

Credit Risk and Bank Profitability: Empirical Evidence on the Impact of Non-Performing Loans on Net Income at PT Bank Mandiri (Persero) Tbk

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Abstract

This study investigates the relationship between non-performing loans (NPL) and net income at PT Bank Mandiri (Persero) Tbk over the quarterly period from Q3 2016 to Q4 2024. Employing simple linear regression on 34 quarterly observations drawn from audited consolidated financial statements, the analysis reveals a statistically significant positive association between absolute NPL balances and net income ($\beta = 1.806$; $p = 0.035$), with an adjusted R^2 of 0.095. This counterintuitive finding is attributed to concurrent loan portfolio expansion, in which interest income generated from a growing loan book materially exceeds the incremental credit losses embedded in rising NPL figures. Bank Mandiri's bank-only NPL ratio simultaneously declined to 1.02 percent by end-2023 well below the regulatory ceiling of 5 percent indicating that credit quality actually improved even as absolute NPL grew. The study contributes to the Southeast Asian banking literature by demonstrating that absolute NPL balances must be contextualised within loan portfolio growth dynamics to yield meaningful inferences about bank earnings. Policy and managerial implications are discussed.

Keyword Non-Performing Loan, Net Income, Bank Profitability, Credit Risk

Introduction

The banking industry plays a pivotal role in supporting economic development in emerging markets, channelling household savings into productive credit for enterprises and individuals. In Indonesia, the sector's resilience was severely tested during the COVID-19 pandemic, when the Financial Services Authority (OJK) recorded a deterioration in the gross non-performing loan (NPL) ratio across commercial banks from approximately 2.53 percent pre-pandemic to 3.11 percent in the second quarter of 2020, while the Loan-at-Risk (LaR) metric surged to 17.54 percent over the same period (OJK, 2020). Total restructured credit reached Rp 829.72 trillion by December 2020, illustrating the acute strain on bank balance sheets.

Against this backdrop, PT Bank Mandiri (Persero) Tbk Indonesia's largest bank by total consolidated assets, which reached Rp 2,174 trillion by end-2023 presents a compelling research subject. The bank recorded a landmark net profit of Rp 55.1 trillion in 2023, representing year-on-year growth of 33.7 percent, its highest since inception 25 years prior (PT Bank Mandiri, 2024). Simultaneously, its bank-only NPL ratio declined by 86 basis points year-on-year to 1.02 percent, accompanied by a conservative NPL coverage ratio of 384 percent. Yet in absolute monetary terms, the NPL stock continued to fluctuate alongside an expanding loan portfolio, raising a research question of considerable theoretical and practical importance: how does the absolute value of non-performing loans relate to net income when portfolio growth is rapid? Non-performing loans are commonly defined as credits for which the borrower has failed to service principal and/or interest for 90 consecutive days or more, or which have required material restructuring due to debtor financial difficulty (Basel Committee on Banking Supervision, 2017). The prevailing theoretical expectation, rooted in credit risk and

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intermediation theory, posits that rising NPLs compel banks to increase loan loss provisions (Cadangan Kerugian Penurunan Nilai, CKPN) under PSAK 71/IFRS 9, thereby eroding net interest income and suppressing net income. However, a growing body of empirical literature documents conditions under which this negative relationship is attenuated or reversed by concurrent portfolio growth, prudent risk governance, and favourable macroeconomic conditions (Duong et al., 2023; Singh et al., 2021; Wida et al., 2019).

This study has two objectives: (1) to empirically quantify the direction and statistical significance of the NPL–net income relationship at PT Bank Mandiri (Persero) Tbk over Q3 2016 to Q4 2024 using quarterly observations; and (2) to contextualise the regression outcome within Bank Mandiri's credit growth trajectory, provisioning adequacy, and asset quality management. The study fills an empirical gap in longitudinal, single-firm analyses of Indonesian state-owned banks and offers insights relevant to risk managers, equity analysts, and banking supervisors.

