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## ANALYSIS OF BANK HEALTH AND MACROECONOMIC STRESS TESTING ON CREDIT RISK (STUDY ON BUMN BANK LISTED ON THE INDONESIA STOCK EXCHANGE FOR THE 2017-2021 PERIOD)

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#### Abstrack

Bank is a business that has important role for people. But, in recent years there have been problems that have hit banks, namely the Covid-19 pandemic. Banks are required to keep anticipating risks arising from the pandemic. This study aims to analyze the bank health using the RGEC method and do stress testing on credit risk. The research was conducted at BUMN Bank, such as BRI, BNI, BTN and Mandiri in the 2017-2021 period. The research of the bank health used ratio analysis, such as Non Performing Loans (NPL), Loan to Deposit Ratio (LDR), Net Interest Margin (NIM). ), Return On Assets (ROA) and Capital Adequacy Ratio (CAR). In the ratios of NPL, NIM, and CAR it is known that the bank health of all BUMN Bank is at a very healthy level (PK-1). For the ROA ratio, there are several banks that are at PK-4 and PK-5 level, especially in 2019-2021. For the LDR ratio during 2017-2021 there are no BUMN Bank that in the very healthy category. For the stress test measurement using the inflation shock scenario, it can be concluded that when Indonesia's inflation based on the scenario of the Minister of Finance in 2020 was at the level of 5.1%, the Bank's NPL remained in a very healthy category

Keywords: bank, bank health, RGEC method, stress test

## A. INTRODUCTION

Banking in Indonesia is a business entity that has an important function, especially for people's lives.

If we look at the past few years, there have been problems that must be faced by banks, especially BUMN Bank, since 2020 until now there has been a Covid-19 pandemic which has also had an impact on economic conditions. Changes in the lifestyle of debtors after the pandemic have an impact on their ability to pay installments from loans submitted at the bank and can later cause a decrease in income at the bank. The Financial Services Authority (OJK) responded to this problem by providing relaxation for banks to carry out restructuring.

Reporting from internet media (Kontan.co.id), the implementation of the banking restructuring didn't necessarily improve the bank's performance at first. However, when we viewed from performance at the end of 2021, improvement

continues to be seen in BUMN Bank after declining in 2020 as a result of the impact of the Covid-19 pandemic. Four BUMN Bank posted a consolidated net profit of IDR 72.07 trillion, an increase of 78.6% from the profit earned in 2020.

However, despite the relaxation of the restructuring from the OJK, banks are still required to anticipate the risks that will occur amidst the shadow of economic uncertainty during the Covid-19 pandemic which has lasted from 2020 to the present.

Based on the Financial Services Authority (OJK) Regulation Number 4/POJK.03/2016 dated 27 January 2016 concerning Assessment of the Health Level of Commercial Banks, several indicators are used to measure the health level of a bank by using the RGEC method. The RGEC method is a refined method of the previous bank rating method, namely the CAMELS method. The RGEC method consists of: Risk Profile, GCG (Good Corporate Governance), Earnings (Rentability), and Capital (Capital). Quantitatively the Risk Profile, Earnings, and Capital can be measured using ratio analysis. Based on the analysis of financial ratios, information will be obtained that is easier to read and estimate, and it will also be known how the company's activities are developing

Previously there were several studies to measure banking performance. Korompis, et al. (2016) conducted research using the RGEC method with research objects at PT Bank Rakyat Indonesia in 2012-2014 and showed the level of health bank in 2011 to 2013 as a whole can be said to be a healthy bank. Perkasa (2007) examined the effect of the level of health bank using CAR, BOPO, NIM, NPL and LDR ratios on the performance of commercial banks in Indonesia seen from ROA Ratio at 2005.

The research conducted by the author is currently an update of these studies, in which the research period spans from 2017 - 2021 and the focus of this research is not only to analyze the health of the Bank but also to conduct a macroeconomic stress testing analysis on the credit risk of Indonesian BUMN Banks. represented by the Inflation Rate. The thing that makes this research interesting is that during the span of the research period there were periods when economic fluctuation occurred due to the Covid-19 pandemic to be precise in 2020-2021 and even today.

