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Empirical Evidence of Banking Risk Management in Indonesia

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A B S T R A C T

This study aims to analyze the differences in banking risk in Indonesia before and after the implementation of POJK No. 18/POJK.03/2016 concerning Risk Management for Commercial Banks. This study contributes to society and the banking world by increasing understanding of the importance of implementing risk management in maintaining the stability of the national financial system. The present research employs a comparative quantitative approach to analyze the differences in banking risk before and after the implementation of the POJK. Data collection was conducted utilizing secondary data obtained from bank financial reports and official OJK publications during the period 2009–2024. The findings of the research indicate significant differences in the NPL, BOPO, and NIM variables, while the LDR ratio does not show a significant difference with a significance level above 0.05. These findings provide a new perspective on the effectiveness of risk management regulatory policies in Indonesia.

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INTRODUCTION

The existence of the banking industry is a true reflection of the stability of a country's financial system, where any changes in banking performance illustrate the prevailing economic conditions and the financial sector's capacity to respond to various market dynamics. Through its intermediary function, banks serve as institutions that connect parties possessing excess capital with those requiring financial resources. This activity not only facilitates the efficient flow of capital but also directly contributes to the growth of the real sector and national economic development. Consequently, any fluctuation in banking performance often mirrors a country's overall economic condition, including the financial system's ability to withstand market volatility and uncertainty (Putra et al., 2025). Therefore, the performance and resilience of the banking sector are essential indicators of macroeconomic stability.

Over the past two decades, the global economy has experienced a series of major shocks that have disrupted the resilience of the global financial framework. These include the 2008–2009 global financial crisis, which triggered widespread reforms in the financial sector (Fund, 2009); the COVID-19 pandemic in 2020, which strained banks' profitability and liquidity; and a range of geopolitical tensions, such as the Russia–Ukraine conflict, global inflationary pressures, and tighter monetary policies that have heightened uncertainty in financial markets (World, 2024). The impacts were also felt in Indonesia, where economic slowdown and commodity price fluctuations led to an increase in the gross Non-Performing Loan (NPL) ratio from 2.16% in 2014 to 3.16% in early 2017 (DetikFinance, 2017), along with a rise in the Loan to Deposit Ratio (LDR) from 83.58% in 2012 to 90.47% in 2015 (Investor Daily, 2016). In addition, the operational efficiency of banks declined, as reflected in the increase of the Operating Expenses to Operating Income (BOPO) ratio from 79.29% in 2014 to 82.22% in 2016 (Suhendro, 2018) These conditions highlight the importance of strong supervisory mechanisms and robust risk management systems to maintain banking sector stability amid economic pressures.

Awareness of the essential role of effective risk management has prompted financial authorities in Indonesia to strengthen the regulatory structure governing the banking sector in an effort to maintain financial system stability. Banking risk management is essentially a systematic procedure for recognizing, assessing, overseeing, and mitigating risks that emerge from various banking operations (OJK, 2016). The first regulation on the implementation of risk management for commercial banks was stipulated in PBI No. 5/8/PBI/2003, which was later refined into PBI No. 11/25/PBI/2009 to align with Basel II-based international standards. The transfer of banking supervision from Bank Indonesia to OJK was a milestone in strengthening the risk-based governance and supervision framework. One of the results was the issuance of POJK No. 18/POJK.03/2016 concerning the Implementation of Risk Management for Commercial Banks, which broadened the scope of supervision by emphasizing the importance of governance, capital adequacy, and banks' preparedness in facing major risks.

The POJK regulates eight categories of risks, that need to be controlled by banks, which include credit risk, market risk, liquidity risk, operational risk, legal risk, reputational risk, strategic risk, and compliance risk. In its implementation, banks are required to carry out four main stages, namely identification, measurement, monitoring, and control of risks for all their products and activities. Banks are required to periodically provide reports to the OJK regarding the implementation of their risk management practices. Through this policy, the OJK endeavors to reinforce the stability of the national banking industry and ensure that every financial institution possesses the resilience to withstand potential crises that may impact public confidence. However, the policy's efficacy in its implementation still varies in the field and has not yet shown consistent results.