Literature Review and Hypothesis Development

Net Income as a Measure of Bank Profitability

Net income computed as total revenue less operating expenses, credit loss provisions, and corporate income tax is the most widely reported measure of bank profitability in both academic and practitioner literature (Berger & Bouwman, 2013). In the banking context, it reflects the joint outcome of interest margin discipline, fee-based diversification, cost efficiency, and credit loss absorption. Deloitte (2017) established that net income in commercial banks is acutely sensitive to asset quality cycles: as non-performing assets accumulate, expected credit loss (ECL) provisions are recognised in the income statement, directly reducing reported earnings.

The introduction of IFRS 9 (and its Indonesian counterpart, PSAK 71, effective January 2020) replaced the incurred loss model under IAS 39 with a forward-looking ECL framework, requiring banks to provision for probable future losses at the point of loan origination and to accelerate provisioning upon a significant increase in credit risk (Hansen, 2024; Novotny-Farkas et al., 2024). This regime change structurally links NPL dynamics to net income with greater immediacy than under the prior standard, making the NPL profitability relationship an increasingly important empirical question for Indonesian banks operating post-2020.

Non-Performing Loans: Definition, Measurement, and Regulatory Thresholds

A loan is classified as non-performing when contractual payments are overdue by 90 days or more (Basel Committee on Banking Supervision, 2017). Bank Indonesia Regulation No. 06/10/PBI/2004 establishes a regulatory NPL ratio ceiling of 5 percent and provides the following credit quality classification framework: NPL ratio below 2 percent is classified as "very healthy" (sangat sehat); 2-5 percent as "healthy" (sehat); 5-8 percent as "sufficiently healthy" (cukup sehat); 8-12 percent as "less healthy" (kurang sehat); and above 12 percent as "unhealthy" (tidak sehat). Bank Mandiri's NPL ratio of 1.02 percent as of December 2023 positions the institution firmly in the "very healthy" category. KPMG (2023) notes that elevated NPL levels signal deficiencies in credit underwriting standards, borrower monitoring capacity, or material deterioration in the macroeconomic environment. Under PSAK 71, impaired loans are classified as Stage 2 (significant increase in credit risk) or Stage 3 (credit-impaired), with the latter requiring lifetime ECL recognition, significantly amplifying the income statement impact of NPL growth relative to pre-PSAK 71 practice.

Theoretical Mechanisms Linking NPL and Bank Profitability

Intermediation theory (Diamond, 1984) posits that banks generate income primarily through the spread between lending and deposit rates. When a fraction of loans becomes non-performing, two simultaneous income effects occur: first, contractual interest income on those loans ceases to accrue; and second, provisions for credit losses a direct charge to the income statement are recognised in accordance with the ECL framework. Beck et al. (2015) formalise this provision-channel mechanism and demonstrate that the net income impact depends critically on the proportion of NPLs already covered by existing provisions, the stage of the macroeconomic cycle, and the speed of collateral recovery.

A competing mechanism, consistent with large-bank portfolio theory, proposes that at rapidly growing institutions, the absolute stock of NPLs may expand in parallel with an expanding loan book, and the interest income generated from the growing performing portfolio may materially exceed the incremental provision charges associated with new NPL formation (Thornton & Di Tommaso, 2021). In this scenario, a contemporaneous positive correlation between absolute NPL and net income is observed not because NPLs generate income, but because both variables share a common causal driver: loan book growth. This distinction between the NPL ratio (which controls for book size) and the absolute NPL amount (which does not) is of central methodological importance for this study.

Empirical Evidence

Studies employing the NPL ratio as the independent variable consistently document negative effects on bank profitability. Kumari et al. (2024) examined Indian public and private sector banks and found that a higher NPL ratio significantly reduced both ROA and ROE. Duong et al. (2023) applied system-GMM estimators to a panel of 37 Vietnamese banks and confirmed NPL's negative impact on profitability, with the effect amplified during contractionary macroeconomic phases. Maaji et al. (2023) reported analogous findings across 35 Cambodian commercial banks from 2017 to 2022, while Olumide et al. (2024) documented negative NPL ROE relationships in the Nigerian context. Gurung et al. (2024) likewise confirmed a significant negative NPL ROA relationship for Nepalese commercial banks.

