International Journal of Studies in Business Management, Economics and Strategies
Volume 5, Issue 7, July- 2026
ISSN (E): 2949-883X
Scholarsdigest.org

THE EFFECT OF AUDIT EFFECTIVENESS USING DATA ENVELOPMENT ANALYSIS ON ENHANCING THE VALUE OF BANKS LISTED ON THE IRAQ STOCK EXCHANGE

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Abstract
This study aimed to demonstrate the effect of audit effectiveness, as measured by Data Envelopment Analysis (DEA), on enhancing the value of banks listed on the Iraq Stock Exchange, by examining the effect of audit effectiveness — measured through both scale efficiency indicators and technical efficiency indicators — on the value of these banks. The study adopted the descriptive-analytical approach, applied to Iraqi audit offices and firms responsible for auditing the accounts of banks listed on the Iraq Stock Exchange. The study population consisted of audit firms licensed under the system governing the practice of the auditing and oversight profession in Iraq, and the sample comprised three audit firms auditing the accounts of twenty private banks listed on the Exchange.
The independent variable (external audit effectiveness) is measured by using Data Envelopment Analysis by the DEAP 1.2 program, two approaches were used, technical efficiency and scale efficiency, while the dependent variable (bank value) is measured by using the market value approach, based on trading reports published on the official website of the Iraq Stock Exchange.
The hypotheses were tested using simple and multiple linear regression using the SPSS statistical program. The study found a statistically significant positive effect of the effectiveness of the audit measurement by indicators of scale efficiency on improving the value of banks listed on the Iraq Stock Exchange, while no statistically significant effect was found for technical efficiency indicators. The study recommends strengthening the independence of external auditors, training them in modern methodologies, and expanding the scope of research to include other dimensions of bank value, such as financial risk and operational efficiency.

Keywords: Audit Effectiveness, Data Envelopment Analysis, Bank Value, Iraq Stock Exchange.

Introduction

Section One: Methodological Framework of the Research

External audit is an objective and rigorous evaluation process of financial and accounting operations, and one of the most important oversight tools for institutions and companies. It aims to verify the accuracy of the accounting information provided by management and to ensure the company's compliance with applicable laws and regulations. The importance of external audit lies in enhancing the confidence of investors and creditors in the accuracy of this information, thereby helping them make sound investment decisions. Audit effectiveness reflects the extent to which the audit process is able to achieve its objectives, depending on the competence and experience of the auditors, their independence, the appropriateness of the audit methodologies used, and the extent of management's cooperation with the auditors. Audit effectiveness is considered one of the most important factors affecting the quality of financial information and the success of companies; it is therefore important for audit firms and offices to seek to improve the effectiveness of their operations by providing the necessary training for auditors, ensuring their independence, using modern audit methodologies such as Data Envelopment Analysis (DEA), and strengthening cooperation between management and auditors. Given the importance of this topic, it was necessary to examine the effect of external audit effectiveness on enhancing the value of banks listed on the Iraq Stock Exchange, given that the banking sector is one of the sectors most sensitive to the quality of oversight and auditing.

A. II. Previous Studies

Mohamed Eid (2023) aimed to demonstrate the effect of the audit quality of published financial statements, as an independent variable, on the company's market value, as a dependent variable, in order to determine the role of high-quality audit performance in maximizing the value of Egyptian companies listed on the stock exchange, through an analytical and applied study of 80 companies (400 observations). The study found a significant positive relationship between external audit quality, measured by the size of the audit firm, and the market value of the audited company, with variation in the effect of certain moderating variables such as company size. Al-Daws (2023) aimed to determine the role of advanced analytical procedures in improving the effectiveness of the audit process. The study adopted the descriptive-analytical approach by distributing a questionnaire to three companies and used the data envelopment method along with other statistical tools using SPSS. The study concluded that advanced analytical procedures (statistical, exploratory, real-time analysis, and data mining) contribute to enhancing the effectiveness of the audit and increasing its efficiency.

Shawkal (2022) tried to verify the effect of applying audit data analysis techniques through the support vector machine algorithm and the particle swarm algorithm on audit effectiveness, applied to 14 banks listed on the Damascus Securities Exchange during the period 2012–2022, the study showed a positive impact of applying these techniques in improving audit effectiveness in terms of the detection of fraud and assessment of going concern.