Several previous studies have shown mixed results regarding the effectiveness of risk management implementation. Mulyati (2024) and Masrukhan et al. (2024) found that risk management implementation can improve financial performance and maintain bank stability. Conversely, Cesario (2023) and Dewi & Bagus (2017) found that some banks still do not optimally implement risk management principles, resulting in increased credit, liquidity, and operational risks. These differing findings indicate an empirical and phenomenological gap that warrants further study. Given the ongoing development of Indonesia's banking industry and increasingly stringent regulations, It is essential to evaluate whether the OJK's risk governance framework has a meaningful effect on strengthening bank stability and operational outcomes.

This study contributes both phenomenologically and academically. Phenomenologically, it provides an empirical description of the influence of risk management regulations on the resilience of the national banking sector amid global economic change. Academically, it enriches the literature by using a long-term (16-year) quantitative comparative approach, which is relatively rare in similar studies. This approach allows for a more in-depth analysis of structural changes within Indonesia's banking sector resulting from policy interventions, so the findings are expected to provide an in-depth insight into the extent to which the implementation of risk management plays a role in strengthening the resilience and performance of national banking.

Based on the above description, this study aims to analyze the differences in banking risk levels in Indonesia before and after POJK No. 18/POJK.03/2016 regarding the Implementation of Risk Management for Commercial Banks, by reviewing key ratios such as NPL, BOPO, LDR, and NIM, through the use of secondary data obtained from official financial reports of commercial banks regulated by the OJK. Through the results of this comparative analysis, it is anticipated that this research will provide both academic and practical contributions to enhancing the governance of banking risk management in Indonesia.

LITERATURE REVIEW

Risk Management

Risks in various forms and sources are an inseparable element of every activity, because the future is uncertain and full of uncertainties that have the potential to cause risks (Rolianah et al., 2021). According to Darmawi (2010), risk management is an effort to recognize, analyze, and control various risks that arise in every company activity with the objective of attaining optimal operational performance and productivity. According to the Financial Services Authority (OJK), risk management is a framework of approaches and procedures designed to identify, evaluate, monitor, and control risks generated by all banking operations. From these various perspectives, it can be interpreted that risk management is a planned and systematic process aimed at recognizing, analyzing, and controlling possible losses that could occur as a result of uncertainty, so that company or banking activities can run effectively, efficiently, and sustainably.

Financial Services Authority Regulation (POJK) No. 18/POJK.03/2016 on the Implementation of Risk Management for Commercial Banks

The implementation of risk management in banking institutions is vital to sustain the financial stability and resilience of banks and to minimize the potential for losses arising from various risks. Referring to the Financial Services Authority Regulation (POJK) No. 18/POJK.03/2016, banks are required to implement effective risk management practices both on an individual basis and through consolidated financial reporting that includes their subsidiaries. The implementation must at least include proactive oversight conducted by the managerial and supervisory boards, adequate risk management policies and guidelines, along with integrated mechanisms for identifying, evaluating, supervising, and mitigating risks, as well as the establishment of a sound internal control system (OJK, 2016). As stipulated in Article 2, the execution of risk management must be adjusted to each bank's objectives, business policies, size, complexity, and capability. In practice, banks are required to manage eight major types of risk; credit risk, market risk, liquidity risk, operational risk, legal risk, reputational risk, strategic risk, and compliance risk in an integrated manner to ensure that their business activities remain safe and sustainable (OJK, 2016).

Regulation Theory

Stigler (1971) argues that the emergence of regulatory policies in the economic sector is largely driven by the influence of interest groups that seek to persuade the government to introduce rules benefiting their objectives. In this view, the government serves as an intermediary that channels and formalizes those interests through the creation of regulatory frameworks. Regulation Theory further explains that the establishment of such rules often occurs in response to periods of crisis or imbalance that necessitate state intervention, with the purpose of restoring stability and enhancing the performance of financial institutions (Hariyani & Martini, 2015a). In line with this concept, (Suhartono, 2018) highlights that regulation represents a form of government

control over economic activities designed to safeguard public interests. The issuance of the Financial Services Authority Regulation (POJK) No. 18/POJK.03/2016 on the Implementation of Risk Management for Commercial Banks exemplifies this principle, as it aims to promote stable and accountable banking practices. Through this regulation, banks are expected to effectively identify, measure, and manage various forms of risk, thereby contributing to the overall resilience and equilibrium of the financial sector.