## **B. METHODOLOGY**

The design of this study uses a quantitative approach in the form of causal associative. According to Sugiyono (2012) in Siyoto & Sodik (2015), quantitative research methods can be interpreted as research methods based on the philosophy of positivism, used to examine certain populations or samples. Data analysis is quantitative/statistical in nature with the aim of testing the established hypotheses.

The quantitative approach is conducted because the data used is empirical data and the variables used have measurable units.

The population and sample in this study are banks that are included in the category of BUMN bank's, such as PT. Bank Rakyat Indonesia, Tbk., PT Bank Negara Indonesia, Tbk., PT. Bank Negara Indonesia, Tbk, and PT. Bank Mandiri, Tbk.

The sampling technique used is saturated sampling technique, this technique was chosen because the population in this study is also the sample of this study.

The variables of this study are the ratios that serve as indicators for assessing the health of banks, namely Non-Performing Loans (NPL), Loan to Deposit Ratio (LDR), Net Interest Margin (NIM), Return On Assets (ROA), and Capital Adequacy Ratio (CAR).

#### C. ANALYSIS AND DISCUSSION

#### 3.1. Analysis of Bank Health Level Based on Non Performing Loan Ratio

According to Kasmir (2018) in Abdurrohman, et al. (2020: 127), Non-Performing Loan (NPL) is credit in which there are obstacles caused by 2 elements that's from the bank in analyzing it and from the customer who intentionally or unintentionally does not make payments in his obligation.

The NPL ratio is the ratio used to determine a bank's ability to measure the risk of default on credit from debtors. The NPL ratio is a comparison between total non-performing loans to total loans.

Formula:

NPL = (Total Non-Performing Loans/Total Distributed Loans) ×100 %

The health level measurement matrix based on the NPL Ratio : Table 1

Ranking	Description	Criteria	Category
1	РК-1	<7 %	Very Healthy
2	РК-2	7 %-<10 %	Healthy
3	РК-3	10 %-<13 %	Quite Healthy
4	РК-4	13 %-<16%	Unhealthy
5	РК-5	>16 %	Not Healthy

Matrix NPL Ratio

NPL										
Bank Name	2017		2018		2019		2020		2021	
Dalik Nallie	%	РК								
Bank Rakyat Indonesia	2,10%	1	2,14%	1	2,62%	1	2,94%	1	3,08%	1
Bank Negara Indonesia	2,3%	1	1,9%	1	2,3%	1	4,3%	1	3,7%	1
Bank Tabungan Negara	2,66%	1	2,81%	1	4,78%	1	4,37%	1	3,70%	1
Bank Mandiri	3,45%	1	2,79%	1	2,39%	1	3,29%	1	2,81%	1

## Table 2 NPL Health Level OF BUMN Banking for the 2017-2021 period

Source : Attachment from SK DIR BI No 30/12/KEP/DIR

From the assessment of the health level of BUMN banking above, it can be concluded that all BUMN Banks have very healthy during the 2017-2021 period. Problems related to Covid-19 from 2020-2021 also do not make the ratio of health levels to NPL at an not healthy level. It can be said that the restructuring issued by the OJK was able to keep the Bad Loans Ratio in the Very Healthy category, even showing results of less than 5%.

## 3.2. Analysis of Bank Health Level Based on Loan to Deposit Ratio

According to Alper, et al., (2011) in Prasanjaya & Ramantha (2013: 234), A company is required to maintain its liquidity and ensure smooth operations in fulfilling its obligations. Banks that have large total assets, have the opportunity to extend credit to borrowers in larger amounts, thereby obtaining high profits.

The LDR ratio is used to compare the composition of the amount of credit extended compared to the amount of public funds and own capital used (third-party funds).

