Determining Factors of Financial System Stability (FSS) in Indonesia

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ABSTRACT

The purpose of this study is to identify the factors that cause financial system instability. This study uses the Profitability Model which is represented by Return on Assets (ROA) as an indicator of Financial System Stability (FSS) as well as the dependent variable. As for the independent variables, this study uses the Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), Composite Stock Price Index (ISHG), and Assets. The data used in this study were cross-sectional variables between 2015-2019, which were processed using the Econometric Model of Panel Data Regression Analysis and Eviews 9.0. Research findings indicate that CAR and NPL have a significant influence on the creation of FSS through the profitability model.

Keywords: financial system stability, non-performing loans, composite stock price index, assets

1. INTRODUCTION

The 1998 financial crisis was a valuable lesson in the importance of financial system stability (FSS) in Indonesia.In the case of Indonesia, the authority to stabilize the financial system is under the control of Bank Indonesia, namely through macroprudential regulation and supervision. The purpose of this stabilization is to prevent and reduce systemic risk, promote a balanced and quality intermediation function, and improve financial system efficiency and financial accessibility .

Until now, there is no international agreement regarding the definition of FSS. However, so far, FSS is understood in a limited way by academics as a condition in which the financial system enters an unstable stage when the condition of the system can endanger and hinder economic activity. Financial system instability can be caused by many factors. This is generally a combination of the causes of market failure, either due to structural or behavioral factors. Market failure itself can be caused by external (international) and internal (domestic) factors.

Currently, there is a trend towards globalization of the financial sector, which is supported by technological developments that have caused the financial system to become more integrated. In addition, financial product innovation is also increasingly dynamic and diverse with increasing complexity. These various conditions, apart from being a source of triggers for financial system instability, can also make it more difficult to overcome this instability.
So far, identification of sources of financial system instability has generally been more of a forcasting, i.e. forecasting ahead. This is intended to determine the potential risks that will arise and will affect future financial system conditions. In general, the risks that often occur in the financial system include credit risk, liquidity risk, market risk and operational risk. Therefore, by conducting research on the factors that can cause instability in the financial sector, it is hoped that it can be seen how far these risks have the potential to become increasingly dangerous, widespread and systemic in nature so that they have a negative impact on the national economy.

2. LITERATURE REVIEW

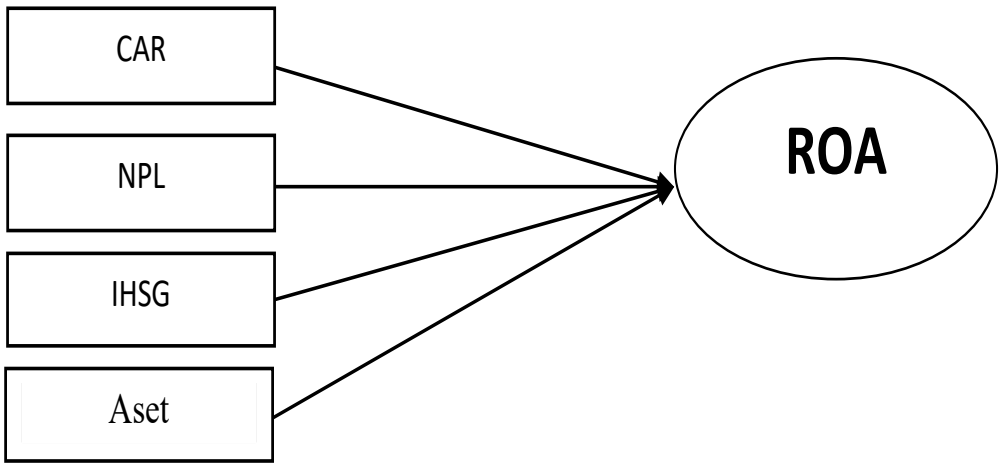
Financial System Stability (FSS) actually does not have a standard internationally accepted definition. In essence, FSS is understood as a financial system that enters an unstable stage when the system has endangered and hampered economic activity. According to BI (2013), a stable financial system is able to allocate sources of funds and absorb shocks that occur so as to prevent disruption to real sector activities and the financial system. A stable financial system is a financial system that is strong and resistant to various economic disturbances so that it is still able to perform its intermediation function, carry out payments and spread risks properly. Financial system stability is a condition in which the economic mechanism for setting prices,

