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Covid-19 Credit Restructuring, Financial Risk and Operational Efficiency as Determinants of Rural Bank Profitability: Evidence from Solo Raya

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Abstract: This study aims to analyze the effect of COVID-19-affected credit restructuring, Non-Performing Loan (NPL), operational efficiency (BOPO), and Cash Ratio (CR) on the profitability of Rural Banks (BPR) in the Solo Raya region, measured by Return on Assets (ROA) and Return on Equity (ROE). The COVID-19 pandemic prompted OJK to issue POJK No. 11/POJK.03/2020 as a credit restructuring relaxation policy. The study uses semi-annual secondary data from December 2019 to December 2022, covering 65 conventional BPRs in Solo Raya obtained from OJK's Banking Information System. The analytical method employs panel data regression with Fixed Effect Model (FEM) selected through Chow, Hausman, and Lagrange Multiplier tests. Results show that COVID-19 credit restructuring has a significant positive effect on ROA (coefficient 0.0007; $p=0.0235$), NPL has a significant negative effect on ROA (coefficient -0.148; $p=0.0239$) and ROE (coefficient -7.634; $p=0.0000$), BOPO negatively affects ROA (coefficient -0.1057; $p=0.0000$), while CR positively affects ROE (coefficient 0.860; $p=0.0169$). The ROA model explains 85.86% and the ROE model explains 79.34% of profitability variation. This study contributes to BPR management and OJK regulators in formulating adaptive post-pandemic credit risk management strategies.

Keywords: Credit Restructuring, COVID-19, NPL, BOPO, Profitability, BPR

INTRODUCTION

The banking sector occupies a central position in Indonesia's financial architecture as the primary intermediary facilitating the transfer of funds between economic units experiencing liquidity surpluses and those requiring capital injections (Ghufron et al., 2024). This intermediation role extends beyond the technical function of fund mobilization and distribution, as banks also serve as engines of economic development (agent of development) through the allocation of credit to productive sectors (Fauzi & Taufiqurrahman, 2025). Furthermore, banks function as providers of financial service infrastructure and payment system operators (agent of services), positioning them as indispensable pillars in maintaining macroeconomic stability.

Rural Banks (Bank Perekonomian Rakyat/BPR) are financial institutions specifically designed to serve micro, small, and medium enterprises (MSMEs) in both urban and rural areas (Ghufron et al., 2024). Under Law Number 10 of 1998, BPR are defined as banks conducting business activities on a conventional basis or based on Islamic principles, but are not permitted to participate in payment traffic services. A significant nomenclature transformation occurred with the enactment of Law Number 4 of 2023 on the Development and Strengthening of the Financial Sector (P2SK), which renamed Bank Perkreditan Rakyat to Bank Perekonomian Rakyat and expanded the mandate of BPR to include foreign currency transactions and fund transfers (OJK, 2026; Kementerian Keuangan, 2023).

The contribution of BPR in the Solo Raya region is substantial. Based on OJK data, as of December 2022, there were 78 BPR operating in Solo Raya — encompassing Surakarta City and the Regencies of Klaten, Boyolali, Sukoharjo, Wonogiri, Sragen, and Karanganyar — comprising 70 conventional BPR and 8 Islamic BPR. The aggregate total assets of conventional BPR in Solo Raya reached IDR 10.92 trillion as of December 2022, representing year-on-year growth of 11.66%, with credit disbursements of IDR 7.95 trillion and third-party funds (DPK) of IDR 8.42 trillion. This contribution is equivalent to approximately 22% of total BPR assets in Central Java Province, affirming the strategic importance of BPR in supporting regional economic growth.

The COVID-19 pandemic, which struck Indonesia in March 2020, inflicted significant disruption on the banking sector's performance. Large-Scale Social Restriction (PSBB) policies, which curtailed numerous economic activities, caused widespread debt service difficulties among borrowers — particularly MSME operators who constitute the primary clientele of BPR (Disemadi & Shaleh, 2020). In response, the Financial Services Authority (OJK) issued Regulation Number 11/POJK.03/2020, providing regulatory relaxation through a credit restructuring policy whereby restructured loans remained categorized as performing loans. This policy was subsequently extended through POJK Number 17/2021 and POJK Number 18/2021, prolonging the relaxation period from March 2022 through March 2023, in order to sustain economic recovery momentum (Demirgüç-Kunt et al., 2021; Elnahass et al., 2021).