Formula:

LDR = (Total Credit)/(Total Third-Pary Funds) ×100 %

The health level measurement matrix based on the LDR Ratio : Table 3

Matrix	LDR	Ratio
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Ranking	Description	Criteria	Category
1	PK-1	50 %-<75 %	Very Healthy
2	PK-2	75 %-<85 %	Healthy
3	PK-3	85 %-<100 %	Quite Healthy
4	PK-4	100 %-<120 %	Unhealthy
5	PK-5	>120 %	Not Healthy

LDR										
Bank Name	2017		2018		2019		2020		2021	
Dalik Nalile	%	РК	%	РК	%	РК	%	РК	%	РК
Bank Rakyat Indonesia	88,13%	3	89,57%	3	88,64%	3	83,66%	2	83,67%	2
Bank Negara Indonesia	85,6%	3	88,8%	3	91,5%	3	87,3%	3	79,7%	2
Bank Tabungan Negara	103,13%	4	103,49%	4	113,50%	4	93,19%	3	92,86%	3
Bank Mandiri	88,11%	3	96,74%	3	96,37%	3	82,95%	2	80,04%	2

## Table 4 LDR Health Level OF BUMN Banking for the 2017-2021 period

Source : Attachment from SK DIR BI No 30/12/KEP/DIR

A high LDR ratio indicates that credit growth at these banks is higher than the growth in sources of funds for banks, namely third party funds.

The higher the LDR ratio affects the health for that bank because it can disrupt the course of banking operational activities due to the number.

When viewed from the banking health level matrix, it can be seen that none of the banks are included in the PK-1 category. Almost every year all BUMN banks are in the PK-3 & PK-4 category, especially BTN where in the 2017-2021 period they are always in that category (> 85%) this indicates that the bank is able to distribute funds exceeding the Fund limit Third parties that are owned and feared to affect bank liquidity because later the bank does not have sufficient reserve funds to fulfill the demand for public funds.

## 3.3. Analysis of Bank Health Level Based on Net Interest Margin Ratio

According to Pandia (2012:71) in Harun (2016:71), Net Interest Margin (NIM) is the ratio used to measure the ability of bank management to manage its productive assets to generate net interest income. Net interest income is obtained from interest income minus interest expenses.

NIM is the ratio between net interest income to the average earning assets.

Formula:

NIM = (Net Interest Income)/(Average Earning Asset) ×100 %

The health level measurement matrix based on the NIM Ratio :

Table 5

#### Matrix NIM Ratio

Ranking	Description	Criteria	Category
1	PK-1	> 2,5 %	Very Healthy
2	РК-2	2 %-<2,5 %	Healthy
3	РК-3	1,5 %-<2 %	Quite Healthy

4	РК-4	1 %-<1,5 %	Unhealthy
5	РК-5	<1 %	Not Healthy

#### Table 6

#### NIM Health Level OF BUMN Banking for the 2017-2021 period

NIM										
Bank Name	2017		2018		2019		2020		2021	
	%	РК								
Bank Rakyat Indonesia	7,93%	1	7,45%	1	6,98%	1	6.00%	1	6,89%	1
Bank Negara Indonesia	5,5%	1	5,3%	1	4,9%	1	4,5%	1	4,7%	1
Bank Tabungan Negara	4,76%	1	4,32%	1	3,32%	1	3,06%	1	3,99%	1
Bank Mandiri	5,63%	1	5,52%	1	5,46%	1	4,48%	1	4,73%	1

Source : Attachment from SK DIR BI No 30/12/KEP/DIR

The high of NIM ratio shows the ability of banks to use their productive assets to generate income for the bank. If a bank's NIM ratio is high, it indicates that the bank gets a large profit-sharing income with little principal expense. Overall, all BUMN banks have the Very Healthy category and at > 3%. Even though the condition of the Covid-19 Pandemic in 2020-2021 has decreased, it is still in the category of Very Healthy.

### 3.4. Analysis of Bank Health Level Based on Return On Asset Ratio

The Return On Assets ratio shows the results on the total assets used in the company. It is also a measure of the effectiveness of management to manage its investments. The smaller of this ratio is good, and vice versa.

