

# Financial Ratio Analysis as a Prediction Tool of Bankruptcy on Banking Companies Listed in Indonesia Stock Exchange

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**Abstract**—This study aims to analyze the financial ratios of banks to predict bank bankruptcy in Indonesia. Variables used by a number of seven bank financial ratios are CAR, LDR, NPL, BOPO, ROA, ROE and NIM. The research data is obtained by census which means the whole population is used in the research which is 33 banks in year 2018. The analysis tool used is logit regression. The results of the multivariate test showed that the LDR variable had a significant effect on the profitability of bankruptcy of banks in Indonesia at  $\alpha > 5\%$  but did not have the same sign as predicted. CAR, NPL, BOPO, ROE, and NIM variables have the same mark as the predicted but not significant. The ROA variable is not significant and has a different sign than predicted. In general, the results do not accept all  $H_0$ . The accuracy of bank bankruptcy predictions in 2018 amounted to 94.7%. Therefore, the level of errors made in predicting bankruptcy is type II, that is, banks that are predicted to go bankrupt are not bankrupt.

**Keywords:** bank, bankruptcy, bank financial ratio, logit regression

## I. INTRODUCTION

Banking is a company in which its activities directly deal with the society. Banking activities are much influenced by the trust from its customers or community. If there is disturbance within the institution, there will be strong reaction from the people. During the economic crisis which began with the liquidation of sixteen banks in November 1997 and later on 13 March 1999 as thirty-eight other banks were declared to be failed to continue their activities. There are two types of distress, namely economic distress and financial distress. Economic distress of a company is associated with an imbalance between revenue and expenditure. Economic distress can be also caused by the company's capital costs which are higher than the profit rate on historical cost of investment. Meanwhile, a company is categorized as financially distressed if the company is unable to pay its due date liabilities although the total assets exceed its liabilities.

Another reason for the bank's collapse — as it happened in the 1997-1998 crisis was a lot of bank owners who intervened in the daily operational of banks, extension of credit or loans,

and little attention to risk management, good governance, and prudential.

Bankruptcy may be triggered by various factors, both directly and indirectly. Banks can go bankrupt and must be closed if their performance is poor due to high numbers of non-performing loans or assets. Moreover, bank had liquidity problems due to massive withdrawals at one time since systemic crisis, bank run, and public distrust of the bank. Liquidity problems can also be caused by a mismatch of short-term funding structures [1].

Company's performance can be measured by using financial statements. The bank's financial statements consist of balance sheet provide information about financial position, income statement to assess the bank's operational development, statement of cash flows that provide information on cash turnover. Financial statement not only reflects the condition of a company in the past but it can also be used to predict the financial condition of a company in the future [2]. Company's high value indicated high prosperity that every company wants to achieve [3]. And from financial statements, company management can find out what the fair share price of the company [4].

Financial distress of a company can be reflected in the performance indicators where the company experiences short-term financial distress (liquidity) which if inadequately managed will result in long-term financial distress (solvability) that may lead to bankruptcy [5]. Financial distress can be interpreted as the inability of a company to pay its financial liabilities at due date which lead to bankruptcy of the company [6]. Corporate bankruptcy can be detected with an early warning system [7].

## II. THEORETICAL FRAMEWORK

The Act of State No. 10 of 1998 concerning "Banking" stated that banks are business entities that collect funds from the public in form of deposits and distribute them to the public in form of loan and / or other forms to improve people's standard of living. Commercial banks are banks that carry out conventional business activities and / or based on sharia principles for the purpose of providing services in payments.

### A. Financial Statement

The most important role of financial statements in management is as accountability of report. The report is written in the form of financial statements to present the financial position and results in a certain period based on the accounting principles.

Financial statements are the fundamental to understand financial position of a company, to assess past performance and to predict financial performance in the future [8]. He added that financial statements has the ability to clearly present the financial health of a company to make informative business decisions".

According to the research it is shown how definite fundamental signals from current financial reports such as changes in sales, accounts receivable, inventory, gross margin and capital expenditure can increase predictions of earnings changes in the coming year [9].

In accordance with the Statement of Financial Accounting Concepts No. 1 about the purpose of financial reporting to provide useful information to investors, creditors and other users, both current and potential in making investment, credit and similar decisions rationally. The second objective of financial reporting is to provide information to help investors, creditors, and other users both present and potential in assessing the amount, time and uncertainty of prospective cash receipts from dividends or interest [10].

