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The effect of loan to deposit ratio(LDR), interest income ratio, and non-interest income ratio on average return on equity(ROE)

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ABSTRACT: In this study, the effect of Interest Income/Total Assets ratio, Non-Interest Income/Total Assets ratio, and Total Loans/Total Deposit ratio (LDR) on average return on equity ratio(ROE) was examined. A multiple regression analysis was applied with R-Studio program using the data of Ziraat Bank, one of the public banks operating in Turkey, between the years 2003-2021. The following results were obtained. The effect of the LDR independent variable on the ROE dependent variable is significant and negative, the effect of interest income ratio independent variable on the ROE dependent variable is statistically insignificant and negative, and the effect of non-interest income ratio independent variable on the ROE dependent variable is significant and positive. 55.16% of the variation in ROE is explained by the independent variables in the model. In this study, it was aimed to determine the simultaneous and partial effects of loan to deposit ratio(LDR), interest income ratio, and non-interest income ratio on average return on equity ratio and to contribute to other researchers.

KEYWORDS : *Loan to Deposit Ratio(LDR), Interest Income, Non-Interest Income, Return on Equity (ROE)*

I.   INTRODUCTION

Profitability ratios are ratios that show the combined effect of liquidity, asset management, and debt management ratios on the company's operating results. Return on equity measures the return that the firm's shareholders receive from their investment in the firm. It shows the net profit earned by the firm's one unit of equity. Return on equity is affected not only by net profit, but by the firm's financial leverage. Financial leverage magnifies the return of the firm's shareholders. However, financial leverage also increases the probability of the firm falling into financial failure and going bankrupt. Generally, high return on equity is perceived as a positive sign for the firm's performance. If performance is due to the use of high leverage, high return on equity means that the firm has a high risk of bankruptcy.

Return on equity measures the return received by the company's shareholders. Because managers want to maximize the firm's stock price. Managers, investors, and analysts want return on equity to be higher than any other ratio. The dividend payout ratio shows how much of the firm's profits are distributed to shareholders and how much is retained within the company. A low dividend ratio means that the firm retains more profits to grow and invest in future projects. The firm that retains profit also increases its level of equity and its own value. [1]
Equity covers the elements consisting of the value invested as capital and the profits obtained as a result of the activities that have not yet been withdrawn. In the equity item in the liabilities section of the balance sheet, there are paid-in capital and profits accumulated over the years and not distributed as dividends. ROE, which is the return obtained by deducting liabilities from assets, means return on equity. ROE which is one of the financial indicators widely used to determine the value of the return on investment capital, provides information on how efficiently the bank's resources are used. It is a very reliable financial tool that has been used by banks and all companies in general for some time now.

Companies or banks that have a high return on equity and can maintain or even increase it consistently achieve high returns. ROE, which determines success or failure, measures the profitability of the company or bank's own resources. A very low ROE generally means poor or unfavorable economic management. ROE, which is useful in following the development of the company or the bank, also provides the determination of the capacity to earn profit from the capital. Investors, who can determine the financial profitability of their invested capital with ROE, can obtain information about management performance by knowing how their capital is used. The increase or decrease in ROE provides information about management performance.
If a bank's return on equity or return on assets measures are higher than those of other banks, it is known as a high performaning bank. For a bank to report higher returns, it must take on more risk, price assets and liabilities better, or gain cost advantages compared to other banks. [2]

Banks generate income in two ways. Sources of bank revenue are; 1. interest income from loans, securities, and federal funds sold. 2. Fees and service charges, called non-interest income, related to products and services, such as loan originations, loan servicing, deposit account activity, credit card annual fees and fees for safety deposit boxes. [3]

Net interest income is obtained when total interest income is subtracted from total interest expenses. This difference, expressed as the interest margin, is the difference between the bank's interest income from loans and securities and the interest cost of borrowed funds. When the interest margin falls, there is a weakening in the bank's profitability. [4]

Recently, bankers are targeting non-interest income, known as fee income, as the main source of future revenues. Bankers continue to sell services other than loans more aggressively. They adopted non-interest incomes as a channel to increase profitability of their income statements, to diversify their income sources, and not to be affected by changes in interest rates. [4] Non-interest income is becoming more important day by day due to the pricing pressure on net interest income. [5] The fact that banks attach more importance to non-interest income means that the operational and strategic risks of banks will increase. Special capital requirements exist for various risk categories, not just for credit and market risks. [6] While banks have made progress in generating traditional fee income, banks need to expand their products in order to remain competitive with other banks. At the same time, it is inevitable that they need to improve their sales, relationships, services, and investment knowledge. Many analysts agree that the dramatic increase in noninterest income, as a proportion of total income, came from investment banking, trading and brokerage activities. In addition to generating commission income, new products further increase banks' competition with other banks and financial institutions that offer a wide range of products and services. [7]

In this study, the relationship between loan to deposit ratio, interest income ratio, non-interest income ratio and ROE was examined.

