



Implementing Analytical Procedures in Predicting Return on Assets Through the Mediating Role of Regression Analysis: An Applied Study in Mosul Bank for Development and Investment

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Abstract

The present study highlights the influence of using analytical procedures through the application of regression analysis as an analytical procedure in predicting the rate of return on banking assets. This approach is applied to the financial statements of Mosul Bank for Development and Investment to obtain reasonable assurance as to whether the rate of return on assets, based on the data contained in the financial statements, will continue in the near future. The results of the analysis demonstrate that the expected rate of return on assets for 2024 is (1.21%), compared to the years of the study sample. This indicates that Mosul Bank for Development and Investment does not possess a good rate of return on assets, enabling it to confront emergency and unexpected situations resulting from future economic changes and events. Furthermore, the phenomenon of financial failure is one of the most important phenomena requiring careful consideration and investigation into its causes, as its consequences are now reflected on both internal and external stakeholders. To obtain this objective, the regression model was applied to Mosul Bank for Development and Investment, a sample of Iraqi banks listed on the Iraq Stock Exchange, to determine the bank's ability to confront any risks or difficulties that may arise as a result of fluctuations in the Iraqi economy.

The study recommends enhancing the use of quantitative analytical procedures in accounting and auditing practices, with a focus on developing the skills of analysts and auditors in utilizing analytical statistical tools, such as regression analysis, to provide more accurate and objective assessments of financial performance. It also emphasizes the importance of integrating these



methods into accounting and control systems to improve the effectiveness of financial forecasting and strengthen the response to potential risks.

Keywords: Analytical Procedures, Return on Assets, Bank Profitability, Linear Regression.

Introduction

Banks occupy a crucial position in any economy among other financial institutions, as they perform unique functions. Consequently, the failure of banks would be disastrous for the entire economy due to the risk of the failure spreading to other banks, as banks are interconnected through payment systems. Accepting repayable deposits on demand and providing loans and investments are among the primary functions performed by commercial banks. Therefore, there are a number of risks resulting from the operation of these banks, including interest rate risks, market risks, and return on assets risks. The regression analysis and financial ratio analysis methods are implemented when applying analytical procedures in evaluating the performance of commercial banks. This is one of the most important methods to measure the various banking risks that affect banking profitability, which is a primary goal for all commercial banks and essential for their survival and continuity. It is also a goal sought by investors (Abd, & Kazem, 2022, 13.82). The indicator is of interest to creditors when dealing with a bank. It is an important tool for measuring management's efficiency in using available resources. There is a direct relationship between risk and return. The increase in the risk leads to the possibility of losing a portion of the invested capital. In order to activate analytical procedures to find unusual relationships that result from fluctuations in investments and to determine the level of risk involved in investments, implementing some advanced statistical methods enables prediction of account balances in the future to identify the deviation between fluctuations, unusual relationships, and the bank return rate. Thus, analytical procedures emerged as tools used in



financial analysis due to their ability to identify deviations that may affect financial performance as well as to study the relationship between different financial variables. Therefore, regression analysis is one of the most used methods in this field to be a mathematical model for measuring the relationship between a dependent variable, which is the return on assets, and the independent variables, which may contribute to explaining the changes occurring in this return.

The Methodology

1. Problem Statement

The research problem revolves around the analytical procedures used to evaluate bank performance, particularly in terms of profitability. This is achieved by using analytical procedures based on the return on assets (ROA) ratio using regression analysis, which evaluates the ROA variable and uses analytical procedures as an indicator of prediction.

Based upon, the following question can be formulated: What role do analytical procedures play in predicting ROA using regression analysis to enhance prediction accuracy?

2. Significance of the Study

1. Highlighting the importance of applying analytical procedures to the ROA.
2. Detecting deviations and analyzing their causes by comparing actual values with expected values.
3. Presenting an analytical model that combines statistical methods and the prediction process.

3. The Objectives

1. Determining the effectiveness of analytical procedures in predicting ROA as an important financial performance indicator in banks.