(Qawqzeh et al., 2020) A study examined the impact of external auditor effectiveness on the quality of financial reporting and the mediating effect of audit quality using data from 180 companies listed on the Amman Stock Exchange (2009–2017). The study found that the size of the audit firm has a limited effect on quality, while industry specialization enhances it sharply by curbing earnings-management practices, and that the length of the auditor's tenure negatively affects the quality of reports. Khalaf, Sura Jassim (2024) sought to demonstrate the effect of audit committees on the efficiency of internal auditing and its reflection on the disclosure of sustainability information in Iraqi banks listed on the Iraq Stock Exchange, and found a statistically significant relationship between the effectiveness of audit committees and the level of disclosure among the banks studied.

Jamal Abdel Moneim, Sara; Al-Douri, Omar Ali Kamel (2023) studied the relationship between the quality of external audit and the strength of internal control systems according to the components of the COSO framework in the Iraqi oversight sector and found a statistically significant positive effect of external audit effectiveness on strengthening internal control elements, which supports the current study's hypothesis about the reflection of audit effectiveness on governance quality and institutional value.

The Iraq Stock Exchange (2023) conducted a study to test the determinants of audit fees for the banks listed on the Iraq Stock Exchange, using the inferential-experimental approach and a modified Ohlson model. The results showed that the bank size, business risk, and the duration of the relationship with the audit office are among the most important determinants of audit fees, which are related to the inputs of the Data Envelopment Analysis model used in the current study (number of working hours and industry experience). Al-Mawla (2024) found a strong positive relationship between internal auditing and risk management in the listed Iraqi banks, through the contribution of auditing to improving risk-management procedures and strengthening internal control, providing an institutional context that supports the results of the current study about the relationship between audit effectiveness and improving bank value.

Another study investigated the effect of employing digital transformation technologies on the quality of external audit and its impact on firm value. The result showed a positive and statistically significant effect. This confirms the increasing trend of integrating quantitative and modern technical tools (for example, Data Envelopment Analysis) to evaluate the efficiency and quality of the audit process and its link to firm value.

These recent studies on Fin DEA (Cui, Harrison, Ng & Rouse, 2024–2025) presented a methodological development for using Data Envelopment Analysis based on published accounting data to measure firm performance, while discussing the effect of accounting policies and price variability on the accuracy of DEA results — reinforcing the methodological basis for using this approach to measure audit effectiveness in the current study, and calling for caution in interpreting the efficiency of the banking units studied.

1) Research Gap

What distinguishes the current study from previous studies is that it combines Data Envelopment Analysis — with its technical and scale efficiency indicators — as a tool for measuring external audit effectiveness from the perspective of the auditor's own performance (rather than from the perspective of audit-firm characteristics such as size or tenure), and

links this directly to the value of banks listed on the Iraq Stock Exchange through the market value approach. This is a methodological intersection that most previous Iraqi and Arab studies have not addressed directly.

B. III. Study Problem

Iraq has a law regulating the audit profession and setting its standards, and the Financial Supervision Authority oversees the work of legal auditors and ensures their compliance with international standards. Awareness of the importance of auditing has grown, together with auditors' pursuit of performing the audit process effectively. Accordingly, the study problem is represented in answering the following main question:

Does audit effectiveness, as measured by Data Envelopment Analysis, affect the value of banks listed on the Iraq Stock Exchange?

- Does audit effectiveness, as measured by scale efficiency indicators, affect the value of banks listed on the Iraq Stock Exchange?
- Does audit effectiveness, as measured by technical efficiency indicators, affect the value of banks listed on the Iraq Stock Exchange?

C. IV. Study Objectives

The study aimed to demonstrate the effect of audit effectiveness, as measured by Data Envelopment Analysis, on the value of banks listed on the Iraq Stock Exchange, through achieving the following sub-objectives:

- Demonstrating the effect of audit effectiveness, as measured by scale efficiency indicators, on the value of banks listed on the Iraq Stock Exchange.
- Demonstrating the effect of audit effectiveness, as measured by technical efficiency indicators, on the value of banks listed on the Iraq Stock Exchange.