II. LITERATURE REVIEW

Studies on return on equity ratio (ROE) were researched and tried to be summarized below.

Anwar, Marliani, & Gunawan (2016) analyzed the liquidity, profitability, activity and solvency ratios on Bank Bukopin's financial performance. Data of the Bank Bukopin financial statements between the years 2011 and 2013 was used in the analysis. They calculated the liquidity ratios, profitability ratios, activiy ratios and solvency ratios to determine the financial performance of Bank Bukopin. The research showed that the liquidity, profitability, activity and solvency ratios was expressed in good and healthy state. In this study, the return on investment ratio and the return of equity ratio (ROE) were used to measure the profitability ratios. They suggested careful management of funding sources and placements, increasing profit margins and turnover of operating assets, arranging acivity strategy, and providing good service to customers. [8]

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. [9]

Wijaya & Yustina (2017) analyzed the factors that effect stock market in listed companies in ISX (Iraq Stock Exchange). 29 samples used in the research were bank companies in Indonesia listed in Indonesia Stock Exchange between years 2010 and 2014. In this study, three hypotheses were examined: Dividend policy has correlation wih stock price, profitability ratio has correlation with stock price, solvency ratio has correlation with stock price. Multiple linear regression analysis was used, stock price was dependent variable, independent variables were dividend payout ratio, return on assets ratio, return on equity ratio (ROE), debt to stockholders' equity ratio. According to results; dividend pay out ratio had significant correlation with stock price, return on assets ratio had significant correlation with stock price, return on equity ratio had insignificant correlation with stock price, and debt to equity ratio had insignificiant correlation with stock price. [10]

Kabajeh, Nu'aimat & Dahmash (2012) examined the relationship between the return on assets, return on equity, and return on invesment ratios with Jordanian insurance public companies share prices between the years 2002 and 2007. 23 Jordanian insurance public companies listed in Amman Security Exchange were taken as sample. Data was obtained from the published annual reports of companies (for accounting data) and monthly and yearly bulletins published by Amman Security Exchange (for market data). Pooled regression analysis method was used. The research was concluded that a strong and positive relationship between the return on assets, return on equity, and return on investment ratios together with share prices. According to the seperated pooled analysis, a positive and low relationship between return on assets ratio and share prices, a positive and low relationship between return on investment ratio and share prices, no relationship between return on equity ratio and share prices. [11]

Heikal, Khaddafi, & Ummah (2014) analyzed the effects of Return on Assets, Return on Equity, Net Profit Margin, Debt Equity Ratio and Current Ratio toward growth income of automotive companies listed in Indonesia stock Exchange. Return on assets, return on equity, net profit margin, debt-equity ratio, and current ratio are the independent variables and growth income is the dependent variable. Multiple linear regression and classical assumption test were applied to data of 55 samples. As a result of the study, it was found that the return on assets, return on equity, net profit margin had a positive and significant effect on earnings growth. The effect of debt-equity ratio and current ratio on earnings growth was negative and significant. Return on assets, return on equity, net profit margin, debt to equity ratio, and current ratio simultaneously had a positive and significant effect on growth income. [12]

Hertina & Saudi (2019) investigated the impact of return on assets, return on equity, debt-equity ratio and earning per share on property and real estate companies listed on the Indonesia Stock Exchange between years 2012 and 2016. 27 companies were used as a sample. Panel data regression method was used in the analysis. They concluded that the return on assets and return on equity had no effect on stock returns, the debt-equity ratio had a significant effect on stock returns, and earning per share had a significant effect on stock returns. Return on assets, return on equity, debt-equity ratio and earning per share independent variables together had a significant effect on stock return. [13]

Sebayang (2020) examined the effect of capital adequacy ratio and non-performing loans on return on equity. Multiple regression analysis was applied using a sample of 20 foreign private banks in Indonesia. The first hypothesis of the research was a positive impact and an increase in the value of the capital adequacy ratio on return on equity. The second hypothesis was a positive impact and an increase in the value of non-performing loans on return on equity. The third hypothesis was a positive effect and an increase in the value of non-performing loans and capital adequacy ratio on return on equity. It has been shown that the capital adequacy ratio of significant effect against return on equity, non-performing loan did not affect a significant return on equity, capital adequacy ratio and non-performing loan simultaneously effected on return on equity. [14]

