

Financial Distress Prediction in Rural Banks in Indonesia: Pressure Ratio, Intermediation, and Efficiency

Financial Distress
Prediction in Rural
Banks

I Nengah Arsana
STIE AMM Mataram; Mataram, Indonesia
E-Mail: inengaharsana2@gmail.com

591

ABSTRACT

This study investigates the impact of financial institution pressure ratios, intermediation, and efficiency on financial distress in Rural banks in Indonesia, vital for economic stability due to their role in serving underserved communities. The objective is to analyze how Non-Performing Loans, Capital Adequacy Ratio, Liquid Assets to Total Assets, Loan to Deposit Ratio, Net Interest Margin, and Operating Expenses to Operating Income influence financial distress, measured by the Interest Coverage Ratio. The research uses data from 639 Rural banks over 2014–2023, totaling 6,390 observations, sourced from the Financial Services Authority. Binary logistic regression was employed for analysis. Findings reveal that Non-Performing Loans and Operating Expenses to Operating Income significantly increase the likelihood of financial distress, while Capital Adequacy Ratio, Liquid Assets to Total Assets, Loan to Deposit Ratio, and Net Interest Margin significantly reduce it. The model demonstrates strong predictive power with 88.2% classification accuracy and a Nagelkerke R Square of 0.701. These results underscore the importance of managing credit risk and operational efficiency to enhance financial resilience. The study offers critical policy implications for regulators and bank management to mitigate risks and strengthen the financial health of Rural banks, supporting sustainable economic growth.

Submitted:
MARCH 2025

Accepted:
JUNE 2025

Keywords: Efficiency, Financial Distress, Financial Institution Pressure, Intermediation, Logistic Regression.

ABSTRAK

Penelitian ini menyelidiki dampak rasio tekanan lembaga keuangan, intermediasi, dan efisiensi terhadap kesulitan keuangan di Bank Perkreditan Rakyat di Indonesia, yang penting bagi stabilitas ekonomi karena perannya dalam melayani masyarakat yang kurang terlayani. Tujuannya adalah untuk menganalisis bagaimana Pinjaman Bermasalah, Rasio Kecukupan Modal, Aset Likuid terhadap Total Aset, Rasio Pinjaman terhadap Simpanan, Margin Bunga Bersih, dan Beban Operasional terhadap Pendapatan Operasional memengaruhi kesulitan keuangan, yang diukur dengan Rasio Cakupan Bunga. Penelitian ini menggunakan data dari 639 Bank Perkreditan Rakyat selama 2014–2023, dengan total 6.390 observasi, yang bersumber dari Otoritas Jasa Keuangan. Regresi logistik biner digunakan untuk analisis. Temuan mengungkapkan bahwa Pinjaman Bermasalah dan Beban Operasional terhadap Pendapatan Operasional secara signifikan meningkatkan kemungkinan kesulitan keuangan, sementara Rasio Kecukupan Modal, Aset Likuid terhadap Total Aset, Rasio Pinjaman terhadap Simpanan, dan Margin Bunga Bersih secara signifikan menguranginya. Model ini menunjukkan daya prediksi yang kuat dengan akurasi klasifikasi sebesar 88,2% dan Nagelkerke R Square sebesar 0,701. Hasil ini menggarisbawahi pentingnya pengelolaan risiko kredit dan efisiensi operasional untuk meningkatkan ketahanan finansial. Studi ini menawarkan implikasi kebijakan yang penting bagi regulator dan manajemen bank untuk mengurangi risiko dan memperkuat kesehatan finansial Bank Pedesaan, yang mendukung pertumbuhan ekonomi yang berkelanjutan.

Kata kunci: Efisiensi, Kesulitan Keuangan, Tekanan Lembaga Keuangan, Intermediasi, Regresi Logistik.

JIAKES

Jurnal Ilmiah Akuntansi
Kesatuan
Vol. 13 No. 3, 2025
pp. 591-602
IBI Kesatuan
ISSN 2337 – 7852
E-ISSN 2721 – 3048
DOI: 10.37641/jiakes.v13i3.3491

INTRODUCTION

The stability of financial institutions is vital for the sustainability of the banking system. Rural Banks (*Bank Perkreditan Rakyat/BPR*) serve as key financial intermediaries for communities in areas that remain underserved by conventional banks. Taswan & Si (2010) assert that banks must effectively function as collectors and distributors of funds to generate reasonable profits. Specifically, BPRs channel funds primarily to small businesses and local entrepreneurs, thereby contributing to economic growth and domestic stability, as highlighted by Buchdadi et al. (2020). Data from the Indonesian Banking Statistics indicate that public trust in BPRs has been robust during the 2014–2023 period, with third-party funds (*Dana Pihak Ketiga/DPK*) increasing by 134.74% from IDR 58,750 billion to IDR 137,909 billion and credit disbursement growing by 105.86% from IDR 68,391 billion to IDR 140,791 billion. However, this growth coincides with a significant decline in the number of BPRs, with a 14.67% reduction (241 fewer banks) from 1,643 in 2014 to 1,402 in 2023, largely due to mergers and liquidations. Data from the Financial Services Authority (*Otoritas Jasa Keuangan/OJK*) report that 66 BPRs were liquidated because of severe financial pressure. Key indicators reflect this distress: the loan-to-deposit ratio (LDR) decreased from 79.79% to 76.56%, the non-performing loan (NPL) ratio increased from 4.75% to 9.87%, and return on assets (ROA) dropped from 2.98% to 1% over the period.