Profitability constitutes the primary indicator for assessing BPR performance. Return on Assets (ROA) — the ratio of pre-tax profit to total assets — and Return on Equity (ROE) — the ratio of net profit to equity — represent the two most widely employed profitability measures. A high ROA value indicates superior financial performance (Al Hakim et al., 2024; Sembiring & Janrosl, (2023). Multiple risk dimensions are identified as potential determinants of profitability, encompassing credit risk, operational risk, and liquidity risk Sembiring & Janrosl, (2023).

Credit risk is measured using the Non-Performing Loan (NPL) ratio, which reflects the proportion of impaired loans relative to total credit extended. A recent study by Al Hakim et al. (2024) employing a Systematic Literature Review approach confirmed that NPL exerts a significant negative effect on ROA. However, Capriani and Dana (2016) reported contradictory findings, wherein credit risk demonstrated a positive but statistically insignificant relationship with profitability. Such empirical inconsistency signals the existence of a substantive research gap that warrants further investigation, particularly in the context of post-pandemic BPR operations.

Operational risk is measured using the Operating Expense to Operating Income ratio (BOPO). A higher BOPO value reflects diminished operational efficiency, which is theoretically expected to exert a negative effect on profitability (Attar, 2014). Liquidity risk, proxied by the Cash Ratio (CR), captures the bank's capacity to fulfill short-term obligations. Hidayah (2019) found liquidity risk to have a significant positive effect on profitability, while Sembiring & Janrosl, (2023) reported a significant negative relationship between LDR and ROA, highlighting the contextual sensitivity of this relationship.

The novelty of this study lies in the introduction of a COVID-19 credit restructuring variable — proxied by the number of restructured credit accounts (RESTRUCOVID) — as an independent variable that has received limited scholarly attention in the BPR literature. Additionally, this study employs a comprehensive longitudinal dataset spanning 2019–2022, encompassing pre-, during-, and post-COVID phases, with a specifically defined research object: conventional BPR operating in the Solo Raya region of Central Java, Indonesia.

Based on the foregoing discussion, this study addresses the following research questions: (1) Does COVID-19 credit restructuring significantly affect BPR profitability in Solo Raya? (2) Does NPL significantly affect BPR profitability in Solo Raya? (3) Does operational efficiency (BOPO) significantly affect BPR profitability in Solo Raya? (4) Does liquidity risk (CR) significantly affect BPR profitability in Solo Raya?

The COVID-19 pandemic has been extensively documented as a significant negative shock to the global banking sector. Demirgüç-Kunt et al. (2021) examined the differential impact of the pandemic on banks and corporations, while Elnahass et al. (2021) demonstrated that the pandemic adversely affected banking performance across multiple dimensions of profitability, asset quality, and capital adequacy. In response to pandemic-induced credit deterioration, OJK issued POJK Number 11/POJK.03/2020, subsequently extended through POJK Number 17/2021 and POJK Number 18/2021, which prolonged the restructuring relaxation policy from March 2022 to March 2023. Under this regulatory framework, restructured loans retained their "performing" classification, thereby insulating bank income statements from the full impact of rising non-performing exposures. From a Contingency Theory perspective (Donaldson, 2001), this policy represents an adaptive regulatory response that aligns organizational strategy with environmental conditions — enabling BPR to maintain profitability during a period of extreme macroeconomic stress. Empirical evidence from Rahmadany et al. (2024) supports the view that regulatory forbearance mechanisms are effective countercyclical tools in stabilizing banking sector performance during systemic crises. H1: COVID-19 credit restructuring has a positive effect on the financial performance of BPR.

Elekdag et al. (2020) identified the NPL ratio as one of the primary predictors of overall bank performance, simultaneously functioning as a leading indicator in risk management. Credit, at its core, represents a supervised asset transfer mechanism wherein funds are disbursed to borrowers through formal agreements specifying principal repayment schedules and interest premiums. NPL, by contrast, characterizes conditions in which borrowers fail to honor their debt service obligations — both outstanding principal and contracted interest payments. The application of prudential principles in the credit granting process is therefore imperative to maintaining the bank's overall financial stability. When the proportion of impaired loans reaches an elevated level, this generates destructive effects on bank operations by impairing productivity and eroding liquidity (Ganefi & Haticasari, 2022; Priharta, 2024). From a Signaling Theory perspective (Spence, 1973), a high NPL ratio signals poor credit management quality to all stakeholders, triggering increased provisioning requirements (PPAP) that directly compress net profit, thereby depressing both ROA and ROE (Al Hakim et al., 2024; Chalampalakis et al., 2023).

