Market Risk on Bank Profitability: Evidence from Indonesian State-Owned Banks

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Abstract

The objective of this study is to analyze the effect of market risk, as proxied by interest rate risk and foreign exchange risk, on the profitability of State-owned banks in Indonesia within the period 2013-2020. Interest rate risk is proxied by net interest margin (NIM), foreign exchange risk is proxied by net open position (NOP), and bank profitability is proxied by return on assets (ROA). Four State-owned banks were chosen as a sample by employing a saturated sampling technique. The data were processed using the SPSS 26th version by performing multiple linear regression analysis. The findings of this study discover that interest rate risk (NIM) partially has a positive and significant effect on State-owned banks' profitability (ROA). Conversely, foreign exchange risk (NOP) partially has a negative and not significant effect on State-owned banks' profitability (ROA). Interest rate risk (NIM) and foreign exchange risk (NOP) simultaneously have a significant impact on State-owned banks' profitability (ROA).

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INTRODUCTION

Bank as a mediating institution that connects those with excess funds (surplus) and underfunds (deficit) is one industry that influences a country's economy. They are the most vulnerable institution to risks, primarily related to finances. This position causes the bank to be dragged automatically into market risk. As a profit-oriented service organization, a bank must be able to maintain its performance and growth potential, as it is a critical factor when parties such as investors make investment decisions.

Market risk is a situation experienced by a company driven by transformations in market conditions and situations beyond the company's control (Fahmi, 2018). Market risk is often referred to as comprehensive risk because it is experienced by all companies and tends to affect the entire market simultaneously. Market risk, in particular, is a major component of financial risk, and since it is a systematic risk, it cannot eliminate through diversification. However, market risk can be mitigated by adopting suitable hedging strategies (Kassi et al., 2019).

Generally, market risk consists of foreign exchange risk, interest rate risk, commodity position risk, equity position risk, and political risk (Fahmi, 2018). Foreign exchange risk occurs because of changes in the exchange rates between domestic and foreign currencies, whereas the risk that encountered due to changes in interest rates that impact a company's earnings is known as interest rate risk. Market risk, which comprises foreign exchange and

interest rate risks, may increase and reduce the banks' revenue due to unpredictable fluctuation.

The conditions and situations in which market risk is formed occur due to factors beyond the company's control. These factors include the rise and fall of bank interest rates, inflation, unstable economic growth, and changes in exchange rates. Furthermore, these changes have encouraged changes in several banking products such as deposits, savings, current accounts, credit decisions, investment decisions, etcetera. Risk in banking arises from every transaction or business decision that contains uncertainty about the outcome since almost every bank transaction is associated with some degree of uncertainty (Mansyur, 2018).

Profitability is a measurement of how efficiently a company manages its assets to generate profits. This ratio can be used by management to evaluate its operations, while investors may use it to make well-informed decisions about which stocks have the most growth potential. The return on assets ratio, or ROA, is a popular metric for determining profitability. It is the most widely used criterion for determining bank profitability since it allows for easy comparison of the company's return on investment with other institutions. Return on assets (ROA) is figured by dividing net income by total assets within the period. Investors will be more likely to invest in banks that are performing well.

Interest rate risk is defined as a threat that a bank may suffer loss or lose money in granting loans, taking and depositing funds, or dealing in financial instruments in consequence of changes in interest rates or other unforeseen occurrences (Onyiriuba, 2016). According to Mashud Ali, interest rate risk emerges from mismatched maturities of interest rate-related instruments on the assets and liabilities sides of the bank's balance sheet (Fahmi, 2018). The proxy of interest rate risk used in this study is the net interest margin (NIM) ratio. The net interest margin (NIM) ratio was utilized to proxy for interest rate risk in this study. It is a parameter for evaluating a bank's ability to manage its earning assets to generate income (Puspitasari et al., 2021). The greater the NIM, the more effective the bank is at credit placement (Badawi, 2017).

