Analysis of the Influence of Banking Performance and Macroeconomic on Banking Stability in Indonesia

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Abstract
This study aims to analyze the effect of banking and macroeconomic performance on banking stability in Indonesia. The main factor that causes fluctuations in banking stability is influenced by internal factors (fundamental factors) are factors that originate from within the company and can be controlled by company management, while external factors (non-fundamental factors) are caused by economic conditions such as interest rates and government policies. The purpose of this study is to analyze the effect of banking and macroeconomic performance on banking stability in Indonesia. The researcher uses the period of years after the issuance of OJK rules from 2014 to 2021. This study uses dynamic panel regression with Generalized Method of Moments (GMM) estimation. The result of this research is that the variables of NPL, GDP, inflation, and Bi Rate have a significant influence on banking stability.

Keywords: banking performance, macro economy, banking stability, GMM

1. Introduction

A strong, stable, and competitive economy desperately needs funding from the non-banking financial sector and banks that work efficiently(Cahyaningrum & Antikasari, 2017). This is because, the economy needs liquidity in carrying out all economic transactions(Aithal, 2016). Economic sector growth will move optimally if it is able to maintain and maintain sector stability finance it well. In Indonesia, the financial sector is still dominated by the banking sector(Gunawan, 2019). The stability of the banking system is indicated by sound banking conditions and the well functioning of the intermediation function. If these conditions are well maintained, the process of money circulation and the transmission mechanism of monetary policy in the economy, which mostly takes place through the banking system, will also work well. (Acharya & Ryan, 2016; Henry Ntarmah et al., 2019). If there is an increase in the weakening of the exchange rate and inflationary pressures, the market risk faced by banks will be even greater so that the bank will tighten by raising high interest rates. Of course, this will

have a negative impact on the stability of the banking system(Al-Khouri & Arouri, 2016; El Karfi & Mentagui, 2020).

Instability in the global financial system will affect economic growth and development in various countries, especially in banking sector. Sghaier (2016)said that it happened because banking functions as an intermediary that connects surplus and deficit units, facilitate funds for productive purposes so as to contribute to economic development. Dincer (2020) think that fluctuations and risks in the capital market have led to increased attention to empirical studies on financial stress, banking performance and risk management in the banking industry. Thus, there is a need for institutions that can stabilize the country's economy.
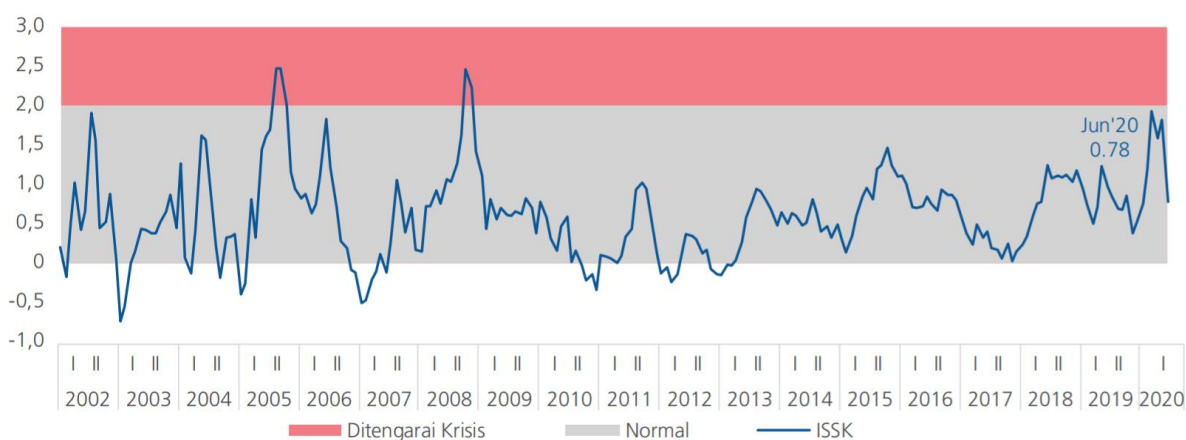