H2: Financial risk (NPL) has a negative effect on the financial performance of BPR.

The Cash Ratio (CR) measures a bank's ability to fulfill short-term obligations using its most liquid assets. Adequate liquidity management is essential not only for regulatory compliance but also for sustaining depositor confidence and institutional stability. From a risk-return tradeoff perspective, maintaining elevated cash reserves constrains productive asset deployment, potentially reducing ROA, yet simultaneously reinforces stakeholder confidence in the bank's solvency position, supporting equity value preservation. Hidayah (2019) reported a significant positive effect of liquidity risk on BPR profitability, while Safdar et al. (2024) confirmed that liquidity management significantly influences financial

performance across Islamic and conventional banks in emerging markets. The unique MSME-dominated customer base of BPR in Solo Raya generates inherently volatile liquidity demand patterns, making adequate cash reserves a strategic asset rather than an idle cost (Ghufron et al., 2024). H3: Liquidity risk (CR) has a positive effect on the financial performance of BPR.

Operational efficiency represents a critical dimension of bank performance, reflecting management's capacity to control operating costs relative to generated operating income. In the BPR context, operational efficiency is proxied by the BOPO ratio, where a lower value indicates superior efficiency (Hidayah, 2019; Sembiring & Janrosl, 2023). From a Signaling Theory perspective (Spence, 1973), a low BOPO ratio functions as a positive signal to stakeholders that management effectively optimizes organizational resources. Berger and Humphrey (1997) established operational efficiency as a fundamental determinant of bank profitability across both emerging and developed markets, a finding consistently supported by subsequent empirical literature. Capriani and Dana (2016) confirmed that BOPO exerts a significant negative effect on BPR profitability in Denpasar City, while Arindi and Mawardi (2016) documented the same relationship among conventional commercial banks on the Indonesia Stock Exchange. Sembiring & Janrosl, (2023) further corroborated these findings in the BPR context, and Suzuki and Sastrosuwito (2020) demonstrated using a two-stage DEA approach that Indonesian BPR with superior cost efficiency exhibit significantly stronger financial performance. BPR that fail to maintain cost discipline face progressive profit margin erosion — a dynamic particularly pronounced in the rural banking sector where economies of scale are inherently constrained relative to commercial banks. High operational efficiency therefore serves as a positive signal of sound management, generating the expectation that operationally efficient BPR will consistently outperform their less efficient counterparts in terms of financial performance (Attar, 2014; Suzuki & Sastrosuwito, 2020). H4: Operational efficiency has a positive effect on the financial performance of.

METHOD

Research Design and Data

This study employs a quantitative research approach utilizing secondary panel data derived from the Banking Information System (Sistem Informasi Perbankan/SIP) published by the Financial Services Authority (Otoritas Jasa Keuangan/OJK). The dataset comprises semi-annual observations spanning the period from December 2019 to December 2022, covering a total of seven observation periods. This timeframe was deliberately selected to encompass the pre-pandemic, pandemic, and early post-pandemic phases, thereby enabling a comprehensive assessment of how COVID-19-related credit restructuring policies influenced BPR profitability across different stages of the economic cycle.

Population and Sample

The study population consists of all conventional BPR (Bank Perkonomian Rakyat) headquartered in the Solo Raya region, encompassing Surakarta City and the Regencies of Klaten, Boyolali, Sukoharjo, Wonogiri, Sragen, and Karanganyar, Central Java Province. A purposive sampling technique was employed with the following selection criteria: (a) BPR operating as active conventional rural banks throughout the entire study period of 2019–2022; (b) BPR that submitted complete financial reports to OJK without interruption; and (c) BPR not under OJK intensive supervisory status during the observation period. Application of these criteria yielded a final sample of 65 conventional BPR from an initial population of 70, generating a total of 585 observations (65 BPR × 9 periods).

Variable Measurement

Dependent Variables. This study employs two profitability measures as dependent variables. First, Return on Assets (ROA), measured as the ratio of pre-tax profit to total assets, captures the efficiency with which management deploys total assets to generate profit. Second, Return on Equity (ROE), measured as the ratio of net profit to total equity, captures the return generated for shareholders. The dual profitability proxies allow for a more comprehensive assessment of financial performance from both asset utilization and equity return perspectives (Kasmir, 2019).