Signaling Theory

The signaling theory formulated by Michael Spence (1973) describes how companies convey financial information as a form of signal to external parties to describe their business conditions and prospects. Drawing on the view of Brigham and Houston (2011), signaling theory explains that actions taken by company management are intended to transmit indicators to investors regarding the firm's anticipated prospects and operational outcomes. According to (Hariyani & Martini, 2015b) Companies can convey information in the form of financial reports, internal company policies, or other forms of information presented voluntarily by management. It can be concluded that signaling theory emphasizes that the information conveyed by companies serves as a signal for external parties to evaluate the firm's financial condition and future performance outlook.

Credit Risk

Credit risk is the potential for losses that arise when another party fails to fulfill its obligations to the bank. In accordance with Financial Services Authority Regulation Number 18/POJK.03/2016, this type of risk includes payment defaults by debtors, concentration of credit distribution in certain sectors, counterparty risk in financial transactions, and risks arising during the transaction settlement process. Non-Performing Loans (NPLs) are a proxy used to assess the potential for problem loans held by banks. If the NPL ratio increases, it means that the level of credit risk borne by the bank has also increased, indicating that the bank's financial standing is less stable. On the other hand, a lower NPL ratio signifies that the bank's condition is more stable and sustainable (Musta'da & Pramono, 2022). The implementation of POJK No.18/POJK.03/2016 is suspected to cause differences in NPL levels due to adjustments in the execution of risk management that can affect the effectiveness of non-performing loan control. This hypothesis is supported by research conducted by Saut & Diansyah (2019) and Umyana (2022) regarding differences in credit risk proxied by non-performing loans (NPL) before and after the enactment of POJK General Bank Risk Management Number 18 /POJK.03/2016.

H1: There is a difference in NPL before and after the implementation of POJK No. 18/POJK.03/2016 on Risk Management for Commercial Banks.

Likuidity Risk

Liquidity risk refers to the possible issue that manifests when a bank does not have the capacity to honor its financial commitments at maturity using its available funding sources or immediate cash flows. As mandated in the Financial Services Authority Regulation Number 18/POJK.03/2016, this condition also includes the inability of banks to utilize high-quality liquid assets as collateral without causing disruption to their operational activities and financial stability. The Loan to Deposit Ratio (LDR) is a proxy that is instrumental in estimating the effectiveness of banks in channeling funds collected from the public into loan financing. If the LDR ratio increases, it means that the bank's liquidity risk also increases because more funds are channeled in the form of credit. Conversely, a lower LDR ratio suggests that the bank's liquidity is healthier and its readiness to cover immediate financial obligations is better.

H2: There is a difference in LDR before and after the implementation of POJK No. 18/POJK.03/2016 on Risk Management for Commercial Banks.

Operational Risk

Operational risk is referred to as the potential loss arising when a bank's internal processes are disrupted, employees make errors, systems fail, or external factors affect the continuity of operational activities. Referring to Financial Services Authority Regulation Number 18/POJK.03/2016, these things can cause disruptions ithin the bank's operational processes and outcomes. Operating Expenses to Operating Income (BOPO) is a proxy employed to assess the scale of a bank's operational efficiency in managing its expenses and income. A higher BOPO ratio implies a deterioration in the bank's efficiency level. Conversely, a lower BOPO ratio reveals that the bank is able to operate more efficiently in conducting its operations and demonstrates effective cost management (Aji & Putri, 2025). The implementation of risk management policies through POJK No.18/POJK.03/2016 is expected to bring about changes in the effectiveness of banking operations. This hypothesis shows an assumption that conforms to the results reported by Nurbaiti et al. (2022) and Sustika & Wiksuana (2016) that there is a difference in operational risk measured by the BOPO ratio prior to and following the enforcement of POJK No. 18/POJK.03/2016 concerning Banking Risk Management.

