The Role of Early Warning System Components in Financial Distress: Evidence from Indonesian Islamic Banks

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Abstract:
This study uses the Early Warning System (EWS) component to predict the condition of Islamic banks before bankruptcy. This study uses the Springate Score model to measure Islamic banks' Financial Distress (FD) condition. Samples were taken from 13 Islamic Commercial Banks for 2016 - 2020. The EWS components are Capital Adequacy Ratio (CAR), Non-Performing Financing (NPF), Financing Deposit to Ratio (FDR) and Allowance for Impairment Losses (CKPN). Based on the Springate Score calculation, the highest FD conditions occurred in 2019 and 2020 due to the COVID-19 pandemic. The logistic regression test results show that only the NPF ratio positively affects FD. While the CAR, FDR, and CKPN variables do not affect FD. It proves that the CAR, FDR and CKPN ratios owned by Islamic banks are said to be good for keeping away from FD conditions.

Keywords: Early Warning System, Financial Distress, Islamic Bank

JEL Classification Code: G32, G33, G21

1. Introduction

Islamic banking is an important component of the national economy. One of the objectives of Islamic banking is to support economic fundamentals from the threat of crisis and maintain its stability (Khasanah et al., 2021; Bank Indonesia, 2019). The instability of Islamic banking was experienced in 1997, where Islamic banking experienced an economic crisis that affected the banking industry in Indonesia (Machmud & Rukmana, 2019). This event also proves how great the risks arising from the economic crisis are. The risks include high rates of bad debts, liquidity problems that do not meet their obligations, and strong rush money (Ali, 2009). The cost of bank rescue during the economic crisis was up to Six hundred trillion rupiahs, equivalent to 60% of the Gross Domestic Product (Riyanto & Puji Agus, 2015). The second global crisis occurred in 2008, the subprime mortgage crisis. Subprime mortgages started with bad housing loans in the United States at the end of 2007 and spread to various countries in the European and American regions. As a further consequence, investors from other countries also suffered losses from securities related to the American subprime mortgage (Anwar, 2014; Murharsito, 2008).

Eleven years later, the world was again shocked by the COVID-19 pandemic, which negatively impacted the country's health, education, political and economic sectors (Chairani, 2020). Even entering the end of 2020, this

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pandemic has not subsided, which has triggered a decline in global trade activities and financial market uncertainty. The slowdown in world economic growth amid the COVID-19 pandemic is estimated to have contracted by -4.4% in 2020, while Indonesia's economy grew by -2.07% compared to 2019. This growth represents the lowest since the 1997 monetary crisis (IMF, 2020).

The ongoing economic crisis causes bankruptcy, so banks need an EWS as an early detection before bankruptcy occurs. The system is important for banks to identify healthy or unhealthy conditions. Sufitri (2019), Sumandi (2017) and Taufan & Iriawan (2011) convey that the EWS component comes from bank health indicators, namely financial statements. Financial statements as the final result of the accounting process produced by the company to provide information as a history of banking achievements and forecasts for the future (Herawati, 2019). In addition, financial statements can be calculated from several common financial ratios to serve as the basis for assessing the health level of banks. Through analyzing financial ratios, it can be seen how well a bank is performing.