Figure 1. Graph of Financial System Stability Index (Z-score)

Source: Bank Indonesia, processed

Based on Figure 1, the financial system stability index fluctuated according to current conditions. In 2005 and 2008 it had a value above 2 (in the red area) indicating that at that time there was a crisis. In 2020 also has a stability index value close to 2 where there is a monetary crisis due to the global disaster of the Covid-19 pandemic. The Financial System Stability Index, which is one of the indicators used to monitor financial system stability, was updated with several strengthening. Strengthening is carried out such as expanding the scope of performance indicators of financial/banking institutions.

The main factor that causes fluctuations in banking stability is influenced by internal factors (fundamental factors) are factors that originate from within the company and can be controlled by the company's management, while external factors which are non-fundamental factors are caused by economic conditions such as interest rates and government policies. (Azmi et al., 2019). The fundamental factors discussed in this study are banking performance. Setiawati (2020)said that the banking performance factors in this study include Loan to Deposit Ratio (LDR), Non Performing Loan (NPL), and Capital Adequacy Ratio (CAR). Fakhrunnas (2019)that f Macroeconomic actors that influence outside the bank's performance that will be discussed in this study are GDP, inflation and the BI Rate.

Non-performing loans of conventional banks are still relatively well maintained, as reflected in the ratio of non-performing loans (NPL) which is still below the 4% limit. The gross NPL ratio appears to have increased throughout 2020. This is due to the decline in the ability of business actors and the public to pay credit installments due to a decline in income accompanied by reduced demand for new loans due to the impact of the Covid-19 pandemic. The LDR ratio showed a stable value during 2014 to 2019, then there was a slack in 2020 of 82.24%. This happened due to the rapid growth of third party funds (DPK), liquidity was at a healthy level to anticipate various uncertainties during the COVID-19 pandemic.

GDP, inflation and BI-Rate as a reflection of economic stability and government policies are external factors that also affect the amount of financing(Priyanto et al., 2016). The real sector as the main basis in carrying out conventional bank operational activities is strongly influenced by the inflation rate that occurs in the economy so that it has a direct impact on the performance of Islamic banking. Inflation during the study period tends to fluctuate. In 2016-2017, inflation tends to rise. The most significant rise in inflation can be seen In 2017, inflation was caused by an increase in prices regulated by the government (administered prices), in the form of an increase in electricity rates of 900 volt amperes (VA) at the beginning of the year, inflation rose from the previous 3.02% in 2016 to 3.61% in 2017.

Setiawati (2020)examines the influence of the fundamental factors of bank performance and macroeconomics on financial stability that Banks must be able to maintain and maintain the stability of the financial sector properly. The results of this study indicate that simultaneously, the variables of fundamental factors and macroeconomic factors have a significant influence on banking stability. Meanwhile, partially, the results of this study indicate that the LDR, NPL, BIrate and inflation variables have a significant effect on banking stability and the CAR variable has no significant effect on banking stability. Karim et al. (2016) examines macroeconomic indicators and banking stability in Indonesia that the findings show a long-term relationship between commercial bank stability and economic factors. The long-term relationship and the impact of bank stability, Cholesky standard deviation shock models, ARDL and Impulse Response Function (IRF) were used. ARDL and IRF were performed independently and iteratively on the data for three different models. Fakhrunnas (2019)explain that dthere is no long-term relationship between macroeconomic variables and bank risk taking. This finding confirms that banks have no exposure to macroeconomic turbulence in long-term effects, Due to a well-managed risk mitigation and diversification process, large size Islamic banks are more resilient,

Based on the previous research above, the researchers found the update of the research to be studied, namely by looking at the pattern of the year of research after the issuance of Law Number 21 of 2011 that as of December 31, 2013 the banking supervision function completely shifted from Bank Indonesia (BI) to the Financial Services Authority (OJK). The interesting thing that the researcher found was that the Indonesian state took the reference for the formation of the OJK from European countries and the United States, while when the OJK was formed in Indonesia, several European countries, including the UK and the United States, actually dissolved and the regulations were returned to the Central Bank. Mcphilemy