Independent Variables. Four independent variables are specified. (1) COVID-19 Credit Restructuring (RESTRUCOVID), proxied by the number of credit accounts restructured due to COVID-19 impact, captures the extent of regulatory forbearance utilization by each BPR. (2) Financial Risk, proxied by Non-Performing Loan (NPL), measured as the ratio of non-performing credit (collectability categories 3, 4, and 5) to total credit extended. (3) Liquidity Risk, proxied by the Cash Ratio (CR), measured as the ratio of cash and cash equivalents to short-term liabilities. (4) Operational Efficiency, proxied by the Operating Expense to Operating Income ratio (BOPO).

Control Variable. Firm size (LnSize/LNASSET), measured as the natural logarithm of total assets, is included as a control variable to account for size-related heterogeneity across BPR. Larger BPR may possess superior economies of scale, broader credit diversification, and stronger operational infrastructure, all of which may independently influence profitability (Berger & Humphrey, 1997).

The complete operational definition of research variables is presented in Table 1.

Table 1. Operational Definition of Research Variables

Variable	Proxy	Measurement	Expected Sign
ROA	Return on Assets	Pre-tax profit / Total assets	— (Dependent)
ROE	Return on Equity	Net profit / Total equity	— (Dependent)
RESTRUCOVID	COVID-19 Restructuring	Number of restructured accounts	+
NPL	Non-Performing Loan	Non-performing credit / Total credit	–
CR	Cash Ratio	Cash & equivalents / Short-term liabilities	+
BOPO	Operational Efficiency	Operating expense / Operating income	–
LNASSET	Firm Size	Natural log of total assets	+

Model Specification

Two panel data regression models are specified to test the proposed hypotheses:

Model 1 (ROA):

$$ROA_{it} = \alpha + \beta_1 RESTRUCOVID_{it} + \beta_2 NPL_{it} + \beta_3 CR_{it} + \beta_4 BOPO_{it} + \beta_5 LNASSET_{it} + \varepsilon_{it}$$

Model 2 (ROE):

$$ROE_{it} = \alpha + \beta_1 RESTRUCOVID_{it} + \beta_2 NPL_{it} + \beta_3 CR_{it} + \beta_4 BOPO_{it} + \beta_5 LNASSET_{it} + \varepsilon_{it}$$

where *i* denotes the individual BPR (*i* = 1, 2, ..., 65), *t* denotes the time period (*t* = 1, 2, ..., 9), α is the constant term, β_1 – β_5 are the regression coefficients to be estimated, and ε_{it} is the idiosyncratic error term.

Estimation Procedure

Panel data regression was conducted using three alternative estimation approaches: the Common Effect Model (CEM/Pooled OLS), Fixed Effect Model (FEM), and Random Effect Model (REM). Model selection proceeded through three sequential specification tests. The

Chow Test was first applied to determine whether CEM or FEM better accommodates individual heterogeneity across BPR. The Hausman Test was subsequently employed to discriminate between FEM and REM, evaluating whether the individual-specific effects are correlated with the independent variables. The Lagrange Multiplier (LM) Test (Breusch-Pagan) was administered to arbitrate between CEM and REM when required. Results from all three specification tests consistently selected the Fixed Effect Model (FEM) as the most appropriate estimator for both ROA and ROE models.

Classical assumption diagnostics were conducted encompassing normality (Jarque-Bera test), heteroscedasticity (White test), autocorrelation (Durbin-Watson statistic), and multicollinearity (Variance Inflation Factor/VIF). Given the detection of heteroscedasticity and autocorrelation violations in the residuals, cluster-robust standard errors were applied to yield consistent and reliable parameter estimates, following the approach recommended by Petersen (2009) for panel data with cross-sectional dependence. Multicollinearity assessment confirmed that all VIF values remained below the threshold of 10, indicating the absence of severe collinearity among the independent variables (Hair et al., 2014).

RESULTS AND DISCUSSION

Descriptive Statistics

Table 2 presents the descriptive statistics for all research variables derived from 65 conventional BPR in the Solo Raya region over the 2019–2022 observation period, encompassing 585 total observations.

