Determinants of Return on Assets

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ABSTRACT

The aim of this research is to identify the factors impacting the return on assets of privately owned deposit banks in Türkiye and to examine these banks by comparing their net profits, total assets, loans, deposits and non-interest incomes. Equity, deposit, loan, liquidity and non-interest income ratios were used as factors affecting the return on assets. Panel data analysis was made by applying R-Studio Program. According to analysis results, it was determined that the liquidity and non-interest income ratio had a positive impact on the return on assets. It was concluded that the negative impact of equity on return on assets.

Keywords: Non-Interest Income, Profitability, Return on Assets, ROA.

I. INTRODUCTION

Today, one of the most used ratios in determining bank profitability is return on assets (ROA). Net income after tax within total assets is the formula for return on assets. ROA is primarily an indicator of managerial effectiveness. It shows how skilful the bank management is at converting the bank's assets into net income.

ROA, which is the return on the bank's total assets as a measure of operating efficiency, can be seen in the first place as a reflection of the bank's profit margin and operating income. In the background, it includes management decisions such as portfolio of funds collected and invested, bank size, expense control, service and product pricing, tax liability.

The ratios that reflect the net result of the financial policies and transactions of banks or companies are profitability ratios. While liquidity, asset management, and debt management ratios narrowly reflect the bank's performance, profitability ratios represent the combined effect of all these ratios on the bank's overall operating performance. The bank or company reacts quickly to unexpected changes in profitability ratios. A low ROA can result from a large amount of debt intentionally taken. In this case, high interest expenses will result in very low net income. Of course, many ratios need to be looked at when evaluating a company's performance and determining what strategy it should pursue to move forward. By analyzing the bank's own rates over time, it is examined whether its financial situation is getting better or worse. The bank's rates are compared to the sector average and the sector's leading banks. These benchmarks are used to determine the principles of future performance.

There are many studies in the literature regarding the factors affecting the return on assets in companies or banks. In this research, the influence of deposit, loan, non-interest income, liquidity and equity ratios on return on assets were examined. The research was limited to privately owned deposit banks.

II. LITERATURE REVIEW

The aim is to investigate the primary determinants impacting the profitability of private deposit banks operating in Türkiye.

It was tried to indicate the results obtained in relation to the variables used in this research.

Saeed (2014) found that the positive influence of equity ratio on ROA for commercial banks of United Kingdom. Holden and El-Bannany (2004) showed that the impact of equity ratio on ROA is positive for banks in United Kingdom and bank size has an adverse effect on ROA. Almazari (2014) conducted a regression analysis for Saudi and Jordanian banks. The results showed that the impact of size of bank and credit facilities on ROA in Saudi banks is negative. Ani et al. (2012) performed a regression analysis of Nigria deposit banks. They found that the impact of equity ratio on ROA is negative and the impact of loan ratio on ROA is positive.

Ana et al. (2011) conducted a panel data analysis for Republic of Croatia commercial banks. They found the positive influence of deposit ratio and equity ratio on ROA.

Alnumani (2013) found that the insignificant positive effect of credit ratio and insignificant negative effect of equity ratio on ROA for commercial banks in Jordanian.

Bhatia et al. (2012) found a significant influence of non-interest income and deposit ratio on ROA for Indian banks of private sector.

Nimer et al. (2015) showed that the effect of liquidity on ROA is significant for banks in Jordan.

Gul et al. (2011) determined the positive influence of size of bank, loan and deposit ratios on ROA in commercial banks of Pakistan. San and Heng (2013) found positive impact of equity ratio on ROA for commercial banks in Malaysia. Weersainghe and Perera (2013) concluded that the effect of liquidity on ROA is negative for Sri Lanka commercial banks.
Kawshala and Panditharatna (2017) found the positive influence of deposit and capital ratio, and bank size on ROA in domestic commercial banks in Sri Lanka.

Boateng (2018) concluded that the effect of equity ratio on ROA is negative for banks of India. Lipunga (2014) showed that according to the findings of regression, the influence of liquidity on ROA is positive for Malawi commercial banks. Doan and Bui (2021) concluded that the liquidity has a negative impact on ROA for commercial banks of Vietnam. Anarfi et al. (2016) showed that the loan and capital have a positive effect on ROA for banks of Ghanaia. Rahman et al. (2015) showed the positive influence of non-interest income, equity and loan ratios on ROA for Bangladesh commercial banks. Ramlan and Adnan (2016) found the influence of equity ratio on ROA is negative for Malaysia Islamic banks.