FSS researchers agree that FSS is influenced by many factors, including macroeconomic, fiscal, institutional, and others with varying study results in each country. For example, the relationship between cost efficiency and non-performing loans (NPL) is found in the US banking industry (Berger and DeYoung, 1997), in the Czech Republic (Podpiera and Weill, 2008), and in Spain (Salas and Saurina, 2002). Meanwhile in Finland, Sorge and Virolainen (2006) examined the relationship between loan loss provisions and macroeconomic variables. Then Quagliarello (2007) examined the relationship between business cycle developments and NPLs in Italy, and more recently Louzis et al. (2012) investigated the determinants of NPL in the Greek banking industry. Relatively similar studies were conducted by Nkusu (2011) and De Bock and Demyanets (2012) who investigated the determinants of NPL in developed and emerging market economies. Gropp and Heider (2009) examine the determinants of the capital structure of large EU and US banks. Meanwhile, Saurina (2009) examines the role of provision as a tool that avoids the pro-cyclicality of capital adequacy requirements and strengthens bank solvency.
Based on the various studies above, the IMF then conducted an expansion of the study across countries by investigating the effects of financial crisis episodes on FSS. This IMF study was conducted by controlling for several macroeconomic and fiscal variables from 20 OECD countries during the 1997-2009 period. His findings reveal that there is a degree of fragility of the banking system (in terms of capital adequacy, asset quality, and profitability) and risks to financial stability.

In addition, the effect of the financial crisis on the stability of the banking sector is a signal to future policy makers of the possible costs to be borne by the public. This finding strengthens the argument for the need for a more proactive attitude on the part of regulatory and supervisory authorities in the financial sector in order to maintain financial stability, as well as increasing cooperation between fiscal, monetary and macroprudential authorities in order to prevent the effects of the financial crisis.

Thus, this indicates that the banking sector is the main pillar for the creation of the FSS considering that in general, around 85% of the funds in the financial sector are in the banking sector with variations between countries. Therefore, this study will only use one of the FSS models from the banking sector, namely the level of banking profits in Indonesia (profitability) which is reflected in the level of Return on Assets (ROA). In that context, profitability is influenced by other FSS variables, namely Bank Capital (Capital Adequasy Ratio/CAR), Credit Risk (Non-Performing Loans/NPL), and the Composite Stock Price Index (JCI).
After reviewing the literature above, the author presents the framework of the study as shown in chart 1 below.

Chart 1. :Study Framework



Based on the framework of the study above, this study will test the following hypotheses:

1. Does CAR have a positive and significant effect on ROA?
   Ho: There is no positive and significant effect between the CAR and ROA variables.
   H1: There is a positive and significant effect between the CAR and ROA variables.
2. Does NPL have a positive and significant effect on ROA?
   Ho: There is no positive and significant effect between the NPL variable and ROA.
   H2: There is a positive and significant effect between the NPL variable and ROA.
3. Does the JCI have a positive and significant effect on ROA?
   Ho: There is no positive and significant effect between the JCI variable and ROA.
   H3: There is a positive and significant effect between the JCI variable and ROA.
4. Does Assets have a positive and significant effect on ROA .
   Ho: There is no positive and significant effect between the Assets variable and ROA.
   H4: There is a positive and significant effect between the Assets variable and ROA.

3. METHODOLOGY

In this study, the authors use banking variables that have an impact on the ROA of the seven Book 4 banks using the profitability model in the 2015-2019 period. In this case ROA is a variable that describes the FSS. In this study, the variables used were ROA, CAR, NPL, and Assets of the seven Book 4 banks, and the JCI. This research data uses cross section data, which is processed using the Econometric Model of Panel Data Regression Analysis and Eviews 9.0 as the processing instrument. All data of the variables used are sourced from Indonesian Banking Statistics (SPI) and the Indonesia Stock Exchange. While the tool used to process the data in this research is Eviews 9.0 with Panel Data Regression Analysis method.