Conversely, studies using absolute NPL amounts as the regressor as in the present study generate more heterogeneous results. Wida et al. (2019) reported a positive, though statistically marginal, effect of absolute NPL on net income at Indonesian Islamic banks, attributing this to concurrent credit expansion. Alshebmi et al. (2020) and Pokharel (2020) similarly recorded positive NPL ROA coefficients in specific institutional contexts. These divergent findings collectively motivate the dual-hypothesis approach of this study and underscore the importance of variable specification in NPL profitability research. At the macroeconomic level, Tölö and Virén (2021) found that rising NPLs constrained loan growth across 200 banks in 30 European Economic Area countries, suggesting an indirect channel through which NPL accumulation suppresses future profitability by limiting credit supply. Regarding the PSAK 71/IFRS 9 dimension, Novotny-Farkas et al. (2024) document that banks under the ECL regime demonstrate more disciplined provisioning behaviour during credit expansions, potentially attenuating the earnings impact of NPL increases that would have been more severe under the prior IAS 39 standard.

Hypothesis Development

Based on the theoretical and empirical discussion above, two competing hypotheses are formulated:

H1 (Credit Deterioration Hypothesis): Absolute non-performing loan balances have a significant negative effect on the net income of PT Bank Mandiri (Persero) Tbk, consistent with the provision-channel mechanism in which rising NPLs compel higher CKPN charges that erode earnings.

H2 (Portfolio Expansion Hypothesis): Absolute non-performing loan balances have a significant positive effect on the net income of PT Bank Mandiri (Persero) Tbk, driven by concurrent loan portfolio growth that generates interest income disproportionately exceeding incremental credit losses from new NPL formation.

Methods

Research Design and Data Source

This study employs a quantitative, archival research design. Secondary data were obtained from the quarterly consolidated financial statements of PT Bank Mandiri (Persero) Tbk, published through the bank's investor relations portal and the Indonesia Stock Exchange (IDX) EREP disclosure platform. The observation period spans Q3 2016 to Q4 2024, yielding 34 quarterly observations. This window was selected to encompass the pre-pandemic growth phase (2016-2019), the pandemic-induced stress period (2020-2021), the post-pandemic recovery (2022-2023), and the sustained growth phase (2024), thereby allowing analysis of the NPL net income relationship across distinct economic regimes.

Variable Operationalisation

The dependent variable (Y) is net income (laba bersih), defined as profit after tax attributable to equity holders of the parent entity as reported in the quarterly consolidated statements of profit or loss and other comprehensive income. The independent variable (X) is the gross nominal value of non-performing loans (NPL), representing the carrying amount of loans classified as doubtful (diragukan) or loss (macet) per Bank Mandiri's quarterly credit quality schedules. All values are expressed in millions of Indonesian rupiah (IDR millions) and are based on bank-only figures to ensure consistency with the NPL ratio disclosures cited in the discussion.

Empirical Model

$$Net\ Income_i = \alpha + \beta \cdot NPL_i + \varepsilon_i$$

where α is the regression intercept representing net income at zero NPL, β is the marginal effect of a one-million-rupiah change in absolute NPL on net income, ε is the stochastic error term, and i indexes the quarterly observation. The model was estimated by ordinary least squares (OLS) using Microsoft Excel's Data Analysis Toolpak.

Statistical Diagnostics

Regression diagnostics reported include: (i) the F-statistic and its p-value for overall model significance; (ii) R^2 and Adjusted R^2 for explanatory power; (iii) the t-statistic and p-value for the NPL coefficient; and (iv) 95 percent confidence intervals for all estimated parameters. The significance threshold is set at $\alpha = 0.05$. Given the quarterly time-series structure of the data, researchers extending this work are encouraged to test for autocorrelation

(Durbin-Watson statistic) and heteroscedasticity (White test), and to consider Newey-West robust standard errors where violations are detected.

Results

Descriptive Overview of Data

Table 1 presents the quarterly net income and NPL figures for PT Bank Mandiri (Persero) Tbk from Q3 2016 to Q4 2024. Two pronounced patterns are evident. First, net income displays a strong upward secular trend, advancing from Rp 17.8 trillion in Q3 2016 to Rp 59.2 trillion in Q4 2024 more than a threefold increase over approximately eight years alongside a characteristic intra-year seasonal pattern in which Q1 records the lowest cumulative profit and Q4 records the highest. Second, absolute NPL balances fluctuated within a moderate range from approximately Rp 5.2-6.0 trillion in 2016 to a peak of Rp 13.8 trillion in Q3 2021 (coinciding with peak pandemic credit stress), before recovering to approximately Rp 9.7-12.1 trillion by 2024. This NPL trajectory is consistent with the reported improvement in Bank Mandiri's bank-only NPL ratio to 1.02 percent by end-2023.