H3: There is a difference in BOPO before and after the implementation of POJK No. 18/POJK.03/2016 on Commercial Bank Risk Management.

Market Risk

Market risk pertains to the exposure to financial setbacks reflected in both recognized balance sheet accounts and contingent commitments, including derivative instruments. Referring to Financial Services Authority Regulation Number 18/POJK.03/2016, this risk arises as a result of changes in the general market situation, including fluctuations in the prices of options and other financial instruments. Net Interest Margin (NIM) is a proxy that assesses a bank's ability to earn net interest income through its productive assets. A higher NIM ratio means that the bank's proficiency in generating interest revenue is

better. Conversely, a lower NIM ratio indicates a decline in the banking institution's ability to generate income from interest. This hypothesis is consistent with studies conducted by Juventia (2018) and Sintha (2018), which found that there was a difference in market risk as measured by the NIM ratio before and after the enactment of POJK Commercial Bank Risk Management Number 18/POJK.03/2016.

H4: There is a difference in NIM before and after the implementation of POJK No. 18/POJK.03/2016 on Risk Management for Commercial Banks

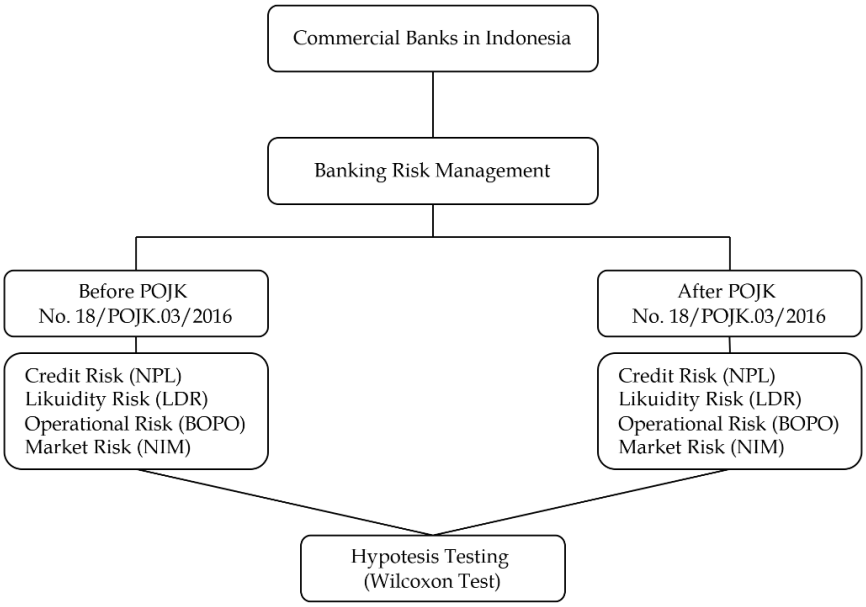

Figure 1. Conceptual Framework

METHODOLOGY

This research is a comparative quantitative study. The comparative quantitative approach was conducted by utilizing numerical data from financial reports, which were then compared with other financial data to see the differences or changes that occurred (Kasmir, 2019). The present study endeavors to examine the differences in banking risk before and after the implementation of Financial Services Authority Regulation Number 18/POJK.03/2016 concerning the Implementation of Risk Management in Commercial Banks. The data analyzed in this study covers the period from 2009 to 2024. The period before the implementation of POJK covers 2009 to 2016, while the period after the implementation of POJK covers 2017 to 2024. The objects used as the population in this study includes the entire set of commercial banking institutions overseen by the Financial Services Authority, totaling 105 companies. The sample was determined through purposive sampling based on the following criteria: (1) Commercial Banks registered with the OJK during the 2009–2024 period, (2) published complete annual financial reports during the observation period. From a total of 105 Commercial Banks in

the population, 97 banks were obtained that met the criteria as research samples.

