

## The Impact of Liquidity Risk Optimization on the Stability of Islamic Commercial Banks in Indonesia

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**Abstract.** *This research was conducted with the aim of knowing the effect of liquidity risk on bank stability with credit risk and operational efficiency as intervening variables for Islamic Commercial Banks in Indonesia for the 2010-2019 period. This study uses secondary data on the financial reports of Islamic commercial banks issued by the financial services authority (OJK) during the period 2010 to 2019. The sample was taken using a non-probability sampling technique, namely purposive sampling in order to obtain 11 Islamic commercial banks. The analysis technique is carried out by testing 6 (six) hypotheses. The results of this study indicate that liquidity risk can have a direct effect on bank stability, but there are also credit risk and operational efficiency variables play a role in mediating the relationship to the stability of the bank. Meanwhile, liquidity risk is not able to directly affect the operational efficiency of the bank.*

**Keywords:** *Liquidity Risk, Credit Risk, Operational Efficiency, Bank Stability*

### 1. INTRODUCTION

The study of liquidity risk has become the concern of many researchers. Managing liquidity risk is an important part of improving banking performance Djebali & Zaghdoudi (2020) and Rupeika-apoga et al., (2020). The ability of banks to maintain liquidity risk determines the success of managing banking operations Amara & Mohamed (2019). High liquidity has an impact on operational stability, but can reduce the ability to distribute funds to the community Ghenimi et al., (2017). Banking can choose to increase the distribution of funds to the public to improve financial performance, but this condition can have an impact on decreasing liquidity capacity Amara & Mohamed (2019). Therefore, this liquidity risk still needs to be studied in depth.

There are inconsistencies in the results of research that examines the effect of liquidity risk on banking stability. Nesrine Djebali and Khemais Zaghdoudi (2020) state that liquidity risk has a positive effect on bank stability, well-managed liquidity risk will increase

performance stability. Likewise M. Kabir Hassan et al. (2018) shows the results that banks that have high liquidity risk will increase their stability. This is because high liquidity risk can be optimized to increase operational effectiveness, resulting in high profits, as stated by Rupeika-apoga et al., (2018).

However, several other studies show that high liquidity risk will reduce banking stability. Ameni Ghenimi et al., (2017) shows that liquidity risk has a significant negative effect on bank stability. In another study, Ramona Rupeika-Apoga et al. (2020) found results that were different from previous research, that liquidity risk had a negative and significant effect on bank stability. Even Tijani Amara and Mohamed Mabrouki (2019) found that liquidity risk did not affect bank stability. The inconsistency of research results on the effect of liquidity risk on banking stability suggests that there is a research gap, which raises fundamental questions about What is the liquidity risk so that it is able to continue to produce good banking stability. This research gap will be studied in this study.

The development of banking as a financial institution has a decisive role in providing investment needs and working capital in the real sector (Muhammad, 2005). Islamic banks as financial institutions need to maintain stability. Measurement of bank stability can be proxied by using the z-score which reflects the bank's probability. Bank stability decreases if  $(CAR + ROA) < 0$ , where CAR is the ratio of bank capital assets and ROA is the percentage of profit to total assets (Lepetit & Strobel, 2014). The more positive the z-score value of a bank away from zero, the farther the bank will be from bankruptcy risk (Martin & Hesse, 2010). In managing banking, there are several risks that must be considered, including credit risk, liquidity risk, market risk and operational risk (Fauziah et al., 2020). Liquidity risk is one of the risks that needs to be considered and handled seriously. Liquidity risk can occur because banks choose to channel funds in high amounts. The size of this fund distribution ratio can be measured by the Financing to Deposit Ratio (FDR). Banks that distribute funds in a prudent manner, their operational effectiveness will increase and the risk of non-performing loans will be low. Low problem loans, indicating a high rate of refund. This will have an impact on the ability of profitability at The size of this fund distribution ratio can be measured by the Financing to Deposit Ratio (FDR). Banks that distribute funds in a prudent manner, their operational effectiveness will increase and the risk of non-performing loans will be low. Low problem loans, indicating a high rate of refund. This will have an impact on the ability of profitability at The size of this fund distribution ratio can be measured by the Financing to Deposit Ratio (FDR). Banks that distribute funds in a prudent manner, their operational effectiveness will increase and the risk of non-performing loans will be low. Low problem loans, indicating a high rate of

refund. This will have an impact on the ability of profitability at finally increasing banking stability Djebali & Zaghdoudi (2020).

This research was conducted at Islamic commercial banks in Indonesia for the period 2012 to 2021. During this period, Islamic commercial banks in Indonesia experienced quite volatile conditions. In the period from 2012 to 2020, economic conditions were quite stable so that banks were able to distribute funds normally. However, from 2020 to 2021, the economy will experience sluggishness. This was because during this period the Covid-19 pandemic occurred which had an impact on the weakening of the real sector. Therefore, this research chooses a conducive and sluggish period for banking, so it is expected that the results of this study will be more accurate.

