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 40 banks in year 2017. 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 Ha.
Keywords: bank, bankruptcy, bank financial ratio, bankruptcy.
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Introduction

Various financial institutions grow as the economy grows. One of the financial institutions that seem to have the most important role in economy is banking financial institution, which are commonly referred as bank. Bank is a kind of financial institution in which companies, government and private institutions, as well as individuals save their funds. Through providing loan and various services, banks serve financial needs and launch payment system mechanism for all economic sectors.

Banking plays an important role in people's lives. 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.

Tabel 1.1
Banking Performance 2015-2018

Tabel 1.25. Kinerja Bank Umum Konvensional (Commercial Banks Performance) Miliar Rp (Billion Rp)																
Keterangan	2015	2016	2017		2018											Items
			Nov	Des	Jan	Feb	Mar	Apr	Mei	Jun	Jul	Ags	Sep	Okt	Nov	
Rasio Pemenuhan Kecukupan Modal Minimum (%)	21,39	22,93	23,37	23,18	23,43	23,24	22,65	22,25	22,19	22,01	22,56	22,83	22,91	22,97	23,32	Capital Adequacy Ratio (%)
- Modal	914.657	1.052.597	1.157.064	1.166.002	1.175.666	1.177.340	1.161.653	1.160.316	1.166.181	1.176.676	1.198.170	1.213.589	1.226.367	1.240.430	1.251.213	- Capital
- ATMR	4.276.555	4.589.611	4.951.148	5.029.816	5.017.974	5.065.592	5.129.158	5.213.753	5.254.403	5.345.488	5.311.506	5.315.028	5.353.846	5.400.855	5.364.358	- Risk Weighted Assets
Rasio Modal Inti terhadap ATMR (%)	19,00	21,19	21,69	21,50	21,77	21,58	20,98	20,50	20,45	20,42	20,92	21,09	21,19	21,25	21,59	Core Capital Ratio to ATMR (%)
- Modal Inti (Tier I)	812.590	972.350	1.073.893	1.081.234	1.092.477	1.093.381	1.076.311	1.068.586	1.074.729	1.091.769	1.110.931	1.120.955	1.134.279	1.147.625	1.158.069	- Core Capital (Tier I)
- ATMR	4.276.555	4.589.611	4.951.148	5.029.816	5.017.974	5.065.592	5.129.158	5.213.753	5.254.418	5.345.488	5.311.506	5.315.028	5.353.846	5.400.855	5.364.358	- Risk Weighted Assets
Return On Assets Ratio (%)	2,32	2,23	2,48	2,45	2,50	2,36	2,55	2,40	2,38	2,43	2,46	2,47	2,50	2,52	2,52	Return On Assets Ratio (%)
- Laba sebelum pajak	132.601	136.048	166.121	165.196	175.466	166.526	180.570	170.741	169.789	173.853	177.127	177.808	181.016	183.358	183.716	- Profit
- Rata-rata total aset	5.703.813	6.106.959	6.696.785	6.730.350	7.020.879	7.049.879	7.078.453	7.099.936	7.130.626	7.168.225	7.187.449	7.208.105	7.228.114	7.262.656	7.290.852	- Average total assets
Biaya Operasional thdp Pendapatan Operasional (%)	81,49	82,22	78,37	78,64	81,80	81,09	78,76	79,59	79,43	79,46	79,05	79,26	79,13	78,71	78,03	Operating Expenses/Operating Income (%)
- Biaya Operasional	569.141	624.173	546.822	603.178	68.078	113.344	162.597	215.324	265.633	322.902	374.211	432.358	490.120	536.041	580.228	- Operating Expenses
- Pendapatan Operasional	698.404	759.146	697.707	766.975	83.228	139.780	206.441	270.531	334.423	406.359	473.387	545.460	619.357	681.014	743.585	- Operating Income
Net Interest Margin Ratio (%)	5,39	5,63	5,31	5,32	5,19	5,00	5,07	5,07	5,09	5,11	5,12	5,14	5,13	5,13	5,12	Net Interest Margin Ratio (%)
- Pendapatan bunga bersih	293.824	329.913	340.285	342.731	348.992	338.024	343.588	345.001	347.684	350.332	352.305	354.475	355.477	356.825	357.633	- Interest income net
- Rata-rata total aset produktif	5.449.642	5.854.786	6.413.849	6.445.076	6.729.232	6.755.977	6.782.807	6.801.445	6.825.468	6.859.225	6.877.219	6.896.128	6.917.324	6.952.549	6.981.469	- Average total earning assets
Loan to Deposits Ratio (%)	92,11	90,70	88,97	90,04	89,10	89,21	90,19	90,43	91,99	92,76	93,11	93,79	94,09	93,71	93,19	Loan to Deposits Ratio (%)
- Total Kredit kepada pihak ketiga bukan Bank	3.903.936	4.199.713	4.418.713	4.548.155	4.445.801	4.474.893	4.553.173	4.587.122	4.686.549	4.784.436	4.784.803	4.839.567	4.921.548	4.970.100	4.960.336	- Total Credit to third party
- Total Dana Pihak Ketiga	4.238.349	4.630.352	4.966.736	5.050.984	4.989.468	5.016.043	5.048.278	5.072.433	5.094.582	5.157.744	5.138.722	5.160.189	5.230.922	5.303.577	5.322.634	- Total Third Party Funds
Rasio Aset Likuid (%)	16,70	17,50	18,49	18,56	18,23	18,11	17,91	17,36	17,19	16,68	15,64	15,41	15,35	15,39	15,58	Liquid Assets Ratio (%)
- Aset Likuid Primer	736.720	837.433	893.406	963.833	920.320	901.106	922.998	921.985	984.962	964.041	823.382	816.952	821.890	843.314	860.438	- Primary Liquid Asset
- Aset Likuid Sekunder	251.623	296.098	362.824	353.504	359.304	380.975	354.856	321.754	261.775	263.243	319.086	316.172	323.418	322.236	319.336	- Secondary Liquid assets
- Total Aset	5.919.390	6.475.602	6.944.188	7.099.564	7.020.879	7.078.879	7.135.601	7.163.989	7.253.384	7.356.221	7.302.794	7.352.701	7.462.427	7.573.536	7.572.810	- Total Assets
Ket: Data tidak termasuk data kinerja BUS																