Table 1. Criteria for Sample Selection

No	Sampling Criteria	Number of Firms
1	Commercial banks under the oversight of the Financial Services Authority from 2009 to 2024	105
2	Commercial banks that did not fully publish their financial reports during the period 2009-2024	(8)
Total Sample		97
Jumlah data penelitian 97 × 8 tahun		776

Source: Data processed by researcher (2025)

This study utilizes secondary data collected using documentation techniques. Documentation is an approach applied to acquire data and information comprising archival materials and written references containing numerical data, images, symbols, and other forms of information that can support research activities (Sugiyono, 2017). As part of this research, data was obtained from the official web portals of individual banks and the Financial Services Authority (www.ojk.go.id). Data analysis methods were applied as a tool in response to the research inquiries and to test the hypotheses formulated by the researcher. Data analysis is the activity of processing and compiling data in an systematic manner based on the results obtained. Data analysis methods are used to manage research results with the aim of generating conclusions consistent with the research objectives. The analysis in this study used the assistance of SPSS 31 statistical software.

Several analyses in this study included descriptive statistics with the aim of illustrating the level of banking risk for each variable during the observation period. According to Ghazali (2018), through this analysis, the mean, maximum value, minimum value, and standard deviation of the data studied can be determined. Then, a normality test was conducted to analyze the data distribution using the Kolmogorov-Smirnov method. Based on the results of the normality test, it was found that the data was not normally distributed, so hypothesis testing was carried out using a non-parametric method, namely the Wilcoxon Signed Rank Test. The Wilcoxon test is a statistical technique used to assess the difference between two paired data groups, so that the number of observations in each group must be the same (Susetyo, 2010). According to Hulu and Kurniawan (2021), the Wilcoxon serves to identify whether a treatment causes a significant difference in the variable being studied or not.

In this study, the variables analyzed include four main types of risk in banking, namely (1) credit risk, which is assessed through the Non-Performing Loan (NPL) ratio, indicating the possibility of losses arising because the borrower or contracting parties fail to meet their payment commitments to the bank, (2) liquidity risk, assessed using the Loan to Deposit Ratio (LDR), which describes the potential risk experienced by banks in meeting credit distribution demands and customer deposit withdrawals at a given time, (3) operational

risk, which is assessed using the Operating Expense to Operating Income (BOPO) ratio, indicating risks arising from errors in operational processes; and (4) market risk, which is measured using the Net Interest Margin (NIM), indicating a condition where a company experiences changes in external market conditions and situations beyond its control.

Table 2. Operational Variables

Variables	Measurement
Credit Risk (NPL)	$NPL = \frac{Non\ Performing\ Loans}{Total\ Loans} \times 100\%$
Likuidity Risk (LDR)	$LDR = \frac{Total\ Credit}{Total\ Third\ Party\ Funds} \times 100\%$
Operational Risk (BOPO)	$BOPO = \frac{Operating\ Expenses}{Operating\ Income} \times 100\%$
Market Risk (NIM)	$NIM = \frac{Net\ Interest\ Income}{Average\ Earning\ Assets} \times 100\%$

RESEARCH RESULTS

Descriptive Statistics

Descriptive statistical methods are applied to present a general description of the characteristics of the data for each variable studied. The analysis includes the presentation of minimum, maximum, mean, and standard deviation values.

Table 1. Descriptive statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
NPL BEFORE POJK	776	.00	71.65	27.610	441.713
NPL AFTER POJK	776	.00	55.64	28.670	288.096
LDR BEFORE POJK	776	8.11	466.78	911.840	3.366.057
LDR AFTER POJK	776	.00	971.6	923.241	4.985.990
BOPO BEFORE POJK	776	.88	235.2	823.916	1.912.745
BOPO AFTER POJK	776	39.34	428.4	885.721	3.024.652
NIM BEFORE POJK	776	.24	18.04	60.524	264.549
NIM AFTER POJK	776	-3.52	24.38	50.678	258.225
Valid N (listwise)	776				