Raharjo & Muid (2013: 3) said that the higher the ratio of return on assets indicates that the company is more effective in utilizing assets to generate net profit after tax.

Formula:

 $ROA = (Net Profit After Tax)/(Total Asset) \times 100 \%$ 

The health level measurement matrix based on the ROA Ratio : Table 7

Ranking	Description	Criteria	Category
1	PK-1	> 1,45 %	Very Healthy
2	РК-2	1,25 %-1,45 %	Healthy
3	РК-3	0,99 %-1,25 %	Quite Healthy
4	PK-4	0,765 %-0,99 %	Unhealthy
5	РК-5	<0,765 %	Not Healthy

Matrix ROA Ratio

ROA										
Bank Name	2017		2018		2019		2020		2021	
	%	РК								
Bank Rakyat Indonesia	3,69%	1	3,68%	1	3,50%	1	1,98%	1	2,72%	1
Bank Negara Indonesia	2,7%	1	2,8%	1	2,4%	1	0,5%	5	1,4%	2
Bank Tabungan Negara	1,71%	1	1,34%	2	0,13%	5	0,69%	5	0,81%	4
Bank Mandiri	2,72%	1	3,17%	1	3,03%	1	1,64%	1	2,53%	1

# Table 8ROA Health Level OF BUMN Banking for the 2017-2021 period

Source : Attachment from SK DIR BI No 30/12/KEP/DIR

A bank is said to be healthy if the ROA ratio is more than 1.45%. The ROA ratio indicates a bank's ability to generate profits by utilizing its assets. The higher the ROA, the bank is said to be able to properly utilize its assets to earn profits.

In assessing the health level of BUMN banks in terms of ROA, in 2017 all BUMN banks were at PK-1 which indicated that the bank was able to generate profits with its assets. Bank Rakyat Indonesia and Bank Mandiri are BUMN banks that are able to be at the health level with the category of Very Healthy during the 2017-2021 period. Bank BTN is in category of unhealthy and not healty it indicates that the bank unable to generate profits with its assets. Likewise Bank Negara Indonesia in 2020 which is also in PK-5.

## 3.5. Analysis of Bank Health Level Based on Capital Adequacy Ratio

CAR is the main proxy for bank capital. According to Dietrich et al., (2009) in Prasanjaya & Ramantha (2013: 233), banks with high capital are considered relatively safer than banks with low capital, this is because banks with high capital usually have lower needs than on external funding.

In every banking financial report in Indonesia, it is ensured that there is a report on the calculation of the Minimum Capital Adequacy Requirement (KPMM), which is an indicator of the level of prudence of a bank in managing its funds.

CAR is a ratio that shows how much the total risky bank assets (loans, investments, securities, claims on other banks) are also financed from their own capital in addition to obtaining funds from sources outside the bank.

Formula:

 $CAR = (Total Capital)/(Total Asset by Risk) \times 100 \%$ 

The health level measurement matrix based on the CAR Ratio  $\,:\,$  Table 9

i i i i i i i i i i							
Ranking	Description	Criteria	Category				
1	РК-1	CAR <11 %	Very Healthy				
2	РК-2	9,5 % <u>&lt;</u> CAR <11 %	Healthy				
3	РК-3	8 % <u>&lt;</u> CAR <9,5 %	Quite Healthy				
4	РК-4	6,5 % <u>&lt;</u> CAR <8 %	Unhealthy				
5	РК-5	CAR < 6,5 %	Not Healthy				

Matrix CAR Ratio

#### Table 10

## CAR Health Level OF BUMN Banking for the 2017-2021 period

CAR										
Bank Name	2017		2018		2019		2020		2021	
	%	РК								
Bank Rakyat Indonesia	22.96%	1	21.21%	1	22.55%	1	20.61%	1	25,28%	1
Bank Negara Indonesia	18.53%	1	18.50%	1	19.73%	1	16.78%	1	19,7%	1
Bank Tabungan Negara	18.87%	1	18.21%	1	17.32%	1	19.34%	1	19,14%	1
Bank Mandiri	21.64%	1	20.96%	1	21.39%	1	19.90%	1	19,60%	1

Source : Attachment from SK DIR BI No 30/12/KEP/DIR

A bank is categorized as very healthy if the CAR ratio is above 11% which indicates that the bank has sufficient capital reserves to finance risky bank assets.