Source: Statistik Perbankan Indonesia Vol 16 No12, Nov 2018, www.ojk.go.id

From the table above it can be seen that the Bank's performance in November 2018 CAR (23.32%), Core Capital ratio to ATMR (21.59%), ROA (2.52%), Operating Expense / Operating Income (78.03%)), NIM (5.12%), LDR (93.19%), Liquid Asset Ratio (15.58%).

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.

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 (Pankof and Virgil in Suharman, 2007). Nurhayati (2013) said that company's high value indicated high prosperity that every company wants to achieve.

One of the techniques used to assess companies is financial ratio analysis. Indicators of bank's performance can be viewed from liquidity, profitability, bank risk, capital ratio and business efficiency ratio. Liquidity ratio assesses the company's ability to meet short-term liabilities. Profitability ratio assesses the company's ability to make profit. Business risk ratio assesses the risks in running a business. Capital ratio measures the ability of capital to cover losses. Business efficiency ratio measures the level of efficiency of the company. The financial ratio is expected to be used to detect financial distress.

The bankruptcy prediction model is used as a means of early warning of financial distress, that is, it can improve conditions before reaching a crisis or bankruptcy condition (Endri, 2009).

Literature Review
Financial Statement
The final result of financial records is financial statements. Financial statements are reflection of management's achievements in particular period. By analyzing the financial statements of a company, the management's performance can be identified during particuar period of time. However, financial statements is not the only aspect to reflect the actual achievements.

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.

Fraser and Ailen Orminston (2004: 1-2) explained that financial statements are the fundamental to understand financial position of a company, to assess past performance and to predict financial performance in the future. He added that financial statements has the ability to clearly present the financial health of a company to make informative business decisions".

It can be concluded that financial statements generally consist of balance sheet and also profit and loss statements, but in fact, some additional reports are often used to support financial statements and provide further explanations such as capital statement, statement of cash flows, and others.

Bank Liquidity Theories
There are four renowned banking liquidity theories (Veitzhal, 2007: 387):
a.   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.
b.   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.
c.   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.
d.   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:
1)   Deal with withdrawals
2)   Fulfill bank's obligations
3)   Provide loans

Bankruptcy

The terms used in this study is to identify some banking problems such as bankruptcy (Altman, 1968; Ohlson, 1980; Barniv *et all*, 2002); bank failure (Meyer and Pifer, 1970), bank problems (Sinkey, 1975; Santoso, 1996), financial distress (Platt and Platt, 2002). 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 (Santoso in Suharman, 2007). Foster (1986) used the term financial distress to show severe liquidity problems that cannot be solved without a large scaling of corporate operations or structures.