D. V. Study Hypotheses

Main hypothesis: There is a statistically significant effect of audit effectiveness, as measured by Data Envelopment Analysis, on the value of banks listed on the Iraq Stock Exchange. The following two sub-hypotheses are derived from it:

- H1: There is a statistically significant effect of audit effectiveness, as measured by scale efficiency indicators, on the value of banks listed on the Iraq Stock Exchange.
- H2: There is a statistically significant effect of audit effectiveness, as measured by technical efficiency indicators, on the value of banks listed on the Iraq Stock Exchange.

E. VI. Study Methodology

The descriptive-analytical approach was adopted to achieve the study's objectives and answer its hypotheses. This approach expresses the phenomenon under study as it exists in reality, and is concerned with describing it precisely, both qualitatively and quantitatively, in order to obtain objective scientific results consistent with the actual data of the phenomenon, based on the principles of comparison, interpretation, and evaluation, with the aim of reaching generalizable results that contribute to expanding knowledge related to the subject of the study.

F. VII. Scope of the Study

- Spatial scope: Audit firms and offices licensed under the system governing the practice of the profession and auditing in Iraq.
- Temporal scope: The study was limited to data from the first quarter of 2024, together with market value data for the financial years 2021 and 2022.

G. VIII. Study Population and Sample

The study population consists of audit firms licensed under the system governing the practice of the auditing and oversight profession in Iraq. The study sample comprised three reputable and licensed audit firms operating in the city of Baghdad; due to the confidentiality of the information, their names were not disclosed. The three firms audit the accounts of twenty private banks listed on the Iraq Stock Exchange, and are subject to the oversight of the Financial Supervision Bureau.

Table (1): Study Population and Sample

Audit Firm	Number of Banks Audited	Bank Codes	Percentage
First Audit Firm	9	1–9	45%
Second Audit Firm	6	10–15	30%
Third Audit Firm	5	16–20	25%
Total	20 banks	1–20	100%

Source: Prepared by the researcher.

II. Section Two: Theoretical Framework of the Research

A. I. The Concept of Audit Effectiveness

Audit effectiveness has been defined as the ability to achieve a successful audit process that accomplishes its objectives as fully as possible (Rosenfeld, 2012, 5), and has also been defined as the extent to which the audit process succeeds in achieving its purpose (Hawks, 2019, 27).

In the researcher's view, audit effectiveness is defined as the extent of the audit process's ability to succeed in achieving its objectives and reaching real results that reflect the accuracy of the financial statements — whether or not they are free of material misstatements — disclosing such misstatements, and providing recommendations to the parties benefiting from the audit process.

B. II. Means Contributing to Audit Effectiveness

International and American standards focus on audit effectiveness as a foundation of the audit process, given the catastrophic consequences that a lack of effectiveness may have on the audited entity, and the potential to mislead the decisions of beneficiary parties. Among the most important of these means are:

Number of lawsuits filed against the audit office: Francis (2011, 125–152) indicated that an increase in lawsuits is evidence that the audit process has deviated from effectiveness, whereas Shawkal's study considered that this indicator varies according to the level of legal awareness in each country.

- Material misstatements discovered during the audit: these are considered one of the final outputs of the audit process (Drake, 1990, 50), and have been used by a number of researchers as an indicator of effectiveness; however, they alone do not reflect every aspect of deficiency, since they may involve fraudulent activity that cannot be reduced to mere material errors.
- Reliance on the auditor's report as a function of the audit process's outputs (Fuerman, 2009, 150; Rouse, cited in Shawkal, 2023, 80), with the researcher expressing reservations about this indicator on its own, since major global companies have collapsed despite the issuance of clean audit reports concerning them.

Among the factors affecting audit effectiveness (Safi, 2019, 53) are: the availability of experience and skills on the part of the auditor, assessing inherent risk or control risk at the lowest possible level, and providing additional services to the client. These factors are interrelated, such that an auditor's lack of any one of them leads to reduced effectiveness and an inaccurate report on the fairness of the financial statements.

C. III. The Concept of Data Envelopment Analysis

Data Envelopment Analysis is one of the non-parametric methods based on mathematical programming used to estimate the frontier function, also known as the observation frontier (Nader et al., 2013, 132), and is used to measure the efficiency of homogeneous units that use a set of inputs to produce a set of outputs, by treating decision-making units as a production activity that takes place in a single stage (Zayed et al., 2022, 244).