## **2. LITERATURE REVIEW**

Managing banking liquidity is one of the keys to success in achieving financial performance. Liquidity that is well managed will be able to maintain the stability of banking operations (Ramlall, 2018). Banking needs to maintain liquidity risk, so that the funds owned are able to generate profitability, while still having the ability to fulfill obligations. Banking liabilities have unique characteristics, most of the funds managed come from third party funds with very varied maturities. The amount of funds channeled to the public will reduce the bank's ability to meet obligations that have the potential to mature. Obligations that will mature from savings and current accounts are relatively more difficult to predict than funds originating from deposits. Therefore a higher Financing to Deposit Ratio (FDR) can indicate a higher liquidity risk (Wulandari & Utami, 2019). The Financing to deposit ratio (FDR) can show a bank's ability to repay incoming funds from customers. The greater the FDR, the higher the bank's risk of failing to meet liquidity.

Good bank stability shows that the bank is able to carry out its function as an intermediary institution in channeling public funds in the form of financing. Banks that are able to maintain stability will have a relatively low risk of bankruptcy (Warjiyo, 2006). To determine banking risk, the Z-score can be used (Polizzi & Scannella, 2020). This indicator can assess individual bank risks as well as the bank's financial stability as a whole. The Z-score is a measure of risk that reflects the bank's probability. Bank stability decreases if  $(CAR + ROA) < 0$ , where CAR is the ratio of bank capital assets and ROA is the percentage of profit to total assets (Lepetit & Strobel, 2014). The more positive the z-score value of a bank, the farther the bank will be from bankruptcy risk (Martin & Hesse, 2010).

In maintaining bank stability, the health of bank fund distribution must be considered. Distribution of bank funds to the public is monitored for their return performance so that credit risk is maintained. The ratio for measuring credit risk is Non Performing Financing (NPF), i.e. ratio that can show how much the number of problem loans is (Nugroho & Anisa, 2018). Credit risk will potentially affect bank stability. Low credit risk can encourage efforts to increase banking stability (Syatiria & Hamdani, 2017). Credit growth that is not carried out in a prudent manner can increase non-performing loans, and ultimately result in increased bank instability (Ali et al., 2019). According to Ghenimi et al., (2017) credit risk has an impact on reducing bank stability. This happens because banks are unable to reduce the volume of non-performing loans, thereby increasing banking costs and ultimately reducing bank stability.

Another variable that can affect the level of stability of Islamic banking is efficiency (Ghassan & Guendouz, 2019). The bank's ability to operate efficiently results in optimizing asset utilization. Assets that are utilized optimally, are managed by taking care of the consequences of costs that must be incurred. The ratio that can be used to measure operational efficiency is to compare operational costs to operating income (BOPO) (Ozili, 2018). Banking that is able to maintain and pay attention to the efficiency of its operational costs allows banks to reduce potential losses and financial distress (Dendawijaya, 2005). Ghassan & Guendouz (2019) argued that operational efficiency can increase banking stability. Banks that carry out their operational activities inefficiently will cause the bank to be unable to compete in raising funds or channeling funds to the public (Nugroho & Anisa, 2018). The bank is in good condition, one of which is marked by the low level of the BOPO ratio which indicates the more efficient the operational costs incurred by the bank (Dendawijaya, 2005).

### ***2.1. Liquidity Risk and Bank Stability***

The main activity carried out by banks is managing risk. Liquidity risk shows the amount of potential losses that can occur in the future caused by the ability to fulfill banking obligations (Bello et al., 2017). High liquidity risk, potential for default. This can have an impact on public distrust in placing their money in banks (Ghenimi et al., 2017), so that it can have a negative impact on bank stability.

Public funds received by banks in various forms, such as savings, demand deposits and time deposits, must be prepared at maturity. The greater the proportion of public funds disbursed, the less the supply of funds that will be used to serve the collection of third party funds. This is in line with the findings of Amara & Mohamed (2019) which stated that liquidity risk has a negative effect on bank stability. However, banks must manage third party funds not

only to maintain liquidity, but also to make these funds productive and generate income. Improper liquidity risk management will have an impact on reducing bank stability (Djebali & Zaghdoudi, 2020). Research with similar results was stated by Rupeika-apoga et al., (2020) which suggests that a high percentage of liquidity risk can increase the occurrence of additional risks and will have an impact on reducing the level of bank stability. Based on the description above, the following hypotheses can be proposed:

H1: Liquidity risk has a negative effect on Bank Stability.

## ***2.2. Credit Risk and Bank Stability***

Funds disbursed by banks have the potential to be non-refundable by customers. Distribution of funds is carried out with a strict mechanism and the principle of prudence. Credit risk is a risk that has the potential to arise due to a customer's failure to fulfill the obligation to return the funds received (Syatiria & Hamdaini, 2017). The higher the potential for uncollectible loans, the greater the third party funds that are not successfully received back by the bank. This condition can have an impact on bank financial stability which is decreasing (Ghenimi et al., 2017).