The models to be tested in this study are as follows:

ROAit = β_0 + 1CARit + 2NPLit + 3IHSGit + 4Assetite.....(1)

Where:

ROAit	:*Return on Assets*(ROA)
CARit	:*Capital Adequacy Ratio*(CAR)
NPLit	:*Non-Performing Loan*(NPL)
JCI	:Composite Stock Price Index (JCI)
i and T	: Bank i and year t

In this study the data used is secondary data in the form of panel data. Panel data is data obtained from observations of cross-sectional units or individual units observed in successive time periods or time series

(Baltagi, 2013). There are several advantages of using panel data compared to pure cross-section and pure time series data. First, the use of panel data can provide important information for the authors that cannot be obtained using pure time series data and pure cross-sectional data. Second, it can reduce collinearity between explanatory variables, increase the degree of freedom and can also provide larger data.
In this case the data analysis using the three approaches below:

3.1 Pooled Least Square (Common Effects)

The common effect method is the simplest technique because it combines cross-section and time series data with the OLS method. Individual and time differences, where the slope and intercept are considered the same for each individual unit. The common effect model can be written using an econometric model:
Y_{it}= + Xit + eit ……..…….……..…….(2)

3.2 Fixed Effect Method

The fixed effect method assumes that the difference in the intercept only varies with individual units while it is constant over time. In addition, this method assumes that the slope between individual units and time units is constant. What is meant by fixed effect is that each individual has a constant constant for various times or periods, as well as a constant slope for each time or period. Differences between individual units can be known through the difference in the value of the intercept. This method estimates panel data with OLS and uses dummy variables. This fixed effect model can be written with an econometric model as follows:
Y_{it}= + Xit + D1t + … + Dit + eit ……..…….……..(3)

3.3 Random Effect Method

*Random Effect Method*This takes into account the residuals that are thought to have a relationship between individuals and time. The random effects model in the econometric model is as follows:

Y_{it}= + Xit + eit ……..…… (4)

e_{it}= ui + vt + wit ……..…… (5)

Where:

ui = component of cross-sectional error
vt = time-series error component
wit = compound error component

3.4 Chow Test

To select the model, the Chow Test will be used. Chow Test is used to see which model is more appropriate between the Common Effect model or the Fixed Effect model (Fixed Effect or Random Effect); assuming that the probability of Chi-square > 0.05 then Ho is accepted by the model used by the Common Effect. However, if Probability < 0.05 then the model used is Fixed Effect.

H0: Common Effect Model
H1: Fixed Effect Model

3.5 Hausman Test

After completing the Chow Test, it will then be tested which model between Fixed Effect or Random Effect models is the best and most appropriate, this test is called the Hausman test.
Hausman test is used to determine which model is the best between Fixed Effect or Random Effect models; assuming that the probability of Chi-square> 0.05 then Ho is accepted by the model used by Random Effect. However, if Probability < 0.05 then the model used is Fixed Effect. Hausman test testing is carried out with the following hypothesis:

H0: Random Effect Model
H1: Fixed Effect Model

The Hausman test will follow the chi-squares distribution as follows:

$$m = \hat{q}\, Var\,(\hat{q})\text{-}1\, \hat{q} \quad \text{……(6)}$$

This Hausman test statistic follows a Chi-Square statistical distribution with k degrees of freedom, where k is the number of independent variables. If the Hausman statistical value is greater than the critical value, then Ho is rejected and the correct model is the Fixed Effect model, whereas if the Hausman statistical value is less than the critical value, the correct model is the Random Effect model.

3.6 LM Test

Lagrange Multiplier (LM) is used to determine whether the Random Effect model or the Common Effect (OLS) model is best used. This Random Effect significance test was developed by Breusch Pagan. The Breusch Pagan method for the Random Effect significance test is based on the residual value of the OLS method. The value of the LM statistic is calculated by the following formula:

$$\mathbf{LM} = \frac{nT}{2(T-1)} \left(\frac{\sum_{i=1}^{n} (T\bar{\hat{e}}_i)^2}{\sum_{i=1}^{n}\sum_{t=1}^{T} \hat{e}_{it}^2} - 1 \right)^2 \quad \text{…….. (7)}$$

Where:

n = number of individuals

T = number of time periods

e = method residual*Common Effect*(OLS)

The hypotheses used are:

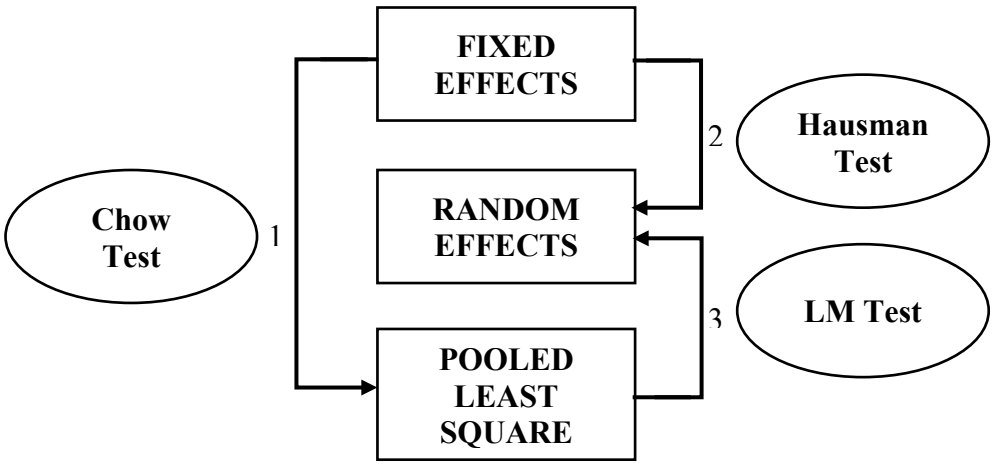
H0: Common Effect Model

H1: Random Effect Model

The LM test is based on a chi-squares distribution with a degree of freedom equal to the number of independent variables Winarno (2011). If the statistical LM value is greater than the statistical critical value or chi-squares, it will reject the null hypothesis, which means that the most appropriate estimate for the panel data regression model is the Random Effect method rather than the Common Effect method. On the other hand, if the statistical LM value is less than the statistical value or chi-squares as a critical value, then the null hypothesis is accepted, which means that the best estimate used in panel data regression is the Common Effect method, not the Random Effect method.

At this time the LM test is not used because the Chow test and Hausman test have shown that the most appropriate model is the Random Effect Model. The LM test will be used when the Chow test shows that the model used is the Common Effect Model, while the Hausman test shows the most appropriate model is the Random Effect Model. Therefore, the LM test is needed as the last stage to determine the most appropriate Common Effect or Random Effect model. Below is a chart of the model selection process in the data panel.

Chart 2: Model Selection Process in the Data Panel



Source: Park, 2011

4. RESULTS AND DISCUSSION

As stated above, data analysis uses a model that must first be tested to obtain confirmation of the best model. The results of the model test are presented below.

4.1 Model Test Results & Hypotheses

Modeling between Common Effects and Fixed Effects, To test the best model between Common Effect and Fixed Effect (represented by the fixed effect model) Chow Test can be used where the hypotheses are:

H0 : 1 = 2 = 3 = ... = i, Common Effect

H1 : 1 2 3 .... i, Fixed Effect

With assumption:

If the probability of Chi-square> 0.05 then Ho is accepted

If the probability of Chi-square <0.05 then Ho is rejected

Table 1.:Estimated Results of Model Selection Common Effect Vs. Fixed Effect

Method	Chi-square probability	Decision	Information
Chow Test	**0.0000**	**Ho rejected**	***Fixed effect***

Source: Eviews 9.0 . data processing

By testing using the Chow Test where the null hypothesis (H0) is the Common Effect model, the probability value of the Chi-Square is 0.000 < 0.05. Thus the null hypothesis (H0) is rejected, so the better model to use is the estimation with Fixed Effect, then the next test is to compare Fixed Effect with Random Effect where the test will use the Hausman Test.

4.2 Determining the Model Between Fixed Effect and Random Effect

Deciding whether to use Fixed Effect or Random Effect can use Hausman Test. The assessment will use the Chi-Square probability value so that the decision to choose the two models can be determined statistically. Before conducting the test, the first thing to do is to make a hypothesis:

H0 : The right model is Random Effect

H1 : The right model is Fixed Effect

Decision making is based on looking at the results of the Chi-Square probability, if the Chi-square probability is > 0.05 then H0 is accepted by the Random Effect model. However, if Probability < 0.05 then the model used is Fixed Effect.

Table 2: Estimation Results of Fixed Effect Vs. Model Selection. Random Effect

Method	Chi-square probability	Decision	Information
Hausman Test	**0.9738**	**Ho accepted**	***Random Effect***

Source: Eviews 9.0 . data processing

By testing using the Hausman Test where the null hypothesis (H0) is a Random Effect model, the probability value of Chi square is 0.9738 > 0.05. Thus the null hypothesis (H0) is accepted, so the better model to use is estimation with Random Effect.