Foreign exchange risk refers to the risk of fluctuations in the values of existing and future cash flows denominated in other currencies (Lessambo, 2021). This risk stems from mismatches in domestic currency assets and liabilities valuation. This value discrepancy causes the bank to suffer losses or gains as a result of exchange rate fluctuations (Mansyur, 2018). Foreign exchange risk is measured by the net open position (NOP) ratio. The net open position (NOP) ratio is one of the major aspects of managing foreign exchange transaction risk employed as a controller of foreign exchange management positions due to unpredictable fluctuation in the exchange rate. If the exchange rate rises, the increase in foreign currency income exceeds the increase in foreign currency costs, increasing profit (Badawi, 2017).

Although there have been many studies on net interest margin (NIM), which places NIM as the independent variable, the results are still different. The research carried out by Yudha et al. (2017), Mansyur (2018), Tehresia et al. (2021), and Puspitasari et al. (2022) have found that net interest margin (NIM) has a significant positive effect on return on assets (ROA). However, Cuandra & Setyawan (2020) has discovered that net interest margin (NIM) has no significant but positive impact on return on assets (ROA).

Several prior research around net open position (NOP) and bank profitability (ROA) was found in studies conducted by Varadigna & Suhadak (2017), Mansyur (2018), Kevin & Setyawan (2020), and Anggraeni et al. (2022). However, there are some inconsistencies among the results. According to the research carried out by Varadigna & Suhadak (2017) and Anggraeni et al. (2022), it showed that foreign exchange risk (NOP) does not significantly affect bank profitability, which is contrary to the study conducted by Mansyur (2018) and Kevin & Setyawan (2020) that stated foreign exchange risk (NOP) has a significant but negative effect on bank profitability (ROA). Meanwhile, Mulyani (2020) has discovered that

foreign exchange risk (NOP) has a negative and no significant effect on bank profitability (ROA). These distinctions indicate an interesting phenomenon to reexamine the connection between net interest margin and net open position on return on assets on bank profitability.

This study is inspired by numerous banking studies that have not counted the net open position (NOP) in profitability modeling. Concerning the rationale for the variable's importance, it is nearly ensured that banks will utilize foreign exchange items in their assets and liability management activities (Salim & Setiawan, 2020). To the best of the author's knowledge, not many studies have been found assessing the effect of net interest margin and net open position on return on assets. Therefore, the objective of this study is to examine the influence of interest rate risk (NIM) and foreign exchange risk (NOP) on State-owned banks' profitability (ROA) in Indonesia. The results of this study are expected to enrich research models that analyze market risk factors on bank profitability.

Based on the aforementioned literature review and prior research, this study's statistical hypotheses and research framework are as follows.

H1: interest rate risk (NIM) partially has a positive and significant effect on State-owned banks' profitability (ROA)

H2: foreign exchange risk (NOP) partially has a negative and not significant effect on State-owned banks' profitability (ROA)

H3: interest rate risk (NIM) and foreign exchange risk (NOP) simultaneously have a significant effect on State-owned banks' profitability (ROA)
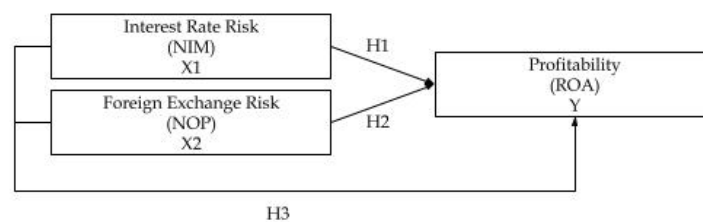
Figure 1. Research Framework

RESEARCH METHOD

This study relies on quantitative design and is causality research, which gauges the impact of the independent variable towards the dependent variable. The population selected for this study is all State-owned banks listed on the Indonesia Stock Exchange within the period 2013-2020, consisting of four banks. All four banks were chosen as a sample in this research by employing a saturated sampling technique, which requires drawing a sample from the entire population due to the limited number of samples. The research sample is shown in Table 1.