(2013)explained that the OJK in the UK (FSA) failed to supervise banks when one bank went bankrupt due to a shock. The researcher uses the period of year after the issuance of the regulation from 2014 to 2021. So the researcher is interested in examining the problem of financial stability caused by banking performance and macroeconomic variables. The researcher also uses quantitative testing with the STATA analysis tool, the dynamic panel regression estimation of the Generalized Method of Moments (GMM) to obtain an estimate of the parameters of the panel data model.

Banks that cannot maintain and develop their performance will be threatened with a decline in their banking quality. Therefore, to keep bad things from happening, there must be measures to measure conventional conditions in their health. The purpose of this study is to analyze the effect of banking and macroeconomic performance on banking stability in Indonesia. From these problems and the differences in the results of previous studies, this research is important to do in order to analyze the financial stability of conventional banks to assess and provide scientific input. This research is used as a study with the title "**Analysis of the Influence of Banking Performance and Macroeconomics on Banking Stability in Indonesia.**

2. Method

The scope of this research is banking stability in Indonesia which is influenced by banking performance such as CAR, LDR, NPL and macro economy such as GDP, inflation and Bi Rate. The dependent variable in this study is banking stability as measured by Zscore. The independent variables in this study are banking performance as measured by CAR, LDR, NPL and macroeconomic variables as measured by GDP, inflation, Bi Rate.

2.1 Types and Sources of Data

This study uses secondary data/panel data obtained from *Annual Reports*, Central Bureau of Statistics (BPS), and International Monetary Fund (IMF). The population of Conventional banks registered with the Financial Services Authority (O)JK as many as 89 banks. This study uses purposive sampling consisting of20conventional bank with the largest assets in Indonesia during the period 2014 to 2021. The dependent variable in this study is banking stability as measured by Zscore. The independent variables in this study are banking performance as measured by CAR, LDR, NPL and macroeconomic variables as measured by GDP, inflation, Bi Rate. This study uses a dynamic panel estimation of the Generalized Method of Moment (GMM) using the STATA application version 16.

2.2 Generalized Method of Moment (GMM) Analysis

Generalized Method of Moment (GMM) is an extension of the moment method. GMM equates the condition moment of the population and the condition moment of the sample. The most basic problem of the dynamic panel data model is the correlation between the endogenous lag variable (which is positioned as an explanatory variable) and error, so that OLS will produce biased and inconsistent estimates. Therefore, the Arellano-Bond GMM estimation method is used which can produce unbiased, consistent, and efficient parameter estimates. The results of the parameter estimation in the equation are as follows:

$$\binom{\widehat{\delta}}{\widehat{\beta}} = \left[\left(N^{-1} \sum_{i=1}^{N} (\Delta y_{i,t-1}, \Delta x_i)' Z_i \right) \widehat{\Lambda}^{-1} \left(N^{-1} \sum_{i=1}^{N} Z_i' (\Delta y_{i,t-1}, \Delta x_i) \right) \right]^{-1}$$

$$\left[\left(N^{-1} \sum_{i=1}^{N} (\Delta y_{i,t-1}, \Delta x_i)' Z_i \right) \widehat{\Lambda}^{-1} \left(N^{-1} \sum_{i=1}^{N} Z_i' \Delta y_i \right) \right].$$

Baltagi (2015) for to determine the best dynamic panel model (GMM method), there are three criteria, namely unbiased, validity, and consistency A good GMM model is a valid, consistent and unbiased model. The model specification criteria used include:

2.2.1 Arellano-Bond Test (Consistency)

The Arellano-Bond test is used to test the consistency of the estimates obtained from the GMM process. Hypothesis Arellano-Bond test and the test statistic in Equation (7). Arellano and Bond's test hypotheses are as follows.