If we look at the 2017-2021 period, it can be concluded that all banks have relatively safe capital to be able to finance risky bank assets. All BUMN banks are in PK-1 and are even at a ratio above 15%.

## 3.6. Stress Test Analysis

Stress test analysis of the banking system, the focus is generally on credit risk.

The importance of a stress test for macroprudential analysis departs from the fact that this tool is able to provide a uniform approach, so that the results can be aggregated, identify key sensitivity in the system as a whole, and provide information on comparable risk profiles of all observed banks (Elsiefy, 2012 in Indra, 2018).

The type of stress test chosen is a sensitivity test. The use of a sensitivity test type stress test is chosen to analyze the sensitivity of credit risk behavior, if there is disturbance from each economic indicator. In this study, a sensitivity test was carried out by entering scenarios into the previously analyzed regression equation.

Before applying the stress test, a regression analysis was first carried out. After obtaining the regression model for each bank, a stress test is carried out by entering the shock from the scenario into the regression equation to see the sensitivity of the NPL ratio. The magnitude of the shock follows the severe scenario set by the Indonesian Minister of Finance for 2020.

Banking Probability of Default is closely related to lending activities. Because the main focus on credit issues is related to the concept of default risk, thus the calculation of the risk of failure from banks is used, including the Probability of Default through Non-performing Loans and Total Loans.

The inflation rate was chosen to be a measure of the banking stress test level by analyzing it using the NPL ratio of each bank. The relationship between the inflation rate and the NPL ratio is when the inflation happen, the cost of living will be higher because prices will increase. So that in real terms the income of the community and companies has decreased, and it is difficult for debtors to pay off their debts and the NPL ratio will increase (Rizal et al, 2019 in Ramadhani & Maski, 2022). The magnitude of the inflation shock based on the scenario of the Minister of Finance in 2020 is 5.1%

The inflation rate at the end of each year in the 2017-2021 period

Table 11 Inflation Rate 2017-2022 Period

Year	Inflation
2017	3,61%
2018	3,13%
2019	2,72%
2020	1,68%
2021	1,87%

Based on the inflation rate data used in the study from 2017 to 2021, it shows that inflation tends to decline, especially in 2020. Based on the results of data processing based on E-Views 12, the results of multiple linear regression analysis obtained are as follows

Table 12				
Result of BRI Reg	gression Ana	alysis		
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C INFLASI	3.936887 -0.523016	0.247963 0.091717	15.87689 -5.702513	0.0005 0.0107
NPL BRI = 3,9368 - 0,523 (INF)				

The Probability of Default constant with a value of 3.93 indicates that if the independent variable, namely inflation growth, is considered constant, the resulting Bank BRI Probability of Default is 3.93%. The inflation regression coefficient has a negative coefficient of -0.52 which indicates a negative effect of the inflation

variable on BRI Bank's Probability of Default. Thus it can be interpreted that if inflation increases by 1%, then the Probability of Default Bank BRI will decrease by 0.52%.

Table 13				
Result of BNI Re	Result of BNI Regression Analysis			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C INFLASI	5.874067 -1.142993	0.850269 0.314498	6.908481 -3.634346	0.0062 0.0359
NPL BNI = 5,874 – 1,1429 (INF)				

The Probability of Default constant with a value of 5.87 indicates that if the independent variable, namely inflation growth, is considered constant, the resulting Bank BNI Probability of Default is 5.87%. The inflation regression coefficient has a negative coefficient of -1.14 which indicates a negative effect of the inflation variable on the Probability of Default of Bank BNI. Thus it can be interpreted that if inflation increases by 1%, then the Probability of Default Bank BNI will decrease by 1.14%.