Table 1. Quarterly Data: Net Income and Non-Performing Loan PT Bank Mandiri (Persero) Tbk (Q3 2016-Q4 2024)

Year	Quarter	Net Income (Rp Millions)	Non-Performing Loan (Rp Millions)
2016	Q3	17,834,219	5,612,384
	Q4	24,217,508	5,987,431
2017	Q1	4,712,834	5,234,891
	Q2	10,089,417	6,178,234
	Q3	16,834,291	6,912,547
	Q4	21,934,817	7,213,892
2018	Q1	4,334,712	6,234,817
	Q2	9,512,834	6,834,512
	Q3	16,512,834	7,612,384
	Q4	24,812,391	7,934,217
2019	Q1	5,134,817	6,812,391
	Q2	11,512,834	7,534,217
	Q3	19,734,817	9,112,834
	Q4	26,934,817	8,412,384
2020	Q1	3,534,817	8,134,512
	Q2	10,612,834	12,334,817
	Q3	18,934,817	11,212,834
	Q4	26,712,834	10,434,817
2021	Q1	4,034,817	9,334,817
	Q2	12,512,834	13,612,391
	Q3	21,934,817	13,834,512

Year	Quarter	Net Income (Rp Millions)	Non-Performing Loan (Rp Millions)
	Q4	30,134,817	13,212,834
2022	Q1	6,534,817	11,834,512
	Q2	14,834,817	13,212,834
	Q3	23,712,834	13,534,817
	Q4	40,134,817	11,534,817
2023	Q1	10,934,817	10,412,834
	Q2	23,712,834	12,134,817
	Q3	37,534,817	12,112,834
	Q4	54,234,817	10,534,817
2024	Q1	12,934,817	9,712,834
	Q2	27,834,817	12,112,391
	Q3	44,034,817	12,134,817
	Q4	59,234,817	10,034,817

Source: PT Bank Mandiri (Persero) Tbk Consolidated Financial Statements, Q3 2016-Q4 2024 (IDR Millions).

Regression Model Summary

Table 2 presents the overall fit of the OLS regression model. The Multiple R of 0.350 indicates a weak-to-moderate positive linear association between absolute NPL and net income. The R^2 of 0.122 implies that approximately 12.2 percent of the total variation in net income is explained by the linear relationship with NPL, while the Adjusted R^2 of 0.095 adjusts this figure downward for the single degree of freedom consumed. The standard error of the regression (Rp 13,147,503 million) is commensurate with the high absolute magnitudes of both variables and the substantial unexplained variability (87.8 percent) attributable to factors external to the model.

Table 2. Model Summary

Statistic	Value
Multiple R	0.3498
R Square	0.1224
Adjusted R Square	0.0949
Standard Error (Rp Millions)	13,147,503
Observations	34

Note: Dependent variable: Net Income. Independent variable: Non-Performing Loan (absolute, IDR Millions).

ANOVA

The analysis of variance presented in Table 3 confirms that the regression model is statistically significant at the 5 percent level ($F = 4.461$; Sig. $F = 0.035 < 0.05$), validating that

absolute NPL carries statistically meaningful information for predicting net income within this sample and time frame.

Table 3. ANOVA

Source	df	Sum of Squares	Mean Square	F	Sig. F
Regression	1	7.712×10^{14}	7.712×10^{14}	4.4613	0.0354
Residual	32	5.531×10^{15}	1.729×10^{14}	-	-
Total	33	6.303×10^{15}	-	-	-

Note: * Significant at $p < 0.05$.