Table 1. Research Sample

No	Company Name	Code
1	PT Bank Negara Indonesia (Persero) Tbk.	BBNI
2	PT Bank Rakyat Indonesia (Persero) Tbk.	BBRI
3	PT Bank Tabungan Negara (Persero) Tbk.	BBTN
4	PT Bank Mandiri (Persero) Tbk.	BMRI

Source: Indonesia Stock Exchange (2022)

Secondary data were obtained for this study with documentation method from the company's annual report by accessing the company's official website. The data were

processed using the SPSS 26th version. Multiple linear regression analysis was employed to analyze the data along with the t-test and F-test, together with the coefficient of determination as the significant test to examine the hypotheses. In performing multiple linear regression analysis, several procedures need to be fulfilled, namely the classical assumption test, which contains the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test. This study makes use of 2 (two) independent variables, which net interest margin (NIM) as a proxy of interest rate risk (X1), and the net open position (NOP) as a proxy of foreign exchange risk (X2), while the dependent variable is the return on assets (ROA) as a proxy of State-owned banks' profitability (Y). The following is the multiple linear regression analysis equation and the operational variable applied for this study.

$$ROA = \alpha + \beta_1 NIM + \beta_2 NOP + e$$

Table 2. Operational Variable

Variable	Proxy	Formula
Bank profitability (Y)	Return On Assets (ROA)	$\dfrac{\text{Net Income}}{\text{Total Assets}}$
Interest rate risk (X1)	Net Interest Margin (NIM)	$\dfrac{(\text{Interest Received – Interest Paid})}{\text{Average Assets}}$
Foreign exchange risk (X2)	Net Open Position (NOP)	$\dfrac{(\text{Assets in Foreign Currency – Liabilities in Foreign Currency})}{\text{Equity}}$

RESULTS AND DISCUSSION
Results
Descriptive Statistics Test

**Table 3. Descriptive Statistics Test Results**

Descriptive Statistics

	Mean	Std. Deviation	N
ROA (Y)	2,6344	1,20236	32
NIM (X1)	5,8366	1,39179	32
NOP (X2)	2,3991	1,30708	32

Source: Processed data (2022)

Table 3. shows a statistical description for each of the variables used in this study. The data analyzed is 32 observations, comprising eight years of data from four State-owned banks. From the table above, the ROA (Y) variable has a mean value of 2,6344 and a standard deviation of 1,20236. The NIM (X1) variable has a mean value of 5,8366 and a standard deviation of 1,39179. The NOP (X2) variable has a mean value of 2,3991 and a standard deviation of 1,30708.

Classical Assumption Test
Normality Test
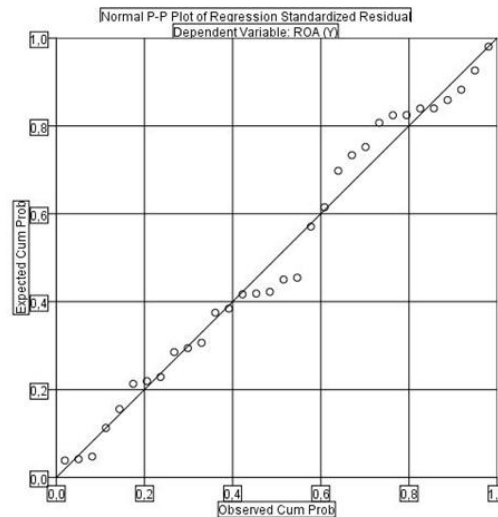
Figure 2. Normality test Results

Source: Processed data (2022)

The normality test results are visualized in Figure 1. As can be seen, the Normal P-P Plot figure above displays that the data points are nearly around the diagonal line. In conclusion, the data follow a normal distribution; hence the analysis can be continued.

Multicollinearity Test

Table 4. Multicollinearity Test Results

	Coefficients[a]	
Model	Collinearity Statistics	
	Tolerance	VIF
1 (Constant)		
NIM (X1)	,844	1,185
NOP (X2)	,844	1,185

a. Dependent Variable: ROA (Y)

Source: Processed data (2022)

Table 4. shows the Coefficients model's test results. Multicollinearity symptoms do not present if tolerance is greater than 0,100 and VIF is less than 10,00. As seen in the table, both NIM (X1) and NOP (X2) have a Tolerance of 0,844 and a VIF of 1,185. As a result, it is safe to assume no multicollinearity symptoms on the regression model's independent variables.