Financial distress represents an early warning phase that may escalate into bankruptcy within financial institutions (Azizah & Lismawati, 2024). Therefore, identifying financial distress symptoms early is essential to mitigate systemic risks that could jeopardize the stability of the banking sector and the broader national economy. A stable, efficient, and responsive financial system is thus critical in withstanding both internal and external pressures. Nelson and Perli (2007) and Li et al. (2021) emphasize that indicators of financial stability can be employed to detect the likelihood of financial distress in banking institutions. According to Wali (2018), several financial ratios are commonly used to assess institutional vulnerability, including NPL, capital adequacy ratio (CAR), and liquidity ratio. Additionally, indicators related to operational efficiency and intermediation performance, such as the LDR, are also relevant. These variables are often linked to the potential emergence of financial difficulties, particularly in institutions like BPR. However, prior studies have produced mixed results. While some Ekadjaja et al. (2021) and Arsana et al. (2024) find NPL positively influences financial distress, others report opposing or insignificant effects (Effendi & Haryanto, 2016; Africa, 2016; Kuncoro & Agustina, 2017).

Various previous studies have yielded inconsistent findings regarding the effect of financial ratios on financial distress in the banking sector. For instance, Kuncoro and Agustina (2017) as well as Isayas (2021) reported that the CAR significantly and positively affects financial distress. In contrast, Indrajati et al. (2020) argued that CAR has a negative relationship with the likelihood of financial distress, while Ermar and Suhono (2021) found no significant effect of CAR at all. Likewise, studies on the effect of the Liquid Assets to Total Assets (LTA) ratio have shown conflicting results. Zatira et al. (2023) and Rangga et al. (2025) stated that LTA positively and significantly affects financial distress, whereas Kartika and Hasanudin (2019) found a negative and significant effect. Meanwhile, Pratiwi and Sudiyatno (2022) concluded that LTA has no influence on financial distress. Similar disparities appear in studies of the LDR. Hendrianto (2024) found a positive and significant effect of LDR on financial distress, while Maisarah et al. (2018) found a negative one, and Yuliani and Haryati (2022) found no effect. The impact of Net Interest Margin (NIM) is also debated. Suot et al. (2020) reported a positive relationship, whereas Altavilla et al. (2018) and Lopez et al. (2020) found a negative one, and Zahronyana and Mahardika (2018) saw no significant effect. Regarding Operating Expenses to Operating Income (*Biaya Operasional terhadap Pendapatan Operasional/BOPO*), Sholahudin and Sudarmawan (2024) reported a positive and significant effect, contrasting with Nasser et al. (2022) who found a negative impact, and Pratiwi and Sudiyatno (2022) who reported no effect.

The inconsistencies in previous findings emphasize the need for further research to deepen the understanding of financial distress, particularly in the context of BPRs in Indonesia. To date, limited studies have thoroughly examined the relationship between financial stability indicators and financial distress in BPRs over an extended period, such as 2014–2023, and with a substantial dataset of approximately 6,390 observations. This study aims to fill that gap by providing a comprehensive analysis using the most recent data available through 2023. Specifically, this research seeks to: first, investigate the influence of financial institutional pressure ratios (NPL, CAR, LTA), intermediation LDR, and financial efficiency indicators (NIM, BOPO) on the probability of financial distress in BPRs in Indonesia; second, assess the predictive power of the logistic regression model in detecting distress conditions; and third, explore the policy implications of these findings to support regulatory oversight and strengthen the financial resilience of the BPR sector in Indonesia.

LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT

Financial Ratios and Their Impact on Financial Distress

Non-Performing Loans (NPL) represent a critical indicator of credit risk in banking institutions, as they reflect the proportion of loans where borrowers fail to meet repayment obligations. Naili and Lahrichi (2022) emphasize that rising NPL levels signal deteriorating asset quality, which erodes customer confidence and increases the risk of financial distress. High NPLs necessitate larger loan-loss provisions, reducing profitability and potentially leading to liquidity issues, which may escalate into bankruptcy if mismanaged. Similarly, Capital Adequacy Ratio (CAR) measures a bank's capital strength relative to its risk-weighted assets, serving as a buffer against financial shocks. Olawale (2024) notes that a robust CAR enhances bank resilience, reducing the likelihood of distress by ensuring sufficient capital to absorb losses. In contrast, inadequate CAR heightens vulnerability to economic downturns.