Table 3: Random Effect Processing Results

Dependent Variable	***ROA***	
Independent Variable	***Random Effect***	
	Coefficient	**Probability**
C	-0.059586	0.2520
CAR	0.104180	0.0432
NPL	-0.508053	0.0001
JCI	0.012880	0.3267
Asset	0.003368	0.5541
R2	0.447277	
adj. R2	0.373581	
Prob. F-Stat	0.001058	

Source: Eviews 9.0 . data processing

4.3 Coefficient of Determination (R2 Test)

This study uses the type of analysis method of data processing Random Effect panel data. The following is a summary of R2 test data processing:

Table 4: Test ResultsR2

Model	Test	R2	adj. R2
3	***Random Effect***	0.447277	0.373581

Source: Eviews 9.0 . data processing

In the results of data processing from the Random Effects model, the coefficient of determination (Adj. R2) is 0.373581, this means that the variation of the independent variables (CAR, NPL, JCI, and Assets) is able to explain the dependent variable (ROA) of 37.35%. . The remaining 62.65% is a variation of other independent variables outside the model that affect ROA.

4.4 F Test (Concurrent Test)

The F test is used to detect as a whole whether the independent variable has an effect on the dependent variable. This test is carried out by comparing the probability value of the F-Statistic with a significance level of = 5% or 0.05. The following is a summary of the results of the F test.

Table 5: F . Test Results

Model	Test	Prob. F-Stat	Decision
3	***Random Effect***	0.001058	**H0 Rejected**

Source: Eviews 9.0 . data processing

Table 5 shows that the F-Stat probability value (0.001058) from the model is smaller than 0.05 (0.001058 < 0.05) so H0 is rejected, this shows that it is proven that the independent variables (CAR, NPL, JCI, and Assets) have an influence on the dependent variable. (ROA).

4.5 T Test (Partial Test)

T test is used to determine whether the independent variables in the regression equation individually have a significant value in predicting the value of the dependent variable. This test is done by comparing the value of Prob. independent variable (t-count) to the significance level of (5% or 0.05), with the criteria for the provisions of the Prob test. The independent variable (t-count) < (5% or 0.05) then the effect of the independent variable is significant, so H0 is rejected. This means that the independent variable can affect the dependent variable randomly.

Table 6: T . Test Results

Variable	Coefficient	Prob	Decision
CAR	0.104180	0.0432	**H0 rejected**
NPL	-0.508053	0.0001	**H0 rejected**
JCI	0.012880	0.3267	**H0 accepted**
Asset	0.003368	0.5541	**H0 accepted**

Significance at =5%
Source: Eviews 9.0 . data processing

From the results of the regression output which have been summarized in table 6, it can be seen that the probability of t-count on the CAR and NPL variables has a significance level below = 5% or 0.05. This means that the independent variables simultaneously have a significant effect on the ROA variable. Meanwhile, on the other hand, the JCI and Assets variables produce a value that is more than the stipulation value of = 5% or 0.05. That is, individually these variables do not have a significant effect on the ROA variable.

Furthermore, the estimated value of the constant coefficient model has a significant effect and produces a negative value of -0.059586, it shows that without the influence of the CAR, NPL, JCI, and Assets variables, the ROA is -5.9%.

In addition, the CAR regression coefficient has a positive and significant effect on ROA, in accordance with the expected hypothesis. This means that if the CAR increases by 1%, the ROA will increase by 0.1%. Meanwhile, the NPL regression coefficient has a negative and significant effect on ROA, in accordance with the expected hypothesis. This means that if the NPL increases by 1%, the ROA will decrease by 0.5%.

5. DISCUSSION OF RESEARCH RESULTS

CAR is very important for banks because it is used to measure the effectiveness of the company to generate profits by utilizing its assets. Generally, studies find a positive effect between the CAR ratio and banking profitability (ROA). This shows that the higher the CAR, the better the bank's ability to bear the risk of any risky earning assets. A high CAR will provide opportunities for banks to increase profitability because these funds are used for lending or channeling funds in the form of credit so that the profits obtained by banks in the form of loan interest will increase.

Therefore, since the beginning, the IMF has used the Capital Adequacy Ratio (CAR) to test the health of the banking system(Hung et al., 2018)and FSS(Th & Athanasios, 2014). Bank capital consists of first and second class capital. First class capital includes: paid-in capital, undistributed profits, and non-cumulative preferred stock. Second-class capital includes allowance for credit losses, capital market instruments, and subordinated liabilities. Banks are required to maintain a minimum ratio of 12% of total capital and 8% of first-class capital in relation to risk-weighted assets and other risks. Therefore, the capital adequacy ratio for commercial banks is an important issue that has received considerable attention in the financial literature(Shabani et al., 2019).