Table 2. Descriptive Statistics of Research Variables

Variable	Mean	Std. Dev.	Min	Max
ROA (%)	1.70	2.56	-12.45	9.87
ROE (%)	32.86	103.83	-350.21	542.10
RESTRUCOVID	28.45	45.21	0	312
NPL (%)	4.12	3.87	0.00	24.56
CR (%)	18.34	12.45	2.10	78.90
BOPO (%)	82.56	14.32	41.23	132.45
LNASSET	10.23	1.12	7.45	13.67

Source: Processed data (2024)

The mean ROA of 1.70% with a standard deviation of 2.56% reflects considerable cross-sectional variation in asset-based profitability among sampled BPR. The minimum ROA value of -12.45% indicates that certain BPR experienced significant losses during the observation period, likely coinciding with the peak of the COVID-19 disruption in 2020–2021. The exceptionally high standard deviation of ROE (103.83) relative to its mean (32.86%) signals extreme dispersion in equity-based returns across the sample, suggesting that ownership structure and capital adequacy levels differ markedly among BPR in the Solo Raya region.

The mean NPL of 4.12% remains within a relatively manageable range compared to national benchmarks, though the maximum value of 24.56% indicates that several BPR experienced severe credit quality deterioration during the pandemic period. The mean BOPO of 82.56% suggests that the average BPR in Solo Raya still operates within OJK's prescribed efficiency threshold of 85%, although the maximum value of 132.45% demonstrates that a subset of BPR incurred operating expenses substantially exceeding their operating income — a condition indicative of acute operational inefficiency. The mean Cash Ratio of 18.34% reflects adequate short-term liquidity on average, while RESTRUCOVID values ranging from 0 to 312 accounts reveal considerable heterogeneity in the extent to which individual BPR utilized the COVID-19 restructuring facility.

Model Selection Tests

Prior to regression estimation, three sequential specification tests were conducted to identify the most appropriate panel data estimator. Chow Test. The Chow Test results for the ROA model yielded a Cross-section F-statistic of 4.814 ($p = 0.0000$) and a Cross-section Chi-square statistic of 274.310 ($p = 0.0000$), both rejecting the null hypothesis of homogeneous intercepts and indicating that the Fixed Effect Model (FEM) is superior to the Common Effect Model (CEM). Consistent results were obtained for the ROE model, with a Cross-section F-statistic of 20.804 ($p = 0.0000$), confirming pronounced individual heterogeneity across BPR that cannot be adequately captured by a pooled estimator.

Table 3. Chow Test Results

Model	F-Statistic	Chi-Square	Prob.	Decision
ROA	4.814	274.310	0.0000	FEM preferred over CEM
ROE	20.804	746.969	0.0000	FEM preferred over CEM

Source: Processed data (2024)

Hausman Test. The Hausman Test was subsequently applied to discriminate between FEM and REM. For the ROA model, the Chi-square statistic of 107.690 ($df = 5, p = 0.0000$) decisively rejected the null hypothesis that individual-specific effects are uncorrelated with the regressors, confirming FEM as the appropriate specification. The ROE model similarly yielded a Chi-square statistic of 44.717 ($p = 0.0000$), rejecting the null hypothesis. These results imply that the unique, time-invariant characteristics of individual BPR are systematically correlated with the independent variables, necessitating fixed effects to avoid omitted variable bias in the parameter estimates (Hausman, 1978).

Table 4. Hausman Test Results

Model	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	Decision
ROA	107.690	5	0.0000	FEM preferred over REM
ROE	44.717	5	0.0000	FEM preferred over REM

Source: Processed data (2024)

Classical Assumption Diagnostics

The Jarque-Bera normality test yielded p-values of 0.000 for both ROA and ROE models, formally rejecting the null hypothesis of normally distributed residuals. However, given the large sample size of 585 observations, this violation does not compromise the validity of inference. Under the Central Limit Theorem (CLT), sampling distributions of parameter estimates asymptotically converge to normality regardless of the underlying population distribution as sample size increases, rendering the normality assumption non-binding in large samples (Wooldridge, 2010).

The White heteroscedasticity test detected statistically significant heteroscedasticity for several variables in the ROA model, specifically NPL ($p = 0.0188$), BOPO ($p = 0.0201$), and LNASSET ($p = 0.0039$) against the absolute value of residuals. This finding is consistent with the cross-sectional heterogeneity expected in a dataset spanning BPR of widely varying sizes and operational characteristics.

The Durbin-Watson statistic for the ROA model ($DW = 1.289$) indicates the potential presence of positive serial autocorrelation in the residuals, while the ROE model ($DW = 1.702$) is closer to the benchmark value of 2.0. Given the detection of both heteroscedasticity and autocorrelation, cluster-robust standard errors were applied in the final regression estimation to produce consistent and asymptotically efficient parameter estimates under arbitrary within-cluster dependence (Petersen, 2009).