In light of the descriptive statistical results, it can be seen that the Non-Performing Loan (NPL) variable shows a mean value of 27.610 with a standard deviation of 441.713 before the implementation of POJK, and a mean of 28.670 with a standard deviation of 288.096 after the implementation of POJK. The Loan to Deposit Ratio (LDR) shows a mean of 911.840 with a standard deviation of 3,366.057 before the implementation of POJK, and a mean of 923.241 with a standard deviation of 4,985.990 after the implementation of POJK. Operating Expenses to Operating Income (BOPO) had a mean of 823.916 with a standard deviation of 1,912.745 s before the implementation of POJK, and a mean of 885.721 with a standard deviation of 3,024.652 s after the implementation of POJK. Meanwhile, the Net Interest Margin (NIM) variable showed a mean of 60.524 with a standard deviation of 264.549 before the implementation of POJK, and a mean of 50.678 with a standard deviation of 258.225 after the implementation of POJK.

Overall, these results show that after the implementation of POJK Banking Risk Management Number 18 /POJK.03/2016, credit risk, liquidity risk, operational risk, and market risk in banking tend to increase, so that risk management needs to be strengthened to maintain stability and financial performance.

Normality Test

Table 2. Normality test

Test of Normality			
Variable	**Statistic**	**df**	**Sig.**
NPL BEFORE POJK	.233	776	<,001
NPL AFTER POJK	.163	776	<,001
LDR BEFORE POJK	.221	776	<,001
LDR AFTER POJK	.236	776	<,001
BOPO BEFORE POJK	.133	776	<,001
BOPO AFTER POJK	.258	776	<,001
NIM BEFORE POJK	.075	776	<,001
NIM AFTER POJK	.088	776	<,001

The normality test serves to assess whether the research data follows a normal distribution pattern. In this study, the Kolmogorov-Smirnov (K-S) method was used because the amount of data was quite large, namely 776 observations. The The dataset can be classified as normally distributed if the sig. or p-value is greater than 0.05. Drawing upon the results of the normality analysis, it can be inferred that the data for all variables in this study are not

normally distributed because the significance value (Sig.) obtained is less than 0.05.

Hypotheses Testing

This study used the non-parametric Wilcoxon test to test the hypothesis, with the following results:

Table 3. Uji Wilcoxon

Hypotheses	Variable	Z	Asymp.Sig (2-tailed)	Conclusion
H1	NPL BEFORE POJK NPL AFTER POJK	-4.626[b]	.000	Significant
H2	LDR BEFORE POJK LDR AFTER POJK	-0.748[c]	.455	Not Significant
H3	BOPO BEFORE POJK BOPO AFTER POJK	-5.430[b]	.000	Significant
H4	NIM BEFORE POJK NIM AFTER POJK	-13.788[c]	.000	Significant

a. Wilcoxon Signed Ranks Test
b. Based on negative ranks
c. Based on positive ranks

- The Non-Performing Loan (NPL) calculation shows a z value of -4.626 with a significance level p-value of (0.000), which indicates that the value is below the significance threshold of 0.05. This indicates a difference in NPL before and after the implementation of POJK Banking Risk Management Number 18 /POJK.03/2016.
- The Loan to Deposit Ratio (LDR) calculation shows a z value of -0.748 with a significance level (0.455) greater than 0.05. This explains the difference in LDR before and after the implementation of POJK Banking Risk Management Number 18 /POJK.03/2016.
- The calculation of the Operating Expenses to Operating Income Ratio (BOPO) shows a z value of -5.430 with a significance level p-value of (0.000), which indicates that the value is below the significance threshold of 0.05. This indicates a difference in the s that occurred in BOPO before and after the implementation of POJK Banking Risk Management Number 18 /POJK.03/2016.
- The Net Interest Margin (NIM) calculation shows a z-value of -13.788 with a significance level of p-value (0.000), which indicates that the value is below the significance threshold of 0.05. This indicates a difference in NIM before and after the implementation of POJK Banking Risk Management Number 18 /POJK.03/2016.