H0: There is no autocorrelation in the i-th order first difference remainder

H1: There is an autocorrelation in the i-th-order first difference remainder

$$m(2) = \frac{\Delta \widehat{v}_{i,t-2}' \Delta \widehat{v}_*}{(\Delta \widehat{v})^{\frac{1}{2}}} \sim N(0,1)$$

With:

$\Delta Vi,t-2$: Vector*error*on the 2nd lag with order $q = \sum N$ $i=1$ $Ti - 4$

ΔV_* : Vector *error* cut to fit $\Delta Vi,t-2$ that are $q \times 1$

The decision is that H0 is rejected if Zcount > Ztable. This means that the consistency of GMM is shown by a statistically insignificant value (failed to reject H0) on m2.

2.2.2 Sargan Test (Validity Test)

Sargan test is used to determine the validity of the use of instrument variables whose number exceeds the estimated number of parameters (over identifying restriction condition). Sargan hypothesis and test statistics on the following equation:

$$S = \widehat{v}' Z \left(\sum_{i=1}^{N} Z_i' \widehat{v}_i \widehat{v}_i' Z_i \right)^{-1} Z' \widehat{v} \sim \chi_{L-(k+1)}^2$$

With:

$\widehat{v}$: *Error* from model estimation

The decision is that H0 is rejected if the value of the S test statistic is greater than the chi-square ($\chi 2$) or p-value < α.

2.2.2 Bias Test

An unbiased test can be performed by comparing the estimated coefficients from the OLS estimate and the fixed effect estimate. The OLS method will cause the estimation to be biased upwards (biased upwards), while the fixed effects method causes the estimation to be biased downwards (biased downwards). The model can be said to be unbiased if the estimated coefficient is below the OLS estimate and above the fixed effect estimate.

Gujarati (2021)explained that the approaches used in estimating the dynamic panel data regression model were first-difference GMM (FD-GMM) and system GMM (SYS-GMM). If the results of the FD-GMM method show that the instrument used is invalid, then the SYS-GMM method is used, and vice versa. The following is an explanation of the panel data regression model approach:

2.2.3 First-Difference Generalized Method of Moments(FD-GMM)

FD-GMM was developed by Arellano and Bond (1991). This approach produces unbiased, consistent, and efficient estimators. The following is an AR(1) autoregressive panel data model without including exogenous variables:

$Y_{it} = \delta Y_{i,t-1} + u_{it}$

The one-step consistent estimator δ is obtained by specifying the weighting matrix, i.e. (Arellano & Bond, 1991):

$A_N = \left(N^{-1} \sum_{i=1}^{N} W_i^T G W_i\right)^{-1}$

The results of the one-step Arellano-Bond GMM estimation (one-step consistent estimator) are obtained as follows:

$$\hat{\delta} = \left[\left(N^{-1} \sum_{i=1}^{N} \Delta Y_{i,t-1}{}^T W_i\right) A_N \right.$$
$$\left(N^{-1} \sum_{i=1}^{N} W_i^T \Delta Y_i\right)\right]^{-1} \left[\left(N^{-1} \sum_{i=1}^{N} \Delta Y_{i,t-1}{}^T W_i\right) \right.$$
$$\left. A_N \left(N^{-1} \sum_{i=1}^{N} W_i^T \Delta Y_i\right)\right]$$

W_i is the instrument variable matrix. Instrument variables are variables that are not correlated with error, but are correlated with explanatory endogenous variables. A two-step consistent estimator is obtained by substituting the optimal matrix as follows (Arellano & Bond, 1991):

$\hat{V}_N^{-1} = \left[N^{-1} \sum_{i=1}^{N} W_i^T \Delta \hat{v}_i \Delta \hat{v}_i^T W_i\right]^{-1}$

$\Delta \hat{v}$ is the residual vector obtained from the first-step consistent estimator.