Yanto, Christy & Cakranegara (2021) examined the effects of return on asset, return on equity, net profit margin, debt equity ratio and current ratio toward stock price, Sample acquired 3 companies from 35 manufacturing companies listed in Indonesia Stock Exchange between the years 2016 and 2018. There was one dependent variable and five independent variables in the analysis. According to the t test results, net profit margin had negative and insignificant effect toward stock price, debt to equity ratio had positive and significant effect toward stock price, current ratio had positive and significant effect toward stock price. Return on asset had negative and insignificant effect toward stock price, return on equity had positive and significant effect toward stock price. [15]

Lusy, Hermanto, Panjaitan, & Widyastuti (2018) investigated the effects of current ratio and debt-equity ratio on return on assets and return on equity. The data of 10 companies listed on the Indonesia Stock Exchange between years 2014 and 2017 was used. Multiple linear regression analysis was performed using the SPSS program. It has been found that the current ratio had positive effect on return on assets, debt to equity ratio had positive effect on return on assets, current ratio had positive effect on return on equity, debt to equity ratio had positive effect on return on equity. The value of adjusted R-squared for return on assets was 14.9%, this showed that current ratio and debt o equity ratio have a weak effect on return on assets. The value of adjusted R-squared for return on equity was 38.6%, this showed that current ratio and debt to equity ratio have a marginally strong effect on return on equity. [16]

Pointer & Khoi (2019) examined the significant predictors of return on assets and return on equity for banks and insurance companies listed on the Vietnamese stock market. A panel data set with 16 Vietnamese banks and 10 insurance companies between the years 2008 and 2017 was used. Panel Least Squares and Generalized Linear Model were applied in the analysis. The research had 13 independent variables of return on assets, return on equity, firm size, years in business, capital structure, book value per share, earnings per share, stock price, annual percentage change in consumer price index, annual growth of the gross domestic product, price to earnings ratio, percentage change in money supply, credit to the economy. The results showed that significant predictors of return on assets were return on equity, company size, years in business, book value, and earnings per share. The key predictors of return on equity were return on assets, firm size, years in business, capital structure, book value, and earnings per share. [17]

Dissanayake (2012) examined the significant determinants of return on equity. Data of 11 Microfinance Institutions in Sri Lanka between the years 2005 and 2011 was used in the analysis. The five independent variables of study were operating expense ratio, personel productivity ratio, write-off ratio, cost per borrower ratio, debt/equity ratio. The dependent variable was return on equity ratio. Multiple regression analysis method was applied. The results showed that the operating expense ratio, write off ratio and cost per borrower were the statistically significant variables in determining return on equity. According to the correlation matrix of the sample, a strong negative correlation between operating expense ratio and return on equity ratio at 1% significance level, a strong positive correlation between personel productivity and return on equity. [18]

III. METHODOLOGY

In this study, the data of Ziraat Bank, one of the public banks operating in Turkey, between 2003 and 2021 were used. Data including Interest Income(Net)/Total Assets (IIR), Non-Interest Income (Net)/Total Assets (NIIR), Total Loans and Receivables/Total Deposits (LDR), and Average Return on Equity (ROE) ratios were obtained from the website of The Banks Association of Turkiye, www.tbb.org.tr [19]

3.1.Average Return on Equity

ROE which means return on equity, is one of the ratios used to measure the profitability of a company or bank. Expressing how efficiently the investments made by the shareholders in the company are used, ROE is one of the most important profitability indicators followed by investors. It is an indicator of the effective use of company resources by the top management of the company or bank. It is important that the ROE, which measures how much profit the company can make with its equity and how much it can increase this profit, is above the annual inflation rate. The competitive advantage of the company can be found by comparing the company ROE with the industry average. Competitive advantage is an indication that the company is outperforming its competitors.

Increasing ROE over time means that a company is successful in creating shareholder value. The decreasing ROE ratio over time indicates that the company management cannot use the equity capital effectively and does not make the right decisions about investments. Shareholders expect a high ROE from a low-risk investment. With the ROE ratio, investors can interpret whether they are making a good return, while the company can interpret the efficiency of valuing equity. ROE is created by combining the income statement and balance sheet. The share of the ROE ratio used as the dependent variable in this study is the Net Profit or Loss for the period taken from the total column of the Profit/Loss table. Its denominator is the difference between the average of total equity in the relevant calendar year taken from the balance sheet total column and the Average of Profit or Loss for the Period in the related calendar year.