D. IV. Models of Data Envelopment Analysis

- Constant Returns to Scale model (CRS): assumes that the change in outputs equals the change in inputs, and is the basic model on which subsequent models were built (Safi, 2019, 53).
- Variable Returns to Scale model (VRS), known as the BCC model after Banker–Charnes–Cooper (1984), which provides an efficiency estimate linked to a specific scale of operations (Ramadan, 2019, 81).

E. V. Advantages of Data Envelopment Analysis

- Does not require predetermined weights for inputs and outputs.
- Does not require prior hypotheses linking dependent and independent variables.
- Can handle multiple inputs and outputs with differing units of measurement.
- Can accommodate qualitative/descriptive factors (Al-Jarad, 2014, 74).

F. VI. Disadvantages of Data Envelopment Analysis

- Inability to distinguish between inefficiency and statistical error.
- Difficulty in selecting statistical properties, given that it is a non-parametric method.
- Results are sensitive to small sample sizes.

Does not address the degree of relationship between inputs and outputs (Abazeed, 2022, 43).

G. VII. Steps in Applying Data Envelopment Analysis

- Determine the objective of the evaluation.
- Select the decision-making units.
- Select the inputs and outputs.
- Collect and organize the data.
- Select the model and measure relative efficiency.
- Evaluate the results and formulate proposals (Hussein Selim & Hassan Mostafa, 2022, 144–147).

H. VIII. The Business of Banking is About Value

I. Banking business units are subject to a variety of local, regional and international pressures that cause management to continually work to improve productivity and competitiveness in the face of economic and financial change. Success in banking requires taking the necessary steps to create value for the bank, since the value of the bank resides in its ability to meet the needs of a segment of society. IX. The Nature of Bank Value Bank value is the perception of investors about the bank's success, and this is reflected in stock prices. The main goal of a bank is to maximize its wealth, or value - that is, to maximize the wealth of shareholders.

J. IX. The Concept of Bank Value

Bank value represents investors' perception of its success, and this is reflected in stock prices; the primary goal of a bank is to maximize its wealth, or value — that is, to maximize shareholders' wealth. When market value consistently exceeds the book value of shares, the bank's valuation rises and market confidence in its current and future performance increases (Ahmed, 2019, 106).

K. X. Objectives of Maximizing Bank Value

Bank value is viewed as a financial translation of its performance: any improvement in performance is accompanied by a rise in value, while any organizational, administrative, or operational deficiency leads to a decline in its market and economic value. The objective of banks has gradually shifted from maximizing profitability to maximizing value in the capital market, this being regarded as a strategic objective requiring successful accounting and marketing strategies that create value for shareholders (El-Sayed, 2018, 32). Through maximizing their value, banks also aim to (El-Sayed Abdel Rahman, 2018, 32):

- Provide the information needed by external parties — most importantly investors — to make their decisions.
- Support merger operations between entities through an objective valuation of the merging parties.

L. XI. Factors Affecting Bank Value

Bank value depends on the soundness of the decisions taken by its management across the various aspects of its activity (Jumaa, 2016, 137), the most important of which are:

- Investment decisions: achieving high value by investing funds in assets with high income value commensurate with the assumed risks.
- Financing decisions: achieving high value by financing financial needs at the lowest possible cost while ensuring the availability of the funds needed to meet obligations.
- Business decisions: value rises with an increase in the sales growth rate, a reduction in expenses, and an increase in gross profits, in addition to dividend-distribution decisions and liquidation costs.
- External audit effectiveness: external audit is one of the most important tools for enhancing transparency and confidence in banks' financial information. Its effective performance may increase investor confidence and enable more effective detection of errors and fraud, thereby protecting shareholders' rights and increasing demand for the bank's shares and their price, in addition to reducing investment risk and improving corporate governance.

III. Section Three: Analytical Study

A. Statistical Methods Used

The SPSS statistical program (version 25) was used to test the study hypotheses through simple and multiple linear regression analysis, alongside the DEAP data envelopment analysis program (version 2.1) to measure audit effectiveness.

B. Measurement of the Study Variables

External audit effectiveness was measured using Data Envelopment Analysis (DEA), based on the following DEA inputs: the number of audit team members, the number of hours worked by the team, the number of training hours completed, the team's industry experience, its members' turnover rate, and the extent of internal audit linkage quality, while the model output was represented by the number of adjustments. The dependent variable (bank value) was measured based on trading reports published on the official website of the Iraq Stock Exchange, using the market value approach.