The Financial Services Authority (2020) noted that several financial ratios moved slowly as of December 2020, including the Non-Performing Financing (NPF) ratio with a range of 3% to 1% decrease and a decrease in the Financing Deposit to Ratio (FDR) which touched 75%. Apart from experiencing a decrease, several ratios also increased in 2020. These ratios include the Allowance for Impairment Losses (CKPN) and Capital Adequacy Ratio (CAR) ratios, with an increase of 16.63% & up to 21.64%.
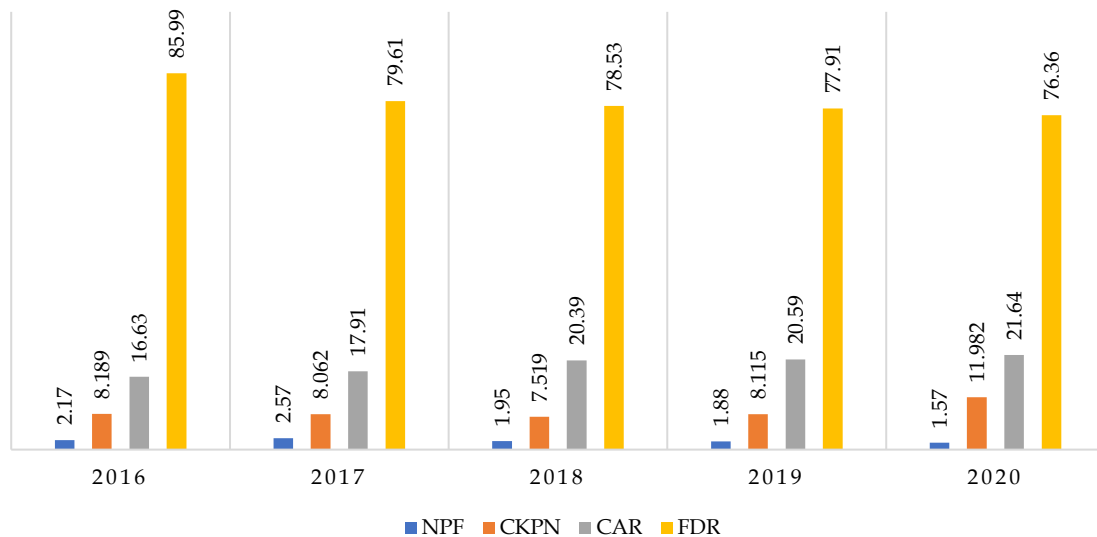

Figure 1: Financial Ratios of Indonesian Islamic Commercial Banks

According to Bank Indonesia, the ideal CAR ratio level that banks should have been around 8-10%. Therefore, banks need to pay attention to the level of

CAR to stay within this ideal limit. Even though they have a large capital, banks that do not utilize their capital optimally can affect the FDR level because their savings are getting tighter (Syarifah et al., 2020). Likewise, with the CKPN ratio, the nominal increase in the CKPN ratio impacts reducing the level of non-performing financing. The higher the CKPN ratio, the greater the NPF that losses must cover (Sholikhah, 2018). If the NPF and CKPN are high, the potential for bankruptcy is also high. It proves that financial ratios can be used to assess the health level of banks in predicting bankruptcy (Sofiasani & Gautama, 2016).

Financial Distress (FD) conditions are initially characterized by declining financial liquidity (E. R. Sari & Yulianto, 2018). The worst state of the company is at its lowest point, where it cannot fulfil its debts or obligations (Putri dan Merkusiwati, 2019). Shidiq & Wibowo (2017) stated that banks with a high risk of bankruptcy need EWS as a form of early detection to minimize the consequences of losses and prevent an economic crisis. EWS needs to be considered by bank regulators to find out a bank that is indicated by FD (Sofiasani & Gautama, 2016).

Some literature shows different results in predicting FD. Research by Afiqoh & Laila (2018), Putri et al. (2018) and Suot et al. (2020) shows that the CAR ratio has a significant positive effect on the risk of bankruptcy of banks, it is because the CAR ratio is the strength of capital for Islamic banks in bearing risky assets. Different results in the research of Sofiasani & Gautama (2016), Habbi & Harto (2019) and Suci & Noviansyah (2019) explain that the CAR variable does not affect FD prediction. It is because the definition of financial difficulties is related to bank losses and liquidity. If a bank experiences a loss (negative profit) but the capital ratio is high enough, the bank is said to be healthy even though the condition is the loss.

Hasibuan et al. (2020), Purbayati (2020) and Pamungkas et al. (2021) revealed that there is an effect of the NPF ratio on FD. It is explained that high NPF causes banks to lose sources of income from profit-sharing income and profit margin income, resulting in a decrease in profits and the potential for FD. Meanwhile, research conducted by Arinna & Kusumaningtias (2018), Alvidianita & Rachmawati (2019) and Supriatin et al. (2019) showed that the NPF ratio does not affect the potential bankruptcy of Islamic banks. It is explained that even though the NPF value is high, if the bank applies the precautionary principle, at any time there is a loss to the bank's operations, it can cover its non-performing financing.

Khadapi (2017), Alvidianita & Rachmawati (2019) and Masruri (2020) show that the FDR ratio has a significant effect on FD. It is explained that the FDR value shows the low liquidity capacity and total bank financing, thus risking FD. Meanwhile, research by D. W. Sari (2017), Erni & Imron (2019) and Hasibuan et al. (2020) shows that the FDR ratio does not affect FD. It is evidenced by the FDR ratio value of less than 94.75%, so the potential for FD is low.