Sufian and Chong (2008) concluded that the influence of non-interest income and equity ratios on ROA is positive for Philippine banks.

Zhang and Dong (2011) found that deposit, capital ratio and credit have a positive relationship with ROA.

III. METHODOLOGY

ROA, deposit, loan, non-interest income, equity, liquidity ratios of 8 privately-owned deposit banks operating in Turkey were used in the analysis. The data source has data for four periods of each year (March, June, September, and December) between 2002 and 2022. Data are available for December 2002, and for March, June, September for 2022. Data source is The Banks Association of Turkey.

A. Return on Assets (ROA)

ROA shows how efficiently the bank or company uses its assets to make a profit. The larger the ROA coefficient obtained, the more successfully the company’s assets are considered to be used to generate profits. ROA varies depending on bank size. In some time periods, the ROA of small banks may be higher than large banks. The comparison of assets sizes and net profits for the period as of 30.09.2022 of 8 privately owned deposit banks whose data were used in the study is shown in Fig. 1. below. In the graph, banks are listed according to their asset sizes. When banks are ranked according to asset size, Isbank ranks first and Turkish Bank ranks last. Banks are listed as Isbank, Yapi Kredi, Akbank, TEB, Fibabank, Sekerbank, Anadolubank, Turkish Bank according to their total assets. Ranking according to net profit is Akbank, Isbank, Yapi Kredi, TEB, Fibabank, Anadolubank, Sekerbank, Turkish Bank.

B. Deposit Ratio (DR)

Deposits are the item with the highest weight among the external resources and total resources of commercial banks. Credit customers of banks demand long terms and high amounts. Deposits generally include short-term and low-amount savings. Banks create an efficient fund transfer process between loans and deposits. They aim to optimize the use of resources by extending the maturity of the deposits they use to fund their placements.

C. Loan Ratio (LR)

Profitable assets of commercial banks are loans and investments. Credits, which are the primary occupations of commercial banks, can be separated according to their maturity structure and nature. Commercial loans are long-term and high-amount to corporate customers. Personal loans are aimed at individual customers and include types such as credit cards, consumer, automobile, housing loans. Entrepreneurial loans for commercial purposes, on the other hand, contain some characteristics of both groups.

The comparison of total credits and total deposits for the period as of 30.09.2022 of 8 privately owned deposit banks whose data were used in the study is shown in Fig. 2. below. According to the graph, the loan to deposit ratio is 92% for Yapi Kredi, 85% for Isbank, 81% for Akbank, 74% for TEB, 72% for Sekerbank, 71% for TEB, 66% for Anadolubank, 56% for Turkish Bank.
Non-interest income can be expressed by the formula given in (1).

Non − Interest Income (net) =
Net Fees and Commission Income or Expenses +
Dividend Income + Business Profit or Loss +
Other Operating Income

The ratios of net non-interest income/total assets of 8 privately owned deposit banks between years 2011 and 2021 are shown in Fig. 3, below. The ratio of non-interest income to total assets, in 2011, the highest is seen in Yapi Kredi with 2.32, and the lowest in Fibabank with 0.83. In 2012, the highest is seen in Sekerbank with 2.89, and the lowest in Fibabank with 1.25. In 2013, the highest is seen in Sekerbank with 2.10, and the lowest in Turkish Bank with 0.68. In 2014, the highest is seen in Anadolubank with 2.23, and the lowest in Turkish Bank with 0.47. In 2015, the highest is seen in Akbank with 1.29, and the lowest in Fibabank with 0.50. In 2016, the highest is seen in Sekerbank with 1.97, and the lowest in Turkish Bank with 0.76. In 2017, the highest is seen in Yapi Kredi with 1.16, and the lowest in Turkish Bank with 0.05. In 2018, the highest is seen in Anadolubank with 2.76, and the lowest in Turkish Bank with 0.50. In 2019, the highest is seen in Anadolubank with 2.65, and the lowest in Isbank with 0.50. In 2020, the highest is seen in Anadolubank with 2.14, and the lowest in TEB with -0.30. In 2021, the highest is seen in Fibabank with 2.09, and the lowest in TEB with -0.20.

The ratio varies between 1.04-1.96 for Akbank, 0.84-2.76 for Anadolubank, 0.50-2.09 for Fibabank, 0.52-2.89 for Sekerbank, 0.05-1.52 for Turkish Bank, -0.30-1.54 for TEB, 0.50-2.23 for Isbank, and 1.14-2.32 for Yapi Kredi.