2.2.5 System Generalized Method of Moments (SYS-GMM)

Blundell and Bond (1998) state the importance of using initial conditions in generating efficient estimators of dynamic panel data models when they are small. System GMM is a method used to estimate a system of equations by combining first difference condition moments and level condition moments.

3. Results

The purpose of this study is to analyze the effect of financial and macroeconomic performance on banking financial stability in Indonesia. This study is used to determine the level of financial stability in banks in Indonesia, the financial stability variable is used as the dependent variable as measured by the Zscore value. In this study, independent variables such as financial performance will be measured by the value of Non Performing Loan (NPL), Loan to Deposit Ratio (LDR) and Capital Adequacy Ratio (CAR). While macroeconomic variables will be measured by the value of Gross Domestic Product, Inflation and Interest Rates.

Table 1. Test of Banking Financial Stability Sargan (Zscore)

Test	Statistical Value	P-Value
Sargan Test	22,15398	0.3322

Based on table 1, the Sargan test (instrument validity) on banking financial stability shows a p-value of 0.3322>0.05 in First-Difference (FD GMM) and 0.3004>0.05. In the results of this test, both approaches fail to reject H0 where there is no instrument variable that is correlated with error, so the instrument variable is valid.(Yuniar, IA and Kusrini, 2019).

The following are the results of the Arellano-Bond test analysis aimed at finding consistent estimates, namely there is no autocorrelation between the residuals and endogenous variables, which is shown through the dynamic panel data estimation system. The following table is the Arellano-Bond test for banking financial stability:

Table 2. Arellano-Bond Consistency Test of Banking Financial Stability

Test	Statistical Value	P-Value
AR(m1)	-0.76533	0.4441
AR(m2)	-0.57523	0.5651

Based on table 2, the Arellano-Bond consistency test (ABtest) by comparing the First-Difference (FD GMM) parameter shows a p-value of 0.5651> 0.05 so it is not significant. This result shows that the p-value failed to reject H0 so that no autocorrelation was detected in the dynamic panel data estimation system.

Table 3. Estimation of First-Difference Parameters (FD GMM)

Variable	Coefficient	Std, Error	Statistic test	P-Value
Zscore	-0.0559547	0.071968	-0.78	0.437
NPL	-0.6698282	0.1414017	-4.74	0.000
LDR	0.0028399	0.013776	0.21	0.837
CAR	0.0045114	0.0320797	0.14	0.888
GDP	0.1760054	0.0433624	4.06	0.000
Inflation	-0.4440077	0.1254482	-3.54	0.000
Bi-Rate	0.4951125	0.1547024	3.20	0.001

Source: Data processed, 2022

Based on table 3 regarding the estimation of the First-Difference (FD GMM) parameter, it shows that there are several independent variables that have a significant influence on the Zscore. Output results that have a significant influence include NPL, GDP, inflation and BiRate. The NPL variable has a significance value of 0.000 <0.05 and the coefficient is negative, which means that the NPL variable has a significant negative effect. The GDP variable has a significance value of 0.000 <0.05 and the coefficient is positive, which means that the GDP variable has a significant positive effect. The inflation variable has a significance value of 0.000

<0.05 and the coefficient is negative, which means that the inflation variable has a significant negative effect. BIrate variable has a significance value of $0.001 < 0$,

From the estimation results of GMM First-Difference (FD GMM), the model equation can be made as follows:

$$Zscore_{i,t} = \alpha - 0{,}6698282 NPL_{i,t} + 0{,}0028399 LDR_{i,t} + 0{,}0045114 CAR_{i,t} + 0{,}1760054 GDP_{i,t} - 0{,}4440077 Inflation_{i,t} + 0{,}4951125 BI\,Rate_{i,t} + e_{i,t}$$

4. Discussion

In this section, we will discuss the discussion of the research results that have been studied. The discussion of the results of this study contains the original thoughts of the researcher to provide an explanation and interpretation of the results that have been analyzed in order to answer the research questions. The following is an interpretation of the research results that have been studied.