Nuryadiputra (2019), Sholikhah (2018) and Purnomo (2020) show that the CKPN fulfilment ratio has a positive and significant effect on the probability of bankruptcy. It is explained that the CKPN ratio is important as a cover for losses due to non-performing financing before bankruptcy occurs. Meanwhile, Spica & Herdinigtyas (2005) research states that the CKPN ratio has no significant effect on bankruptcy conditions.

This study aims to predict the occurrence of FD in Indonesian Islamic Banks by using EWS components in the form of CAR variables for capital adequacy indicators, NPF variables for risk profile indicators, FDR variables for liquidity indicators and CKPN as loss cover due to high NPF. The author uses the object of Indonesian Islamic Commercial Banks for the 2016 - 2020 period because this period began the decline in the performance of Islamic banks, especially in 2019 - 2020, due to the COVID-19 pandemic. The existence of this information can help the author to identify banks that experience FD.

2. Literature Review

Signaling theory is a positive and negative signal to the company's condition (Jogiyanto, 2000). This theory explains that a company's management needs to signal users of financial statements so that management and investors can make the right policy (M. K. Sari, 2016). Signaling theory correlates with EWS because it develops the signal theory (Tinggi & Sakum, 2020). In addition, signal theory can be used as a medium to determine signals of company failure or bankruptcy (Turvatragol, 2013).

EWS can provide early warning of financial difficulties and future banking operations (Wulandari et al., 2018). Early warning systems are important for both internal and external parties of the company so that internal parties will be faster in improving the company's financial condition. Meanwhile, external parties can assist in minimizing risks as early as possible (N. W. K. A. Putri & Merkusiwati, 2014). The use of EWS has proven effective in identifying the condition of the company in a healthy or unhealthy state.

FD is a stage of decline in the company's financial condition before experiencing bankruptcy or liquidation (Almilia, 2006). FD can be interpreted as the company's inability to pay its financial obligations at maturity (Darsono & Anshar, 2005). Fauzia (2017) divides three types of bankruptcy: insolvency, failure and bankruptcy. Altman (1984) states that insolvency occurs when a company cannot meet its short-term obligations when due. Failure in the economy occurs when the rate of return on invested capital decreases (Fauzia, 2017). Meanwhile, bankruptcy is characterized by company debt exceeding the fair valuation of its total assets (Rachmat, 1995). Islamic banks are expected to be able to detect early before bankruptcy through financial ratios that indicate bank health. If the bank cannot minimize early on, the chance of FD conditions will be high.

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The potential for FD can be measured through CAR (Kasmir, 2010). The higher the CAR ratio, the stronger the bank is in bearing risky assets. It is because CAR is a ratio of bank performance to measure the adequacy of capital owned by banks to support assets that contain or generate risk, such as loans (Dendawijaya, 2009). If the bank has sufficient capital, it may lead to FDs. Afiqoh & Laila (2018) revealed that the CAR ratio has a significant effect on the risk of bankruptcy of banks because the CAR ratio is the strength of capital for Islamic banks in bearing the risky assets of Islamic banks. In contrast to Habbi & Harto (2019) , who said that CAR does not affect FD, this is evidenced that the CAR variable cannot be used to predict FD because the definition of financial distress is related to bank losses and liquidity.

NPF is also seen as a factor in the occurrence of FD by indicating the company managing the amount of NPF (Zahronyana & Mahardika, 2018). If the NPF ratio is high, the problems that banks will face will be even greater. Conversely, if the NPF ratio is low, it indicates a better condition for banks to return bad financing (Kasmir, 2009). If there are more bad financing processes, it will reduce the amount of bank income, resulting in FD (M. K. Sari & Sadriatwati, 2020). Pamungkas et al. (2021) stated that the NPF ratio has a significant effect on Islamic commercial bank FD because the higher the NPF ratio, the higher the probability of FD. Meanwhile, research by Supriatin et al. (2019) showed that the NPF ratio does not affect the potential bankruptcy of Islamic banks because despite the increase in the NPF ratio, if the bank applies the prudential principle, at any time there is a loss to the bank's operations it can cover its non-performing financing.

EWS can also be represented by FDR, which measures how far the bank can refinance withdrawals made by depositors by relying on financing provided as a source of liquidity (Dendawijaya, 2009). The lower the FDR ratio, the better the bank's ability to manage the intermediary function optimally to keep the company away from FD. Masruri (2020) shows that the FDR ratio significantly affects FD. It is due to the ratio of funds channelled to funds raised. Meanwhile, Sari (2017) states that the FDR ratio does not affect FD because more than 80% of the financing is widely distributed in the community.