2. Testing the statistical correlation between the use of analytical procedures and the increase or decrease in ROA.
3. Developing statistical methods that can be used to predict return on assets and presenting them to the banks in the study sample to benefit from them in addressing the country's economic conditions.

4. The Hypothesis

There is a statistically significant relationship between the use of analytical procedures and the accuracy of predicting return on assets.

The Theoretical Framework

First; Analytical Procedures

Substantive audit procedures are the procedures used by the external auditor to gather evidence that the assertions made by management in the financial statements are reliable and consistent with the applicable financial reporting framework and relevant legislation. When internal controls are deemed ineffective, the auditor typically relies on substantive analytical procedures to determine whether the figures "make sense" and to obtain explanations for any unexpected fluctuations in the financial statements (IFAC, 2010, 29). It also refers to tests applied to financial statements by examining and comparing the relationships between those statements. The aim of the implementation of such measures is to obtain appropriate evidence of account balances and transactions, and to form a comprehensive conclusion about whether the financial statements are consistent with the understanding obtained by the auditor (Boecker, 2008, 32) by studying and analyzing the financial statements, records, and financial statements of the economic unit according to the financial ratios and indicators of the institution being audited for



previous years with the ratios and indicators of the year being evaluated (Arens, 2020: 67). Analytical procedures are also important audit procedures applied by the external auditor in order to identify indicators specific to the economic unit by comparing the current account balances with the balances of previous periods or with the account balances of other similar economic units operating in the same field (Płotka, 2018, 181, 204, 209). The benefits provided by analytical procedures when used in the audit process include enabling the auditor to understand the client's activity, indicating the presence of material distortions in the financial statements, assessing the client's ability to continue, reducing the volume of detailed tests, and forming the final picture of the financial statements (Al-Abdali, 2011: 175). Analytical procedures consist of analyzing important ratios and trends, including the results of fluctuation surveys, relationships that conflict with other appropriate information, or deviations from expected amounts (Yoon, & Pearce, 2021, 185, 199). If the auditor notices an increase or decrease in one of these ratios or financial indicators, the auditor shall predict and find the reasons that led to these changes. Then, evidence is required to verify the validity of these predictions. This method is acceptable if the institution's business for the previous period is similar to the current period, but it is not acceptable if there are changes in the institution's business or accounting treatments, or if the institution is engaged in unusual activities. Therefore, regression analysis is used as an analytical procedure in the audit process and to predict these balances.

Regression analysis is one of the most widely used statistical methods in auditing. It is used to assess the reasonableness of a balance by linking the account whose reasonableness is to be judged (the dependent variable) with some other accounts (the independent variable). Thus, the value of the dependent variable can be predicted. By comparing the value of the dependent variable to the actual balance, the auditor can determine whether it is reasonable or not (Hayes, 2005, 87).



Second; Banking Profitability

By definition, banking profitability indicates the difference between the amount of profit generated from assets and the expense of liabilities. In other words, it is the relationship between revenues and costs generated by using the bank's current and fixed assets in operating activities. Conceptually, it is the main essence for commercial banks in general to confront the risks they are exposed to when entering into investment projects surrounded by credit risks, investment risks, and liquidity risks (Al-Badri, 2016, 63). Therefore, profitability represents the extent of a bank's ability to generate profits in the future. It is an indicator of the bank's success. The banking profitability ratio is also a very important indicator for investors to measure the bank's ability to generate net profits related to dividend distributions (Faraj, 2021, 69). An increase in a bank's profitability means an increase in net profits. Bank profitability is also the primary and fundamental goal for the survival and continuity of commercial banks in the financial markets and the goal sought by investors. It is an indicator that creditors care about when dealing with commercial banks, as well as an important and fundamental indicator for measuring the efficiency of financial and administrative performance in general (Al-Mutairi, 2014, 82).