ROE is an important performance measure. Managers strive to maximize the wealth of their shareholders. A firm takes a step to improve its ROE does not always mean that shareholder wealth will increase as well. Actually, if a firm relies too heavily on ROE to evaluate performance, it may encounter the following problems. First, ROE does not consider risk. Shareholders care about both ROE and risk factor. Financial leverage can increase expected ROE, but more leverage means higher risk. Therefore, it may not be good to increase ROE using leverage. Second, the ROE does not take into account the amount of capital invested. Third, a focus on ROE can cause managers to turn down profitable projects. Investing in a highly profitable project can lead to a decrease in the year-end dividend. Therefore, the managers of the firm may be reluctant to undertake the new project. [20]

Average Return on Equity is calculated by dividing net earnings by average total equity. This financial ratio expresses the performance of a company or bank in terms of average outstanding equity during the financial year. The numerator of the Return on Equity formula includes net income, and the denominator includes the result obtained by dividing the amount of equity at the beginning and end of the relevant year by 2. Return on Equity (ROE) may also include recent stock sales, share repurchases, and dividend payments, so it may not accurately reflect the company's actual return over a period of time. Average return on equity can provide a more accurate description of the company's profitability than ROE, especially if the company's equity value has changed significantly during a fiscal year. If the change in equity in a financial year is very small, it is expected that the calculated ROE and average ROE values will be the same or close to each other. In the return on equity formula, the denominator is equity, while in the average return on equity formula, the denominator is average equity. Average return on equity is expressed as an adjusted version of the return on equity measure. Average Return on Equity formula is shown below.

$$\text{ROE} = \frac{period\ net\ profit\ (loss)}{average\ equity}\ (\%)$$

Figure 1. shows the average return on equity ratios of Ziraat Bank between 2011 and 2021. The rate which increased in 2012, progressed to close values until 2018, and decreased since 2018.
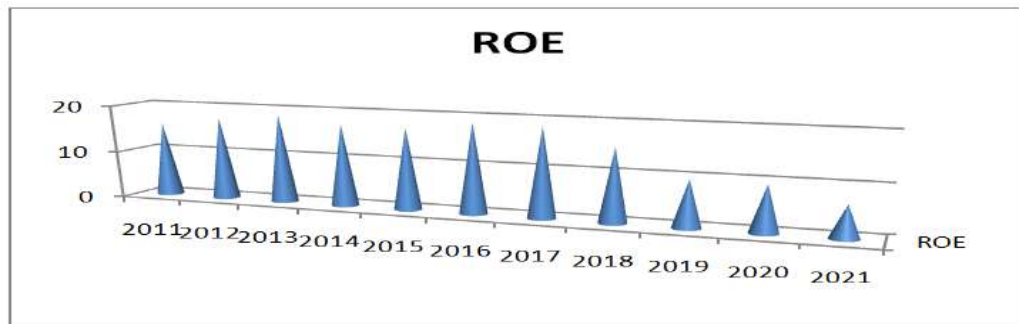
Figure 1.

3.2.Loan to Deposit Ratio

Total Loans/Total Deposit ratio is also known as the LDR 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 deposit ratio is low, it will mean that the bank is not using its resources well. The fact that the loan deposit ratio of banks, whose main source is deposits and whose main asset is loans, exceeds 100%, indicates that they extended more loans than the deposits they collected. The loan deposit rates of banks that convert the deposits they collect into loans should not exceed 100%. The formula for the Loan to Deposit Ratio is shown below.

$$\text{LDR} = \frac{total\ loans\ and\ receivables}{total\ deposit}\ (\%)$$

Figure 2. shows the loan-to-deposit ratios of Ziraat Bank between 2011 and 2021. The rate which decreased in 2012, continued to increase until 2017 and remained stable in 2017 and 2018. It is observed that the loan to deposit ratio decreased since 2019.