CKPN, as one of the indicators of FD predictors, is an allowance formed when the value of financial assets after impairment is less than the initial value. CKPN has an important value for banks to anticipate the risk of FD due to funds channelled not returning (Rosita, 2021). Nuryadiputra (2019) shows that the CKPN fulfilment ratio has a positive and significant effect on the bank's bankruptcy probability. It is explained that the CKPN ratio is important as a cover for losses due to non-performing financing before bankruptcy occurs. Meanwhile, research by Spica & Herdinigtyas (2005) states that the CKPN ratio has an insignificant effect on problematic conditions because the higher the CKPN ratio, the less likely the bank will experience FD.

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3. Research Methods

The type of data used in this study is secondary data which is panel data. Data is obtained by accessing the website of The Financial Services Authority. The sample in this study is Islamic Commercial Banks for the period 2016 - 2020. This study uses the Springate Score Model to predict FD. The Springate Score calculation formula is as follows (Anitra & Widyawti, 2018).

$$S = 1,03\,A + 3,07\,B + 0,66\,C + 0,4\,D$$

A = Working Capital to Total Asset,
B = Earnings Before Interest and Taxes to Total Asset,
C = Earnings Before Taxes to Current Liabilities and
D = Total Sales to Total Asset

The company classification is said to be healthy if S>0.862 and is said to be unhealthy if S <0.862. (Sinarti & Sembiring, 2015). This study also measures the EWS components in CAR, NPF, FDR and CKPN. According to PSAK 71/2018, the value of CKPN can be obtained using the formula:

$$CKPN = \frac{CKPN\ Established}{Total\ Earning\ Assets}\ x\ 100\%$$

This study was tested using Eviews 12 software using the binary logit test by categorizing 0 for banks that did not experience FD and category 1 for banks that experienced FD. The logistic regression statement can be expressed as follows (Ghozali, 2007):

$$Ln = \frac{p}{1-p} = \beta0 + \beta1\,(CAR) + \beta2\,(NPF) + \beta3\,(FDR) + \beta4\,(CKPN) + e$$

According to Ghozali (2007), the analysis steps in logistic regression are the Overall Model Fit Test, Hosmer and Lemeshow Goodness of Fit Test, Adjusted R-Squared, and Partial Test. The logit model ignores the normality, heteroscedasticity, and autocorrelation tests so that only a multicollinearity test is needed (Gujarati et al., 2012: Ghozali, 2016). The logit model differs in interpretation from the Ordinary Least Square (OLS) regression equation. Suppose OLS requires choosing the best regression model, namely the Common Effect Model, Fixed Effect Model and Random Effect Model tests. However, the logit model does not use the best model test selection because the OLS equation and the logit model are different. The logit model can select the relationship because it uses a nonlinear log transformation approach to predict the odds ratio. The odds ratio in the logit model is often expressed as a probability (Tinungki, 2010; Purhadi, 2015; M. Sari, 2020). It is supported by research by Arellano (2003),

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Hesli et al., (2012), Qaedi (2020) and Kwon et al. (2021) that the logit model does not require the best model test, namely the Common Effect Model, Fixed Effect Model and Random Effect Model tests.

4. Finding and Discussion

The results of the Springate Score calculation from 2016 - 2020 can be seen in table 1. The company classification is said to be healthy if the Springate Score value is> 0.862 and is said to be unhealthy if the Springate Score value is <0.862 (Sinarti & Sembiring, 2015).

Table 1: Springate Score

Bank	Years				
	2016	2017	2018	2019	2020
Bank Muamalat	0.185	0.823	0.908	0.811	0.813
Bank Mega Syariah	0.376	1.670	1.735	1.562	0.404
Bank Panin Dubai Syariah	0.913	1.429	0.504	1.151	0.929
BNI Syariah	0.845	0.523	0.987	1.030	0.875
BRI Syariah	1.010	0.943	0.896	0.918	0.800
Bank Mandiri Syariah	0.983	0.353	0.387	0.400	0.314
BCA Syariah	0.921	1.056	1.023	0.692	0.795
BTPN Syariah	2.287	2.743	2.725	2.865	2.364
Maybank Syariah	1.257	0.350	0.675	0.595	0.628
BJB Syariah	0.394	0.451	0.570	0.524	0.520
Bank Victoria Syariah	-0.276	0.659	0.676	0.633	0.527
Bank Bukopin Syariah	1.056	0.866	0.928	0.73	0.928
Bank Aceh Syariah	2.430	2.005	1.605	1.263	1.777
Average	0.871	1.067	1.047	1.013	0.898