C. Audit Effectiveness in the First Audit Firm

Table (2): Audit Effectiveness in the First Audit Firm

Bank	CRS	VRS	Scale Efficiency	Returns to Scale
1	0.720	1.000	0.720	Increasing
2	1.000	1.000	1.000	Constant
3	0.833	1.000	0.833	Increasing
4	0.750	0.812	0.923	Increasing
5	1.000	1.000	1.000	Constant
6	0.453	0.769	0.589	Increasing
7	1.000	1.000	1.000	Constant
8	1.000	1.000	1.000	Constant
9	1.000	1.000	1.000	Constant
Mean	0.862	0.953	0.896	—

Source: Prepared by the researcher based on the outputs of the DEA program.

The average constant returns to scale efficiency was 86%, the average variable returns to scale efficiency was 95%, and the average scale efficiency was 90%, meaning that process inputs should be reduced by a percentage ranging between 10% and 14% to reach full effectiveness — a level considered good. Five banks achieved full scale efficiency (100%) and can be regarded as benchmarks to be used in improving the performance of the remaining banks, taking into account the differences between their characteristics.

D. Audit Effectiveness in the Second Audit Firm

Table (3): Audit Effectiveness in the Second Audit Firm

Bank	CRS	VRS	Scale Efficiency	Returns to Scale
10	1.000	1.000	1.000	Constant
11	0.795	1.000	0.795	Increasing
12	0.930	1.000	0.930	Increasing
13	1.000	1.000	1.000	Constant
14	0.571	0.646	0.885	Increasing
15	0.969	1.000	0.969	Increasing
Mean	0.878	0.941	0.930	—

Source: Prepared by the researcher based on the outputs of the DEA program.

The average constant returns to scale efficiency was 88%, the average variable returns to scale efficiency was 94%, and the average scale efficiency was 93%, meaning that process inputs need to be reduced by a percentage ranging between 7% and 12% to reach full effectiveness — a good level. Two banks achieved full scale efficiency (100%) and can be regarded as benchmarks for the firm's remaining banks.

E. Audit Effectiveness in the Third Audit Firm

Table (4): Audit Effectiveness in the Third Audit Firm

Bank	CRS	VRS	Scale Efficiency	Returns to Scale
16	1.000	1.000	1.000	Constant
17	1.000	1.000	1.000	Constant
18	0.875	1.000	0.875	Increasing
19	0.761	0.818	0.930	Increasing
20	1.000	1.000	1.000	Constant
Mean	0.927	0.964	0.961	—

Source: Prepared by the researcher based on the outputs of the DEA program.

The average constant returns to scale efficiency was 93%, the average variable returns to scale efficiency was 96%, and the average scale efficiency was 96%, meaning that inputs need to be reduced by a percentage ranging between 4% and 7% to reach full effectiveness — a good level. Three banks achieved full scale efficiency (100%) and can be regarded as benchmarks for the firm's remaining banks.

F. Comparison of External Audit Effectiveness across the Three Audit Firms

The results in Tables (2, 3, 4) show that the second audit firm had the highest effectiveness (93%), followed by the third audit firm (96% according to the scale efficiency indicator, though with a relatively smaller number of benchmark banks), and then the first audit firm (90%). These results indicate a clear disparity in the level of performance effectiveness among the three Iraqi audit firms included in the study, which may be attributed to differences in the human resources and industry experience available to each firm.

G. Measuring Audit Effectiveness by Technical and Scale Indicators for the Full Sample

Table (5): Technical Efficiency and Scale Efficiency for the Study Sample (20 Banks)

Bank	Technical Efficiency (CRS)	Technical Efficiency (VRS)	Scale Efficiency	Returns to Scale
1	0.720	1.000	0.720	Increasing
2	1.000	1.000	1.000	Constant
3	0.833	1.000	0.833	Increasing
4	0.750	0.812	0.923	Increasing
5	1.000	1.000	1.000	Constant
6	0.453	0.769	0.589	Increasing
7	1.000	1.000	1.000	Constant
8	1.000	1.000	1.000	Constant
9	1.000	1.000	1.000	Constant
10	1.000	1.000	1.000	Constant
11	0.795	1.000	0.795	Increasing
12	0.930	1.000	0.930	Increasing
13	1.000	1.000	1.000	Constant
14	0.571	0.646	0.885	Increasing
15	0.969	1.000	0.969	Increasing
16	1.000	1.000	1.000	Constant
17	1.000	1.000	1.000	Constant
18	0.875	1.000	0.875	Increasing
19	0.761	0.818	0.930	Increasing
20	1.000	1.000	1.000	Constant
Mean	0.883	0.952	0.922	—

Source: Prepared by the researcher based on the outputs of the DEA program.

