

The effect of Loan to Deposit Ratio(LDR), Non-Performing Loan(NPL), Other Operating Expenses, and Non-Interest Income on Profitability(ROA)

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Abstract: In this study, the effect of loan to deposit ratio, non-performing loans ratio, other operating expenses ratio, and non-interest income ratio on the return on assets ratio was examined. In the research, the data of 31 banks was analyzed with multiple regression method using the R-Studio Program. As a result of the study, it was found that the loan to deposit ratio, non-performing loans ratio, other operating expenses ratio, and non-interest income ratio simultaneously affect the return on assets significantly. It was observed that the loan to deposit ratio is a significant and positive effect on the return on assets. The effect of non-performing loans ratio on return on assets is statistically insignificant and negative. The effect of the non-interest income ratio on the return on assets is positive and significant. The effect of the other operating expenses ratio on the return on assets is negative and statistically insignificant. The aim of this study is to determine the effect of the loan to deposit ratio on the effective use of bank assets in making profits, to evaluate of non-performing loans together with their place in total credits, to observe the effect of non-interest expenses and other operating expenses on the return on assets, and it is aimed to contribute to other researchers.

Keywords:

Loan to Deposit Ratio(LDR), Non-Performing Loan(NPL), Return on Assets(ROA), Non-Interest Income, Other Operating Expenses.

Introduction

As for any business or company, the main goal of banks is to maximize profits. Profitability management means balance sheet management in other words asset-liability management. It is necessary to analyze the financial ratios of banks in order to determine the relationships between the assets and liabilities of banks and their income generating activities and to evaluate the factors affecting bank profitability.

ROA, one of the most important financial parameters of today, reveals the return on total assets of the bank. This ratio shows how effective the bank's assets are in generating profits. ROA shows the return on total assets of the bank. The size of this ratio also varies according to the scale of the bank. In some time periods, the ROA of small banks may be higher than the ROA of large banks, and in some periods it may be less. ROA, which is the return on assets ratio, shows the efficiency of bank assets in generating profit. A large ROA coefficient means that the bank has successfully used its assets to generate profits.

The main activity of banks is to collect funds under the name of deposits and make these funds available as loans. Therefore, buying and selling money forms the basis of a bank's income generating activities. Deposits, which are included in the liabilities section of the balance sheet, are the item with the highest weight in both external and total resources of the bank's balance sheet. Loans, which are the main field of activity of the banks in the active section of the balance sheet, are the most important item in the asset section of the balance sheet. Loans represent a financing relationship between the bank and its customers. Credit deposit ratio LDR is one of the main indicators that measure the liquidity status banks. The main source of loans is deposits. This ratio shows the extent to which banks have converted the deposits they have collected into loans.

NPL ratio is the ratio of non-performing loans to total loans and expresses the asset quality and risk level in banks. Non-performing loans are also important in the bank's balance sheet. If the bank, which has an increase in NPLs, chooses to increase its provisions, it leads to a decrease in the bank's resources and net income. The bank's lending capacity decreases. As risky assets increase, capital liabilities also increase. As the capital adequacy of the bank decreases, the profitability of the bank decreases and the risk premium increases. The effect of the increase in NPLs on the economy is in the form of a contraction in the loan supply. The decrease in liquidity in the economy causes stagnation of economic parameters, in other words, economic slowdown.

Non-interest income is generally obtained from the bank's services that include fees and commissions. Fees and commissions received, capital market profits, foreign exchange profits, dividends received and other incomes constitute non-interest income. The increase in non-interest incomes has a positive effect on profitability performance. Smith, Staikouras, & Wood (2003) It is found that the increased importance of non-interest income stabilised profits, for most but not all categories of bank, in the European banking industry in years 1994-98.

Other operating expenses consist of non-interest expenses. Non-interest expenses include all other cost items other than the bank's interest paid assets. Cash and non-cash loans received by the bank and fees and commissions paid by the bank to other transactions, capital losses caused by the decline in the market value of the securities in its portfolio, expenses and losses of foreign exchange transactions, personnel expenses, severance payment provisions, depreciation allocated by the bank against the depreciation of its real estate, taxes and fees paid to its securities and real estate, provisions allocated for non-

performing loans, other provisions and specified other expenses are included in the non-interest expenses group.

In this study, the effect of loan to deposit ratio, non-performing loan ratio, other operating expenses ratio, and non-interest income ratio on asset profitability ratio was examined.

Literature Review

Studies examining the effects of the variables used in the analysis on the return on assets were investigated and tried to be summarized below.

Zhang and Dong (2011), consistently with the literatures, found that the bank specific determinants, with the exception of size, such as capital ratio, loans, and deposits were positively related to bank performance as measure by return on assets regardless of whether it is small, medium, or large banks.