Banks should determine the level of liquidity taking into account the highest possible deposit withdrawal. Liquidity shortages can lead to problems that can drive the bank into bankruptcy. As the liquidity of the assets increases, the returns they will offer compared to the less liquid investment alternatives will also decrease. The transactions of banks to meet their liquidity needs deprive them of a certain profit. When there is a liquidity shortage, they need to quickly obtain funds from the central bank or other banks at an affordable price.

F. Equity Ratio (EQR)

Equity is the amount that shareholders pay to the company to buy the shares that the company sells in order to raise its capital. Paid-in capital shows the money that the shareholders provide to the company in proportion to their own shares. In addition, earnings retained by the company over the years are also included in equity. If the directors of the firm decide to reinvest the profits of the relevant operating period within the firm instead of distributing dividends to the shareholders, this amount is recorded in the retained earnings account in the balance sheet. In bank balance sheets, the share of paid-in capital in total liabilities is generally low. This does not mean that the paid-in capital is unimportant. On the contrary, when a bank with a solid capital structure encounters any negative situation, it may be possible to overcome it with minimal loss.

G. Research Method

The variables and formulas of the established model are given in Table I.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Return on Assets (ROA)</td>
<td>( \frac{\text{Total net profit}}{\text{Average Assets}} )</td>
</tr>
<tr>
<td>Deposit Ratio (DR)</td>
<td>( \frac{\text{Total Deposit}}{\text{Total Assets}} )</td>
</tr>
<tr>
<td>Loan Ratio (LR)</td>
<td>( \frac{\text{Total Loans}}{\text{Total Assets}} )</td>
</tr>
<tr>
<td>Non-Interest Income Ratio (NIIR)</td>
<td>( \frac{\text{Net Non-Interest Income}}{\text{Total Assets}} )</td>
</tr>
<tr>
<td>Equity Ratio (EQR)</td>
<td>( \frac{\text{Equity}}{\text{Total Assets}} )</td>
</tr>
<tr>
<td>Liquidity Ratio (LIR)</td>
<td>( \frac{\text{Liquid Assets}}{\text{Total Assets}} )</td>
</tr>
</tbody>
</table>

ROA is the dependent variable, DR, LR, NIIR, EQR, and LIR are independent variables. The panel data model formula created with these variables is given in (2).

\[
Y_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + u_{it} \tag{2}
\]

where,

\[
Y_{it} = \text{Return on Assets (ROA)}
\]

\[
X_{1it} = \text{Equity Ratio (EQR)}
\]

\[
X_{2it} = \text{Deposit Ratio (DR)}
\]

\[
X_{3it} = \text{Loan Ratio (LR)}
\]

\[
X_{4it} = \text{Liquidity Ratio (LIR)}
\]

\[
X_{5it} = \text{Non-Interest Income Ratio (NIIR)}
\]

\[
\beta_0 = \text{constant parameter}
\]

\[
u_{it} = \text{error term}
\]

In (2), the sub-index t is used since the variables change according to time, and the sub-index i is used because it also changes according to the units. Panel data have both horizontal and vertical dimensions. For this reason, panel data reveal more impact and measure more effectively when

Fig. 3. Non-Interest Income.
compared to cross-section analysis or time series analysis. As can be seen in the Results section, the number of cross-section data is indicated by N, and the number of the time dimension is T. If the time series is the same for all cross sections, it is defined as a balanced panel, if not, it is defined as an unbalanced panel. R-Studio Program was used in the analysis of the data.

IV. RESULTS AND DISCUSSION

In Fig. 4. below, banks are shown with lines of different colors. The general trend is the blue dashed line, with all the banks being processed at the same time. This line is a regression between the average return on assets and the year. Average return on assets increases slightly as time progresses.

The descriptive statistics of the data set used in the study are summarized in Table II.

As Table II shows, Return on assets (ROA) has a median of 1.387 and a mean of 1.046. 23.403 and -49.038 are the maximum and minimum points, respectively. Equity Ratio (EQR) has a median of 11.669 and a mean of 12.295. 91.609 and 4.738 are the maximum and minimum points. Deposit Ratio (DR) has a median of 63.066 and a mean of 64.213. 87.533 and 1.153 are the maximum and minimum points. Loan Ratio (LR) has a median of 60.327 and a mean of 55.779. 87.841 and 0.078 are the maximum and minimum points. Non-Interest Income Ratio (NIIR) has a median of 0.987 and a mean of 1.242. 7.9238 and -1.579 are the maximum and minimum points.