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.

According to Farid and Siswanto (in Januarti, 2002), in determining the bankruptcy model through financial analysis, classification of error can be classified into two:

- 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.
- 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.

Indicators of Financial Distress or Bankruptcy

According to Foster (1986), there are some indicators or sources of information about financial failure or bankruptcy:

a) 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.
b) 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.
c) 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.

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:

a. H_{a1} = CAR have negative influence on probability of bank financial distress in Indonesia
b. H_{a2} = LDR have positive influence on probability of bank financial distress in Indonesia
c. H_{a3} = NPL have positive influence on probability of bank financial distress in Indonesia
d. H_{a4}= BOPO have positive influence on probability of bank financial distress in Indonesia
e. H_{a5} = ROA have negative influence on probability of bank financial distress in Indonesia
f. H_{a6} = ROE have negative influence on probability of bank financial distress in Indonesia
g. H_{a7} = NIM have negative influence on probability of bank financial distress in Indonesia

Figure 3.1
Research Framework
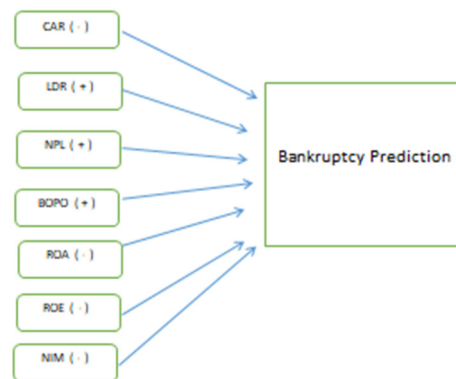
Research Method

The population in this research is 40 banking companies listed in Indonesia Stock Exchange during 2017. The prediction model of the next following year tends to be more accurate (Suharman, 2007). The sample was obtained through census in which the population used as the data. Census is applied to obtain real value (Supranto, 2003).

The data is in the form of annual financial statements. The variables in this research were classified into two; they are dependent variable and independent variable as shown in Table 4.1:

Table 4.1
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 healthy and healthy enough
Independent variable: CAR	CAR = Capital / Asset with Risk x 100%
LDR	LDR = Loan to Deposit Ratio x 100%
NPL	NPL = Non Performing Loans x 100%
BOPO	BOPO = Operational Expenses/ Operational Income x 100%
ROA	ROA = Profit before Tax / Total Assets x 100%
ROE	ROE = Net Profit / Equity x 100%
NIM	NIM = Net Interest / Earning Asset x 100%

The object of this research is banking companies listed in Indonesia Stock Exchange during 2017 by using CAR, NPL, LDR, BOPO, ROA, ROE and NIM ratios for predicting bankruptcy in banking business.