DISCUSSION

The difference in Non-Performing Loans (NPL) before and after POJK Number 18/POJK.03/2016 Implementation of Commercial Bank Risk Management

The results of the Wilcoxon Signed Rank Test on the Non-Performing Loan (NPL) variable analyzed using SPSS 31 show a significant difference before and after the enactment of POJK Commercial Bank Risk Management Number 18/POJK.03/2016 in general banking in Indonesia, so that the hypothesis (H1) in this study is **"accepted"**. These empirical results conform to the findings proposed by Saut & Diansyah (2019) and Umyana (2022) regarding differences in credit risk proxied by Non-Performing Loans (NPL) before and after the enactment of POJK General Bank Risk Management Number.18 /POJK.03/2016. These results support the regulatory theory based on the views of DiMaggio and Powell (1983), that regulations are made to maintain financial system stability and increase public confidence in financial institutions. In this case, the implementation of POJK No.18/POJK.03/2016 shows a significant change in the NPL ratio after the enactment of POJK No.18/POJK.03/2016.

The implementation of POJK No. 18/POJK.03/2016 shows that regulations can influence banks' behavior in managing credit risk, as reflected in changes in the NPL ratio. This is in line with risk management theory, which explains that executing of effective risk management can influence the stability and performance of banks through systematic stages of consistently identifying, assessing, monitoring, and controlling risk. However, the changes that occur do not always have a positive impact, as an increase in NPLs may occur if the implementation of this policy is not yet fully effective in every bank.

Commercial bank NPLs increased during the implementation of Commercial Bank Risk Management No. 18/POJK.03/2016, indicating that regulations do not fully guarantee low credit risk, as their effectiveness depends on the quality of implementation in each bank. The increase in credit risk is also influenced by uncertain economic conditions, such as inflation, interest rate changes, rising unemployment, and unexpected external factors such as natural disasters, pandemics, and global and regional market fluctuations (Nasir et al., 2022), which affect the ability of debtors to meet their obligations.

Thus, this regulation strengthens the banking sector's resilience to risk, but does not completely prevent an increase in NPLs. The efficacy of the policy necessitates refinement through strengthened implementation, supervision, and the readiness of banks to face economic dynamics. Research by Samsaga & Nelly (2025) also shows that risk management has not had a significant effect on reducing NPLs.

Differences in the Loan to Deposit Ratio (LDR) before and after POJK Number 18/POJK.03/2016 Implementation of Commercial Bank Risk Management

The results of the Wilcoxon Signed Rank Test on the Loan to Deposit Ratio (LDR) variable analyzed using SPSS 31 reveal the absence of a statistically significant difference between the periods before and after the enactment of POJK on Commercial Bank Risk Management; thus, the hypothesis (H2) in this study is **"rejected"**. This finding indicates that the regulation has not had a real effect on banks' ability to manage their liquidity. These observations are

supported by research conducted by Kusuma & Hidayati (2023), Lombogia (2015) and Anindya & Kartini (2023) which states that the implementation of regulations is not always followed by significant changes.

Although the overall difference is not significant, it appears that banking liquidity risk has come under pressure following the implementation of the POJK Risk Management. This evidenced by the upward trend in LDR, which can occur when credit growth exceeds third-party fund growth. External factors such as interest rate fluctuations, exchange rate changes, and the repercussions of the COVID-19 pandemic have likewise exerted additional strain on bank liquidity.

In addition, the internal process of banks in adjusting to the new risk management framework also contributed to changes in the LDR. This adjustment requires time and adequate internal capacity for the policy to be implemented effectively. These findings are congruent with the research by Agustuty et al. (2024), which shows that the implementation of risk management policies has not had a significant effect on banking liquidity risk. Thus, the effectiveness of POJK Bank Risk Management is highly contingent upon the internal readiness of banks and consistent supervision in facing economic and market dynamics.