The table above shows that average technical efficiency under the constant returns to scale model was 88.3%, average technical efficiency under the variable returns to scale model was 95.2%, and average scale efficiency was 92.2%. The gap between the CRS and VRS values indicates that part of the apparent inefficiency under the constant returns model is attributable to the scale of operations rather than necessarily to poor technical performance, and that ten of the twenty banks in the study sample achieved full scale efficiency (100%).

H. Measuring Bank Value

Trading reports published on the official website of the Iraq Stock Exchange were relied upon, adopting the market value approach to measure bank value for the financial years 2024 and 2025, as shown in the following table:

Table (6): Market Value of the Sample Banks (in Iraqi Dinars)

Bank	2025	2024	Market Value Growth Rate
1	125,000,000,000	155,000,000,000	-19.35%
2	342,500,000,000	257,500,000,000	33.01%
3	112,500,000,000	125,000,000,000	-10.00%
4	35,000,000,000	50,000,000,000	-30.00%
5	70,000,000,000	75,000,000,000	-6.67%
6	297,000,000,000	307,500,000,000	-3.41%
7	47,500,000,000	95,000,000,000	-50.00%
8	17,500,000,000	25,000,000,000	-30.00%
9	48,000,000,000	45,000,000,000	6.67%
10	53,025,000,000	37,875,000,000	40.00%
11	21,000,000,000	27,000,000,000	-22.22%
12	412,000,000,000	500,000,000,000	-17.60%
13	100,000,000,000	110,000,000,000	-9.09%
14	155,000,000,000	127,500,000,000	21.57%
15	18,000,000,000	33,000,000,000	-45.45%
16	132,500,000,000	110,000,000,000	20.45%
17	271,080,000,000	251,000,000,000	8.00%
18	353,760,000,000	264,000,000,000	34.00%
19	583,950,000,000	583,950,000,000	0.00%
20	265,000,000,000	270,000,000,000	-1.85%

Source: Prepared by the researcher based on trading reports of the Iraq Stock Exchange.

I. Testing the Study Hypotheses

1) Testing the Main Hypothesis

There is a statistically significant effect of audit effectiveness, as measured by Data Envelopment Analysis, on the value of banks listed on the Iraq Stock Exchange. To test this hypothesis, a multiple linear regression test was conducted between audit effectiveness (independent variable) and bank value (dependent variable).

Table (7): Regression Model Summary for the Effect of Audit Effectiveness (DEA) on Bank Value

Model	R	R Square	Adjusted R Square	Std. Error
1	0.546	0.298	0.277	0.32924

Source: Prepared by the researcher based on the outputs of the SPSS program.

The table above shows that the correlation coefficient R was 0.546, reflecting a moderate correlation between audit effectiveness, as measured by Data Envelopment Analysis, and bank value, and that the coefficient of determination was 0.277 — that is, audit effectiveness explains 27.7% of the variation in bank value.

Table (8): Analysis of Variance (ANOVA) for the Study Model

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	0.150	1	0.150	3.651	0.003
Residual	0.410	18	0.023	—	—
Total	0.425	19	—	—	—

Source: Prepared by the researcher based on the outputs of the SPSS program.

The table above shows that the F-statistic was 3.651 at a significance level (Sig. = 0.003), which is smaller than the standard significance level (0.05), confirming the statistical significance of the regression model and its validity for analysis.

Table (9): Regression Coefficients for the Effect of Audit Effectiveness (DEA) on Bank Value

Model	B	Std. Error	Beta	T	Sig.
(Constant)	0.054	0.322	—	0.176	0.000
Audit Effectiveness (DEA)	0.371	0.336	0.546	2.807	0.003

Source: Prepared by the researcher based on the outputs of the SPSS program.

