
R^2	0.3943	0.6127	0.4331
F-statistic	28.48	20.20	33.43
Prob. (F-stat.)	0.0000	0.0000	0.0000
D.W.	0.930	1.407	1.122

Source: Prepared by the researcher according to the results of the tables (5, 6, 7)

6. Select Model

1. Likelihood Ratio Test

This test was used to compare the aggregate regression model and the fixed effects model to determine which model is more appropriate. It can be observed from the table results (9) that the values (Prob. < 0.05), therefore the appropriate model is the fixed effects model.

Table 9: Likelihood Ratio Test Results

Redundant Fixed Effects Tests				
Equation: Untitled				
Test cross-section fixed effects				
Effects Test		Statistic	d.f.	Prob.
Cross-section F		10.39629	-9,166	0.0000
Cross-section Chi-square		80.46462	9	0.0000

Source: Prepared by the researcher according to the outputs of the statistical program (Eviews:12)

2. Hausman Test

This test is used to compare between the fixed effects model and the random effects model and to determine which one is better. It can be observed from the results in Table (10) that the values (Prob. < 0.05), so the appropriate model is the fixed effects model. This is consistent with the results in Table (6) mentioned earlier.

Table 10:Hausman Test

Correlated Random Effects - Hausman Test			
Equation: Untitled			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	38.45259	4	0.0000

Source: Prepared by the researcher according to the outputs of the statistical program (Eviews:12)

3. Interpretation of the results of the optimal model (fixed effects model)

• All model parameters are significant, as the values (Prob. < 0.05) according to the results of the (t) test. Also, the value (Prob. < 0.05) for the (F) test indicates the overall significance of the model.

• An increase of one unit in the return on equity (ROE) leads to an increase in the bank efficiency (BEF) by (0.013), indicating a negative relationship between the variables.

• An increase of one unit in the return on assets (ROA) leads to an increase in bank efficiency (BEF) by (0.016), indicating a negative relationship between the variables.

• The relationship between the return on deposits (ROD) and bank efficiency (BEF) is also negative, where an increase of one unit in (ROD) leads to an increase in (BEF) by (0.010).

• The operating ratio (OR) has a positive impact on increasing bank efficiency (BEF), as an increase of one unit in (OR) leads to an increase in (BEF) by (0.002). This is consistent with economic theory, as financial indicators have a positive impact on increasing bank efficiency.

• The Root MSE value is small, reaching (0.1766), indicating the quality of the model. The (Adjusted R2) value was (0.582), meaning that the independent variables explain about (58%) of the variations in the dependent variable (BEF), which is a good percentage indicating the efficiency of the fixed effects model concerning the studied variables.

CONCLUSIONS

1. Profitability indicators such as return on equity, return on assets, and return on deposits are among the main factors that affect banking efficiency. The most profitable banks are always more efficient in utilizing their resources.

2. The loan-to-deposit ratio is considered an indicator of banks' efficiency in using deposits to grant loans, and moderate ratios indicate a good balance between liquidity and profitability, contributing to enhancing banking efficiency.

3. The study results showed that the fixed effects model is the most appropriate model among panel models, and through the fixed effects model, it was found that there is a significant positive impact of the independent variables (return on assets, return on equity, return on deposits, loan-to-deposit ratio) on banking efficiency, confirming the study's hypothesis of a significant positive impact on banking efficiency.

4. The return on assets is the most influential financial indicator in improving banking efficiency.

Recommendations

1. Iraqi banks must invest in advanced banking technology and innovation to improve operational efficiency and enhance customer experience, which may include potential enhancements such as implementing electronic payment systems and transitioning to online and mobile banking services.

2. Government banks must disclose and announce financial and banking data and information for researchers to use in their studies.

3. Propose conducting future studies using alternative methods to measure banking efficiency.

4. Suggest researchers to conduct further studies using Panel Data models.

5. Enhancing banking culture and financial awareness should be a priority for Iraqi banks to promote banking culture and educate customers about available banking products and services and how to use them properly. Continuous awareness and education campaigns can be implemented to enhance financial knowledge for customers and the general public.

6. Bank management should develop strategies aimed at increasing profits and utilizing all available resources in a way that increases profits and avoids risks.

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