Differences in the Operating Expenses to Operating Income Ratio (BOPO) before and after POJK Number 18 /POJK.03/2016 Implementation of General Bank Risk Management

The results of the Wilcoxon Signed Rank Test on the Operating Expenses to Operating Income Ratio (BOPO), analyzed using SPSS 31, show a significant difference before and after the enactment of the POJK on Risk Management for Commercial Banks, thus hypothesis H3 is **"accepted"** in this study. This study reveals outcomes that are consistent with the findings presented by Nurbaiti et al. (2022) and Sustika & Wiksuana (2016) that there is a difference in operational risk measured by the BOPO ratio before and after the enactment of POJK Banking Risk Management Number 18/POJK.03/2016. This difference can be explained through regulatory theory, which states that policies such as POJK are designed to strengthen internal controls and maintain financial system stability while increasing public confidence, although their effectiveness largely hinges on the preparedness of human resources, internal supervision, and management commitment (Sjofjan et al., 2025).

The results show an increase in the BOPO ratio subsequent to the promulgation of POJK No.18/POJK.03/2016, indicating that commercial banks have not been fully able to minimize operational costs due to the process of adjusting to new policies, weaknesses in internal management, human error, and economic conditions weakened by the COVID-19 pandemic. This regulation is designed to strengthen internal control and bolster the efficiency of operational risk management, but its success largely depends on the capacity of personnel and management commitment (Handayani et al., 2024). According to signaling theory, the increase in BOPO can be understood as a signal that banks are adjusting and strengthening risk management, which accords with

the findings of Saridawati et al. (2021) that the implementation of risk management has a significant impact on operational risk.

Differences in the Net Interest Margin (NIM) before and after POJK Number 18 /POJK.03/2016 Implementation of Commercial Bank Risk Management

Through the Wilcoxon Signed Rank Test on the Net Interest Margin (NIM) variable, analyzed using SPSS 31, a significant difference was found, thus hypothesis H4 is **"accepted"** in this study. The outcomes discerned from this investigation demonstrate alignment with the findings of Juventia (2018) and Sintha (2018), which reported a difference in market risk measured by the NIM ratio before and after the enactment of POJK on Commercial Bank Risk Management Number 18/POJK.03/2016. This finding is in line with regulatory theory, which states that policies are implemented as a form of authority supervision to maintain financial system stability and encourage banks to be cautious in managing market risk. The implementation of POJK General Bank Risk Management requires banks to adjust their strategies in managing assets and liabilities, thereby affecting changes in the NIM ratio.

Descriptive statistical analysis shows that the Net Interest Margin (NIM) declined throughout the enforcement of POJK Commercial Bank Risk Management Number 18/POJK.03/2016. This decline was not only influenced by the implementation of the regulation but also by macroeconomic conditions during the observation period. Several factors caused market risk to rise alongside the decrease in the NIM ratio, namely Bank Indonesia's low interest rate policy, which suppressed the net interest margin (Lestari et al., 2021) and the repercussions of the COVID-19 pandemic, which reduced credit demand and increased loan restructuring (Susanti et al., 2023). Thus, the implementation of this POJK may cause changes in market risk performance, but its impact also depends heavily on economic conditions and financial system stability at the time the policy is implemented.

CONCLUSION AND RECOMMENDATIONS

The study's findings indicate notable differences in the Non-Performing Loan (NPL) ratio, Operating Expenses to Operating Income (BOPO), and Net Interest Margin (NIM) before and after the implementation of POJK No.18 /POJK.03/2016 pertaining to the execution of Risk Management in Commercial Banks. Meanwhile, the Loan to Deposit Ratio (LDR) did not show a significant difference, which means that this policy has not fully affected bank liquidity management. In general, the implementation of POJK encourages banks to strengthen their risk management systems and adjust their financial strategies to be more adaptive to policy changes and economic conditions. However, its implementation has not been fully optimal because it is still influenced by external factors such as interest rate fluctuations, inflation, macroeconomic conditions, and the impact of the pandemic, which also affect financial stability and the adjustment process in the banking sector. Furthermore, its effectiveness remains dependent on the quality of implementation at each bank in applying risk management principles effectively.

ADVANCED RESEARCH

Future studies are expected to add macroeconomic variables such as inflation, interest rates, and economic growth to understand the influence of external factors on banking risk. In addition, future studies can compare the effectiveness of risk management implementation between conventional and Islamic banks, or scrutinize the ramifications of digitalization on the risk profile of banks in Indonesia.

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