Notes: Data processed by the author

The average Springate Score value of Islamic commercial banks from 2016 - 2020 was the highest in 2017, which amounted to 1.067, then decreased until 2020 to 0.898. It is because Indonesia was affected by the COVID-19 pandemic, which caused several sectors to suffer losses, including the banking economy. In 2016 - 2020 BJB Syariah was in a distressed position for five consecutive years. Many factors underlie BJB Syariah's distress, including the low value of Earning Before Interest Tax, Depreciation, and Amortization (EBITDA) and Earning Before Taxes to Current Liabilities (EBTCL). The low EBITDA value is due to rational assets owned that are unable to generate profits in their operational activities, while the low EBTCL value is due to operational profits that cannot cover existing current liabilities. Different results in BTPN Syariah have an average Springate Score value of 2.59 for five periods. It shows the amount of all FD supporting ratios owned by BTPN Syariah can cover assets to generate high income to keep from FD conditions (Anitra & Widyawti, 2018; Kartika, 2015; Ida

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Fitriyah, 2013). Furthermore, a multicollinearity test is carried out to see the correlation between independent variables.

Table 2: Multicollinearity Test

Indicator	FD	CAR	NPF	FDR	CKPN
FD	1.000	-0.163	0.279	0.008	-0.094
CAR	-0.163	1.000	-0.331	0.059	-0.142
NPF	0.279	-0.331	1.000	0.125	0.347
FDR	0.008	0.059	0.125	1.000	0.326
CKPN	-0.094	-0.142	0.347	0.326	1.000

Notes: Data processed by the author

The multicollinearity test results show no correlation value between independent variables exceeding 0.90 (Ghozali, 2018). So, there is no multicollinearity between independent variables, which can then be continued at the Overall Model Fit stage.

Table 3: Overall Model Fit

Test	Value	Test	Value
McFadden R-squared	0.116	Mean dependent var	0.461
S.D. dependent var	0.502	S.E. of regression	0.468
Akaike info criterion	1.373	Sum squared resid	13.182
Schwarz criterion	1.541	Log likelihood	-39.647
Hannan-Quinn criter.	1.439	Deviance	79.295
Restr. deviance	89.724	Restr. log likelihood	-44.862
LR statistic	10.428	Avg. log likelihood	-0.609
Prob (LR statistic)		0.033	

Notes: Data processed by the author

This test is the same as the F test, which determines whether the independent variables have a significant effect on the dependent variable. The test results in table 3 show the Prob (LR Statistic) value of 0.033<0.050, and the LR Statistic value is greater than the F-table value (alpha 5%, df1 = 4, df2 = 60) 2.525 so that the model is said to be fit. It is also stated that the CAR, NPF, FDR, and CKPN variables simultaneously affect FD.

Table 4: Hosmer and Lemeshow Goodness of Fit Test

Test	Value	Test	Value
H-L Statistic	6.106	Prob. Chi-Sq (8)	0.635
Andrews Statistic	12.340	Prob. Chi-Sq (10)	0.262

Notes: Data processed by the author

The test results in table 4 show the Chi-Square probability value on the H-L Statistic of 0.635>0.05. It indicates that the logistic regression model is suitable for further analysis. The model can predict the value of its observations, so the

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logistic regression equation can be used to explain the relationship between the independent and dependent variables.

Table 5: Pseudo R-Squared

Test	Value	Test	Value
McFadden R-squared	0.116	Mean dependent var	0.461
S.D. dependent var	0.502	S.E. of regression	0.468
Akaike info criterion	1.373	Sum squared resid	13.182
Schwarz criterion	1.541	Log likelihood	-39.647
Hannan-Quinn criter.	1.439	Deviance	79.295
Restr. deviance	89.724	Restr. log likelihood	-44.862
LR statistic	10.428	Avg. log likelihood	-0.609
Prob (LR statistic)		0.033	

Notes: Data processed by the author

Table 5 shows the McFadden R-Squared value of 0.116, or 11.6% of the variation that occurs in FD can be explained by the variables in the model, and other variables outside this research model explain the remaining 88.4%.