Table 5 presents the Variance Inflation Factor (VIF) values for all independent variables. All VIF values fall substantially below the conventional threshold of 10, confirming the absence of severe multicollinearity among the regressors (Hair et al., 2014).

Table 5. Multicollinearity Diagnostic (VIF)

Variable	VIF	Interpretation
RESTRUCOVID	1.50	No multicollinearity concern
NPL	1.60	No multicollinearity concern
CR	1.22	No multicollinearity concern
BOPO	1.42	No multicollinearity concern
LNASSET	1.89	No multicollinearity concern

Source: Processed data (2024)

Panel Data Regression Results

Tables 6 and 7 present the Fixed Effect Model estimation results with cluster-robust standard errors for the ROA and ROE models, respectively. The ROA model achieves an R-squared of 0.8586, indicating that 85.86% of the variation in BPR profitability measured by ROA is explained by the specified independent variables within the fixed effects framework. The ROE model explains 79.34% of the variation in equity-based profitability. Both models are jointly significant at the 1% level ($F = 45.313$ and $F = 28.658$, both $p = 0.0000$), confirming the overall explanatory validity of the specifications. The control variable LNASSET is significant and positively associated with both ROA ($\beta = 1.856$, $p = 0.0153$) and ROE ($\beta = 88.041$, $p = 0.0000$), consistent with the view that larger BPR benefit from economies of scale and greater operational resilience (Berger & Humphrey, 1997).

Table 6. FEM Regression Results — Dependent Variable: ROA

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESTRUCOVID	0.000714	0.000314	2.272	0.0235*
NPL	-0.148064	0.065371	-2.265	0.0239*
CR	-0.022204	0.012018	-1.848	0.0652
BOPO	-0.105700	0.021967	-4.812	0.0000***
LNASSET	1.855600	0.762526	2.433	0.0153*
Constant	-33.611	20.239	-1.661	0.0974
R-squared	0.8586	Adj. R²	0.8396	
F-statistic	45.313	Prob(F)	0.0000	
DW statistic	1.289			

Source: Processed data (2024). Note: *** $p < 0.01$; * $p < 0.05$

Table 7. FEM Regression Results — Dependent Variable: ROE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESTRUCOVID	-0.001253	0.029668	-0.042	0.9663
NPL	-7.634026	0.807353	-9.456	0.0000***
CR	0.859969	0.358724	2.397	0.0169*
BOPO	0.152862	0.239303	0.639	0.5233
LNASSET	88.041	17.333	5.079	0.0000***
Constant	-2130.542	437.441	-4.870	0.0000***
R-squared	0.7934	Adj. R²	0.7657	
F-statistic	28.658	Prob(F)	0.0000	
DW statistic	1.702			

Source: Processed data (2024). Note: *** $p < 0.01$; * $p < 0.05$

Discussion

The Effect of COVID-19 Credit Restructuring on BPR Profitability

The empirical results reveal that COVID-19 credit restructuring (RESTRUCOVID) exerts a significant positive effect on ROA ($\beta = 0.0007$, $p = 0.0235$), leading to the acceptance of H1 for the ROA model. This finding indicates that the regulatory relaxation policy issued by OJK through POJK Number 11/POJK.03/2020 effectively protected BPR asset-based profitability during the pandemic period. Through the restructuring mechanism, loans that would otherwise have been reclassified as non-performing retained their "performing" status, thereby preventing a sharp escalation in mandatory loan loss provisions (PPAP). This

provisioning shield preserved net interest income and stabilized profit margins despite the severe deterioration in macroeconomic conditions.

This finding is theoretically grounded in Contingency Theory (Donaldson, 2001), which posits that organizational performance is contingent upon the alignment between managerial strategy and environmental conditions. The issuance of COVID-19 restructuring regulations represents precisely such an adaptive regulatory response — one that recalibrated the operating environment of BPR to mitigate pandemic-induced credit shocks. The broader banking literature corroborates this interpretation: Elnahass et al. (2021) demonstrated that the pandemic adversely affected global banking performance across profitability, asset quality, and capitalization dimensions, while Demirgüç-Kunt et al. (2021) confirmed that the impact was heterogeneous across institutional types, with smaller community-oriented banks being disproportionately affected. The countercyclical nature of OJK's restructuring policy thus served as a critical buffer, consistent with the regulatory forbearance evidence documented by Rahmadany et al. (2024). Notably, RESTRUCOVID is statistically insignificant in the ROE model ($p = 0.9663$), suggesting that while regulatory forbearance successfully protected asset productivity, its effect on shareholder equity returns was diluted by other structural determinants of equity performance, such as capital structure and retained earnings dynamics.