Hakim (2017) examined the partially and simultaneously effect of non-performing loans ratio, loan to deposit ratio, good corporate governance, capital adequacy ratio, net interest margin, and operating costs to operating income variables to the health of conventional banks listed on the Indonesia Stock Exchange. Secondary data of 20 conventional banks listed on the Indonesia Stock Exchange between 2008 and 2012 years were used and analyzed using logistic regression method. The results were that the independent variables of operating costs to operating income and good corporate governance had a significant negative impact on the health of the bank. Other independent variables, non-performing loans, the ratio of loans to deposits, the net interest margin, and the capital adequacy ratio, did not significantly affect the health of the bank.

Inggawati, Lusy, and Hermanto (2018) investigated the effect of loan-to-deposit ratio, operational loan to operational income, and non-performing loans toward bank profitability. 54 banking company were used as sample of research and double linear regression method was used in the analysis. They concluded that the ratio of operational loan to operational income, loan to deposit ratio, and non-performing loan ratio have a negative and significant effect on the dependent variable of return on assets.

Nguyen, Tripe, and Ngo (2018) examined the relationship and efficiency analysis between bank loans and deposits. The annual reports of 44 Vietnamese banks between years 2008 and 2015 were used for data collection. They obtained the results that bank deposits have a positive and significant effect on bank loans, but the effect of loans on deposits was not significant.

Noor and Rosyid (2018) examined the effects of capital adequacy ratio, loan-to-deposit ratio, and return on equity to share price of Bank Danamon. The data was obtained from the Publication Financial Report published by Bank Indonesia between years 2011 and 2016. Multiple linear regression model was used in the analysis. They emphasized the conclusion that the capital adequacy ratio, loan to deposit ratio, and return on equity ratios simultaneously had a significant effect to Bank Danamon's share price. According to the partial results, they stated that the capital adequacy ratio and the loan to deposit ratio have a significant effect to Bank Danamon share price, and the

return on equity has no significant effect on Bank Danamon share price.

Sari and Septiano (2020) investigated the effect of loan-to-deposit ratio, capital adequacy ratio, net interest margin, and non performing loan on return on assets, and also the effect of non performing loan, net interest margin, and capital adequacy ratio on loan to deposit ratio. The research at the Government Bank through financial report data between years 2014 and 2019. Path analysis method was used. They concluded that non-performing loan has a significant and negative effect on the return on assets, the positive and significant effect of non performing loan on the loan to deposit ratio, the negative and significant effect of the net interest margin on the loan to deposit ratio, the positive and insignificant effect of the capital adequacy ratio on the loan to deposit ratio, the insignificant and negative effect of the loan to deposit ratio on the return on assets, the significant and positive effect of the net interest margin on the return on assets, the insignificant and positive effect of the capital adequacy ratio on the return on assets. In the study, loan to deposit ratio was used as an intervening variable and the study resulted that loan to deposit ratio mediated the relationship between net interest margin and return on assets.

Iskandar (2020) examined the effects of capital adequacy ratios, loan to deposit ratios and net interest margin on stock return at commercial banks in Indonesia. Multiple regression analysis was conducted by taking as sample 15 banks listed on Indonesia Stock Exchange between 2016 and 2018 years. It was concluded that the capital adequacy ratio, loan to deposit ratio, and net interest margin variables simultaneously have a positive and significant effect on stock returns on commercial banks and each of the independent variables -capital adequacy ratio, loan to deposit ratio, and net interest margin- partially has a positive and significant effect on stock return at commercial banks listed on Indonesia Stock Exchange.

Anggari and Dana (2020) analyzed the effects of capital adequacy ratio, third party fund, loan to deposit ratio and bank size variables to profitability. Annual financial reports published between 2016 and 2018 of banking companies listed in Indonesia Stock Exchange were used in their studies. 18 banks were obtained as samples and the multiple linear regression method was used in the analysis. They concluded that the capital adequacy ratio, third party fund and bank size variables have a positive and significant effect on profitability. The loan to deposit ratio has a positive and insignificant effect on profitability.

Digdowiseiso (2021) examined the effects of capital adequacy ratio, non-performing loan, loan to deposit ratio and return on asset variables on the stock prices of the banking sector listed on the Indonesia Stock Exchange between the years of 2015 and 2019. 24 companies were taken as sample in the analysis of fixed effects regression, It concluded that the capital adequacy ratio, non-performing loan, loan to deposit ratio and return on assets simultaneously had a significant effect on stock prices. Each variable partially had positive and insignificant effects on stock prices.