### B. Bank Liquidity Theories

There are four renowned banking liquidity theories [11]:

1) *Commercial loan theory*: It is considered to be the oldest theory; it is also known as the doctrine real bills. This theory began about two centuries ago. The study of this theory was conducted by Adam Smith in his famous book *The Wealth of Nations*, published in 1776. This theory assumes that banks can only provide loans with self-liquidating short-term commercial loans. Self-liquidating means the loan is used for repayment.

2) *Shiftability theory*: This theory is based on the proposition that the assets of the banks are either to be sold to other lenders or investors or shifted to central bank which stands ready to purchase assets offered for sale. If the depositors decide to withdraw their money, the bank will only sell the investment, take what is obtained (or purchased), and repay to the depositor.

3) *Anticipated income theory*: In 1940 this theory was prominent in the United States; it is also known as the anticipated income theory. It means all funds allocated or every effort allocating funds is shown in a feasible sector that will be beneficial for the bank.

4) *The liability management theory*: In liability management theory, banks should manage their liabilities properly to be a source of liquidity. The required liquidity for banks is: deal with withdrawals, fulfill bank's obligations, provide loans.

### C. Bankruptcy

The terms used in this study is to identify some banking problems such as bankruptcy [12]; bank failure [13], bank problems [14], financial distress [15]. Banks that failed in businesses have one or both of the following two criteria:

Firstly, the bank needs financial support and or management support from the government in running its operations.

Secondly, based on the level of bank financial health it is categorized as less healthy and unhealthy. The term financial distress to show severe liquidity problems that cannot be solved without a large scaling of corporate operations or structures [16].

At some points, financial distress is the best view as a whole economic idea/ thought. Empirical research about this subject area has objective criteria for categorizing companies. Bankruptcy is a criterion used in many studies. This is a legal event that can be affected by the actions of bankers or other creditors. Even if the presumption of financial distress is binary, it is not necessary to be one-to-one categories between non-distressed/ distressed and non-bankrupt/bankrupt.

Determining the bankruptcy model through financial analysis, classification of error can be classified into two: 1) Type I error, this type of error occurs when there is a prediction that the company is not bankrupt, but it turns out to be bankrupt. 2) Type II error, this type of error occurs when there is a prediction that the company is bankrupt, but it turns out to be not bankrupt [17].

### D. Indicators of Financial Distress or Bankruptcy

There are some indicators or sources of information about financial failure or bankruptcy:

- Current and future cash flows analysis to directly focus on the alleged bankruptcy for the concerned period. Cash flows estimation in this analysis is critical variables as the assumptions that underlie budgeting.
- Company strategy analysis considers potential competitors of the company or institution, relative cost structure, building expansion in the industry, company's ability to continue increasing costs, management quality, and so on. In this theory, such consideration will also underlie cash flow analysis. However, a separate focus on the problem of strategy can highlight the consequences of sudden changes in an industry, for example: BEP testing and cost structure.
- Company financial statements with company comparisons analysis focused on single financial variables (univariate analysis) or a combination of financial variables (multivariate analysis) with external variables such as return securities or bond ratings.

### E. Research Hypothesis

Based on the previous studies, CAR, LDR, NPL, BOPO, ROA, ROE, and NIM have influence on probability of bank

financial distress in Indonesia. Therefore, the hypotheses of this research are as follow:

- $H_{a1}$  = CAR have negative influence on probability of bank financial distress in Indonesia
- $H_{a2}$  = LDR have positive influence on probability of bank financial distress in Indonesia
- $H_{a3}$  = NPL have positive influence on probability of bank financial distress in Indonesia
- $H_{a4}$  = BOPO have positive influence on probability of bank financial distress in Indonesia
- $H_{a5}$  = ROA have negative influence on probability of bank financial distress in Indonesia
- $H_{a6}$  = ROE have negative influence on probability of bank financial distress in Indonesia
- $H_{a7}$  = NIM have negative influence on probability of bank financial distress in Indonesia.

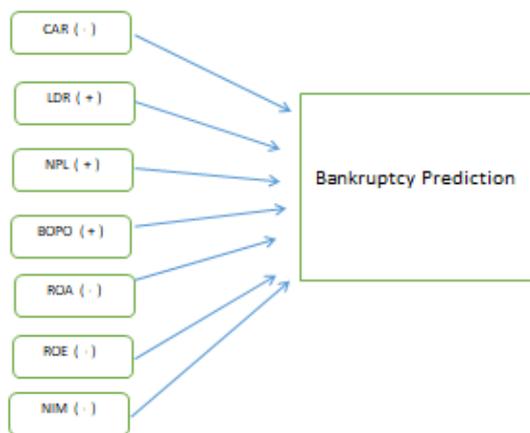


Fig. 1. Research framework.