Tabel 4.2

Banking Companies Listed in Indonesia Stock Exchange

No	Nama Bank	Kode
1	BANK RAKYAT INDONESIA AGRO NIAGA TBK	AGRO
2	BANK AGRIS TBK	AGRS
3	BANK MNC INTERNATIONAL TBK	BABP
4	BANK CAPITAL INDONESIA	BACA
5	BANK CENTRAL ASIA TBK	BBCA
6	BANK HARDA INTERNATIONAL TBK	BBHI
7	BANK BUKOPIN TBK	BBKP
8	BANK MESTIKA DHARMA TBK	BBMD
9	BANK NEGARA INDONESIA TBK	BBNI
10	BANK NUSANTARA PARAHYANGAN TBK	BBNP
11	BANK RAKYAT INDONESIA (PERSERO)TBK	BBRI
12	BANK TABUNGAN NEGARA (PERSERO) TBK	BBTN
13	BANK YUDHA BHAKTI TBK	BBYB
14	BANK DANAMON TBK	BDMN
15	BANK PEMBANGUNAN DAERAH BANTEN TBK	BEKS
16	BANK GANESHA TBK	BGTB
17	BANK INA PERDANA TBK	BINA
18	BANK JABAR BANTEN TBK	BJBR
19	BANK PEMBANGUNAN DAERAH JAWA TIMUR TBK	BJTM
20	BANK QNB INDONESIA TBK	BKSW
21	BANK MASPION INDONESIA TBK	BMAS
22	BANK AMNDIRI (PERSERO) TBK	BMRI
23	BANK BUMI ARTA TBK	BNBA
24	BANK CIMB NIAGA TBK	BNGA
25	BANK MAYBANK INDONESIA TBK	BNII
26	BANK PERMATA TBK	BNLI
27	BANK SINARMAS TBK	BSIM
28	BANK OF INDIA INDONESIA TBK	BSWD
29	BANK TABUNGAN PENSIUNAN NASIONAL TBK	BTPN
30	BANK VICTORIA INDONESIA TBK	BVIC
31	BANK DINAR INDONESIA TBK	DNAR
32	BANK ARTHA GRAHA INTERNATIONAL TBK	INPC
33	BANK CHINA CONSTRUCTION BANK IND TBK	MCOR
34	BANK MEGA TBK	MEGA
35	BANK MITRANIAGA	NAGA
36	BANK OCBC INSP	NISP
37	BANK NATIONALNOBU TBK	NOBU
38	BANK PAN INDONESIA TBK	PNBN
39	BANK PANIN SYARIAH TBK	PNBS
40	BANK WOORI SAUDARA INDONESIA 1906 TBK	SDRA

Source :Indonesia Stock Exchange, Processed

Findings and Discussion

Data Description

In this research, statistical description is needed to analyze the data. The statistical description of the data for the year of 2017 is presented in Table 5.1.

Tabel 5.1

Statistical Descriptive Data in 2017 (in precentage)

Descriptive Statistics

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
CAR	40	11.43	23.72	546.74	16.5679	3.10312
NPL	40	.10	3.61	38.50	1.1667	.94769
LDR	40	56.86	113.15	2,825.06	85.6079	10.99950
BOPO	40	55.35	184.90	2,654.26	80.4321	22.45233
ROA	40	-7.64	4.46	55.17	1.6718	2.00161
ROE	40	-10.99	35.18	534.80	16.2061	9.56676
NIM	40	2.13	11.95	171.05	5.1833	2.27322
Valid N (listwise)	40					

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 5.3
Fit Model Test 2013

FIT MODEL TEST		RESULT
-2 Log Likehood	-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

Source: Processed secondary data

The table 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^2 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 2017 can be seen in the following table:

Table 5.4
Variable Equations in Logit Test

DESCRIPTION	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

* Significant in α > 5%

Source: Processed secondary data

Improper variables in 2017 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.

CONCLUSIONS
This study aims to examine and analyze the significant effect of CAR, LDR, NPL, BOPO, ROA, ROE, and NIM financial ratios on bank bankruptcy. The data used in this study are data of banking companies that are known as the Indonesia Indonesia Securities in 2017. The total population of 40 banks can be used in this study. Hypothesis testing uses multivariate test with logit regression. The results of the study did not accept Ha overall.

The variable that is influential in explaining bank bankruptcy is the LDR. In accordance with the results of the logit test, it can be concluded that bank bankruptcy is caused by the ability to market funds not maximally so

that banks invest funds collected in the form of other productive assets that are not at risk.

Based on the conclusions above, a number of suggestions are expected to be useful for the company and for other parties:

1) The negative effect of LDR on the probability of bankruptcy of a bank shows that the function of banks in lending has not gone well so that an idle fund occurs that can affect bank bankruptcy. To maintain liquidity at the same time so that the bank does not experience bankruptcy, management can plan the marketing of bank service products and place idle funds in the form of productive assets other than credit.

2) Further research should extend the research period and consider factors other than financial ratios, such as size, compliance aspects such as percentage violations of the Lending Limit, percentage exceeding the Maximum Lending Limit, Minimum Statutory Reserves and Net Open Position.

3) The negative influence of the LDR on the probability of bankruptcy of the bank shows that the bank's function in channeling credit has not gone well so that there is an idle fund that can affect the bank's bankruptcy. To maintain liquidity at the same time so that the bank does not experience bankruptcy, management can plan the marketing of bank service products and place idle funds in the form of productive assets other than credit.

4) Further research should extend the research period and consider factors other than financial ratios, such as size, compliance aspects such as percentage violations of the Lending Limit, percentage exceeding the Maximum Lending Limit, Minimum Statutory Reserves and Net Open Position.

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