Nugraha, Yahya, Nariswari, Salsabila, and Octaviantika (2021) examined the effects of non-performing loans, education diversity, and loan to deposit ratio on return on assets in

Conventional Banking listed on the Indonesia Stock Exchange between the years 2015 and 2019. In the research, the effect of loans on geographical location was taken into account. Statistical analysis was carried out using the SPSS program. They obtained a sample of 33 companies from a population of 41 companies by using purposive sampling technique. Descriptive statistical analysis, the coefficient determination test, the F-test, and the t-test were used in this research. They concluded that non-performing loans, loan to deposit ratio and education diversity variables simultaneously have a significant effect on the dependent variable return on assets. Non-performing loans have a significant negative effect on the return on assets, the loan-to-deposit ratio has a significant positive effect on the return on assets.

Rajindra, Guasmin, Burhanuddin, and Anggraeni (2021) examined the effects of operating costs and income and loan to deposit ratio on return on assets. 21 public-private foreign exchange banks listed on the Indonesia Stock Exchange between the years 2015 and 2018 were selected as the sample and analysis was made with multiple linear regression method. They observed that the operational costs, operational income and loan-to-deposit ratio have simultaneously a significant effect on the return on assets. They concluded that the operational costs and operational income have a significant negative effect on the return on assets and the effect of the loan to deposit ratio on the return on assets was insignificant and positive.

Setiawan, Mulyadi, and Nupus (2021) investigated the effects of capital adequacy ratio, loan to deposit ratio, bank size, operating expenses to operating income ratio toward profitability of domestic and foreign banks between the period of January 2003 and December 2007. They also used the Chow test to investigate the same effect between State Owned Banks and Foreign Banks. The time series data was used from Bank Indonesia's three monthly domestic banks and foreign banks published financial reports. Multiple regression analysis was applied by taking 10 domestic banks and 10 foreign banks as valid samples after the purposive sampling phase. They found that the capital adequacy ratio and loan to deposit ratio have a positive and significant effect toward profitability in state owned banks, and that only the bank size variable has a positive and significant effect toward profitability in foreign banks. The result of the Chow test showed influence of capital adequacy ratio, loan to deposit ratio, bank size, the ratio of operations expenses to operations income toward profitability between domestic and foreign banks.

Saleh and Winarso (2021) investigated the effect of loan-to-deposit ratio and non-performing loans on profitability. 24 companies were selected as sample by purposive sampling method. Data of rural banks bandung period 2014 and 2019 were analyzed with a multiple linear regression model using the SPSS program. They obtained the results that the non performing loan ratio and the loan to deposit ratio affected profitability(return on assets ratio).

Lee, Yang, & Chang (2014) investigated the effects of non-interest income on profitability and risk for 967 individual banks. They found that non-interest activities of Asian banks reduced risk, but did not increase profitability on a broad sample basis. According to bank specialization and country's income level, the results varied. For saving banks, non-interest activities decreased profitability and increased risk. For commercial, cooperative, and investment banks, the effect was either by increasing

profitability or decreasing risk. For banks in high income countries, non-interest activities increased risk, for banks in middle and low income countries, non-interest activities increased profitability or decreased risk.

Wycliffe (2019) investigated the effect of debt to equity ratio, portfolio to assets ratio and operating expense ratio on the financial performance of microfinance industry institutions in Kenya. Sample size consisted a panel data set of 12 microfinance institutions. Fixed effect model based on the Hausman test was applied but the model gave insignificant results, the study used random effect model. The research showed a negative correlation between portfolio to assets ratio and return on assets ratio, a positive correlation between debt to equity ratio and return on assets ratio. Operating expense ratio exhibited a negative correlation with return on assets ratio. As a result of the study, it was stated that the operating expense ratio has a negative and significant effect on financial performance (return on assets ratio), the decrease in operational expenses increased the performance of microfinance institution industry in Kenya. Negative and significant coefficient of the operating expense ratio means that the increase in operating costs negatively affects the financial performance of microfinance institutions.

Riadi (2018) investigated the effects of third parties fund, non-performing loan, capital adequacy ratio, loan to deposit ratio, return on assets, net interest margin, operating expenses operating income on lending in regional development banks in Indonesia. Data of 26 regional development banks in Indonesia between the years 2010 and 2014 was used in the multiple linear regression analysis. The results showed that in partial, third parties fund, loan to deposit ratio, capital adequacy ratio and return on assets have a significant and positive effect on lending, a significant and negative effect of operating expenses operating income on the loan portfolio, and non-performing loans have no effect on lending. All independent variables, the third parties fund, non performing loan, capital adequacy ratio, loan to deposit ratio, return on assets, net interest margin, and operating expenses operating income simultaneously influenced on dependent variable lending.