Liquid Assets to Total Assets (LTA) indicates a bank's liquidity position, crucial for meeting short-term obligations. Kartika and Hasanudin (2019) argue that higher LTA levels reduce financial distress risk by ensuring liquidity, though excessive liquidity may reflect inefficiencies in asset utilization, potentially lowering profitability. The Loan to Deposit Ratio (LDR) measures the balance between funds collected and loans disbursed. Maisarah et al. (2018) suggest that an optimal LDR (80%–90%) reflects efficient intermediation, minimizing cash flow disruptions that could trigger distress. Deviations from this range, either too high or too low, may indicate liquidity or operational risks. Net Interest Margin (NIM) gauges a bank's profitability from interest-earning assets. Afrin et al. (2022) highlight that higher NIM reflects effective intermediation, strengthening financial stability, while declining NIM may signal poor credit quality or high funding costs.

Operational Expenses to Operating Income Ratio measures operational efficiency. Safitri et al. (2021) note that a high BOPO indicates inefficiency, as excessive operating costs relative to income increase distress risk. Efficient cost management, reflected by a lower BOPO, supports financial health. Recent studies, such as Hakim et al. (2024), confirm that poor operational efficiency exacerbates financial vulnerabilities in smaller banks like Rural Banks (BPRs). Additionally, Akbar (2023) and Muzaki and Sumawidjaja (2024) find that high NPL and BOPO levels correlate with increased distress probabilities in Indonesian BPRs, reinforcing their predictive power. Based on these findings, the following hypotheses are proposed:

H1: Non-Performing Loan (NPL) has a positive and significant effect on financial distress.

H2: Capital Adequacy Ratio (CAR) has a negative and significant effect on financial distress.

H3: Liquid Asset to Total Asset (LTA) has a negative and significant effect on financial distress.

H4: Loan to Deposit Ratio (LDR) has a negative and significant effect on financial distress.

H5: Net Interest Margin (NIM) has a negative and significant effect on financial distress.

H6: Operational Expenses to Operating Income Ratio (BOPO) has a positive and significant effect on financial distress.

Conceptual Framework

The research framework integrates financial institution pressure ratios (NPL, CAR, LTA), intermediation (LDR), and efficiency indicators (NIM, BOPO) to predict financial distress in Rural Banks (BPRs). Indrajati et al. (2020) argue that these ratios collectively capture the multifaceted risks faced by banks, from credit and liquidity risks to operational inefficiencies. NPL reflects credit quality, CAR indicates capital resilience, and LTA measures liquidity, all of which are critical for assessing financial stability. LDR evaluates the effectiveness of intermediation, while NIM and BOPO gauge profitability and cost efficiency, respectively. This framework posits that these variables influence the probability of financial distress, proxied by the Interest Coverage Ratio (ICR), where a lower ICR signals distress.

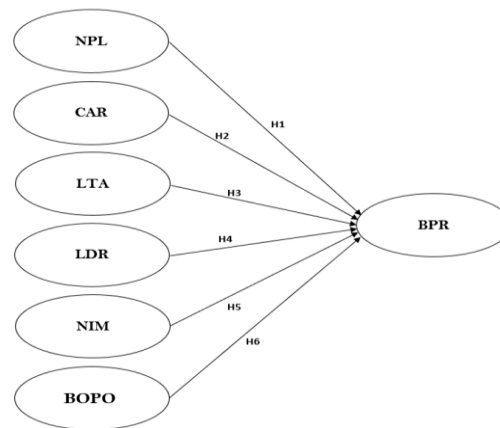


Figure 1. Conceptual Framework

The conceptual framework, illustrated in Figure 1, depicts the hypothesized relationships between the independent variables (NPL, CAR, LTA, LDR, NIM, BOPO) and financial distress. Buchdadi et al. (2020) emphasize that such a model allows for a comprehensive assessment of distress risk by combining risk, efficiency, and intermediation factors. Recent research by Halteh et al. (2018) supports this approach, highlighting that integrated financial ratios enhance predictive accuracy in banking distress models. Similarly, Ariefianto et al. (2022) find that combining liquidity and efficiency metrics strengthens distress prediction in Indonesian banks. The model assumes that higher NPL and BOPO increase distress likelihood, while higher CAR, LTA, LDR, and NIM reduce it. This framework provides a robust basis for empirical testing using logistic regression, as supported by Udin et al. (2017), who advocate for statistical models in distress analysis.

RESEARCH METHOD

This study utilizes financial reports from BPR in Indonesia, sourced from the official publications of OJK spanning 2014 to 2023, to investigate the determinants of financial distress. The population comprises 1,402 conventional BPRs operating in Indonesia, from which a purposive sampling technique selected 639 BPRs that consistently submitted complete financial reports and maintained positive profitability throughout the study period. This selection ensures data reliability and relevance, resulting in 6,390 observations (639 BPRs × 10 years). The extended observation period and large sample

size enhance the statistical robustness of the analysis, capturing long-term trends in financial distress among BPRs. To ensure data validity, all financial reports were cross-checked for consistency, and any incomplete records were excluded to maintain the integrity of the dataset.