Ordinary least squares regression plots of the independent variables with the dependent variable are shown in Fig. 5-Fig. 9. The dark blue line represents the most suitable line.

Deposit Ratio (DR) has a median of 63.066 and a mean of 64.213. 87.533 and 1.153 are the maximum and minimum points. Loan Ratio (LR) has a median of 60.327 and a mean of 55.779. 87.841 and 0.078 are the maximum and minimum points. Liquid Ratio (LIR) has a median of 25.418 and a mean of 29.064. 85.280 and 8.521 are the maximum and minimum points. Non-Interest Income Ratio (NIIR) has a median of 0.987 and a mean of 1.242. 7.9238 and -1.579 are the maximum and minimum points.

The analysis tests applied in the R Studio program are summarized below respectively. To determine which of the random effects and OLS (Ordinary Least Squares) regression models are suitable for the established model, the Breusch-Pagan (BP) Lagrange Multiplier (LM) Test is performed. Since the p value was found to be less than 0.05 significance level as a result of the test, the basic hypothesis regarding the test cannot be accepted. Random effects model is preferred. It is decided that it is appropriate to use the unit effect model.
The significance of the random effects (RE) model was tested. p value is lower than 0.05 significance level as seen in Table IV. The basic hypothesis that the model is statistically insignificant cannot be accepted. The model is decided to be significant.

The significance of the fixed effects (FE) model was tested. p value is lower than 0.05 significance level as seen in Table V. The basic hypothesis that the model is statistically insignificant cannot be accepted. The model is decided to be significant.

<table>
<thead>
<tr>
<th>Balanced Panel:</th>
<th>n = 8, T = 80, N = 640</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residuals:</td>
<td></td>
</tr>
<tr>
<td>Min. -17.67551</td>
<td>1 st Qu. -0.79894</td>
</tr>
<tr>
<td></td>
<td>Median 0.02604</td>
</tr>
<tr>
<td></td>
<td>3 rd Qu. 0.93003</td>
</tr>
<tr>
<td></td>
<td>Max. 20.49515</td>
</tr>
<tr>
<td>Coefficients:</td>
<td></td>
</tr>
<tr>
<td>(intercept) -4.117805</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std.Error 1.694805</td>
</tr>
<tr>
<td></td>
<td>t-value -2.4297</td>
</tr>
<tr>
<td></td>
<td>Pr(&gt;</td>
</tr>
<tr>
<td>X1 -0.357170</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std.Error 0.022528</td>
</tr>
<tr>
<td></td>
<td>t-value -15.6459</td>
</tr>
<tr>
<td></td>
<td>Pr(&gt;</td>
</tr>
<tr>
<td>X2 0.041170</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std.Error 0.015116</td>
</tr>
<tr>
<td></td>
<td>t-value 2.7236</td>
</tr>
<tr>
<td></td>
<td>Pr(&gt;</td>
</tr>
<tr>
<td>X3 0.070524</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std.Error 0.011221</td>
</tr>
<tr>
<td></td>
<td>t-value 6.2853</td>
</tr>
<tr>
<td></td>
<td>Pr(&gt;</td>
</tr>
<tr>
<td>X4 0.077161</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std.Error 0.012585</td>
</tr>
<tr>
<td></td>
<td>t-value 6.1310</td>
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<tr>
<td></td>
<td>Pr(&gt;</td>
</tr>
<tr>
<td>X5 0.592110</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Std.Error 0.106532</td>
</tr>
<tr>
<td></td>
<td>t-value 5.5580</td>
</tr>
<tr>
<td></td>
<td>Pr(&gt;</td>
</tr>
<tr>
<td>Signif. codes:</td>
<td>0.**** 0.001 *** 0.01 ** 0.05 . 0.1 ' 1</td>
</tr>
<tr>
<td>Total Sum of Squares: 8257.6</td>
<td>Residual Sum of Squares: 4113.8</td>
</tr>
<tr>
<td>R-Squared: 0.50182</td>
<td>Adj. R-Squared: 0.49789</td>
</tr>
<tr>
<td>Chisq: 638.623 on 5 DF</td>
<td>p-value: &lt; 2.22e-16</td>
</tr>
</tbody>
</table>
The p-test was applied to decide which of the fixed effects and ordinary least squares models is more suitable. p value is lower than 0.05 significance level. The fixed effects model is preferred.

Both fixed effects and random effects model were statistically significant. Hausman test was performed to determine which one is more suitable. According to the Hausman test result, p value is higher than 0.05 significance level. This result shows the existence of random effects model.