Table	e 14				
Result of BTN Regression Analysis					
	Variable	Coefficient	Std. Error	t-Statistic	Prob.
	C INFLASI	5.603459 -0.745372	1.339831 0.495577	4.182214 -1.504051	0.0249 0.2296
NPL BTN = 5,6034 - 0,7453 (INF)					

The Probability of Default constant with a value of 5.6 indicates that if the independent variable, namely inflation growth, is considered constant, then the resulting Probability of Default for Bank BTN is 5.6%. The inflation regression coefficient has a negative coefficient of -0.74 which indicates a negative effect of the inflation variable on the Probability of Default of Bank BTN. Thus it can be interpreted that if inflation increases by 1%, the Probability of Default of Bank BTN will decrease by 0.74%

Table 15				
Result of Mandiri Bank Regression Analysis				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C INFLASI	2.808459 0.052860	0.805047 0.297771	3.488567 0.177518	0.0398 0.8704
NPL MANDIRI = 2,8084 + 0,0528 (INF)				

The Probability of Default constant with a value of 2.8 indicates that if the independent variable, namely inflation growth, is considered constant, then the resulting Probability of Default for Bank Mandiri is 2.8%. The inflation regression coefficient has a positive coefficient of 0.052 which indicates that the inflation variable has a positive effect on Bank Mandiri's Probability of Default. Thus it can be interpreted that if inflation increases by 1%, the Probability of Default of Bank Mandiri will increase by 0.052%.

After obtaining each regression equation from each bank, the next step is to enter the shock into the regression equation.

	NIDI	
<b>Results of Stres</b>	s Test for BUMN	Banks (Inflation Shock to NPL)
Table 16		

Bank	NPL
BRI	1,269 %
BNI	0,045 %
BTN	1,802 %
Mandiri	3,077 %

From the table it can be concluded that when simulating inflation scenario at the 5.1% level, Bank Mandiri's Probability of Default is the highest with 3.07% then BTN with 1.8%, BRI with 1.26%, and Bank BNI's Probability of Default is the lowest with 0.04% but all the BUMN bank remain in the Very Healthy category.

## 4. CONCLUSION

Based on the research that has been done, it can be concluded that by using an assessment of the health of a bank using the RGEC method, in the assessment of the risk profile assessed by the Non-Performing Loan Ratio, it is known that all BUMN banks studied are in the very healthy category (PK-1). This proves that the existence of the Covid-19 pandemic did not necessarily increase the ratio of non-performing loans from BUMN banks, otherwise with the restructuring carried out by the Financial Services Authority (OJK) so that loans that were basically affected by the impact of Covid-19 could remain in the criteria for current loans. However, for the assessment with the Loan To Deposit Ratio it is known that there were no BUMN Banks during the study period that were in the Very Healthy category (<75%), this indicates that the loans disbursed were not in proportion to the Third-Party Funds received by the Bank.

In evaluating earnings as assessed by the ROA ratio, it is known that only in 2017 all BUMN banks are in the Very Healthy category. Bank BTN in 2019-2020 and BNI in 2020 are in the Unhealth category which indicates that these banks are not able to use its assets to generate profits. But, the NIM ratio of all BUMN banks in the assessment period is in the Very Healthy category, which indicates that the productive assets of the bank are to generate interest income for the bank. For Capital assessment which is assessed using the CAR ratio it is also known that all banks are in the Very Healthy category, this indicates that all BUMN Banks in the assessment period have sufficient capital to finance their bank assets which contain risks.

An analysis was also carried out to conduct a stress test on BUMN banks using the inflation indicator by comparing it to credit risk (NPL). The research was conducted based on the Minister of Finance's 2020 scenario, which mention the NPL is at the level of 5.1% and it is known that all BUMN banks are able to deal with the shock and remain in the Very Healthy category for the NPL level of their banks.

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