The research examines six independent variables representing financial stability, intermediation, and efficiency: NPL, CAR, LTA, LDR, NIM, and BOPO. Financial distress, the dependent variable, is proxied by the ICR, categorized as a dummy variable: BPRs with an ICR less than 1 are classified as financially distressed ($Y=1$), while those with an ICR greater than or equal to 1 are considered non-distressed ($Y=0$), following Buchdadi et al. (2020). Variable measurements adhere to standard financial indicators, as outlined by Kumalasari and Syaichu (2016), ensuring alignment with established banking research practices. The use of ICR as a proxy is justified by its ability to reflect a bank's capacity to meet interest obligations, a critical indicator of financial health in BPRs.

Binary logistic regression, implemented using SPSS version 24.0, serves as the analytical method due to the dichotomous nature of the dependent variable. This approach is suitable for predicting the probability of financial distress based on the selected financial ratios, as supported by Indrajati et al. (2020). The regression model is expressed as:

$$FD_i = a + b_1NPL_i - b_2CAR_i - b_3LTA_i - b_4LDR_i - b_5NIM_i + b_6BOPO_i + e_i$$

where FD_i represents the log-odds of financial distress for each BPR. To ensure model validity, assumptions of logistic regression, including the absence of multicollinearity, were tested using variance inflation factor (VIF) analysis, with all VIF values below 5, indicating no significant multicollinearity issues. Additionally, potential outliers were identified and reviewed using standardized residuals, and missing data were addressed by excluding incomplete records during the sampling process, ensuring robust results.

The analysis began with descriptive statistics to summarize the characteristics of the independent variables, followed by hypothesis testing via the Wald test to evaluate the significance of each variable's effect on financial distress at a 5% significance level. The choice of the 2014–2023 period reflects the availability of comprehensive OJK data and captures significant economic fluctuations impacting BPRs, such as post-global financial crisis recovery and regional economic shifts. This methodological framework, combining rigorous data selection, validated variable measurements, and robust statistical techniques, provides a reliable basis for assessing financial distress in BPRs, offering insights for regulatory and managerial applications.

RESULTS

This study examines the financial statements of 639 BPRs over the 2014–2023 period, comprising a total of 6,390 data points. Among these, 4,317 observations fall under the category of financial distress, while 2,073 are identified as not experiencing financial distress. Based on Table 1, the average NPL of problematic BPRs is 5.19%, higher than that of non-problematic BPRs which is only 4.35%. This shows that the level of non-performing loans is higher in BPRs that are experiencing financial pressure. Difference CAR is very significant, with an average of 39.01% for non-distressed BPRs and only 20.31% for distressed BPRs.

This indicates that healthy BPRs have a much stronger capital structure. The difference in Liquid Assets to Total Assets between both groups is relatively small, with 25.86% for non-distressed BPRs and 24.97% for those in distress. This variable does not appear to be a key differentiator between the two conditions, as its distribution is also nearly uniform. On the other hand, the average LDR was higher in BPRs that did not experience distress (86.69%) compared to those that did (76.87%). This indicates that healthier BPRs are more effective in channeling funds to the community. NIM shows a big difference, where non-distressed BPRs have a net interest margin of 25.63%, while those in distress only have 15.81%. This reflects the ability of non-distress BPRs to generate income from

intermediation activities. BOPO is better in non-distressed BPRs (63.96%) compared to distressed ones (74.27%). The higher the BOPO indicates the worse the efficiency, so that distressed BPRs tend to incur greater costs to obtain income. Overall, BPRs that are not in financial distress tend to have ratios that reflect better efficiency, stability and intermediation capabilities than BPRs that are in distress.

Table 1. Result of Descriptive Analysis: Independent Variables

Variable		N	Mean	Std. Deviation
No Financial Distress	NPL	2073	4.3451	4.75665
	CAR	2073	39.0075	22.78470
	LTA	2073	25.8602	11.53157
	LDR	2073	86.6932	22.68686
	NIM	2073	25.6322	9.06384
	BOPO	2073	63.9552	11.72339
	Valid N (listwise)	2073	-	-
Financial Distress	NPL	4317	5.1946	4.74670
	CAR	4317	20.3125	11.24847
	LTA	4317	24.9722	11.27030
	LDR	4317	76.8701	12.35184
	NIM	4317	15.8112	5.96965
	BOPO	4317	74.2659	11.90958
	Valid N (listwise)	4317	-	-

Table 2. Classification of BPR Not Financial Distress and Financial Distress

Observed	Predicted			Percentage Correct	
	Rural Banks				
	No Financial Distress	Financial Distress			
Step 0	Rural Banks	No Financial Distress	1582	491	76.3
		Financial Distress	263	4054	93.9
	Overall Percentage				88.2

a. The cut value is .500

Based on Table 2, from a total of 6,390 BPR observations, the overall accuracy was 88.20%, which means the model was able to predict BPR conditions correctly in 88 out of every 100 cases. Success rate predicts non-experiencing BPR financial distress It was recorded that 76.3% of the 2,073 BPRs were truly healthy, 1,582 BPRs were classified as correct, and 491 BPRs were incorrectly detected. Meanwhile, the success rate predicts that is experiencing financial distress recorded 93.90% of the 4,317 BPRs distress, 4,054 were correctly classified, while 491 were incorrectly detected.