**III. METHOD**

The object of the research used in this study was a banking company listed on the Indonesia Stock Exchange (IDX) in 2018, using CAR, NPL, LDR, BOPO, ROA, ROE and NIM ratios used to predict bankruptcy of a banking business. The criteria for determining problematic conditions are if the bank has been merged or liquidated; banks whose licenses have been revoked by the authorities, banks that have incurred losses for at least 2 years, and banks that have CAR or NPL do not meet the requirements.

The variables in this research were classified into two; they are dependent variable and independent variable as shown in Table 1.

TABLE I. RESEARCH VARIABLES

Variable	Formula
Dependent Variable : Banking status	Dummy variable " 1 " if it is bankrupt with the criteria of less healthy and not healthy . " 0 "if it is not bankrupt with the criteria of less healthy and not healthy
Independent Variable : CAR	$CAR = Capital / Asset\ with\ risk \times 100\%$
LDR	$LDR = Loan\ to\ deposit\ ratio \times 100\%$
NPL	$NPL = Noan\ Performig\ Loans \times 100\%$
BOPO	$BOPO = Operational\ Expanse / Operational\ Income \times 100\%$
ROA	$ROA = Profit\ Before\ Tax / Total\ Asset \times 100\%$
ROE	$ROE = Net\ Profit / Equity \times 100\%$
NIM	$NIM = Net\ Interest / Earning\ Assets \times 100\%$

**IV. RESULTS AND DISCUSSION**

*A. Data Description*

In this research, statistical description is needed to analyze the data. The statistical description of the data for the year of 2018 is presented in Table 2.

TABLE II. DESCRIPTIVE STATISTICAL

Descriptive Statistics						
	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Sum</i>	<i>Mean</i>	<i>Std. Deviation</i>
CAR	33	11.43	23.72	546.74	16.5679	3.10312
NPL	33	.10	3.61	38.50	1.1667	.94769
LDR	33	56.86	113.15	2,825.06	85.6079	10.99950
BOPO	33	55.35	184.90	2,654.26	80.4321	22.45233
ROA	33	-7.64	4.46	55.17	1.6718	2.00161
ROE	33	-10.99	35.18	534.80	16.2061	9.56676
NIM	33	2.13	11.95	171.05	5.1833	2.27322
Valid N (listwise)	33					

Source: Processed secondary data

CAR variable has minimum value 11.43% and maximum value 23.72%. Meanwhile, the mean value 16.57% indicates the banks have high CAR value. NPL variable has minimum value 0.10% and maximum value 3.61%. The mean value 1.17% indicates the banks are capable to provide loans selectively. LDR variable has minimum value 56.86% and

maximum value 113.15%. The minimum value indicates some of the banks are incapable to provide loans, whereas the maximum value indicates the banks are quite capable to market the funds. Meanwhile, the mean value 85.61% indicates the banks are liquid (less than 120%).

BOPO variable has minimum value BOPO 55.35% and maximum value 184.90%. The mean value 80.43% indicate the average banks have good efficiency rate (less than 94%) while the others need to perform efficiency. ROA variable has minimum value -7.64%, maximum value 4.46% and mean value 1.68%. Negative ROA value indicates some of the banks experienced loss. Nevertheless, the average banks gain high profit in which the value is 1.68% (higher than 1.25%).

ROE variable has minimum value -10.99%, maximum value 35.18%, and mean value 16.21%. Negative ROE value indicates some of the banks experienced loss. However, the average banks gain high profit that can be seen from the mean value 16.21%. NIM variable has minimum value 2.13%, maximum value 11.95%, and mean value 5.18% which indicate the average banks has high rate of Net Interest Margin (the mean value is higher than 2%).

TABLE III. FIT MODEL TEST 2018

Fit Model Test		Result
-2 Log Likelihood	-2 LL Block Number 0	42.015
	-2 LL Block Number 1	21.647
Cox & Snell R Square	Cox	0.347
Nagelkerke R Square	Nagel	0.606
Hosmer and Lemeshow Test	Chi Square	5.446
	Sig	0.709

The table 3 shows that the hypothesis model describe the input data from -2 Log Likelihood Block Number, Cox& Snell R Square, Nagelkerke R Square, and also Hosmer and Lemeshow Test. Fit Model can be assessed from the statistical value -2 LogL without variable, only the constant value 42.015. After a new variable is added, the value -2 LogL decreased to 21.647 or 20.368 drops. In other words, the discrepancy of -2 LogL is significant. It means that the addition of independent variable would improve the fit model.