Influence Non Performing Loans (NPL) on banking stability in Indonesia.

The NPL variable shows a negative and significant effect on the Zscore variable where the p-value is 0.000 <0.05 with a coefficient value of -0.6698282. The estimation results on the NPL variable show a negative and significant effect on the Zscore. Based on these results, it is explained that lower non-performing loans to banks will increase the financial stability of banks in Indonesia. Non-performing loans will have an impact on the bank in obtaining income from the results of the loans offered, this will reduce profits and will adversely affect banking financial stability. The high growth rate of non-performing loans will make the cash flow of a bank not smooth, this condition will cause a decrease in credit that can be channeled by banks. Setiawati (2020) andAl-Khouri & Arouri (2016) which states that the high risk of bad credit will cause the bank to be unstable.

Effect of GDP levelon banking stability in Indonesia.

The GDP variable shows a positive and significant effect on the Zscore variable where the p-value is 0.000 <0.05 with a coefficient value of 0.1760054. The estimation results on the GDP variable show a positive and significant effect on the Zscore. Based on these results, it is explained that by increasing the income of a country, it will increase the financial stability of banks in Indonesia. GDP is basically the output of goods and services of a country in a certain period. The relationship between gross domestic product and the balance of payments is that an increase in the output of goods and services means an increase in production capacity. This will improve the balance of payments and can stabilize the finances of banks in Indonesia(Fatoni & Sidiq, 2019; Sadrinata, F & Rani, 2019).

Effect of Inflation rateon banking stability in Indonesia.

The inflation variable shows a negative and significant effect on the Zscore variable where the p-value is 0.000 <0.05 with a coefficient value of -0.4440077. The estimation results on the inflation variable show a negative and significant effect on the Zscore variable. Based on these

results, it is explained that low inflation in a country will increase banking financial stability in Indonesia. A low inflation rate will make people dare to spend money to buy goods and services, this will stabilize the financial balance so that the financial system will be more stable. These results are in accordance with the research(Acharya & Ryan, 2016; Jayakumar et al., 2018; Setiawati, 2020)which shows that inflation has a negative effect on bank Zscore which indicates bank stability.

Effect of interest rateon banking stability in Indonesia.

The interest rate variable shows a positive and significant effect on the Zscore variable where the p-value is $0.001 < 0.05$ with a coefficient value of 0.4951125. The estimation results on the interest rate variable show a positive and significant effect on the Zscore variable. Based on these results, it is explained that by increasing interest rates in banks, it will increase the financial stability of banks in Indonesia. These results indicate that an increase in interest rates will cause banks to become unstable because the stability index also increases. This is in accordance with research from(Azmi et al., 2019; Miah et al., 2020; Setiawati, 2020; Yuniar, IA and Kusrini, 2019)stated that if monetary stability is disturbed, the monetary authority will respond to several policies to increase or decrease the Bi-Rate so that monetary stability can be maintained.

5. Conclusion

Based on the results of research that has been done, the following conclusions are obtained:

Non-performing loans will have an impact on the bank in obtaining income from the results of the loans offered, this will reduce profits and will adversely affect banking financial stability. The relationship between gross domestic product and the balance of payments is that an increase in the output of goods and services means an increase in production capacity. This will improve the balance of payments and can stabilize the finances of banks in Indonesia. A low inflation rate will make people dare to spend money to buy goods and services, this will stabilize the financial balance so that the financial system will be more stable. Disrupted monetary stability has resulted in the monetary authority responding to several policies to increase or decrease the Bi-Rate so that monetary stability can be maintained.

This research is expected to provide scientific contributions to the government or policy makers in maintaining banking stability in Indonesia. The researcher recommends to further similar research to increase the time period and the bank sample used, so that the results obtained are better and more accurate. Further researchers also need to expand the analysis of the determinants that affect banking stability in depth by adding research variables that have not been discussed in this study.

Acknowledgments

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