The low rate of credit refunds reduces the amount of funds that can be used to fulfill obligations and run bank operations. Low credit risk can increase the level of bank stability (Muhammad Ali et al., 2019) and Ghenimi et al. (2017). Failure to manage the disbursement of credit funds will result in high non-performing loans. This has the potential to increase the risk of bankruptcy. In other words, the higher the amount of credit risk, the greater the potential for bank failure which will have an impact on decreasing bank stability.

This statement is in line with research by Ali et al., (2019) which shows the results that credit risk has a negative effect on bank stability. The high number of non-performing loans requires banks to incur high accounts receivable write-off costs. As a result, banks will lose revenue and opportunities to optimize third party funds for redistribution. Based on the above arguments, the following hypotheses can be proposed:

H2: Credit risk has a negative effect on bank stability.

## ***2.3. Operational Efficiency and Bank Stability***

Bank operational efficiency is measured by the ratio of operational costs to operating income (BOPO). This ratio shows the degree of efficiency in bank management in carrying out its operations (Yuhasril, 2019). The more efficient and lower the costs incurred by the bank so as to produce optimal operating income, it shows that the bank is in good condition. Therefore

a bank that is managed efficiently will have a good impact on its stability (Ghassan & Guendouz, 2019).

Furthermore, Ozili (2018) found that operational efficiency has a positive and significant effect on bank stability. The ratio of operating costs and operating income is high, indicating that banks are able to optimize third party funds for distribution to the public. This will result in high profitability. Optimizing third party funds for distribution to the public has resulted in better bank stability (Ghassan & Guendouz, 2019) and (Vasilyeva et al., 2016). Therefore, based on the description above, the following hypothesis can be proposed:

H3: Operational efficiency has a positive effect on bank stability.

#### ***2.4. Liquidity risk and Credit Risk***

Distribution of public funds is carried out with prudent principles and mechanisms. This is done to reduce risk. Liquidity risk is proxied by the Finance to Deposit Ratio (FDR). This ratio shows the amount of financing or credit extended to the public. The high FDR shows that the distribution of third party funds is high (Wulandari & Utami, 2019). This means that many public funds collected in banks are channeled to the community and reduce the supply of funds that can be used to fulfill obligations (third party funds that are due). Therefore FDR can be used as a proxy to measure liquidity risk. The higher the FDR, the higher the liquidity risk.

Distribution of funds to debtors must comply with a strict mechanism and be carried out with prudential principles. This is done to reduce the risk of bad credit and increase the optimization of third party funds. If carried out with the precautionary principle and a strict mechanism, high financing (credit) distribution will be able to reduce credit risk (Wulandari & Utami, 2019). The amount of credit distributed in a healthy manner will be able to reduce the ratio of non-performing loans (Ghenimi et al. 2017). This is also supported by the results of research conducted by K. Sari (2018) who found that liquidity risk has a significant negative effect on credit risk. Therefore, based on the above arguments, the following hypothesis can be put forward:

H4: Liquidity risk has a negative effect on credit risk.

#### ***2.5. Liquidity risk and Operational Efficiency***

As an intermediary institution, banks always try to maintain their liquidity risk. This is done to ensure that the public can withdraw their funds at any time according to the maturity date. With the ability to meet this liquidity, the bank will be able to maintain customer trust. Liquidity risk is maintained so that there is a balance with profitability. Banks do only need to

maintain its liquidity capabilities, but also must be able to optimize third party funds to generate income (Amin et al., 2017). This is because the public also expects benefits from the funds entrusted to the bank.

High liquidity risk will increase operational efficiency (Amin et al., 2017). Akhter (2018) proves that liquidity risk has a significant influence on operational efficiency. This is because disbursement of financing will increase operational efficiency. Channeling third party funds into receivables and financing provides revenue generating opportunities. Furthermore, Safa et al., (2018) also stated that liquidity risk has a positive and significant influence on operational efficiency. Based on the description above, it can be proposed the following hypothesis:

H5: Liquidity risk has a positive effect on operational efficiency.

## ***2.6. Credit risk and Operational Efficiency***

High distribution of funds, the risk of increasing credit risk. High credit risk can increase operational costs thereby reducing efficiency (Fiordelisi et al., (2010). Credit (financing) provided by banks always has the potential for problems. This is because business dynamics and customer characteristics cannot be predicted accurately. If credit channeled is congested, the bank must provide costs for writing off receivables. Conditions like this cause an increase in bank operational costs (Lotto, 2018). However, the magnitude of credit risk can also increase operational efficiency, when the increase in credit risk is lower than the increase in income earned from credit income (Fiordelisi et al., (2010). Suryanto & Susanti (2020) and Ozili (2018) also show that credit risk has a positive and significant effect on operational efficiency. The increase in credit risk will also have an impact on the increase in operational costs incurred by banks. Then it can be concluded the hypothesis as follows:

H6: Credit risk has a negative effect on operational efficiency.