Third; Bank Profitability Indicators

Bank profits are of great importance in addressing the risks to which commercial banks are exposed, enabling them to remain competitive, provide services, and survive in the financial market environment. Bank profits are also a defensive line against the various risks to which investors are exposed in the future as a result of sacrificing their funds currently by investing them in investment operations for a specific period of time. However, (Carrillo & Gómez, 2019, 63) state that it is not certain that investors will obtain the expected bank profits due to the potential for losses surrounding the investment. Bank profitability indicators reflect the overall performance of commercial banks. One of the most important bank profitability indicators is the return on assets, which measures the overall efficiency of management in generating profits from its total investment in assets. A high return on assets demonstrates that a commercial bank is



more efficient in its use of resources. Moreover, commercial bank management, in particular, benefits from calculating this return to assess the profit-generating efficiency of their assets. To find this ratio, it is calculated by dividing net profit after tax by total assets. This ratio has been used in most studies to measure banking profitability (Vesic, & Petronijevic 2019, 75-81).

Fourth; Return on Assets

Rate of Return; The return on assets refers to the bank's profitability, which represents net income to its total assets. It measures the bank's management's ability to generate income through the use of assets at its disposal. In other words, the return on assets reflects the bank's management's ability to use their financial and real investments to achieve the profit the bank seeks (Qurban, 2021, 571). The return is measured by net income before financing costs. It is calculated by adding interest expenses after tax. The return on assets can also be calculated on a pre-tax basis using the return before interest and taxes as a measure of return. These results produce a measure of the return on assets. This return is not affected by differences in the company's tax status or financial policy (Al Nimer, 2015: 231).

The bank's internal performance is measured by the return on assets, also known as the profitability or productivity ratio. The return on assets can provide the bank with a valuable tool for measuring progress against the bank's internal objectives. The return on assets ratio demonstrates the bank's ability to achieve its internal objectives.

Assets; They represent the extent to which management or the bank employs its assets or resources to generate more income, profit. The return on assets measure includes all of the bank's assets, including those arising from obligations to creditors and those arising from investor contributions (Nataraja & al et al, 2018: 11). Thus, the return on assets can be defined as a measure used to measure the bank's ability to generate profit from the total assets available within the bank. The return on assets rate is used to determine the level of bank operating efficiency in general. Return on assets is one of the profitability ratios used in financial data



analysis. This ratio is often highlighted because it indicates a bank's success in generating profits. Therefore, return on assets can measure a bank's ability to generate profits in the past and project them into the future. The assets in question are the bank's general assets. They are obtained from its own capital or from foreign capital that has been converted into bank assets used to sustain the bank. Return on assets is measured using the equation (Rosikah & et al., 2018: 7-8):

Return on assets = Net profit after tax / Total assets

A high return on assets indicates that the bank is performing well and better than the opposite case, where return on assets is low. Fourth: Linear Regression:

Regression analysis is concerned with studying and estimating phenomena quantitatively through the process of collecting and analyzing data and determining the nature of the relationship between that data. The process of estimating and predicting the future of these phenomena is carried out according to specific statistical methods after obtaining an equation or curve that explains the mathematical relationship between the response variable. Through this, an equation can be found linking a dependent variable to an independent variable or several variables.

Linear regression is an advanced statistical method that ensures accurate inference to improve research results by optimally utilizing data to establish causal relationships between the phenomena under investigation. Linear regression is a mathematical equation that expresses the relationship between two variables and is used to estimate past values and predict future values. It also involves regressing the dependent variable (Y) on several independent variables (X1, X2, XK). Therefore, it is used to predict changes in the dependent variable, which is affected by several independent variables. Its concept is based on semantic relationships that use what is known as dispersion or spread. For example, the numerical level of hammer throw effectiveness can be predicted based on studying other characteristics of the thrower, such as chronological age, training age, skill, physical specifications, and others. Linear regression is not just a single method, but rather a set of methods that can be used to determine the relationship between a continuous dependent variable and a number of independent variables (usually continuous). The linear equation in linear regression is:



$$Y = a + b_1X_1 + b_2X_2 + \dots + e$$

Y = the dependent variable

a = a constant or intercept

b₁ = the slope of the regression of y on the first independent variable

b₂ = the slope of the regression of y on the second independent variable

1X = First Independent Variable

2X = Second Independent Variable

Linear regression can be used if the following conditions are met:

1. The relationship between the independent variables and the dependent variable is linear.
2. The data for both the independent and dependent variables is normally distributed.
3. The values of the dependent variable must be at least ordinal.