Heteroscedasticity Test
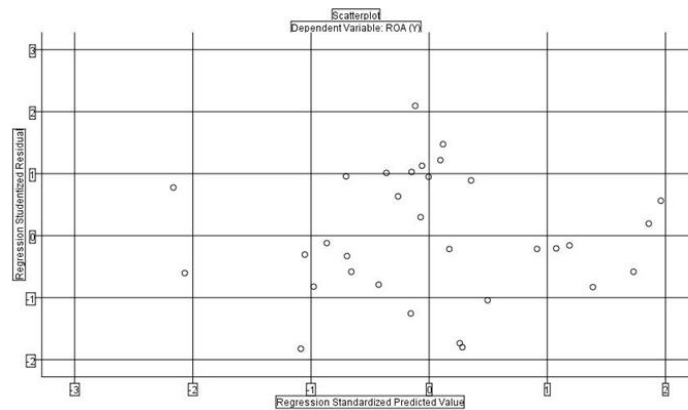
Figure 3. Heteroscedasticity Test Results

Source: Processed data (2022)

The scatterplot image of the heteroscedasticity test results illustrated in Figure 3. shows no pattern (wavy, widened, or narrowed), and the points scatter below and above 0 on the Y-axis. Thus, it indicates the absence of heteroscedasticity symptoms in the regression model.

Autocorrelation Test

The Durbin-Watson method is researchers' most commonly used procedure when performing the autocorrelation test. However, it has several shortcomings, including it may not generate a definitive response if the value falls within the uncertain range. Using the Runs Test method is an alternative to provide a definite conclusion regarding this autocorrelation problem.

Earlier on, an autocorrelation test using the Durbin-Watson method was carried out on the data and formed the following output:

Table 5. Durbin-Watson Test Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,893[a]	,798	,784	,55885	1,420

a. Predictors: (Constant), NOP (X2), NIM (X1)
b. Dependent Variable: ROA (Y)

Source: Processed data (2022)

In accordance with the results in Table 5., it is shown that the value of Durbin-Watson is 1,420, where it lies between the dL value of 1,309 and the dU value of 1,573. The result shows no conclusive answer regarding the autocorrelation symptom. To solve this problem, performing a Runs Test is required, and the following results are obtained:

Table 6. Runs Test Results

Runs Test

	Unstandardized Residual
Test Value[a]	-,08957

Cases < Test Value	16
Cases >= Test Value	16
Total Cases	32
Number of Runs	12
Z	-1,617
Asymp. Sig. (2-tailed)	,106
a. Median	

Source: Processed data (2022)

According to the Runs Test method, it can be confirmed that the regression model is safe from the autocorrelation symptom if only the Asymp. Sig. (2-tailed) value is higher than 0,05 and vice versa. In Table 6. above, the Asymp. Sig. (2-tailed) value is shown to be 0,106. So it is confirmed that the regression model is safe from the autocorrelation symptom. Therefore, the analysis can continue.

Hypothesis Testing
t-Test

Table 7. t-Test Results

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
1 (Constant)	-1,810	,433		-4,182	,000
NIM (X1)	,807	,079	,934	10,274	,000
NOP (X2)	-,110	,084	-,120	-1,316	,198

a. Dependent Variable: ROA (Y)

Source: Processed data (2022)

According to the t-Test results in Table 7., it is found that NIM (X1) has a positive coefficient value of 0,807 with a Sig. value of 0,000, which is smaller than the significant level of 0,05. Thus, it concludes that NIM (X1) partially has a positive and significant effect on ROA (Y). In addition, it also means that a 1% increase of NIM will increase the ROA by 0,807, and a 1% decrease of NIM will decrease the ROA by 0,807.

As opposed to that, NOP (X2) has a negative coefficient value of -0,110 with a Sig. value of 0,198, which is higher than the significant level of 0,05. So, it is concluded that NOP (X2) partially has a negative and not significant effect on ROA (Y). In addition, it also means that a 1% increase of NOP will decrease the ROA by 0,110, and if the NOP reduces by 1%, the ROA will increase by 0,110.

As a result of the findings, the equation model for this study is as follows.

$$ROA = -1,810 + 0,807NIM - 0,110NOP$$

From the equation model, it can be seen that the constant value is -1,810. It denotes that if NIM (X1) and NOP (X2) are equal to 0, then the value of ROA (Y) is -1,810.