Based on the above arguments, the research model can be presented as follows:

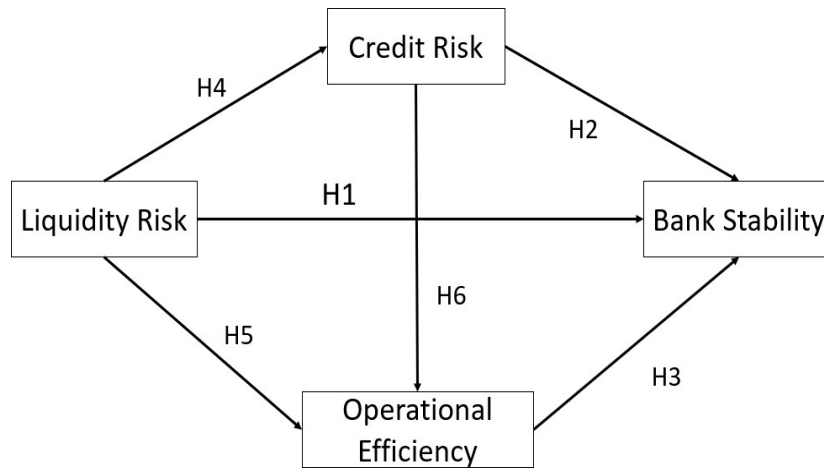


Figure 1. Research Model

### 3. RESEARCH METHODS

#### 3.1. Types of research

This research is a quantitative study using secondary data on bank stability variables (Z-score), FDR (Financing to Deposit Ratio), NPF (Non Performing Financing) and BOPO (Operating Expenses Operational Income) of Indonesian Sharia Commercial Banks. The qualitative paradigm was chosen because of the confirmatory nature of the data analysis to test the proposed research model.

#### 3.2. Population and Sample

The population in this study are Islamic Commercial Banks in Indonesia that are registered with the OJK. Determination of the sample using purposive sampling technique. After selecting according to the criteria, a sample of 11 Islamic Commercial Banks was obtained. The sampling technique of this research is non-probability sampling. The non-probability sampling technique used in this study is purposive sampling.

The sample criteria used in this study are first, Islamic Commercial Banks registered with the Financial Services Authority and Bank Indonesia during the 2010-2019 observation period. Second, Islamic Commercial Banks publish financial reports or annual reports at the Financial Services Authority and Bank Indonesia during the 2010-2019 observation period. Third, the financial statements must have complete data, so that the data can be used in this study.

#### 3.3. Data Collection Techniques

The research data is taken from the annual reports and financial reports of each Islamic Commercial Bank which have been published by the OJK. Researchers collected data from the financial reports of Islamic Commercial Banks in Indonesia in the 2010-2019 period. The financial statements are taken from the website of each Islamic Commercial Bank.



### 3.4. Definition of Concept and Measurement

To assess the level of bank stability, the Z-score variable is used, calculated from the return on capital assets divided by the standard deviation of return on assets. A high Z-score indicates that a bank is more stable because it is inversely proportional to the probability of bank bankruptcy (Polizzi & Scannella, 2020). Z-Score can be calculated by the formula:

$$Z - score = \frac{(ROA + CAR)}{\sigma ROA}$$

To measure liquidity risk, FDR is used which shows how capable it is a bank to repay the use of funds by customers by relying on loans as a source of liquidity. FDR shows the amount of funds from third parties channeled for financing (Muhammad, 2005). FDR is calculated using the formula:

$$FDR = \frac{Total\ Pembiayaan \times 100\%}{Dana\ Pihak\ Ketiga}$$

*credit risk* or credit risk is the risk caused when Islamic banks are unable to get back the funds that have been channeled to customers and the agreed benefits (Nabhan, 2010). To measure credit risk, NPF is used which is calculated as decreased financing divided by total financing (Dewi et al., 2019). Non-Performing Financing is measured by the ratio of problem financing to total financing provided (Almunawwaroh & Marlina, 2018). NPF can be calculated by the formula:

$$NPF = \frac{Pembiayaan\ Bermasalah \times 100\%}{Total\ Pembiayaan}$$

Operational efficiency shows that the costs incurred to obtain profits are smaller than the profits derived from using assets (Nugroho & Anisa, 2018). BOPO is also known as the operational efficiency ratio which measures how banking management manages operational costs to operating income. Efficient operational costs incurred by the bank so that the bank is in good condition is indicated by the low ratio (Dendawijaya, 2005). BOPO can be calculated by the formula:

$$BOPO = \frac{Biaya\ Operasional}{Pendapatan\ Operasional} \times 100\%$$

Table 1. Operational Definition of Measurement Scale

No.	Variable	Indicator
1.	FDR(X)	$FDR = \frac{\text{Total Pembiayaan} \times 100\%}{\text{Dana Pihak Ketiga}}$
2.	Z-score (Y)	$Z - score = \frac{(ROA + CAR)}{\sigma ROA}$
3.	NPF (Z1)	$NPF = \frac{\text{Pembiayaan Bermasalah} \times 100\%}{\text{Total Pembiayaan}}$
4.	BOPO (Z2)	$BOPO = \frac{\text{Biaya Operasional}}{\text{Pendapatan Operasional}} \times 100\%$

#### 4. RESEARCH RESULT

##### 4.1. Normality Test Results B.

Table 2. Normality Test One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residuals
N		78
Normal Parameters, b	Means	.0000000
	std. Deviation	1.37688451
Most Extreme Differences	absolute	.097
	Positive	.097
	Negative	-.066
Test Statistics		.097
asympt. Sig. (2-tailed)		.065c

- a. Test distribution is Normal.
- b. Calculated from data.
- c. Lilliefors Significance Correction.