After obtaining the results of the regression equation, we must determine whether these coefficients are statistically acceptable, i.e., statistically significant. Significance is determined for each coefficient separately.

To determine the significance of the regression coefficients, the t-test and its corresponding probability level is used. SPSS automatically generates the t-test and its corresponding probability level. Statistics are also obtained to determine the overall significance of the model, including (R), (R²), and (-R²).

The first, R, is the simple correlation coefficient, which measures the strength of the relationship between two or more variables. R² is called the coefficient of determination, which is used to determine the explanatory power of the estimated model (estimated equation) in the case of simple linear regression (one independent variable with one dependent variable). R² is used to determine the explanatory power of a multiple linear regression model (because it takes into account the number of independent variables, and is therefore called the corrector because it is originally derived from R²). The F parameter is also used to judge the significance of the estimated model as a whole at a specific significance level (Mahmoud Jawad, Al-Sarraf Salman



Dawood, 2018: pp. 35-37).

Field Procedures

Financial and Statistical Analysis

First; An introductory overview of the study sample

No.	Bank Name	Foundation Year	Foundational Capital	Listing Capital	Number of Branches
1	Mosul Bank for Development and Investment	2001	1000000000	10000000000	10

Source; The researcher based on the financial data of the study sample.

Second; Regression Analysis to Predict the Return on Assets Rate

Calculating the Return on Assets Rate for Mosul Bank for Development and Investment is carried out as in Table (2).

Table (2) Return on Assets Rate for Mosul Bank for Development and Investment (Iraqi dinars)

Year	Net Profit after Tax	Total Assets	Rate of Return on Assets
2006	2300000	90000000	2.5
2007	4350000	113000000	3.8
2008	6450000	206000000	3.1
2009	6900000	205000000	3.4



2010	10200000	186000000	5.5
2011	10600000	258000000	4.1
2012	16200000	473000000	3.4
2013	38700000	560000000	6.9
2014	1800000	348000000	0.5
2015	322000	365000000	0.08
2016	3500000	410000000	0.8
2017	5000000	409000000	1.22
2018	2600000	410000000	0.6
2019	3400000	410000000	0.8
2020	1500000	397000000	0.4

Source; The researcher based on data published in the Iraq Stock Exchange.

Second; Regression Analysis of the Return on Assets Rate

Table (3) Regression Analysis for Mosul Bank for Development and Investment (Iraqi dinars)

Years	Net Profit after Tax (Billion dinars X)	Rate of Return on Assets)Y(	X²	X*Y
2006	2.3	2.5	5.3	5.7
2007	4.35	3.8	18.9	16.5
2008	6.45	3.1	41.6	20
2009	6.9	3.4	47.6	23
2010	10.2	5.5	104	56
2011	10.6	4.1	112.4	43
2012	16.2	3.4	262.4	55
2013	38.7	6.9	1498	267
2014	1.8	0.5	3.24	0.9



2015	0.322	0.08	0.10	0.02
2016	3.5	0.8	12	2.8
2017	5	1.22	25	6.1
2018	2.6	0.6	6.76	1.56
2019	3.4	0.8	11.56	2.72
2020	1.5	0.4	2.25	0.6
Total	114	37	12996	4218