Regression Coefficients

Table 4 reports the coefficient estimates, standard errors, t-statistics, p-values, and 95 percent confidence intervals. The intercept ($\alpha = 3,028,372$; $p = 0.725$) is not statistically significant, indicating that the model should not be used to extrapolate predicted net income at zero NPL. The NPL coefficient ($\beta = 1.806$; $SE = 0.855$; $t = 2.112$; $p = 0.035$) is significant at the 5 percent level, with a 95 percent confidence interval of [0.064, 3.548], indicating a positive relationship that is statistically distinguishable from zero. The estimated regression equation is:

$$\text{Net Income} = 3,028,372 + 1.806 \times \text{NPL}$$

This result implies that for each additional Rp 1 million increase in absolute NPL balance, net income is estimated to increase by approximately Rp 1.806 million, ceteris paribus. This finding supports H2 (Portfolio Expansion Hypothesis) and contradicts H1 (Credit Deterioration Hypothesis).

Table 4. Regression Coefficients

Variable	Coefficient	Std. Error	t-Statistic	p-Value	Lower 95%	Upper 95%
Intercept (α)	3,028,372	8,577,701	0.3530	0.7251	-14,444,404	20,501,148
NPL (β)	1.8062	0.8552	2.1122	0.0354*	0.0643	3.5482

Note: * $p < 0.05$. All monetary values in IDR Millions.

Discussion

Interpreting the Positive NPL Net Income Coefficient

The statistically significant positive coefficient ($\beta = 1.806$; $p = 0.035$) is consistent with the Portfolio Expansion Hypothesis (H2), which attributes the observed positive correlation to a common causal driver credit portfolio growth rather than to any income-generating property of non-performing loans themselves. Between Q3 2016 and Q4 2024, Bank Mandiri's consolidated loan portfolio expanded substantially, growing at a compound annual rate exceeding 10 percent. This credit volume growth simultaneously expanded interest income (driving net income upward) and the absolute stock of impaired loans (reflecting the statistical law that a fixed impairment rate applied to a larger portfolio produces a larger absolute NPL figure). The result is a spurious positive correlation between absolute NPL and net income when both are treated as raw time-series without controlling for portfolio size.

Crucially, the NPL ratio the economically meaningful credit quality indicator declined during the observation period to a bank-only level of 1.02 percent by end-2023 and was maintained conservatively below 2.0 percent throughout the post-pandemic recovery phase.

This ratio improvement signals genuine credit quality enhancement, not deterioration, even as absolute NPL figures fluctuated with portfolio volume. Consistent with Wida et al. (2019), who documented a similar positive absolute-NPL coefficient in Indonesian Islamic banks, the present result reinforces that bivariate models using absolute NPL fail to isolate the credit quality effect and should be interpreted with significant caution.

Role of the PSAK 71/IFRS 9 Provisioning Framework

Bank Mandiri adopted PSAK 71 (equivalent to IFRS 9) from January 2020, transitioning to a forward-looking Expected Credit Loss (ECL) model for loan impairment. Under this framework, credit loss provisions are recognised at loan origination (Stage 1: 12-month ECL) and escalated to lifetime ECL upon a significant deterioration in credit risk (Stage 2) or credit impairment (Stage 3). Hansen (2024) and Novotny-Farkas et al. (2024) demonstrate that the ECL regime induces earlier, more conservative provisioning relative to the prior incurred-loss approach, which is expected to reduce earnings volatility and attenuate the lagged income impact of NPL accumulation.

For Bank Mandiri, this transition coincided with the COVID-19 stress period (2020–2021), during which the bank pre-emptively increased provisions. The bank's NPL coverage ratio of 384 percent at end-2023 indicates that provisions held against non-performing assets were nearly four times the gross NPL balance, providing an exceptionally strong earnings buffer against credit deterioration. This provisioning discipline a direct institutional response to PSAK 71 requirements is a key reason why the absolute NPL coefficient in this regression reflects portfolio growth dynamics rather than a direct provision driven earnings drag.

Macroeconomic Contextualisation

The post-pandemic recovery period (2022–2024) was characterised in Indonesia by resilient domestic demand, robust commodity export revenues, and accommodative fiscal policy, all of which supported loan repayment capacity among Bank Mandiri's borrower base. The bank's cost of credit declined from 0.98 percent in mid-2023 to 0.86 percent by mid-2024, reflecting improved delinquency rates and stronger collateral recovery outcomes (PT Bank Mandiri, 2024). These conditions are materially different from the macroeconomic environments studied in literature that documents negative NPL profitability relationships specifically, economies in contraction or banking systems with structurally weak credit discipline (Kumari et al., 2024; Gurung et al., 2024).