Based on the table above, it is known that the value of Asymp. Sig. (2-tailed) of 0.065 which means greater than the significance of 0.05 after the logarithmic transformation is performed. So it can be concluded that the secondary data contained in this study can be normally distributed.

##### 4.2. Multicollinearity Test

Table 3. Multicollinearity Test

Model	Collinearity Statistics	
	tolerance	VIF
1   FDR	.964	1037
NPF	.605	1,654
BOPO	.611	1635
a. Dependent Variable: Zscore		

Based on the tests that have been carried out, it can be seen that each VIF value is at a value lower than 10, as well as the output tolerance value > 0.1. So it can be concluded that the regression model is free from multicollinearity problems.

### 4.3. Heteroscedasticity Test

Table 4. Heteroscedasticity Test

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	std. Error	Betas		
1 (Constant)	2,280	1686		1,352	.181
FDR	-.019	.012	-.178	-1,524	.132
NPF	-.006	.076	-.012	-.079	.937
BOPO	.005	.018	.043	.293	.770
a. Dependent Variable: ABRESID					

Based on the test above, it can be seen that all independent variables have a significance greater than 0.05. So it can be concluded that all independent or independent variables are free from heteroscedasticity problems.

### 4.4. Autocorrelation Test

The autocorrelation test was performed by calculating Durbin-Watson.

Table 5. Autocorrelation Test

Model	R	R Square	Adjusted R Square	std. Error of the Estimate	Durbin-Watson
1	.409a	.167	.133	.18255	1.949
a. Predictors: (Constant), BOPO, FDR, NPF					
b. Dependent Variable: Zscore					

In the table above the Durbin Watson (DW) value shows the number 1.949. In the DW test table d, it is known that  $k = 3$  and  $N = 77$ , in the table we get  $du = 1.7117$  so that  $4 - du = 2.2883$ . From these calculations, it can be concluded that the  $du$  value  $< DW < 4 - du$  ( $1.7117 < 1.949 < 2.2883$ ) then this value indicates that the test results have no autocorrelation problems.

### 4.5. Hypothesis Test Results and Discussion

Based on the data obtained, the data is processed to test each equation. This research model presents a simultaneous model, but the data is processed per each equation. The first test equation examines the effect of liquidity risk, credit risk and operational efficiency on bank stability as follows:

$$\text{Zscore} = a_1 + b_1 \text{FDR} + b_2 \text{NPF} + b_3 \text{BOPO} + e_1$$

Below are presented the results of the first equation test.

Table 6. Regression Results on Bank Stability

Independent Variable	standardized Coefficients	Sig	Conclusion hypothesis
FDR	-.223	041	Be accepted
NPF	-.423	003	Be accepted
BOPO	.261	.035	Be accepted
Dependent Variable: Zscore			

Based on the results of data processing, the result is that the coefficient of standardized FDR on bank stability is -0.223 with a significance level of 0.041. It can be concluded that liquidity risk which is proxied by FDR has a negative and significant effect on bank stability. The higher the FDR, the lower the stability of the bank. Thus hypothesis 1 is accepted. Liquidity risk (FDR) has a negative and significant effect on bank stability (Z-Score). Based on the results, it shows that the increase in liquidity risk proxied by FDR will have an impact on reducing bank stability. Banks must keep liquidity risk low in order to increase bank stability. Banks that are in stable condition have a high level of liquidity with low liquidity risk. So if the liquidity risk increases, marked by a high FDR ratio, it will result in a high risk that the bank will get. This is because high liquidity risk creates greater risk and will have a negative impact on bank stability. The results of this study are the same as the research that has been conducted by Ghenimi et al., (2017) Amara & Mohamed, (2019) and Rupeika-apoga et al., (2020) that liquidity risk has a significant negative effect on bank stability.

The effect of NPF on bank stability resulted in a coefficient of -0.423 with a significance level of 0.003. This result is smaller than 0.05, thus hypothesis 2 which states that credit risk has a significant negative effect on bank stability is accepted. Credit risk (NPF) has a negative and significant effect on bank stability (Z-Score) Based on the results it shows that an increase in the value of NPF or credit risk will cause bank stability to decrease, banks are unable to reduce the volume of non-performing loans which increases banking costs thereby reducing bank stability . The higher the amount of credit risk, the greater the banking failure, with increasing credit risk, bank stability will decrease. The results of this study are in line with the research of Ghenimi et al., (2017) and Ali et al.,

The degree of influence of BOPO on bank stability shows a coefficient of 0.261 with a significance level of 0.035 below 0.05. This means that hypothesis 3 which states that operational efficiency has a positive effect on bank stability is accepted. Operational efficiency

(BOPO) has a positive effect on bank stability (Z-Score). The more efficient the cost of the bank, will encourage banking stability. The results of this study are in accordance with Ghassan & Guendouz (2019) and Ozili (2018) which state that operational efficiency has a positive and significant effect on bank stability.