The equation for the regression analysis is as follows:

$$B1 = \frac{(N \sum(X*Y) - \sum(X) * \sum(Y))}{(N \sum(X^2) - (\sum(X))^2)}$$

$$N=15, \sum X=114, \sum Y=37, \sum X*Y=4218, \sum X^2=12996$$

By applying the above equation, the following is found:

$$B1 = \frac{((15)(4218) - (114 * 37))}{((15) 12996 - (114)^2)}$$

$$B1 = \frac{(63270 - 4218)}{(194940 - 12996)}$$

$$0.32 = B1 = 59052 / (181944)$$

$$2.47 = \sum Y / N = 37 / 15, 7.6 = 114 / 15 = \sum X / N$$

$$B0 = \sum Y - B1 * \sum X$$

$$2.47 - (0.32 * 7.6) = 0.038$$

Table (4) Net Profit Growth Rate of Mosul Bank for Development and Investment (Iraqi Dinars)

Year	Net Profit after Tax	Growth Rate (Net Profit after Tax)	Difference (Net Profit after Tax)
2006	2.3	-----	-----
2007	4.35	3.8	-----
2008	6.45	5.7	1.95



2009	6.9	5.9	0.19
2010	10.2	9.5	3.55
2011	10.6	9.6	0.11
2012	16.2	15.5	5.9
2013	38.7	38	22.7
2014	1.8	-19.7	-57.9
2015	0.322	-5.2	14.4
2016	3.5	3.4	8.6
2017	5	4.3	0.892
2018	2.6	0.67	-3.6
2019	3.4	2.6	1.9
2020	1.5	-0.767	-3
Tatel		73	-4.6
Average		5.3	-0.35

When the average net profit after tax is (5.3%) and the percentage difference in the growth rate of net profit after tax is as shown in the table Above (-0.35) for each, multiplication is by 4, so the equation is as follows:

Average net profit after tax - (Rate of difference in growth in net profit after tax * number of prediction years)

$$= 5.3 - (0.35 * 4)$$

Therefore, net profit after tax for the year 2024 = 3.9, so it is possible to find the equation to predict the rate of return on assets for the year 2024:

$$Y = 0.038 + 0.32(3.9)$$

$$1.21\%$$

It is noted from Table (4) and the statistical regression analysis equation that the expected rate of



return on assets indicator for Mosul Bank for Development and Investment in the year (2024) is (1.21%) compared to the years in the study sample. This indicates that Mosul Bank for Development and Investment does not possess a good rate of return on assets, enabling it to confront emergency and unexpected situations resulting from future economic changes and events.

Conclusions

The results of the present study reveal that analytical procedures are an effective tool in improving the accuracy of predicting return on assets, especially when used systematically during the financial analysis and auditing phases.

Bank profitability is the primary and fundamental objective for commercial banks' survival and continuity in the financial markets and a goal sought by investors. It is an indicator of interest to creditors when dealing with commercial banks, as well as an important and fundamental indicator for measuring the efficiency of financial and administrative performance in general.

Regression analysis is one of the most important statistical methods used in the audit process as an analytical procedure used to assess the reasonableness of a balance. This is done by linking the account whose reasonableness is to be judged (the dependent variable) with some other accounts (the independent variable), thus predicting the value of the dependent variable.

The expected return on assets (ROA) for 2024 is 1.21%, compared to the years in the study sample. This indicates that Mosul Bank for Development and Investment does not possess a good ROA that enables it to address emergency and unexpected situations resulting from future economic changes and events. Integrating regression analysis into the analytical process has contributed to improving the analyst's or auditor's ability to predict an organization's future performance by identifying the most influential factors in the return on assets.

Recommendations

1. Economic entities and accounting firms should enhance the use of analytical procedures and



their application capabilities as a primary tool for predicting performance indicators, particularly return on assets, through advanced financial analysis softwares.

2. Employing regression analysis models to measure the relationship between accounting variables, such as net income, total assets, operating expenses, and return on assets, which contributes to enhancing the accuracy of prediction.
3. Relying on accurate and reliable financial data to feed into regression models, as the quality of the data directly affects the validity of the analytical model and the accuracy of its predictive outputs.
4. Designing analytical and regression models tailored to the specificities of each economic sector, such as banking, industry, and services, as the factors affecting return on assets vary by sector.
5. Training financial analysts and accountants to understand and apply statistical models and analytical software to ensure the effective use of regression analysis in performance prediction.

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