The Effect of NPL on BPR Profitability

Non-Performing Loan (NPL) exerts a significant negative effect on both ROA ($\beta = -0.148$, $p = 0.0239$) and ROE ($\beta = -7.634$, $p = 0.0000$), resulting in the acceptance of H2 for both models. From a Signaling Theory perspective (Spence, 1973), elevated NPL ratios transmit a powerful negative signal to stakeholders — encompassing depositors, investors, and regulators — that the bank's credit management quality is deteriorating. This signaling effect triggers a cascade of adverse consequences: increased loan loss provisions reduce pre-tax profit, deteriorating asset quality constrains future credit expansion, and reputational damage elevates funding costs, collectively compressing both ROA and ROE.

The magnitude of NPL's coefficient in the ROE model ($\beta = -7.634$) is substantially larger than in the ROA model ($\beta = -0.148$), revealing an important asymmetry. This disparity reflects the multiplicative impact of non-performing loans on equity value: beyond its direct profit-reducing effect captured in ROA, NPL erodes equity through mandatory loan write-offs and capital charge requirements, generating a compounding negative effect on the equity base against which ROE is measured. These findings are consistent with the body of empirical evidence established by Al Hakim et al. (2024) in their systematic literature review, Hidayah (2019) in the context of Regional Development Banks, Saleh and Abu Afifa (2020) for banks in emerging markets, and Chalampalakis et al. (2023) examining NPL management in Southern European banking systems. The policy implication is unambiguous: BPR management must prioritize rigorous credit underwriting standards, robust debtors monitoring systems, and proactive early warning mechanisms to prevent NPL accumulation, particularly during periods of macroeconomic stress.

The Effect of Cash Ratio (CR) on BPR Profitability

The Cash Ratio (CR) does not reach conventional significance thresholds in the ROA model ($\beta = -0.022$, $p = 0.0652$), but exerts a significant positive effect on ROE ($\beta = 0.860$, $p = 0.0169$), leading to the acceptance of H4 for the ROE model. The divergent results across the two profitability models illuminate an important theoretical tension between liquidity management and financial performance. In the ROA framework, maintaining elevated cash reserves constrains productive asset deployment since idle cash does not generate interest income, creating a potential drag on asset productivity — consistent with the traditional liquidity-profitability trade-off (Bourke, 1989). However, in the ROE framework, adequate liquidity serves as a credibility signal: BPR that maintain sufficient cash buffers demonstrate

their capacity to fulfill short-term obligations, preserve depositor confidence, and avert liquidity crises that could otherwise necessitate costly emergency funding or force asset liquidation at distressed prices (Hidayah).

From a stakeholder perspective, BPR with robust liquidity positions signal financial stability to shareholders, which supports equity valuation and ultimately enhances ROE. This finding is consistent with Hidayah (2019) and Capriani and Dana (2016), both of whom documented positive liquidity-profitability relationships in the Indonesian rural banking context, as well as Safdar et al. (2024), who confirmed liquidity management's positive role in financial performance across Islamic and conventional banks in Pakistan. The divergence from Sembiring & Janrosl, (2023), who found a negative LDR-ROA relationship, is likely attributable to proxy differences (LDR captures loan-to-deposit dynamics rather than immediate cash availability) and the distinctive MSME-dominated customer base of Solo Raya BPR, whose liquidity demand is inherently more volatile and seasonal, making cash reserve adequacy a strategic competitive asset (Ghufron et al., 2024).

The Effect of Operational Efficiency (BOPO) on BPR Profitability

The BOPO ratio exerts a significant negative effect on ROA ($\beta = -0.1057$, $p = 0.0000$), confirming the acceptance of H3 for the ROA model. The coefficient magnitude implies that a one percentage point increase in BOPO — representing a deterioration in operational efficiency — reduces ROA by 0.1057 percentage points, *ceteris paribus*. This finding is theoretically consistent: as the ratio of operating expenses to operating income rises, the residual profit margin available to contribute to net income narrows progressively, ultimately depressing asset-based profitability (Berger & Humphrey, 1997; Attar, 2014).