The second equation examines the effect of liquidity risk on credit risk with the following equation:

$$NPF = a_2 + b_4 FDR + e_2$$

Below are the results of the second equation test:

Table 7. Regression Results on Credit Risk

Independent Variable	Standardized Coefficients	Sig	Conclusion Hypothesis
FDR	-.355	.018	Be accepted
Dependent Variable: NPF			

Based on the results of data processing, the coefficient of the effect of FDR on NPF was - 0.355 with a significance of 0.18, below 0.05. Therefore it can be concluded that hypothesis 4 which states that liquidity risk has a negative effect on credit risk is accepted. Based on the results of the hypothesis test, it shows that increasing the FDR value will have an impact on reducing the NPF value. The more financing that is issued by the bank, the level of non-performing financing will decrease. This is very possible because the distribution of financing is carried out prudently so as to produce greater healthy financing. The results of this study are supported by research from Wulandari & Utami (2019) and K. Sari (2018) which states that liquidity risk has a negative effect on credit risk.

The third equation examines the effect of credit risk and liquidity risk on operating efficiency, with the following equation:

$$BOPO = a_3 + b_5 NPF + b_6 FDR + e_3$$

Below are the results of the third equation test:

Table 8. Regression Results on Credit Risk

Independent Variable	standardized Coefficients	Sig	Conclusion hypothesis
NPF	-.626	.000	Be accepted
FDR	.423	.188	Rejected

Dependent Variable: BOPO	
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The test results above show that FDR is not able to reduce operating efficiency with a coefficient of 0.423 and a significance level of 0.188, above 0.05. Thus hypothesis 5 is rejected. Liquidity Risk (FDR) has no effect on operational efficiency (BOPO). These results show that the increase in liquidity risk was not able to affect the operational efficiency of the bank. The higher the financing that is channeled cannot reduce or increase the operating costs of a bank. This is in accordance with Sunardi's research (2017) which found that liquidity risk has no effect on operational efficiency. This finding is very likely due to other variables that mediate the effect of liquidity risk on bank operational efficiency. The increase in liquidity risk does not directly affect the efficiency of bank operations, but through credit risk first. This finding is different from the research by Akhter (2018) and Safa et al., (2018) who argued that liquidity risk has a positive effect on operational efficiency.

Furthermore, NPF is able to reduce BOPO with a coefficient of -0.626 and is very significant (below 1 percent). This shows that hypothesis 6 (six) is accepted. The higher the NPF, the lower the efficiency of bank operations. Based on the results above, it shows that the higher the credit risk proxied by the NPF, the lower the bank's operational efficiency will be. The high level of non-performing financing results in banks having to pay more to set aside the cost of writing off accounts receivable, as well as costs for collecting receivables. It can also be understood that financing provided by banks will increase problem financing and will affect the increased costs that must be provided by banks (Lotto, 2018). The results of this study are the same as that of Suryanto &

#### 4.6. Ftest Test (Simultaneous)

The F test was conducted to see the overall effect of the independent variables on the dependent variable. This test can show the goodness or fit of the proposed model.

Table 9. Ftest ANOVA test

Model		Sum of Squares	Df	Means Square	F	Sig.
1	Regression	31,491	3	10,497	5,321	.002b
	residual	145,977	74	1973		
	Total	177,468	77			
a. Dependent Variable: Zscore						
b. Predictors: (Constant), FDR, NPF, BOPO						

Based on the results of the ANOVA test, a significance value of 0.002 was obtained, which was lower than the significance value of 0.05. So it can be concluded that the proposed

model is quite good, the independent variable is able to be a predictor of the dependent variable.

#### 4.7. Determination Coefficient Test

Table 10. Coefficient of Determination

Model	R	R Square	Adjusted R Square	std. Error of the Estimates
1	.421a	.177	.144	1.4045 2
a. Predictors: (Constant), FDR, NPF, BOPO				
b. Dependent Variable: Zscore				

Based on the results of the R<sup>2</sup> test, the Adjusted R Square value is 0.144. So it can be said that the contribution of the independent variables in explaining or influencing the dependent variable is 0.144 while the remaining 85.6% is influenced or explained by other variables that are not included in this study.

#### 5. CONCLUSION

Based on the results of data analysis and discussion, this research is able to contribute to the study of the concept of liquidity risk. The results of this study are able to explain that liquidity risk can reduce bank stability through several variables, namely credit risk and bank operational efficiency. The difference in research results on the effect of liquidity risk on bank stability, as presented in the research gap above, can be explained that this occurs because there are credit risk and operating efficiency variables that mediate the effect of liquidity risk on bank stability. Empirically, this study shows that in optimizing the role of liquidity, it is important for banks to pay attention to credit risk and operational efficiency in promoting bank stability.