Table 6: Partial Test

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.051	8.214	0.128	0.898
CAR	-1.145	1.141	-1.003	0.315
NPF	0.569	0.235	2.414	0.015
FDR	0.802	1.816	0.441	0.658
CKPN	-0.645	0.333	-1.937	0.052

Notes: Data processed by the author

Table 6 shows that the CAR variable has no effect on FD with a probability value of 0.315>0.05. Because Islamic banking can manage its capital so that the bank does not experience depreciation of assets, and the results show that it is not significant because the higher the Risk-Weighted Assets, the more the amount of bank capital that is not distributed (Suci & Noviansyah, 2019; Theodorus & Artini, 2018). CAR value in Islamic commercial banks for the 2016 - 2020 period is generally stable, with an average of 20.4%. In addition, the data supporting this study's results is that Bank BTPN Syariah experienced a consecutive increase from 2016 - 2020 by reaching a CAR value of 49.44%. Other data that support this research is that the value obtained by Islamic banks is above the minimum CAR limit set by Bank Indonesia, which is 12%. It reflects that the capital owned by Islamic banks is high enough to cover losses on productive assets. Islamic banks with a high CAR value can channel their capital

in the hope of getting high profits despite facing high risks, so the higher the CAR ratio, the less likely it is for Islamic banks to experience FD conditions.

The partial test results show that NPF significantly positively affects FD with a probability level of 0.015<0.05. The influence of NPF on FD indicates that the NPF ratio in Islamic commercial banks for 2016 - 2020 is above the maximum limit set by Bank Indonesia, which is 5%. According to Dendawijaya (2009), the more bad financing processes will reduce the amount of bank income, resulting in FD. In the Springate Score calculation, the indicator influenced by the NPF ratio is the Working Capital to Total Asset ratio, where the amount of financing disbursed will affect current debt in the Working Capital to Total Asset ratio. The Working Capital to Total Asset ratio in Islamic commercial banks is mostly low to minus, including Bank Bukopin Syariah, BNI Syariah, Maybank Syariah and Bank Panin Dubai Syariah. Based on this analysis, the NPF ratio significantly affects FD.

Furthermore, the FDR variable showed no significant effect on FD, with a probability value of 0.6586>0.05. Because the FDR level in Islamic banks during the period 2016 - 2020 is in good health, which is in the range of 84.7%, the bank can carry out its function as an intermediary institution properly (Suryani, 2012). In addition, the data supporting this study's results is that Bank Bukopin Syariah, with the highest FDR value of 196.73% in 2020, is not classified as a bank that experienced FD. Islamic banks can disburse financing with a low rate of return on productive assets, and the company has reserves for impairment losses derived from third-party funds (Aeni, 2020; Pamungkas et al., 2021).

The partial test results also show that CKPN does not significantly influence FD through a probability value of 0.0527>0.05 because the CKPN level in Islamic commercial banks for the 2016 - 2020 period is below the maximum limit set by Bank Indonesia, which is 5%. Sholikhah (2018) said that the large value of CKPN impacted the decline in the bank's NPF rate. However, the data supporting this study's results is that BTPN Syariah shows that the NPF ratio was below 1% during 2016 - 2020, while the CKPN ratio reached 5.68% in 2020. In addition, Islamic banks are said to maintain the quality of productive assets as much as possible so that banks do not incur operational costs for a decrease in productive assets, including uncollectible receivables costs or NPF (Pryangan, 2020).

5. Conclusions

This study aims to determine the effect of the ratio of CAR, NPF, FDR and CKPN to FD. The sample used in this study was Sharia Commercial Banks for 2016 - 2020. Of the four variables studied, the results obtained were only NPF variables that significantly affected FD. It is due to high non-performing financing in Islamic banks, which reduces the amount of bank income.

Meanwhile, the CAR, FDR, and CKPN variables do not affect FD. The ratio of CAR, FDR and CKPN is not the main factor in predicting FD's condition.

This study has limitations. First, several other variables still need to be used in this study, while these variables contribute to predicting FD. Second, researchers only use a short period, so they have yet to learn the significant difference from year to year. Based on these limitations, it is recommended that subsequent researchers add variables that can contribute to FD conditions and increase the period in this study. Considering the condition of each year, the company will experience fluctuations so that it will give birth to a different policy every year.

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