Tarus, Chekol, & Mutwol (2012) analyzed the determinants of the net interest margin of 44 commercial banks in Kenya between the years 2000 and 2009 using pooled and fixed effects regression analysis. In their study, the bank-specific, industry-specific and macroeconomic determinants of interest rate margin were analyzed. They found that operating expenses and credit risk has positive and significant effect on the net interest margin of the commercial banks in Kenya.

Bhatia, Mahajan, & Chander (2012) examined the determinants of profitability in private sector banks in India between period of 2006/07 and 2009/10. Data of a sample of 23 banks in the private sector was used and backward stepwise regression analysis was applied. Return on assets (ROA) was taken as the dependent variable, spread ratio(the difference of interest received and interest paid), provisions and contingencies (part of profits held for contingent situations and expenditure), non-interest income, credit deposit ratio, operating expense ratio, profit per employee, business per employee, investment deposit ratio, capital adequacy ratio, non-performing assets, bank type were taken as other variables. They concluded that spread ratio, provisions and contingencies, non-interest income, operating expense ratio, profit per employee, investment deposit ratio, and non-

performing assets were significant variables affecting the profitability of banks in the private sector of the Indian economy.

Widyastuti, Purwana, & Zulaihati (2017) investigated the impact of capital adequacy, non-performing loan (credit risk), net interest margin, loan to deposit ratio (liquidity) and operating expenses to operating income ratio (operating efficiency) on bank profitability. In the analysis, data of 33 commercial banks in Indonesia with 168 observations between years 2010 and 2015 was used and based on the Chow test, ordinary least squares method was applied. They concluded that net interest margin, loan to deposit ratio, and operational efficiency have a significant impact on profitability, capital adequacy and non-performing loan have not a significant impact on profitability.

Methodology

In this study, profit before tax/total assets, total loans/total deposits, non-performing loans/total credits, net non-interest income/total assets, other operating expenses/operating gross profit ratios of 31 banks operating in Turkiye were used. These banks consist of 3 state-owned banks, 8 private-capital banks, 1 bank transferred to a savings deposit insurance fund, 16 foreign capital banks established in Turkiye, and 3 foreign banks that have opened branches in Turkiye. Due to the completeness of the data, 31 of the 49 banks were selected and used in the analysis. The data belongs to year 2021 and is taken from the website of The Banks Association of Turkiye, www.tbb.org.tr

Return on Assets (ROA)

ROA is calculated by dividing profit or loss before tax by average total assets. The return on assets ratio shows the efficiency of the bank's assets in generating profit. A high ratio indicates that the bank's assets are successfully managed to generate profits. Formula: Profit Before Tax/Total Assets

Non-Performing Loans (NPL)

NPL is found by dividing gross non-performing loans by total cash loans. This ratio expresses the asset quality and risk level. Loans whose collection of principal and/or interest is delayed by more than ninety days from the due date or due date but not exceeding one hundred and eighty days are considered as non-performing loans. Non-performing loans are loans that require the bank to allocate a provision equal to this amount, as there is a risk that the bank has not received payment for a while and there is a risk that the loan will not be paid in full. This provision creates a resource cost to the bank and increases the bank's risk. A non-performing loan is a loan for which the borrower has not made repayments of principal and interest for a certain period of time. If a bank's balance sheet has too many non-performing loans, this indicates that the bank cannot generate income from loan transactions and cash flow problems will occur. The high NPL ratio causes liquidity problems and directly affects the bank's performance. Formula: Non-Performing Loans/Total Credits

Non-Interest Income (NII)

Non-Interest Income ratio shows the place of non-interest incomes in total assets. Non-Interest Income; net fees and commission income or expense, dividend income, business profit or loss, and other operating income. Non-interest income is

generally provided from the bank's services that include fees and commissions such as electronic fund transfer fee, remittance fee, swift fee, account maintenance fee, withdrawal fee, card renewal fee. Banks increase their non-interest income by creating cash flow with services such as bond borrowing and electronic fund transfer as well as providing services such as brokerage and insurance agency for stock sales like investment banks. Formula: Non-Interest Income(Net)/Total Assets

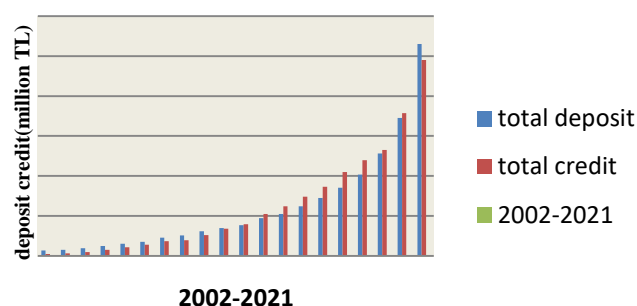
Other Operating Expenses (OOE)