Table 3. Model Feasibility Test Results and Output Omnibus Tests of Model Coefficients

Step		Chi-square	df	Sig.
Step 1		8.047	8	.429
Step 1	Step	4460.296	6	.000
	Block	4460.296	6	.000
	Model	4460.296	6	.000

Based on Table 3, a significance value of 0.429, which exceeds the 0.05 threshold, suggests that the discrepancy between the observed data and the model's predictions is not statistically meaningful. This implies that the logistic regression model demonstrates a good fit, indicating its effectiveness in capturing the relationship between the independent variables and the likelihood of financial distress in BPRs. The chi-square (χ^2) value of 4,460.296 with a significance level of 0.000 indicates that the model, which includes six independent variables, significantly contributes to explaining the likelihood of financial distress. This result confirms that the logistic regression model is appropriate and well-suited for analysis.

Table 4. Model Summary

Analysis	Value
-2 Log likelihood	3593.038 ^a
Cox & Snell R Square	0.502
Nagelkerke R Square	0.701

Based on Table 4, the Nagelkerke R² value of 0.701 suggests that approximately 70.1% of the variability in financial distress conditions among BPRs can be accounted for by the model's variables, which include NPL, CAR, LTA, LDR, NIM, and BOPO. The remaining 29.9% is explained by other variables outside of this research.

Logistic regression analysis was performed using the Wald test to examine the partial effect of the independent variables (NPL, CAR, LTA, LDR, NIM, and BOPO) on financial distress. The test was conducted with a 5% significance threshold. The outcomes of the Wald test are detailed and discussed in Table 5.

Table 5. Wald Test Results

Variable	B	S.E.	Forest	df	Say.	Exp(B)	
Step 1 ^a	NPL	0.024	0.010	5.078	1	0.024	1.024
	CAR	-0.063	0.003	373.374	1	0.000	0.939
	LTA	-0.053	0.007	61.578	1	0.000	0.949
	LDR	-0.071	0.006	163.991	1	0.000	0.932
	NIM	-0.231	0.008	813.782	1	0.000	0.794
	BOPO	0.129	0.005	742.911	1	0.000	1.138
	Constant	4.968	0.634	61.341	1	0.000	143.795

The prediction model for estimating the probability of financial distress in BPRs in Indonesia is expressed as: $FD = 4.968 + 0.024 NPL - 0.063 CAR - 0.053 LTA - 0.071 LDR - 0.231 NIM + 0.129 BOPO$. Based on the logistic regression analysis, the interpretation of each coefficient provides meaningful insight into how each financial ratio affects the likelihood of financial distress. The constant value of 4.968 indicates that when all predictor variables are held constant, the log-odds of a BPR experiencing financial distress is 4.968. The NPL coefficient of 0.024, with an Exp(B) value of 1.024, implies that each one-unit increase in NPL is associated with a 2.4% increase in the probability of financial distress. Meanwhile, the CAR variable has a coefficient of -0.063 and an Exp(B) of 0.939, meaning that a one-unit increase in CAR reduces the risk of financial distress by 6.1%. The LTA variable, with a coefficient of -0.053 and an Exp(B) of 0.949, suggests a 5.1% decrease in the likelihood of financial distress per one-unit increase. Furthermore, LDR has a coefficient of -0.071 and an Exp(B) of 0.932, indicating a 6.8% decrease in financial distress probability for each unit increase. The NIM variable shows the strongest negative effect, with a coefficient of -0.231 and an Exp(B) of 0.794, suggesting that a one-unit rise in NIM is linked to a 20.6% decrease in the likelihood of financial distress. In contrast, BOPO has a positive coefficient of 0.129 with an Exp(B) of 1.138, indicating a 13.8% increase in the probability of financial distress for each one-unit rise in BOPO. Overall, the regression results and hypothesis testing confirm all proposed hypotheses, demonstrating that the model effectively explains variations in financial distress among BPRs in Indonesia.

DISCUSSION

The analysis of financial institution pressure ratios, intermediation, and efficiency indicators provides critical insights into the determinants of financial distress in BPR in Indonesia over the 2014–2023 period. NPL serve as a key indicator of credit risk, reflecting the proportion of loans with repayment issues. Indrajati et al. (2020) highlight that rising NPL levels signal declining asset quality, necessitating larger loan-loss provisions that erode profitability and heighten financial distress risk. The findings confirm that NPL has a significant positive effect on financial distress, with a 2.4%

increase in distress probability per unit rise in NPL. This aligns with the notion that high NPLs undermine customer confidence, potentially triggering mass withdrawals and escalating into severe financial strain if not addressed promptly. Effective credit risk management, including stringent loan screening and monitoring, is thus essential to mitigate this risk.