Figure 2.
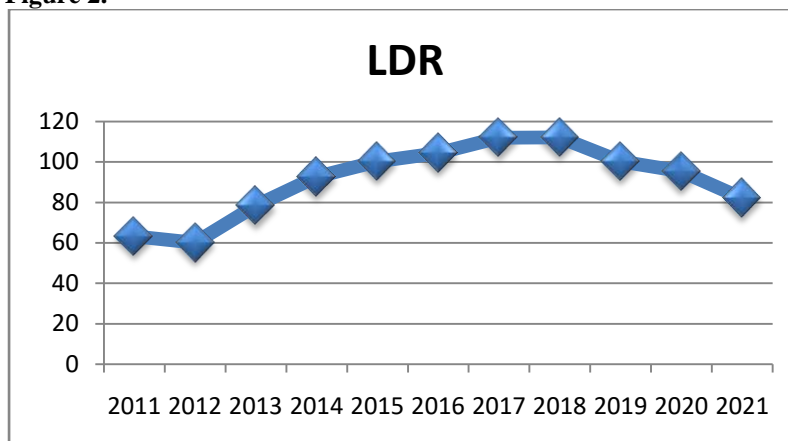
3.3.Non-Interest Income Ratio

Non-Interest Income is generally provided from the bank's services that include fees and commissions. The main non-interest income items in the banking sector are as follows: Fees and commissions received from loans, dividends received, banking service income, commission income, income from the sale of assets, foreign exchange income, and capital market transaction income. Banks receive fees and commissions as service fees for the transactions they perform. They receive the majority of these fees and commissions in exchange for off-balance sheet transactions. The items in the non-interest income section of the profit or loss statement and their contents are given below with their general headings.

Fees and commissions received: Fees and commissions received by the bank for cash and non-cash loans given to its customers (appraisal fee, account maintenance fee, electronic fund transfer fee, money transfer fee, swift fee, card renewal fee, cash advance withdrawal fee, safe deposit box fee, etc.)

Capital Market Profits: Capital gains due to the increase in market prices of securities in the Bank's portfolio.

Foreign Exchange Profits: Income generated by foreign exchange transactions (arbitrage, effective foreign exchange purchases, foreign exchange transfers, etc.)

Dividends Received: Shares received from the profits of the Bank's subsidiaries and subsidiaries,

Other Incomes: These are operating incomes other than ordinary operations and incomes that do not fall into the above groups.

The formula for the Non-Interest Income Ratio is shown below:

$$NIIR = \frac{non-interest\ income\ (net)}{total\ assets}\ (\%)$$

Figure 4. shows the change in the ratio of Non-Interest Income (Net)/Total Assets of Ziraat Bank by years. While the ratio progressed with increases and decreases between 2011 and 2018, it reached a negative value in 2019 with a rapid decrease in 2018. Although it showed an increase in 2020, it is seen that it decreased to negative value in 2021.
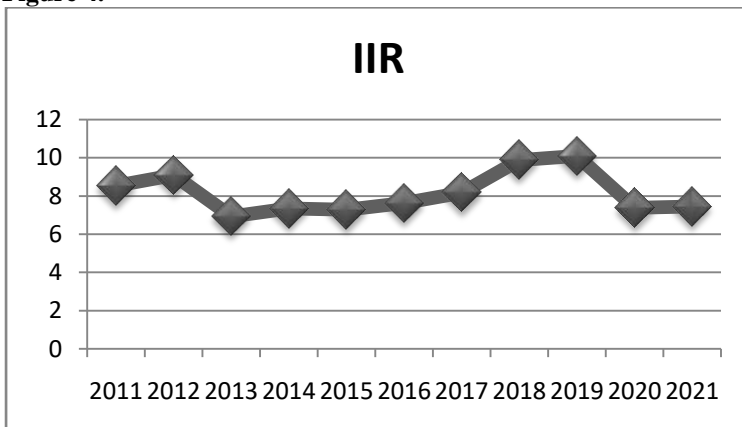
Figure 3.
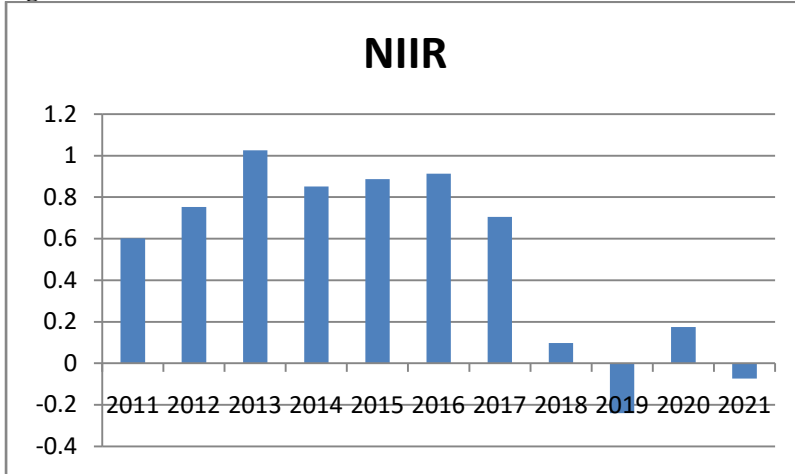
3.4.Interest Income Ratio
The income generated by the bank from its services based on interest constitutes the interest income. Interests received from all kinds of bank loans, interest obtained from required reserve accounts held at the Central Bank, interests obtained from deposits held by the bank in other domestic and foreign banks, interests obtained from interbank money market transactions, interests obtained from securities invested by the bank, and income elements other than these. The interest provided constitutes the interest income.
The Formula of Interest Income Ratio is shown below:

$$IIR = \frac{interest\ income\ (net)}{total\ assets}\ (\%)$$

Figure 5. shows the change in the Interest Income/Total Assets ratio of Ziraat Bank by years. The rate which increased in 2012, decreased in 2013, progressed at close values until 2016, increased in 2017, progressed at close values in 2018 and 2019, decreased in 2020, and was seen at a value close to the previous year in 2021.
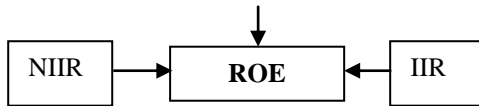
Figure 4.

3.5.Research Design
The analysis design is shown in Figure 6.
Figure 5.

LDR

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┌─────────┐        ┌─────────────┐        ┌─────────┐
│  NIIR   │───────▶│     ROE     │◀───────│   IIR   │
└─────────┘        └─────────────┘        └─────────┘
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Dependent and independent variables are shown in the table below.

Table 1. Ratios used in the study

Variable name	Variable Type
ROE	Dependent variable
LDR	Independent variable
IIR	Independent variable
NIIR	Independent variable

Hypotheses:

H_0: $\beta = 0$ The model is insignificant.
H_1: $\beta \neq 0$ The model is significant.
H_2: $\beta_0 = 0$ The constant coefficient is insignificant.
H_3: $\beta_0 \neq 0$ The constant coefficient is significant.
H_4: $\beta_1 = 0$ The coefficient is insignificant.
H_5: $\beta_1 \neq 0$ The coefficient is significant.
H_6: $\beta_2 = 0$ The coefficient is insignificant.
H_7: $\beta_2 \neq 0$ The coefficient is significant.
H_8: $\beta_3 = 0$ The coefficient is insignificant.
H_9: $\beta_3 \neq 0$ The coefficient is significant.

The three independent variable regression models are as follows:

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

$Y = $ ROE, $X1 = $ LDR, $X2 = $ IIR, $X3 = $ NIIR

$u = $ Error term(residuals), β_0 is the cutting parameter. β_1 measures the change in Y in relation to X_1 when other factors are kept constant. β_2 measures the change in Y in relation to X_2 when other factors are kept constant. β_3 measures the change in Y with respect to X_3, holding other factors constant.

3.6. Data Analysis

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.
ROE	5.25	18.70	22.16	42.73
LDR	15.76	63.91	64.35	112.17
IIR	0.4824	2.2874	2.4330	6.3976
NIIR	-0.2607	0.5574	0.5522	2.1995

The minimum value of the ROE dependent variable is 5.25, the maximum value is 42.73, the median value is 18.70, and the mean value is 22.16. The minimum value of the LDR variable is 15.76, the maximum value is 112.17, the median value is 63.91, and the mean value is 64.35. The minimum value of the IIR variable is 0.4824, the maximum value is 6.3976, the median value is 2.2874, and the mean value is 2.4330. The minimum value of the NIIR variable is -0.2607, the maximum value is 2.1995, the median value is 0.5574, and the mean value is 0.5522.

The graph of the regression model is shown below.

Figure 6.