F-Test

Table 8. F-Test Results

ANOVAª

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35,759	2	17,880	57,249	,000ᵇ
	Residual	9,057	29	,312		
	Total	44,816	31			

a. Dependent Variable: ROA (Y)
b. Predictors: (Constant), NOP (X2), NIM (X1)

Source: Processed data (2022)

The independent variable (X) can be stated to have a simultaneous impact on the dependent variable (Y) if the Sig. value is below 0,05. Based F-Test results in Table 8., the Sig. value is showing 0,000. In conclusion, NIM (X1) and NOP (X2) simultaneously affect ROA (Y).

Coefficient of Determination (R²)

Table 9. Coefficient of Determination Test Results

Model Summaryᵇ

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,893ª	,798	,784	,55885

a. Predictors: (Constant), NOP (X2), NIM (X1)
b. Dependent Variable: ROA (Y)

Source: Processed data (2022)

Table 9. above shows that the R Square value is 0,798 or can be rounded up to 80%. So, it concludes that the dependent variable is simultaneously impacted by the independent variable as much as 80%, whereas the remaining 20% is impacted by other aspects not identified in this study.

Discussion
Interest Rate Risk on Bank Profitability
Hypothesis 1 (H1) stated that interest rate risk (NIM) has a positive and significant effect on State-owned banks' profitability (ROA). Referring to the test results in Table 7., it can be concluded that interest rate risk (NIM) partially has a positive and significant effect on State-owned banks' profitability (ROA). Therefore, hypothesis 1 (H1) is accepted. It shows that the increase of net interest margin will raise the profitability of State-owned banks. Net interest margin is a parameter for evaluating a bank's ability to manage its earning assets to yield revenue (Puspitasari et al., 2021). The greater the NIM, the more effective the bank is at credit placement (Badawi, 2017). The results of this study support the discoveries proposed by Yudha et al. (2017), Mansyur (2018), Tehresia et al. (2021), and Puspitasari et al. (2022) but contrary to Cuandra & Setyawan (2020), that stated net interest margin (NIM) has a positive but not significant effect on return on assets (ROA).

Foreign Exchange Risk on Bank Profitability
Hypothesis 2 (H2) stated that foreign exchange risk (NOP) has a negative and not significant effect on State-owned banks' profitability (ROA). Referring to the test results in Table 7., it can be concluded that foreign exchange risk (NOP) partially has a negative and

not significant effect on State-owned banks' profitability (ROA). Therefore, hypothesis 2 (H2) is accepted. It indicates that the increase of net open position will not affect State-owned banks' profitability. The net open position is a metric primarily used by banks or other financial companies to analyze foreign exchange risk exposure. A higher net open position is perceived as a reason for higher risk for the company. The finding of this research support the discoveries proposed by Mulyani (2020) but are contrary to other studies mentioned earlier.

Interest Rate Risk and Foreign Exchange Risk on Bank Profitability

Hypothesis 3 (H3) stated that interest rate risk (NIM) and foreign exchange risk (NOP) have a significant effect on State-owned banks' profitability (ROA). Referring to the test results in Table 8., it is shown that interest rate risk (NIM) and foreign exchange risk (NOP) do have a simultaneous effect on State-owned banks' profitability (ROA). Therefore, hypothesis 3 (H3) is accepted. In addition, from Table 9. can be concluded that interest rate risk and foreign exchange risk simultaneously affect the bank profitability as much as 80%, whereas the remaining 20% is influenced by other aspects not identified in this study.

CONCLUSION AND SUGGESTION

This study contributes to the literature on the influence of market risk on bank profitability by adding net open position as one of the variables. In conclusion, this study had discovered that interest rate risk (NIM) partially has a positive and significant effect on State-owned banks' profitability (ROA). In contrast, foreign exchange risk (NOP) partially has a negative and not significant effect on State-owned banks' profitability (ROA). Lastly, interest rate risk (NIM) and foreign exchange risk (NOP) simultaneously have a significant effect on State-owned banks' profitability (ROA).

This research does have limitations and can be developed further by adding another measurement of market risk, increasing the research period, and adding more banks to the research sample in order to obtain more varied results, so that it can complement research models that analyze market risk factors on bank profitability in the academic fraternity.

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