It is necessary to examine the cross-sectional dependence in panel data models. BP LM and Pesaran Cross Sectional Dependence (CD) tests were performed to investigate the cross-sectional dependence, that is, the relationship between units or the existence of correlation between units. The p value of both tests is lower than 0.05 significance level. This result shows us the existence of cross-section dependence.

One of the basic assumptions of regression is that there is no autocorrelation. Autocorrelation, also referred to as serial correlation, is defined for error terms of the regression model. It refers to the fact that the error terms are related to their past and previous values.

The Breusch-Godfrey/Wooldridge (BGW) test was used to test for the existence of serial correlation. The test concluded that the p value was lower than 0.05. This result indicates the existence of serial correlation.
The non-interest rate of income has a positive effect on the average return on assets. Pr value is lower than 0.05 significance level. The coefficient β in (2) is significant and its value is 0.592110.

V. CONCLUSION

In the panel data analysis using the R-Studio program, 5 independent variables, namely deposit, loan, liquidity, equity, and non-interest income rates, were used as factors affecting the average return on assets. As a sample, the data of 8 privately owned deposit banks operating in Turkey were taken. As a result of the analysis, it was observed that the effects of liquidity and non-interest income ratios on the average return on assets were positive and significant. The impacts of deposit and loan ratios on the average return on assets was found to be positive and statistically insignificant. The impact of equity ratio on average return on assets was negative and significant.

It is observed that the results had from this analysis are consistent with the previous research. The positive impact of liquidity ratio on ROA is compatible with the findings of Almazari (2014). The significant impact of liquidity ratio on ROA is collaborate with the study of Weersainghe and Perera (2013); Doan and Bui (2021). The result of positive and significant impact of liquidity ratio on ROA is collaborate with Lipunga (2014).

The result of positive and significant impact of non-interest income ratio on ROA is supported by following studies: Bhatia et al. (2012); Sufian and Chong (2008); Rahman et al. (2015). The positive impact of deposit ratio on ROA is collaborate with the results of Gul et al. (2011); Kawshala and Panditharatna (2017); Ana et al. (2011). The statistically insignificant impact of deposit ratio ROA is compatible with analysis by Ramlan and Adnan (2016); Anarfi et al. (2016). The positive and insignificant influence of deposit ratio on ROA is collaborate with Saeed (2014).

The positive impact of loan ratio on ROA is compatible with the results of Gul et al. (2011); Ani et al. (2012); Rahman et al. (2015); Anarfi et al. (2016). The positive and statistically insignificant impact of loan ratio on ROA is collaborate with analysis by Ramlan and Adnan (2016); Almazari (2014); Almumani (2013); Saeed (2014). The insignificant impact of loan ratio on ROA is supported by Ana et al. (2011).

The negative impact of equity ratio on ROA is supported by the results of Gul et al. (2011); Almumani (2013). The significant impact of equity ratio on ROA is supported by the results of Sufian and Chong (2008); Kawshala and Panditharatna (2017); Rahman et al. (2015); Ana et al. (2011); San and Heng (2013); Saeed (2014); Anarfi et al. (2016). The significant and negative impact of equity ratio on ROA is in line with analysis by Ani et al. (2012); Ramlan and Adnan (2016); Boateng (2018).

Today, increasing competition in banking sector causes the profit margins to decrease. For banks, the cost of holding liquid resources as a precautionary measure can result in operating losses. The liquidity ratio should be determined at an appropriate level according to the customer base, developments in the financial markets, and the target strategies of the bank. Bank liquidity should be managed by creating portfolios, importance should be given to low-risk and short-term cashable securities portfolios. In addition, it is necessary to observe the balance sheet asset-liability maturity match.

For all companies, poor management of income generating assets is the main factor leading to bankruptcy. For banks, capital is much more important than other companies. It is of great importance to have a strong capital structure in adverse situations caused by banks’ lack of liquidity and the failure of their placements. By adjusting the equity outsourcing rate, the bank can lower the average cost of capital and optimize its capital structure. As the bank’s outsourcing increases, the decrease in capital adequacy will cause the bank’s financial risk to increase.

There is a decrease in interest income from loans and deposits in the banking sector around the world. This decrease in interest income leads banks to earn from other services and products. It is important to combine technology, data and customer needs into products and services adapted to developing trends. Creating and presenting simple and easy processes to the customer requires the creation of business intelligence that supports smart decision making at every business level, with advanced data analytics in the background. It also is important to create management models jointly with and interacting with other organizations.

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