The statistical significance of the effect of audit effectiveness, as measured by Data Envelopment Analysis, on bank value is evident, as the calculated t-value was 2.807 at a significance level of 0.003, which is smaller than 0.05, confirming the validity of the main hypothesis. The regression equation is formulated as follows:

$$\mathbf{Y = 0.054 + 0.371\ X_1}$$

Accordingly, there is a statistically significant positive effect of audit effectiveness, as measured by Data Envelopment Analysis, on the value of banks listed on the Iraq Stock Exchange.

2) **Testing the First Sub-Hypothesis**

There is a statistically significant effect of audit effectiveness, as measured by scale efficiency indicators, on the value of banks listed on the Iraq Stock Exchange.

Table (10): Regression Model Summary for the Effect of Scale Efficiency on Bank Value

Model	R	R Square	Adjusted R Square	Std. Error
1	0.512	0.262	0.258	0.32924

Source: Prepared by the researcher based on the outputs of the SPSS program.

Table (11): ANOVA for the Scale Efficiency Model

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	0.210	1	0.210	3.923	0.000
Residual	0.404	18	0.022	—	—
Total	0.425	19	—	—	—

Source: Prepared by the researcher based on the outputs of the SPSS program.

Table (12): Regression Coefficients for the Effect of Scale Efficiency on Bank Value

Model	B	Std. Error	Beta	T	Sig.
(Constant)	0.156	0.283	—	0.236	0.000
Scale Efficiency	0.292	0.304	0.512	2.698	0.049

Source: Prepared by the researcher based on the outputs of the SPSS program.

The calculated t-value was 2.698 at a significance level of 0.049, which is smaller than 0.05, confirming the validity of the first sub-hypothesis. The regression equation is formulated as follows:

$$Y = 0.156 + 0.292\ X_1$$

Accordingly, there is a statistically significant positive effect of audit effectiveness, as measured by scale efficiency indicators, on the value of banks listed on the Iraq Stock Exchange.

3) **Testing the Second Sub-Hypothesis**

There is a statistically significant effect of audit effectiveness, as measured by technical efficiency indicators, on the value of banks listed on the Iraq Stock Exchange.

Table (13): Regression Model Summary for the Effect of Technical Efficiency on Bank Value

Model	R	R Square	Adjusted R Square	Std. Error
1	0.236	0.056	0.003	0.149

Source: Prepared by the researcher based on the outputs of the SPSS program.

Table (14): ANOVA for the Technical Efficiency Model

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	0.024	1	0.024	1.062	0.316
Residual	0.401	18	0.022	—	—
Total	0.425	19	—	—	—

Source: Prepared by the researcher based on the outputs of the SPSS program.

Table (15): Regression Coefficients for the Effect of Technical Efficiency on Bank Value

Model	B	Std. Error	Beta	T	Sig.
(Constant)	0.012	0.190	—	0.064	0.950
Technical Efficiency	0.218	0.211	0.236	1.031	0.316

Source: Prepared by the researcher based on the outputs of the SPSS program.

It was found that the calculated t-value was 1.031 at a significance level of 0.316, which is greater than 0.05, confirming that this sub-hypothesis is not supported. Accordingly, there is no statistically significant effect of audit effectiveness, as measured by technical efficiency indicators, on the value of banks listed on the Iraq Stock Exchange.

IV. Results and Recommendations

A. Results

- There is a statistically significant positive effect of audit effectiveness, as measured by Data Envelopment Analysis, on the value of banks listed on the Iraq Stock Exchange.
- There is a statistically significant positive effect of audit effectiveness, as measured by scale efficiency indicators, on bank value, indicating the ability of Iraqi audit firms and offices to make maximum use of their scale and the number of members on their audit teams.
- There is no statistically significant effect of audit effectiveness, as measured by technical efficiency indicators, on bank value, indicating a deficiency in achieving maximum benefit from inputs in producing the desired outputs.
- Levels of audit effectiveness varied among the three audit firms in the study sample, reflecting differences in the human resources and industry experience available to each firm.

B. Recommendations

- Study the effect of external audit effectiveness on other dimensions of bank value, such as financial risk and operational efficiency.
- Focus on improving external audit effectiveness by providing the necessary training for auditors, ensuring their independence, and using modern audit methodologies.
- Audit offices and firms should make use of the research findings to improve the effectiveness of external auditing and its practices.
- Banks should cooperate with external auditors to provide the information needed to conduct the audit process effectively.

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