CAR and LTA further elucidate the factors influencing BPR stability. Hendrianto (2024) underscores that a high CAR strengthens a bank's capital buffer, reducing vulnerability to economic shocks. The study's results show that a one-unit increase in CAR decreases the likelihood of financial distress by 6.1%, confirming its role as a protective factor. Similarly, LTA, which measures liquidity, exhibits a significant negative effect, with a 5.1% reduction in distress probability per unit increase, as supported by Kartika and Hasanudin (2019). Adequate liquidity ensures BPRs can meet short-term obligations, but excessively high LTA may indicate inefficiencies in asset allocation, potentially lowering income. These findings emphasize the need for a balanced approach to liquidity management to maintain financial health without sacrificing profitability.

The intermediation function, captured by the LDR, also plays a pivotal role in financial stability. The study finds that a one-unit increase in LDR reduces the likelihood of financial distress by 6.8%, consistent with Maisarah et al. (2018), who argue that an optimal LDR (80%–90%) reflects efficient fund allocation. An LDR within this range ensures active credit disbursement while maintaining sufficient liquidity to meet withdrawal demands, as noted by Muhammad (2020). Deviations from this range, such as overly aggressive lending or excessive conservatism, can disrupt cash flows and elevate distress risk. Meanwhile, NIM demonstrates the strongest negative effect, with a one-unit increase reducing distress probability by 20.6%. Gustiana and Nasrudin (2021) and Tavakoli (2023) emphasize that a high NIM reflects robust profitability from interest-earning assets, enhancing liquidity and resilience against financial shocks. Conversely, a declining NIM may indicate poor credit quality or high funding costs, increasing distress vulnerability.

Operational efficiency, measured by BOPO, significantly influences financial distress. The findings show that a one-unit increase in BOPO raises distress probability by 13.8%, aligning with Safitri et al. (2021), who note that high BOPO reflects inefficiency due to excessive operating costs relative to income. Inefficient cost management, such as high administrative or salary expenses, weakens financial performance and heightens distress risk. The logistic regression model, with an 88.2% classification accuracy and a Nagelkerke R Square of 0.701, underscores the robustness of these variables in predicting financial distress. This model effectively distinguishes between distressed and non-distressed BPRs, providing a reliable tool for assessing financial health.

The implications of these findings are significant for BPR management and regulators, particularly OJK. Regulators should strengthen oversight of BPRs with elevated NPL and BOPO levels, as these are strong predictors of financial distress. Policies encouraging BPRs to maintain adequate CAR and LTA levels can serve as buffers against financial pressures, while promoting an optimal LDR range ensures efficient intermediation without compromising liquidity. Integrating this predictive model into OJK's supervisory framework could enable early detection of distress signals, allowing timely interventions to prevent crises. For BPR management, prioritizing credit risk management, cost efficiency, and balanced lending practices is crucial for long-term sustainability. These findings also highlight the need for further research to incorporate external factors, such as macroeconomic conditions, to enhance the model's predictive power and provide a more comprehensive understanding of financial distress in BPRs.

CONCLUSION

This study confirms that financial institution pressure ratios, intermediation, and efficiency indicators are robust predictors of financial distress in BPR in Indonesia over the 2014–2023 period. The logistic regression analysis demonstrates that NPL and BOPO significantly increase the likelihood of financial distress, with each unit increase raising distress probability by 2.4% and 13.8%, respectively. Conversely, CAR, LTA, LDR, and NIM exhibit significant negative effects, reducing distress probability by 6.1%, 5.1%, 6.8%, and 20.6% per unit increase, respectively. With a classification accuracy of 88.2% and a Nagelkerke R Square of 0.701, the model effectively distinguishes between distressed and non-distressed BPRs, highlighting the critical role of these financial ratios in assessing BPR stability.

The findings offer significant policy implications for OJK and BPR management, emphasizing the need for stringent oversight of NPL and BOPO to mitigate distress risks, while maintaining optimal CAR, LTA, and LDR levels to bolster financial resilience. Integrating this predictive model into OJK's supervisory framework can facilitate early detection and intervention to prevent financial crises. However, the study is limited by its focus on internal financial ratios, excluding external factors such as macroeconomic conditions like GDP growth or inflation, which may also influence distress. Future research should incorporate these external variables to enhance the model's predictive power and provide a more comprehensive understanding of financial distress in BPRs. Additionally, exploring qualitative factors, such as management practices or regulatory compliance, could further enrich the analysis.