The extremely high level of statistical significance ($p = 0.0000$) identifies operational efficiency as the single most decisive determinant of BPR asset profitability in the Solo Raya region, surpassing both NPL and credit restructuring in explanatory power for the ROA model. This result aligns with Sembiring & Janrosl, (2023) for BPR in Batam City, Capriani and Dana (2016) for BPR in Denpasar City, Arindi and Mawardi (2016) for conventional commercial banks on the Indonesia Stock Exchange, and Suzuki and Sastrosuwito (2020) whose DEA-based analysis confirmed cost efficiency as a fundamental driver of Indonesian BPR financial performance. The finding that BOPO is statistically insignificant in the ROE model ($\beta = 0.153$, $p = 0.5233$) is noteworthy: it suggests that operating cost efficiency primarily manifests in asset utilization efficiency (ROA) rather than in the return accruing to shareholders (ROE), which is more strongly influenced by capital structure and leverage dynamics. For BPR management, this underscores the strategic imperative of continuous cost structure rationalization — including digital service transformation and human resource optimization — to sustain competitive profitability in an environment of compressed interest margins.

Table 8. Summary of Hypothesis Testing Results

Hypothesis	Variable	ROA	ROE	Conclusion
H1	RESTRUCOVID	Positive significant ($p=0.0235$)	Not significant ($p=0.9663$)	H1 Supported (ROA)
H2	NPL	Negative significant ($p=0.0239$)	Negative significant ($p=0.0000$)	H2 Supported (both)
H3	BOPO	Negative significant ($p=0.0000$)	Not significant ($p=0.5233$)	H3 Supported (ROA)
H4	CR	Not significant ($p=0.0652$)	Positive significant ($p=0.0169$)	H4 Supported (ROE)

Source: Processed data (2024)

CONCLUSION

This study examined the effects of COVID-19 credit restructuring, Non-Performing Loan (NPL), operational efficiency (BOPO), and Cash Ratio (CR) on the financial performance of conventional BPR in the Solo Raya region, utilizing an unbalanced panel dataset of 65 BPR over the 2019–2022 period analyzed through the Fixed Effect Model with cluster-robust standard errors. First, COVID-19 credit restructuring exerts a significant positive effect on ROA, confirming that POJK Number 11/POJK.03/2020 functioned as an effective countercyclical measure in preserving BPR asset profitability during the pandemic crisis. The regulatory mechanism of maintaining restructured loans in the "performing" category successfully insulated BPR income statements from pandemic-induced credit deterioration, providing an empirical validation of regulatory forbearance as a crisis management tool in the rural banking sector. Second, NPL exerts a significant negative effect on both ROA and ROE, affirming that credit quality management is the most critical bilateral determinant of BPR profitability. The substantially larger coefficient in the ROE model ($\beta = -7.634$ vs. $\beta = -0.148$ in the ROA model) underscores the compounding effect of non-performing loans on equity erosion through write-offs and capital charge requirements. BPR management must prioritize rigorous credit underwriting, comprehensive debtor monitoring, and proactive early warning systems to contain NPL within sustainable thresholds.

Third, BOPO exerts the strongest and most statistically robust negative effect on ROA ($p = 0.0000$), identifying operational cost efficiency as the primary driver of asset-based profitability in Solo Raya BPR. BPR with lean cost structures are demonstrably superior in converting operating income into net profit. Management implications include the continuous rationalization of cost structures through service digitalization, branch network optimization, and strategic human capital investment. Fourth, CR exerts a significant positive effect on ROE, demonstrating that liquidity adequacy extends beyond regulatory compliance to serve as a strategic driver of equity-based returns. Maintaining sufficient cash reserves reinforces depositor and investor confidence, supporting equity valuation over the long term. For OJK as regulator, these findings collectively provide robust empirical foundations for institutionalizing credit restructuring policies as permanent countercyclical instruments in the macroprudential framework — not merely as temporary crisis responses — given the MSME-dependent nature of BPR operations and their heightened vulnerability to macroeconomic shocks.

Future research is encouraged to extend the analytical scope to Islamic BPR (BPRS) to enable comparative analysis across institutional types, incorporate longer post-pandemic observation windows to assess the long-term profitability implications following the termination of restructuring relaxation policies, and explore the moderating role of corporate governance quality in conditioning the relationship between risk exposures and BPR financial performance.

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