Other Operating Expenses ratio represents the place of other operating expenses in Operating Gross Profit. Other operating expenses mean non-interest expenses. Non-interest expenses of the bank mostly cover fixed expenses such as personnel expenses, taxes, rental expenses, depreciation. Non-interest expenses include all other cost items except for the assets for which the bank pays interest. Formula: Other Operating Expenses/Operating Gross Profit

Loan to deposit ratio (LDR)

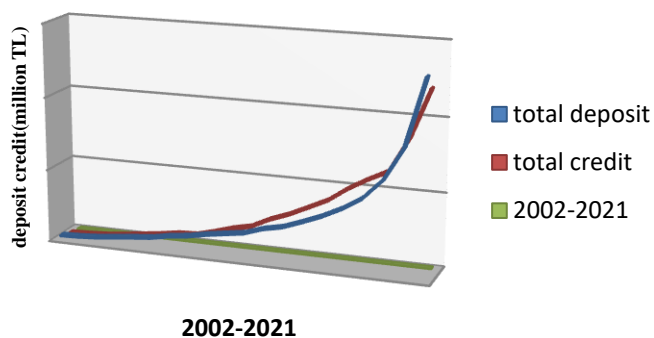
Loan to deposit ratio LDR is found by dividing total cash loans by total deposits. This ratio is also known as the deposit to loan conversion ratio. A high loan-to-deposit ratio poses a significant risk for the bank. The increase in loans, which shows that customers tend to borrow rather than save, adversely affect the liquidity ratio of the bank, causing liquidity problems and causing the bank to borrow external resources. When the loan to deposit ratio is low, it will mean that the bank is not using its resources well. Formula: Total Credits/Total Deposit

Graphic 1.



The above graph was created by using the total deposit and total loan ratios of the sector banks operating in Turkiye between 2002-2021, and the total loan and total deposit ratios were compared over the years. In 2021, total deposits are higher than total loans, while in 2020, total credit is higher than total deposits.

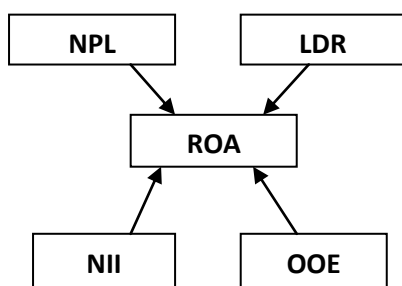
Graphic 2.



The graphic above shows the change in total deposits and total loans of sector banks operating in Turkiye between 2002-2021.

The analysis design is shown in Figure 1.

Figure 1.



Dependent and independent variables are shown in the table below.

Table 1. Variables used in the study

Variable name	Variable type
ROA	Dependent variable
LDR	Independent variable
NPL	Independent variable
NII	Independent variable
OOE	Independent variable

Hypotheses:

- H₀: β = 0 The model is insignificant.
- H₁: β ≠ 0 The model is significant.
- H₂: β₀ = 0 The constant coefficient is insignificant.
- H₃: β₀ ≠ 0 The constant coefficient is significant.
- H₄: β₁ = 0 The coefficient is insignificant.
- H₅: β₁ ≠ 0 The coefficient is significant.
- H₆: β₂ = 0 The coefficient is insignificant.

- H₇: β₂ ≠ 0 The coefficient is significant.
 - H₈: β₃ = 0 The coefficient is insignificant.
 - H₉: β₃ ≠ 0 The coefficient is significant.
 - H₁₀: β₄ = 0 The coefficient is insignificant.
 - H₁₁: β₄ ≠ 0 The coefficient is significant.
 - H₁₂: ρ = 0 There is no first-order autocorrelation.
 - H₁₃: ρ ≠ 0 There is first-order autocorrelation.
 - H₁₄: The residuals have a normal distribution.
 - H₁₅: The residuals do not have a normal distribution.
 - H₁₆: The constant variance assumption is valid.
 - H₁₇: The constant variance assumption is not valid.
- The four independent variable regression models are as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + u$$

$$Y = ROA, X_1 = LDR, X_2 = NPL, X_3 = NII, X_4 = OOE,$$

u = Error term(residuals), ρ = autocorrelation coefficient. β₀ is the cutting parameter. β₁ measures the change in Y in relation to X₁ when other factors are kept constant. β₂ measures the change in Y in relation to X₂ when other factors are kept constant. β₃ measures the change in Y with respect to X₃, holding other factors constant. β₄ measures the change in Y in relation to X₄ when other factors are kept constant.