REFERENCES

- [1] Africa, L. A. (2016). Financial distress for bankruptcy early warning by the risk analysis on go-public banks in Indonesia. *Journal of Economics, Business, and Accountancy Ventura*, 19(2), 259–270.
- [2] Afrin, S., Skamnelos, I., & Sarder, W. (2022). Drivers of intermediation costs, financial repression and stability. *Journal of Economics and Finance*, 46(2), 283-307.
- [3] Akbar, M. (2023). Analysis of the effect of capital adequacy ratio (CAR), non-performing loan (NPL), and operating cost operating income (BOPO), net interest margin (NIM) to loan to deposit ratio (LDR) of state-owned banks in Indonesia. *Journal of Social Research*, 2(5), 1591-1607.
- [4] Altavilla, C., Boucinha, M., & Peydró, J. L. (2018). Monetary policy and bank profitability in a low interest rate environment. *Economic policy*, 33(96), 531-586.
- [5] Ariefianto, M. D., Trinugroho, I., Lau, E., & Sergi, B. S. (2022). Banks' liquidity management dynamics: evidence from Indonesia. *International Journal of Emerging Markets*, 17(9), 2321-2349.
- [6] Arsana, I. N., Suardana, I. M., & Ariffianti, I. (2024). Liquidity risk, credit risk and capital as determining of predicting financial distress in rural banks in Indonesia. *Asian Journal of Engineering, Social and Health*, 3(8), 1703–1717.
- [7] Azizah, S., & Lismawati, L. (2024). The effect of financial performance on financial distress. *Jurnal Ilmiah Akuntansi Kesatuan*, 12(1), 167-178.
- [8] Buchdadi, A., Nguyen, X., Putra, F., & Dalimunthe, S. (2020). The effect of credit risk and capital adequacy on financial distress in rural banks. *Accounting*, 6(6), 967–974.
- [9] Effendi, S. A., & Haryanto, A. M. (2016). Analisis faktor-faktor yang mempengaruhi kondisi financial distress Bank Perkreditan Rakyat. *Diponegoro Journal of Management*, 5(4), 589–602.
- [10] Ekadjaja, M., Siswanto, H. P., Ekadjaja, A., & Rorlen, R. (2021). The effects of capital adequacy, credit risk, and liquidity risk on Banks' Financial Distress in Indonesia. *Ninth International Conference on Entrepreneurship and Business Management (ICEBM 2020)*, 393–399.
- [11] Ermar, F. H., & Suhono, S. (2021). Pengaruh RGEC (Risk Profile, Good Corporate Governance Earning, Capital) terhadap financial distress. *Owner: Riset Dan Jurnal Akuntansi*, 5(1), 107–118.
- [12] Gustiana, A., & Nasrudin. (2021). Evaluating financial system stability using heatmap from aggregate financial stability index with change point analysis approach. *Asia-Pacific Financial Markets*, 28(3), 367-396.
- [13] Hakim, L., Nurgupita, R. K., Rizaldi, M., & Zhahirah, N. (2024). BPR resilience in economic uncertainty: comparison of bpr financial performance in Indonesia before and during the COVID-19 pandemic. *Akuntansi: Jurnal Akuntansi Integratif*, 10(2), 1-16.
- [14] Halteh, K., Kumar, K., & Gepp, A. (2018). Financial distress prediction of Islamic banks using tree-based stochastic techniques. *Managerial Finance*, 44(6), 759-773.