#### REFERENCES

- Akhter, N. (2018). The Impact of Liquidity and Profitability on Operational Efficiency of Selected Commercial Banks in Bangladesh: A Panel Data Study. *Global Journal of Management and Business Research: A Administration and Management*, 18(7).
- Ali, M., Sohail, A., & Khan, L. (2019). Exploring the role of risk and corruption on bank stability: evidence from Pakistan. *Journal of Money Laundering Control*, 22(2), 270–288. <https://doi.org/10.1108/JMLC-03-2018-0019>
- Amara, T., & Mohamed, M. (2019). The Impact Of Liquidity And Credit Risks On The Bank Stability. *Journal of Smart Economic Growth*, 4(2), 97–116.
- Amin, SIM, Mohamad, S., & Shah, ME (2017). Do Cost Efficiency Affects Liquidity Risk in Banking? Evidence from Selected OIC Countries (Does the Cost of Proficiency Affect Liquidity Risk in Banking? Evidence from Selected OIC Countries) *International Center for Education in Islamic Finance*. 51(2), 55–71.

- Bello, N., Hasan, A., & Saiti, B. (2017). The mitigation of liquidity risk in Islamic banking operations. *Business Perspectives, Banks and Bank Systems*, 12(3), 154–165.
- Budiman, F. (2016). The Influence of the Quality of Implementation of Good Corporate Governance (GCG) on the Level of Return and Risk of Financing of Islamic Banks in Indonesia. *MUQTASID Journal of Islamic Economics and Banking*, 7(2), 1–21.
- Dacholfany, M. I. ., Khataybeh , A. M. ., Lewaherilla, N. C. ., Yusuf , M. ., Sihombing , H. B. M., & Chang , M. L. (2022). APPLICATION OF THE BALANCED SCORE CARD CONCEPT AS A HUMAN RESOURCE PERFORMANCE MEASUREMENT TOOL AT THE MINISTRY OF HIGHER EDUCATION IN INDONESIA. *MULTICULTURAL EDUCATION*, 8(04), 1–13. Retrieved from <https://mccaddogap.com/ojs/index.php/me/article/view/78>
- Dendawijaya, L. (2005). *Banking Management (FS Risman (ed.))*. Indonesian Ghalia.
- Dewi, T., Adi, I., & Rokhim, R. (2019). Mudarabah and Musharakah financing impact Islamic Bank credit risk differently ? *Research in International Business and Finance*, 49(September 2017), 166–175. <https://doi.org/10.1016/j.ribaf.2019.03.002>
- Djebali, N., & Zaghdoudi, K. (2020). Threshold effects of liquidity risk and credit risk on bank stability in the MENA region. *Journal of Policy Modeling*, 42(5), 1049–1063. <https://doi.org/10.1016/j.jpolmod.2020.01.013>
- Elsa, & Utami, W. (2014). Comparative Study of Efficiency, Asset Quality and Stability in Islamic Commercial Banks and Conventional Commercial Banks in Indonesia for the 2010-2014 Period. *Journal of Economics and Social Sciences*, 4(1), 104–114.
- Fauziah, Febriyanti, A., & Nisa, NH (2020). Financial Inclusion and Financial System Stability (Bank Z-Score) in Asia Department of Business Administration, State Polytechnic of Malang, Indonesia. *Optimal Journal of Economics and Entrepreneurship*, 14(1), 30–47.
- Fiordelisi, F., Marqués-Ibáñez, D., & Molyneux, P. (2010). Efficiency and risk in european banking.
- Ghassan, HB, & Guendouz, AA (2019). Panel modeling of z-score : evidence from Islamic and conventional Saudi banks. *International Journal of Islamic and Middle Eastern Finance and Management*, 12(3), 448–468. <https://doi.org/10.1108/IMEFM-04-2018-0122>
- Ghenimi, A., Chaïbi, H., Ali, M., & Omri, B. (2017). Borsa \_ Istanbul Review The effects of liquidity risk and credit risk on bank stability : Evidence from the MENA region. *Borsa Istanbul Review*, 1–11. <https://doi.org/10.1016/j.bir.2017.05.002>
- Hassan, MK, Khan, A., & Paltrinieri, A. (2018). Liquidity Risk, Credit Risk and Stability in Islamic and Conventional Banks SC. *Research in International Business and Finance*. <https://doi.org/10.1016/j.ribaf.2018.10.006>
- Jensen, C., & Meckling, H. (1976). Theory Of The Firm : Managerial Behavior , Agency Costs And Ownership Structure I . Introduction and summary In this paper WC draws on recent progress in the theory of (1) property rights, firm. In addition to tying together elements of the theory of e. 3, 305–360.
- Lambert, RA (2001). Contracting theory and accounting. *Journal of Accounting and Economics*, 32(February 2000), 3–87.
- Lepetit, L., & Strobel, F. (2014). Bank insolvency risk and time-varying Z-score measures. *Journal of International Financial Markets, Institutions and Money*, Elsevier, 25, 73–87.