Results

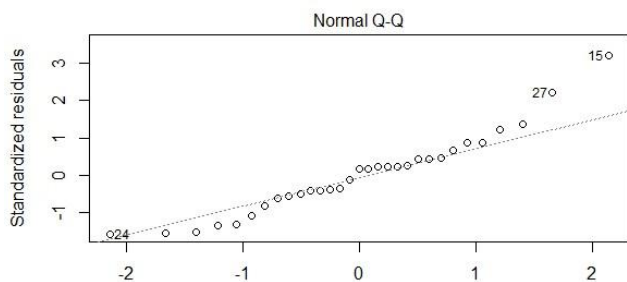
Data analysis was carried out with R-Studio program. The following table contains the minimum value, median value, average value, and maximum values of the variables.

Table 2. Data Statistics Summary

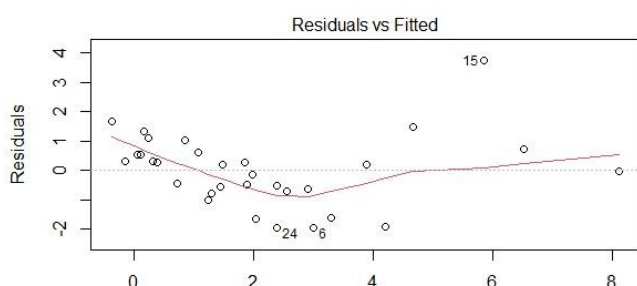
	MIN.	MEDIAN	MEAN	MAX.
ROA	0.1560	1.4858	2.1411	9.5826
LDR	23.97	86.33	2683.99	79892.15
NPL	0.0000	3.093	4.190	30.823
NII	-0.2856	1.2966	1.3672	4.3631
OOE	5.452	21.310	23.573	77.290

The minimum value of the ROA dependent variable is 0.1560, the maximum value is 9.5826, the median value is 1.4858, and the mean value is 2.1411. The minimum value of the LDR variable is 23.97, the maximum value is 79892.15, the median value is 86.33, and the mean value is 2683.99. The minimum value of the NPL variable is 0.00, the maximum value is 30,823, the median value is 3.093, and the mean value is 4,190. The minimum value of the NII variable is -0.2856, the maximum value is 4.3631, the median value is 1.2966, and the mean value is 1.3672. The minimum value of the OOE variable is 5,452, the maximum value is 77,290, the median value is 21,310, and the mean value is 23,573.

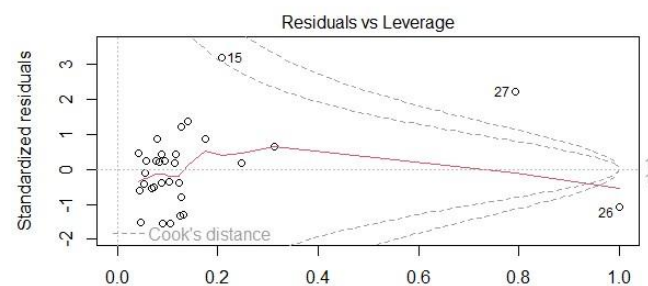
Graphic 3.



Graphic 4.



Graphic 5.



Above are the graphs of the regression model that was created. The difference between the regression line created in accordance with the data and the actual values is called error or residual. The parameters of the regression line are estimated so that the differences or errors between the regression line and the actual values are minimal.

Table 3. Coefficients

Coefficients:	Estimate	Std.Error	t value	Pr(> t)
(Intercept)	0.9518	0.6822	1.395	0.17476
LDR	0.00007455	0.000017	4.386	0.00017
NPL	-0.05346	0.07343	-0.728	0.47310
NII	1.351	0.2094	6.452	0.000000776
OOE	-0.02688	0.03094	-0.869	0.39296

In Table 3, the estimated value of the cut-off parameter, the estimated values of the slope parameters, the standard errors of these parameters, t-statistics and t-statistics probability values are given in the table.

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<http://dx.doi.org/10.29322/IJSRP.13.01.2023.p13348>

According to the results obtained; the estimated value of the estimated constant parameter is 0.9518. The estimated value of the coefficient of the LDR variable is 0.00007455, the estimated value of the coefficient of the NPL variable is -0.05346, the estimated value of the coefficient of the NII variable is 1.351, and the estimated value of the coefficient of the OOE variable is -0.02688. When we interpret these values; 1 unit increase in the LDR variable will increase the ROA by 0.00007455 units while the effects of other variables are constant. 1 unit increase in NPL variable will decrease ROA by 0.05346 units while the effect of other variables is constant. While the effect of other variables is constant, 1 unit increase in NII variable will increase ROA by 1,351 units. While the effect of other variables is constant, an increase of 1 unit in the OOE variable will decrease the ROA by 0.02688 units. If the values of the LDR, NPL, NII, and OOE variables are zero, the ROA will be 0.9518 units. The standard errors of the parameters were obtained as 0.6822, 0.000017, 0.07343, 0.2094, and 0.03094, respectively. According to the double-sided test results in the model output, the probability values of t statistics used for parameter significances expressed with Pr are 0.17476, 0.00017, 0.47310, 0.000000776, and 0.39296, respectively.