Normal Q-Q
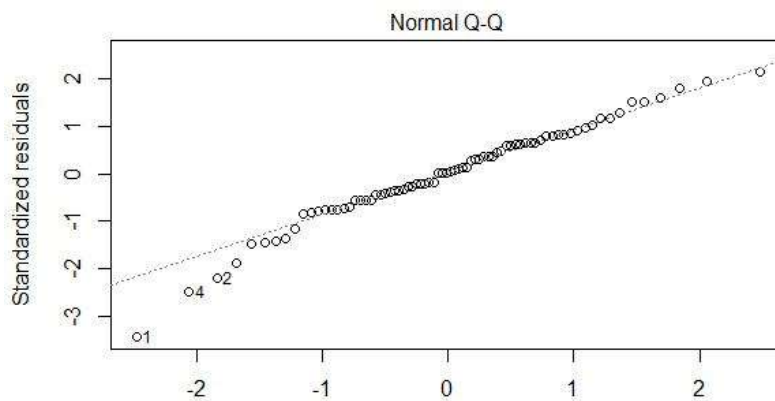
Table 3. Coefficients

Coefficients	Estimate	Std.Error	t value	Pr(>ltl)
(intercept)	33.98915	2.85056	11.924	<2e-16
LDR	-0.18104	0.02757	-6.567	6.89e-09
IIR	-1.55569	0.95846	-1.623	0.1089
NIIR	6.52881	2.81255	2.321	0.0231

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.

According to the results obtained; the estimated value of the estimated constant parameter is 33.98915. The estimated value of the coefficient of the LDR variable is -0.18104, the estimated value of the coefficient of the IIR variable is -1.55569, and the estimated value of the coefficient of the NIIR variable is 6.52881.

When we interpret these values; 1 unit increase in the LDR variable will decrease the ROE by 0.18104 units while the effects of other variables are constant. 1 unit increase in IIR variable will decrease ROE by 1.55569 units while the effect of other variables is constant. While the effect of other variables is constant, 1 unit increase in NIIR variable will increase ROE by 6.52881 units. If the values of the LDR, IIR, and NIIR variables are zero, the ROE will be 33.98915 units. The standard errors of the parameters were obtained as 2.85056, 0.02757, 0.95846, and 2.81255 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 <2e-16, 6.89e-09, 0.1089, and 0.0231 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 less than 0.05 significance level. <2e-16<0.05 This indicates that the constant parameter β_0 is statistically significant. Hypothesis 2 (H_2) is rejected. Hipotez 3 (H_3) is confirmed.

The t statistics probability value of the parameter belonging to the LDR variable is less than 0.05 significance level. 6.89e-09<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 IIR variable is greater than the significance level of 0.05. 0.1089>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 NIIR variable is less than the significance level of 0.05. 0.0231<0.05 This indicates that the β_3 parameter is statistically significant. Hypothesis 8 (H_8) is rejected. Hypothesis 9 (H_9) is confirmed.

Table 4. Model

Multiple R-squared: 0.5516	Adjusted R-squared:0.5329
F-statistic: 29.52	p-value: 1.482e-12

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 0.5516. 55.16 % of the variation in ROE is explained by the independent variables in the model. The adjusted coefficient of determination value is 0.5329. This value is always obtained less than the

coefficient of determination. The F test statistic value is 29.52. The probability value of this test was obtained as 1.482e-12. 1.482e-12<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:

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

$Y = 33.98915 - 0.18104 X_1 - 1.55569 X_2 + 6.52881 X_3$

Tablo 5. Correlation

	ROE	LDR	IIR	NIIR
ROE	1.00	-072	0.29	0.51
LDR	-0.72	1.00	-0.39	-0.55
IIR	0.29	-0.39	1.00	0.78
NIIR	0.51	-055	0.78	1.00

Table 5 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 inverse high level relationship between ROE and LDR, same directional low level relationship between ROE and IIR, same directional medium level relationship between ROE and NIIR, inverse medium level relationship between LDR and IIR, and inverse medium level relationship between LDR and NIIR, high level relationship is seen between IIR and NIIR in the same direction.

IV.   CONCLUSION

In this study, a multiple regression analysis was applied with the R-Studio program using the data of Ziraat Bank for the period of 2003-2021. In the analysis, the effect of loan to deposit ratio(LDR), interest income ratio(IIR), and non-interest income ratio (NIIR) on average return on equity (ROE) was examined. The effect of the LDR independent variable on the ROE dependent variable was significant and negative, the effect of the IIR independent variable on the ROE dependent variable was negative and statistically insignificant, the effect of the NIIR independent variable on the ROE dependent variable was significant and positive. 55.16% of the variation in ROE is explained by the independent variables in the model. The remaining 44,84% of the variation in ROE is explained by other variables not included in this study.