<https://hal.archives-ouvertes.fr/hal-01098721>

- Lotto, J. (2018). The Empirical Analysis of the Impact of Bank Capital Regulations on Operating Efficiency. *International Journal of Financial Studies*, 6(2), 34.  
<https://doi.org/10.3390/ijfs6020034>
- Martin, Č., & Hesse, H. (2010). Islamic Banks and Financial Stability : An Empirical Analysis. *Journal of Financial Services Research*, 38, 95–113.
- Mohammed. (2005). *Sharia Financing Management*. UPP AMP YKPN.
- Nugroho, L., & Anisa, N. (2018). The Influence of Parent Bank Management, Asset Quality, and Efficiency on the Stability of Islamic Banks in Indonesia (2013-2017 Period). *Journal of Innovation and Business*, 6, 114–122.
- Ozili, PK (2018). Banking stability determinants in Africa. <https://doi.org/10.1108/IJMF-01-2018-0007>
- Polizzi, S., & Scannella, E. (2020). The Role of Capital and Liquidity in Bank Lending : Are Banks Safer ? 11(January), 28–38. <https://doi.org/10.1111/1758-5899.12750>
- Ramlall, I. (2018). *The Banking Sector Under Financial Stability*.
- Rupeika-apoga, R., Rom, I., & Grima, S. (2020). Chapter 16 The Determinants Of Bank's Stability : Evidence From Latvia , A Small. *Contemporary Studies in Economic and Financial Analysis*, 104, 235–253. <https://doi.org/10.1108/S1569-375920200000104016>
- Rupeika-apoga, R., Zaidi, SH, Thalassinis, YE, & Thalassinis, EI (2018). Bank Stability : The Case of Nordic and Non-Nordic Banks in Latvia. *International Journal of Economics and Business Administration*, VI(2), 39–55.
- Safa, M., Ali, MH, Ismail, A., Amin, IM, Ali, MH, & Nor, SM (2018). Cost Efficiency and Liquidity Risk in Banking : New Evidence from OIC Countries. *International Journal of Business and Management Science*, 8(2), 255–276.
- Sari, K. (2018). The Influence of Murabahah Financing, Capital Adequacy Ratio (Car), Financing To Deposit Ratio (Fdr), And Inflation on Profitability (Roa) With Non Performing Financing (Npf) As Intervening Variables in Islamic Commercial Banks (2013-2017 Period). *Journals of Chemical Information and Modeling*, 142.  
<https://doi.org/10.1017/CBO9781107415324.004>
- Sarwono, J. (2012). *Path Analysis for Thesis Research, Theses and Dissertations*. Elex Media Komputindo Kompas Gramedia.
- Sunardi, N. (2017). The Effect of Intellectual Capital (Ib-Vaic Tm), Fdr and Car on Cost Efficiency and Its Implications for the Performance of Indonesian Sharia Commercial Bank Companies. *Journal of Securities*, 1(2581), 1–17.
- Syatiria, A., & Hamdani, Y. (2017). Credit Risk, Stability, and Financing Policy. *Sriwijaya Journal of Management and Business*, 15(3).
- Vasilyeva, T., Sysoyeva, L., & Vysochyna, A. (2016). Formalization Of Factors That Are Affecting Stability Of Ukraine Banking System. *Risk Governance & Control: Financial Markets & Institutions*, 6(4), 7–11.
- Warjiyo, P. (2006). Banking System Stability and Monetary Policy: Linkages and Developments in Indonesia. 8(4), 429–454.

- Wulandari, MV, & Utami, SA (2019). Determinant of Non-performing Financing in Indonesia Islamic Bank. International Conference on Islamic Economics, Business, and Philanthropy, 2019, 453–468. <https://doi.org/10.18502/kss.v3i13.4223>
- Yusuf, M., Fitriyani, Z., Abdilah, A., Ardianto, R., & Suhendar, A. (2022). THE IMPACT OF USING TOKOPEDIA ON PROFITABILITY AND CONSUMER SERVICE. *Jurnal Darma Agung*, 30(2), 559 - 573. doi:10.46930/ojsuda.v30i2.2273
- Yusuf, M., Sutrisno, S., Putri, P., Asir, M., & Cakranegara, P. (2022). PROSPEK PENGGUNAAN E-COMMERCE TERHADAP PROFITABILITAS DAN KEMUDAHAN PELAYANAN KONSUMEN: LITERATURE REVIEW. *Jurnal Darma Agung*, 30(1), 786 - 801. doi:10.46930/ojsuda.v30i3.2268
- Yuhasril, Y. (2019). The Effect of Capital Adequacy Ratio ( CAR ), Non Performing Loan ( NPL ), Operational Efficiency ( BOPO ), Net Interest Margin ( NIM ), and Loan to Deposit Ratio ( LDR ), on Return on Assets ( ROA ). 10(10), 166–176. <https://doi.org/10.7176/RJFA>