- [15] Hendrianto, D. (2024). The effect of RGEC on financial distress in rural banks—conventional in the Central Kalimantan Region. *International Conference on Economics Business Management and Accounting (ICOEMA)*, 3, 372–386.
- [16] Indrajati, V., Yuvita, Y., Putri, N. A., Rismawati, F. O., & Puspitasari, D. M. (2020). Determinants of financial distress rural bank in Indonesia: A Logit Approach. *Solid State Technology*, 63(3), 5069–5075.
- [17] Isayas, Y. N. (2021). Financial distress and its determinants: Evidence from insurance companies in Ethiopia. *Cogent Business & Management*, 8(1), 1951110.
- [18] Kartika, R., & Hasanudin, H. (2019). Analisis Pengaruh likuiditas, leverage, aktivitas, dan profitabilitas terhadap financial distress pada perusahaan terbuka sektor infrastruktur, utilitas, dan transportasi periode 2011-2015. *Oikonomia: Jurnal Manajemen*, 15(1).
- [19] Kuncoro, S., & Agustina, L. (2017). Factors to predict the financial distress condition of the banking listed in the Indonesia Stock Exchange. *Accounting Analysis Journal*, 6(1), 39–47.
- [20] Li, Z., Crook, J., Andreeva, G., & Tang, Y. (2021). Predicting the risk of financial distress using corporate governance measures. *Pacific-Basin Finance Journal*, 68(1), 101-124.
- [21] Lopez, J. A., Rose, A. K., & Spiegel, M. M. (2020). Why have negative nominal interest rates had such a small effect on bank performance? Cross country evidence. *European Economic Review*, 124(1), 103-122.
- [22] Maisarah, M., Zamzami, Z., & Arum, E. D. P. (2018). Analisis rasio keuangan untuk memprediksi kondisi financial distress perbankan syariah di Indonesia (Studi kasus pada bank syariah di Indonesia periode 2011-2016). *JAKU (Jurnal Akuntansi & Keuangan Unja)(E-Journal)*, 3(4), 19–34.
- [23] Muhammad, N., Alwi, S. F. S., & Muhammad, N. (2020). Credit management in full-fledged Islamic bank and Islamic banking window: Towards achieving Maqasid Al-Shariah. *International Journal of Financial Research*, 11(3), 92-99.
- [24] Muzaki, Z. H., & Sumawidjaja, R. N. (2024). Pengaruh non performing financing, return on assets, dan BOPO pada kondisi financial distress pada BPRS di Jawa Barat 2020-2023. *eCo-Buss*, 7(2), 1481-1492.
- [25] Naili, M., & Lahrchi, Y. (2022). The determinants of banks' credit risk: Review of the literature and future research agenda. *International Journal of Finance & Economics*, 27(1), 334-360.
- [26] Nasser, A. B. D. U. L., & Hardana, A. (2022). Effect of operating costsonal operating income (BOPO) and non-perfoming financing (npf) on return on assets (roa) in PT. Bank Rakyat Indonesia Syariah, Tbk for the period 2009-2017. *Journal of Sharia Banking*, 3(2), 136-143.
- [27] Nelson, W. R., & Perli, R. (2007). Selected indicators of financial stability. *Risk Measurement and Systemic Risk*, 4, 343-372.
- [28] Olawale, A. (2024). Capital adequacy and financial stability: A study of Nigerian banks' resilience in a volatile economy. *GSC Advanced Research and Reviews*, 21(1), 001-012.
- [29] Pratiwi, E. Y., & Sudiyatno, B. (2022). Pengaruh likuiditas, leverage, dan profitabilitas terhadap financial distress. *Jurnal Ilmiah Akuntansi dan Keuangan*, 5(3), 1324–1332.
- [30] Rangga, T. D., Hapsari, I., Santoso, S. B., & Santoso, S. E. B. (2025). Pengaruh leverage dan likuiditas terhadap financial distress dengan sudut pandang profitabilitas sebagai moderasi. *Al-Muamalat: Jurnal Hukum Dan Ekonomi Syariah*, 10(1), 29–48.
- [31] Safitri, J., Shaferi, I., Nusair, A. E. S., & Affandi, M. A. (2021). The role of Noan Performing Financing (NPF) as a mediator for the relationship between Operating Expenses and Operating Income (BOPO) on the performance of Islamic Banks in Indonesia. *Perisai: Islamic Banking and Finance Journal*, 5(1), 110-110.
- [32] Sholahudin, A. A., & Sudarmawan, B. N. (2024). The influence of NPF, ROA, CAR, and BOPO on financial distress at Sharia Rural Bank in Indonesia. *LAA MAISYIR: Jurnal Ekonomi Islam*, 401–413.
- [33] Suot, L. Y., Koleangan, R. A. M., & Palandeng, I. D. (2020). Analisis rasio keuangan dalam memprediksi kondisi financial distress Pada industri perbankan yang terdaftar di bursa efek Indonesia. *Jurnal EMBA: Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, 8(1).
- [34] Taswan, C., & Si, M. (2010). *Manajemen perbankan*. Yogyakarta: UPP STIM YKPN Yogyakarta.
- [35] Tavakoli, A. (2023). Exploring the relationship between interest rates and bank profitability in financial institutions. *Indonesia Accounting Research Journal*, 11(2), 128-137.
- [36] Udin, S., Khan, M. A., & Javid, A. Y. (2017). The effects of ownership structure on likelihood of financial distress: An empirical evidence. *Corporate Governance: The international journal of business in society*, 17(4), 589-612.
- [37] Wali, R. M. (2018). Analysis of financial ratios and credit risk ratings in the banking industry: insights and findings. *Journal of Business and Economic Options*, 1(2), 52-59.
- [38] Yuliani, S. M., & Haryati, T. (2022). Pengaruh RGEC (Risk Profile, Good Corporate Governance, Earnings and Capital) terhadap financial distress perusahaan perbankan di Indonesia. *Al-Kharaj: Jurnal Ekonomi, Keuangan & Bisnis Syariah*, 5(3).
- [39] Zahronyana, B. D., & Mahardika, D. P. K. (2018). Capital adequacy ratio, non performing loan, net interest margin, biaya operasional pendapatan operasional dan loan to deposit ratio terhadap financial distress. *JRAK*, 10(2), 90–98.

- [40] Zaira, D., Sunaryo, D., & Dwicandra, N. M. D. (2023). Pengaruh likuiditas dan implementasi good corporate governance (GCG) terhadap financial distress. *Balance Vocation Accounting Journal*, 6(2), 160–171.