Increasing non-interest income, which has a positive and statistically significant effect on return on equity, is of great importance for banks today. In addition to providing services such as brokerage and insurance agency for stock sales, banks also increase their non-interest income by creating cash flow through services such as bond borrowing and electronic fund transfer. Diversifying commission resources and increasing commission earnings, developing products and services that can meet the needs and demands of customers, creating new resources other than deposits as a source of funds, making the technological infrastructure and platforms faster and stronger, accelerating the processes by using artificial intelligence which has an important place in the daily functioning of the bank will have a positive impact on profitability performance.

REFERENCES

[1]   M.M. Cornett, T.A. Adair, and J. Nofsinger, *Finance* (NY: McGraw-Hill/Irwin, 2014).

[2]   T.W.Koch, *Bank Management* (The Dryden Press, Orlando: Harcourt Brace College Publishers, 1995).

[3]   J.F.Sinkey, *Commercial Bank Financial Management In The Financial Services Industry* (Prentice Hall., New Jersey: A Simon & Schuster Company, 1998).

[4]   P.S.Rose, *Commercial Bank Management* (McGraw-Hill Irwin, USA: McGraw-Hill Companies, Inc., 1996).

[5]   S.S.MacDonald, and T.W.Koch, *Management of Banking* (Thomson South-Western., USA: The Thomson Corporation, 2006).

[6]   S.Heffernan, *Modern Banking* (John Wiley & Sons, Ltd., GB Glasgow: Bell & Bain Ltd., 2005).

[7]   R.Smith, C.Staikouras, and G.Wood, Non-Interest Income and Total Income Stability. *Bank of England, 198*, 2003, 1-40.

[8]   K.Anwar, G.Marliani, and C.I.Gunawan,   Financial ratio analysis for increasing the financial performance of the company at Bank Bukopin. *Internatonal Journal of Sciences: Basic and Applied Research, 29(2)*, 2016, 231-236.

[9] M.I.Noor, and P.I.Rosyid, Effect of capital adequacy ratio, loan to deposit ratio and return on equity on share price PT Bank Danamon Indonesia. *International Journal of Business and Applied Social Science, 4(1)*, 2018, 87-101.

[10] M.Wijaya, and A.Yustina, The impact of financial ratio toward stock price: evidence from banking companies. *Journal of Applied Accounting and Finance, 1(1)*, 2017, 1-36.

[11] M.A.M.Kabajeh, S.M.A.A. Nu'aimat, and F.N.Dahmash, The relationship between the ROA, ROE and ROI ratios with Jordanian insurance public companies market share prices. *International Journal of Humanities and Social Science, 2(11)*, 2012, 115-120.

[12] M.Heikal, M. Khaddafi, and A.Ummah, Influence Analysis of Return on Assets (ROA), Return on Equity (ROE), Net Profit Margin (NPM), Debt To Equity Ratio (DER), and Current Ratio (CR), Against Corporate Profit Growth In Automotive In Indonesia Stock. *International Journal of Academic Research in Business ans Social Sciences, 4(12)*, 2014, 101-114.

[13] D.Hertina, and M.H.M.Saudi, Stock return: impact of return on assets, return on equity, debt to equity ratio and earning per share. *International Journal of Innovation, Creativity and Change, 6(12)*, 2019, 93-104.

[14] P.Sebayang, The impact of the capital adequacy ratio, non-performing loan against to return on equity (case study private bank in Indonesia). *SHS Web Conferences, The 1st International Conference on Social Sciences and Humanities, 76*, 2020, 1-7.

[15] E.Yanto, I. Christy, and P.A. Cakranegara, The influences of return on asset, return on equity, net profit margin, debt equity ratio and current ratio toward stock price. *International Journal of Science Technology & Management, 2(1)*, 2021, 300-312.

[16] L.Lusy, Y.B.Hermanto, T.W.S. Panjaitan, and M.Widyastuti, Effects of current ratio and debt to equity ratio on return on asset and return on equity. *International Journal of Business and Management Invention, 7(12)*, 2018, 31-39.

[17] L.V.Pointer, and P.D.Khoi, Predictors of return on assets and return on equity for banking and insurance companies on Vietnam Stock Exchange. *Entrepreneuiral Business and Economics Review, 7(4)*, 2019, 185-198.

[18] D.M.N.S.W.Dissanayake, The determinants of return on equity: evidences from Sri Lankan microfinance institutions. *International Refereed Research Journal, 2(2)*, 2012, 26-35.

[19] The Banks Association of Turkiye, *Statistical Reports*. Retrieved December 22, 2022, from www.tbb.org.tr

[20] E.F. Brigham & J.F. Houston, *Fundamentals of Financial Management* (USA: South Western Cengage Learning, 2012)