Generally, the statistical probability value t is compared with 0.01 or 0.05 according to the level of significance used in the study. If these probability values are smaller than the specified level of significance, it is decided that the parameter under consideration is significant.

The t statistics probability value of the constant parameter is greater than 0.05 significance level. $0.17476 > 0.05$ This indicates that the constant parameter is not statistically significant. Hypothesis 2 (H_2) cannot be rejected.

The t statistics probability value of the parameter belonging to the LDR variable is less than 0.05 significance level. $0.00017 < 0.05$. This shows the statistical significance of the β_1 parameter. Hypothesis 4 (H_4) is rejected. Hypothesis 5 (H_5) is confirmed.

The probability value of the parameter t statistics of the NPL variable is greater than the significance level of 0.05. $0.47310 > 0.05$ This indicates that the β_2 parameter is not statistically significant. Hypothesis 6 (H_6) cannot be rejected.

The probability value of the parameter t statistics of the NII variable is less than the significance level of 0.05. $0.000000776 < 0.05$ This indicates that the β_3 parameter is statistically significant. Hypothesis 8 (H_8) is rejected. Hypothesis 9 (H_9) is confirmed.

The probability value of the parameter t statistics of the OOE variable is greater than the significance level of 0.05. $0.39296 > 0.05$ This indicates that the β_4 parameter is not statistically significant. Hypothesis 10 (H_{10}) cannot be rejected.

Table 4. Model

Residual standard error: 1.316	
Multiple R-squared: 0.7376	Adjusted R-squared: 0.6972
F-statistic: 18.27	p-value: 0.0000002962

The Multiple R-squared value seen in Table 4 above is the coefficient of determination that shows the power of the independent variables in the model to explain the dependent variable. The coefficient of determination of the model was found to be 0.7376. 73.76% of the variation in ROA is explained by the independent variables in the model. The adjusted coefficient of determination value is 0.6972. This value is always obtained less than the coefficient of determination. The F test statistic value is 18.27. The probability value of this test was obtained as 0.0000002962. $0.0000002962 < 0.05$

Since the probability value of the F test statistic is less than 0.05 significance level, the basic hypothesis H_0 is rejected and H_1 is confirmed. The model is significant. The formula of the model will be as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + u$$

$$Y = 0.9518 + 0.00007455 X_1 - 0.05346 X_2 + 1.351 X_3 - 0.02688 X_4$$

Table 5. Durbin Watson Test (Autocorrelation Test)

lag	autocorrelation	D-W Statistics	p-value
1	-0.1183645	2.206682	0.612

Table 5. shows Durbin Watson test results. One of the basic assumptions of regression is that there is no autocorrelation. Autocorrelation is defined for the error terms(residuals) of the regression model and means that the error terms are related to their past and previous values.

p-value $0.612 > 0.05$ The probability value is greater than the 5% significance level. In this case, the basic hypothesis H_{12} cannot be rejected. There is no first-order autocorrelation.

Table 6. Shapiro-Wilk Normality Test

Shapiro-Wilk normality test	Data:residuals(regresyon)
W = 0.94786	p-value: 0.1362

According to the calculated results, the W statistic is 0.94786 and the probability value is 0.1362. Since the probability value is greater than 0.05 significance level, the H_{14} basic hypothesis cannot be rejected. The residuals have a normal distribution.

Table 7. Breusch Pagan Test (Heteroskedastisity Test)

Studentized Breusch-Pagan test	Data: regresyon
BP = 7.8446 df=4	p-value: 0.09744

According to the results obtained, the test statistic is 7.8446 and the probability value is 0.09744. The basic hypothesis H_{16} cannot be rejected, since the probability value is greater than the significance level of 0.05. The assumption of constant variance applies.

Table 8. Multikolinearity Test

Multikolinearity Test	VIF	Status
LDR	1.027414	There is no multikolinearity
NPL	2.972767	There is no multikolinearity
NII	1.088720	There is no multikolinearity
OOE	2.916445	There is no multikolinearity

In order to decide whether the multicollinearity is effective or not, the VIF value is commonly compared with 5 or 10, and if it is greater than 5, multicollinearity is interpreted as significant. The higher the degree of multicollinearity, the greater the VIF value will be. According to the results shown in Table 8 above, since VIF values are less than 5, it is decided that there is no multicollinearity.