Meanwhile, the value of Cox Snell's R Square is 0.347 and Nagelkerke R<sup>2</sup> is 0.606 means that dependent variable variability can be defined by 60.6% of independent variable. Hosmer and Lemeshow's Test are applied to test the 0 hypothesis that the empirical data is proper and fit to the model (no differences between model and data). The statistic value of Hosmer and Lemeshow's Goodness Fit Test is 5.446 with significant probability 0.709 (above 0.05). Therefore, the model is accepted.

The logit test result for 2018 can be seen in the following table 4.

TABLE IV. LOGIT TEST

Significant $\alpha > 5\%$				
	Prediction	B	SIG	EXP (B)
CAR	Negative	-0,072	0,037	0,931
LDR	Positive	-0,063	0,067*	0,939
NPL	Positive	0,019	0,043	1,019
BOPO	Positive	-0,097	0,020	0,908
ROA	Negative	1,486	0,023	0,226
ROE	Negative	-0,007	0,018	1,007
NIM	Negative	-0,009	0,033	1,009
CONSTANT		8,376	0,663	0,000

Source: Processed secondary data

Improper variables in 2018 are LDR and ROA. LDR is negative due to incapability of the banks to spend the funds appropriately. As a result, the banks invest in the form of low-risk productive assets. The banks gain much interest income from these investments. ROA becomes positive because of high rate of profit, but the loans are low. The average value of NPL for the overall banks is 1.17%. It indicates that the non-performing loans are less.

TABLE V. ACCURACY OF BANKRUPTCY PREDICTION MODEL

Realty		Prediction Status		Accuracy (%)
Status	Observation	Healthy	Bancrupt	
Healthy	25	24	1	96
Bancrupt	8	1	7	87.5
Accuracy (%)				94.7

Source: Processed secondary data

*Sensitivity* is a true positive rate between prediction and financial failure or bankruptcy. *Specificity* is a true negative rate between prediction and financial failure or bankruptcy. *Correct* is a ratio of accuracy between prediction and reality, both for banks that go bankrupt and those are not bankrupt against the samples. *False positive* (error type II) is a ratio of banks that predicted to go bankrupt but they are not bankrupt against the samples predicted to go bankrupt. *False negative* (error type I) is a ratio of banks predicted not to be bankrupt but they turn out to be bankrupt against the samples predicted not to be bankrupt.

The table 5 shows that there are 8 (eight) banks are predicted to be bankrupt. However, based on the observation, there are only 5 (five) banks bankrupt whereas 3 (three) banks are not bankrupt. Therefore, the accuracy of classification for sensitivity is 7/8 or 87.5%. The prediction of bankruptcy is 25 banks. Based on the observation, there is only 1 bank bankrupt; the rest 24 banks are not bankrupt. The accuracy of classification for specificity is 24/25 or 96%. The overall accuracy of classification (*correct*) is 87.9%. Error type II (*false positive*) is 1/8 or 12.50% whereas error type I (*false negative*) is 1/25 or 40%.

## V. CONCLUSION

This study aims to examine and analyze the significant influence of CAR, LDR, NPL, BOPO, ROA, ROE, NIM financial ratios with bankruptcy banks. The data used in this study is the data of banking companies that were in effect Indonesia Indonesia Stock Exchange in 2018. The total population of 33 banks can be used in this study. Hypothesis testing uses multivariate tests with logit regression. The results of the study did not accept the whole Ha.that there are 8 (eight) banks are predicted to be bankrupt. However, based on the observation, there are only 5 (five) banks bankrupt whereas 3 (three) banks are not bankrupt. Therefore, the accuracy of classification for sensitivity is 7/8 or 87.5%. The prediction of bankruptcy is 25 banks. Based on the observation, there is only 1 bank bankrupt; the rest 24 banks are not bankrupt. The accuracy of classification for specificity is 24/25 or 96%. The overall accuracy of classification (*correct*) is 87.9%. Error type II (*false positive*) is 1/8 or 12.50% whereas error type I (*false*

*negative*) is 1/25 or 40%. For further research, it should extend the research period and consider factors other than financial ratios, such as size, compliance aspects such as the percentage of violations of the Maximum Lending Limit, the percentage exceeding the Maximum Lending Limit, the Minimum Mandatory Demand Deposits and the Net Open Position.

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