In international practice, the use of CAR as an indicator of FSS can be found in Basel 3 rules concerning the obligation of banks to have minimum capital. The Basel Committee itself since the post-global financial crisis has continued to make improvements to strengthen the bank's capital aspect. Capital is an important aspect because capital serves as a cushion if the bank suffers a loss. The higher the capital, the lower the leverage and the risk of bank bankruptcy. Several capital policies that have now been implemented are the capital surcharge policy for domestic systemically important banks (DSIBs), the countercyclical capital buffer (CCB), and the conservation buffer. These various capital policies were implemented in Indonesian banks in stages starting in 2016(Surhaningsih et al, 2015). The banking capital adequacy ratio (CAR) is predicted to continue to increase in line with the bank's obligation to comply with Basel regulations.

In Indonesia, the use of CAR as an FSS indicator is reflected in the BI Regulation (PBI) which requires a minimum CAR of 8 percent for all commercial banks to be met. Based on PBI Number 15/12/PBI/2013, in addition to meeting the capital requirements according to the risk profile in the range of 8-14%, commercial banks are required to form additional capital as a buffer. The additional capital consists of a countercyclical buffer that applies to all banks of 0-2.5%, a conservation buffer of 2.5% which only applies to commercial banks of business groups (BUKU) III and IV or with a minimum capital of IDR 5 trillion, and capital surcharge of 1-2.5% specifically for DSIBs.

The amount of the countercyclical buffer according to the PBI is set by Bank Indonesia and takes effect on January 1, 2016. In this regulation, BI can determine the amount of additional capital that is different according to macroeconomic conditions. Meanwhile, the conservation buffer is implemented in stages of 0.626% on January 1 2016, 1.26% on January 1 2017, 1.876% on January 1 2018, and 2.5% from January 1, 2019 onwards. Meanwhile, the capital surcharge for DSIBs will also come into effect on January 1, 2016 which will be determined by the competent authority. According to the regulation, banks that own and/or exercise control over subsidiaries are obliged to provide the minimum capital for individual banks and/or banks on a consolidated basis with subsidiaries.

In contrast to CAR, NPL has a negative effect on FSS. A high NPL will erode bank profits and in turn can collapse the financial system as a whole as happened in the 1998 financial crisis. This ratio shows that the higher the NPL ratio indicates the worse the loan quality. Bank Indonesia Circular Letter Number 13/24/DPNP/2011 states that credit risk is the risk due to the failure of the debtor and/or other parties to fulfill their obligations to the bank. Non-Performing Loans (NPLs) measure the level of credit risk, which is often also called non-performing loans, which can be interpreted as loans that have difficulty in payment due to gap factors or external factors that are beyond the control of the debtor. The impact of this unreasonable NPL ratio is the loss of the opportunity to earn income from the loan, thereby reducing profits. Based on the Circular Letter of Bank Indonesia, a bank's NPL is a maximum of 5%(Paleni et al., 2017).

According to the International Monetary Fund's Global Financial Stability Report (2009), to increase profitability, banks should focus on managing the quality of their assets along with the determinants of

profitability. The increasing incidence of poor bank asset quality requires attention to the elements that affect the profitability and management of bank assets. In the context of FSS, asset quality is a major predictor of bankruptcy and financial system instability. Therefore, high non-performing loans were found to be the main cause of failure of banking institutions. In addition, the problem of nonperforming assets (NPL) has become synonymous with the functional effectiveness of financial intermediaries and a major cause of economic problems(Rana, 2019).

6. CONCLUSION

The results of this study indicate that CAR and NPL have a significant influence on the creation of FSS through the profitability model. This finding further confirms the decision of the IMF and the Basel Committee to include these two indicators as a measure in assessing FSS. Given that CAR and NPL are important indicators in the creation of FSS, their implementation must be supported by a strict individual and macroprudential monitoring system by OJK and BI. Banks must be encouraged to continue to increase their level of capital, on the other hand, they must be monitored so that they have a low NPL. These two policy mixes are expected to maintain FSS in Indonesia. FSS is actually something complex. As a system, the FSS does not only consist of banking, but also various other financial institutions. Therefore, further research is recommended to involve non-bank financial institutions either individually or jointly.

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