Table 9. Correlation

	ROA	LDR	NPL	NII	OOE
ROA	1.00	0.46	-0.24	0.67	-0.33
LDR	0.46	1.00	-0.14	-0.02	-0.06
NPL	-0.24	-0.14	1.00	0.10	0.79
NII	0.67	-0.02	0.10	1.00	-0.08
OOE	-0.33	-0.06	0.79	-0.08	1.00

Table 9 shows the results of correlation analysis that examines the direction and strength of the relationship between variables. If the correlation coefficient is zero, there is no relationship between the variables, if it is less than zero there is an negative relationship between the variables, if it is greater than zero, there is a positive relationship between the variables. While the relationship between the variables strengthens when the correlation coefficient approaches 1, the relationship between the variables weakens when approaching 0. According to the results obtained, the same directional medium level relationship between ROA and NII, the same directional medium level relationship between ROA and LDR, the same directional high level relationship between NPL and OOE, the inverse low level relationship between ROA and NPL, and the inverse medium level relationship between ROA and OOE are seen.

Conclusion

In this study, as a result of the regression analysis conducted by using the data of 31 banks operating in Turkiye, it was found that the loan to deposit ratio, non-performing loans ratio, non-interest income ratio, and other operating expenses ratio significantly affected the return on assets simultaneously. The loan to deposit ratio had a significant and positive effect on return on assets. The effect of the non-performing receivables/total loans ratio on return on assets was observed to be negative and statistically insignificant. The effect of the non-interest income ratio on active profitability was found to be positive and significant, while the effect of the other operating expenses ratio on ROA was found negative and statistically insignificant. 73.76% of the

change in ROA is explained by the independent variables in the model.

It is seen that the findings obtained from this study are consistently with the literatures.

The negative effect of non-performing loans/total credits on return on assets is consistent with the findings of the following studies: Sari and Septiano (2020), Nugraha, Yahya, Nariswari, Salsabila, and Octaviantika (2021), Inggawati, Lusy, and Hermanto (2018), Bhatia, Mahajan, & Chander (2012). The negative and statistically insignificant effect of the non-performing loans/total credits ratio is consistent with the findings of Widyastuti, Purwana, & Zulaihati (2017),

The finding of positive effect of total credits/total deposit ratio on return on assets is consistent with the following studies: Bhatia, Mahajan, & Chander (2012), Rajindra, Guasmin, Burhanuddin, and Anggraeni (2021), Anggari and Dana (2020). In addition, the significant effect of total credits/total deposit ratio on profitability is consistent with the findings of Widyastuti, Purwana, & Zulaihati (2017).

The significant and positive effect of total credits/total deposit ratio on profitability is consistent with the findings of Nugraha, Yahya, Nariswari, Salsabila, and Octaviantika (2021). The significant and positive effect of total credits/total deposit ratio on profitability is consistent with the findings of Setiawan, Mulyadi, and Nupus (2021), their findings were as follows: LDR had a positive and significant influence toward profitability in State Owned Banks.

The negative effect of other operating expenses/operating gross profit ratio on return on assets is in parallels with the following studies: Rajindra, Guasmin, Burhanuddin, and Anggraeni (2021) the operational expenses/operational income ratio had a negative effect on ROA. Wycliffe (2019) the operating expense ratio (operating expenses/average gross portfolio) had a negative effect on ROA, operating expense ratio exhibited a negative correlation with returns on assets ratio. Bhatia, Mahajan, & Chander (2012) the operating expenses/total expenses ratio had a negative effect on ROA, Widyastuti, Purwana, & Zulaihati (2017) the operational expense/operational income ratio had a negative effect on profitability.

The positive and significant effect of non-interest income/total assets ratio on return on assets is consistent with the findings of Bhatia, Mahajan, & Chander (2012).

With the decrease in the use of cash and the spread of new payment methods today, current deposits, which are an increasing and cost-free resource, are made attractive and presented to the customer, thus positively affecting the deposits, which are the most important item in the total resources, in terms of resource utilization optimization, increasing the sustainable product variety offered to customers to increase non-interest income and the use of these products, Creating new resources other than deposits as a source of funds, making technological infrastructure and platforms faster and stronger, correctly evaluating credit demands in the lending process, which is the main factor determining profitability, giving importance to the identification of credit customers who are likely not to repay the

loan they have received will play an important role in preventing possible losses and reducing non-performing receivables and increasing profitability.

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