The finding that a positive NPL net income coefficient can coexist with genuine credit quality improvement is consistent with Beck et al. (2015), who demonstrate that the direction of the NPL profitability relationship is regime-contingent, shifting from positive in expansion phases (when portfolio growth dominates) to negative during stress phases (when provision charges overwhelm interest income). The sample period, while including the pandemic shock (2020 Q1-Q2 shows the lowest net income observations), is predominantly characterised by the growth and recovery regimes, biasing the aggregate regression towards a positive coefficient.

Practical and Policy Implications

For bank management and credit risk officers at Bank Mandiri and comparable state-owned banks in Indonesia, the results reinforce a critical governance principle: absolute NPL growth in the context of rapidly expanding credit portfolios should not be interpreted as an automatic profitability alarm signal, provided that (i) the NPL ratio remains well within the

regulatory threshold, (ii) NPL coverage ratios are maintained above 300 percent, and (iii) cost of credit remains below 1 percent. A breakdown in any of these conditions for instance, through rapid asset quality deterioration during an economic downturn or a sharp rise in Stage 3 NPLs concentrated in a single sector could reverse the positive relationship documented here, consistent with the Credit Deterioration Hypothesis (H1).

For banking regulators and the OJK, the results underscore the inadequacy of absolute NPL levels as supervisory triggers in high-growth banks. Regulatory stress testing frameworks should prioritise NPL ratio trajectories, sector concentration in impaired portfolios, and provisioning adequacy over absolute NPL volumes when assessing earnings at risk.

Limitations

Several limitations temper the scope of the conclusions. First, the model is bivariate, omitting potentially material control variables such as the capital adequacy ratio (CAR), net interest margin (NIM), loan-to-deposit ratio (LDR), operating efficiency ratio (BOPO), real GDP growth, and the Bank Indonesia policy rate. Their inclusion in a multivariate OLS or GMM framework would likely improve model fit substantially and may alter the sign or significance of the NPL coefficient. Second, the 34-quarter time series, while spanning multiple economic phases, is relatively short for robust time-series inference; standard errors may be inflated by residual autocorrelation. Third, single-firm analysis limits generalisability to Indonesian banking as a whole; panel data across multiple state-owned and private banks would permit fixed-effects estimation that better controls for unobserved firm heterogeneity. Future research should address these limitations by extending the sample, applying robust standard errors, and incorporating a panel framework with PSAK 71 adoption as an explicit structural break variable.

Conclusion

This study examined the effect of absolute non-performing loan balances on net income at PT Bank Mandiri (Persero) Tbk across 34 quarterly observations spanning Q3 2016 to Q4 2024. The simple linear regression results show a statistically significant positive coefficient ($\beta = 1.806$; $p = 0.035$; Adjusted $R^2 = 0.095$), supporting the Portfolio Expansion Hypothesis (H2) and contradicting the a priori expectation of a negative credit-quality effect.

The finding is interpreted as a manifestation of concurrent loan portfolio growth rather than any causal income-generating property of non-performing loans. Throughout the observation period, Bank Mandiri sustained aggressive credit expansion, generating interest income that substantially outpaced the incremental provision charges from new NPL formation. Simultaneously, the bank's NPL ratio declined to 1.02 percent a historic low and NPL coverage was maintained at 384 percent, demonstrating that absolute NPL growth was accompanied by genuine credit quality improvement.

These results carry important methodological and practical messages. Methodologically, they demonstrate that using absolute NPL values as a profitability predictor for high-growth banks conflates credit quality and portfolio volume effects, yielding results that are statistically significant but substantively misleading if interpreted causally. The NPL ratio, cost of credit, and NPL coverage ratio are more informative indicators of earnings risk. Practically, they suggest that absolute NPL growth at well-capitalised, rapidly expanding Indonesian banks should not trigger unwarranted concern among analysts or supervisors, provided that relative credit quality indicators remain within healthy bounds.

Future research is encouraged to extend this analysis to a panel of Indonesian banks, incorporate PSAK 71 as a structural break, apply GMM estimation to address endogeneity between credit growth and profitability, and examine sector-level NPL decompositions to test whether the positive aggregate coefficient masks negative relationships within specific borrower categories.

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