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Bank Profitability Determinants on Bank Specifications and Macroeconomics Moderated with Market Concentration: Bank KBMI 3 and 4 (2020-2024)

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A B S T R A C T

This study investigates the impact of bank-specific and macroeconomic factors on the profitability of conventional commercial banks in Indonesia and examines the moderating role of market concentration. The analysis employs panel data from 18 banks categorized under KBMI 3 and KBMI 4 during the 2020–2024 period, with a total of 90 observations, using the Random Effect Model approach in EViews 12. The results indicate that NPL has a significant negative effect on both ROA and ROE, whereas LDR positively and significantly influences profitability. CAR shows a negative and significant effect on ROE but is insignificant for ROA. Regarding macroeconomic variables, GDP has a positive and significant impact on ROE, while inflation negatively affects both profitability indicators. Moreover, market concentration plays a selective moderating role strengthening the effects of LDR and GDP on profitability but weakening the influence of inflation, while its moderation on NPL and CAR is insignificant.

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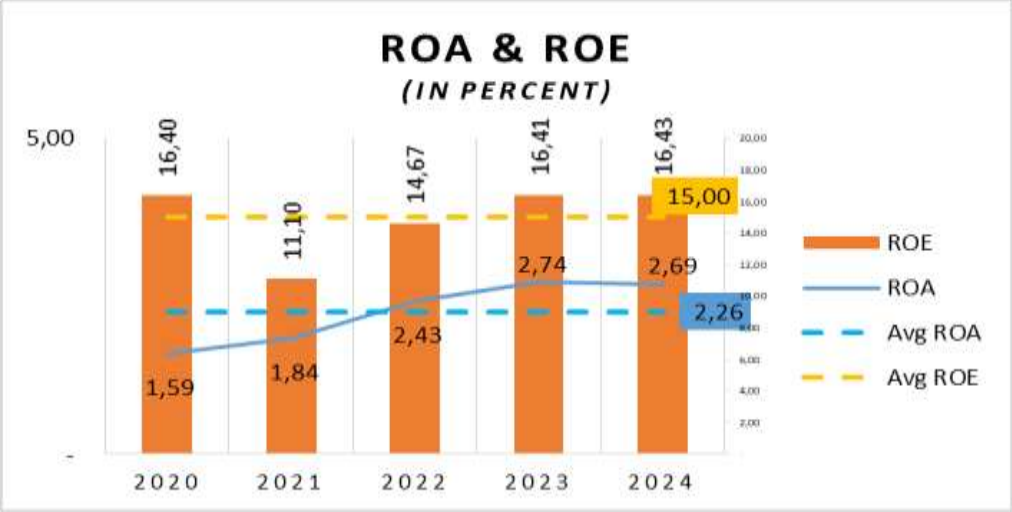
INTRODUCTION

The banking sector has a strategic role in maintaining financial system stability and encouraging economic growth through the intermediation function, which is to collect and distribute funds efficiently. This role will run optimally if banks are able to maintain profitability sustainably in the midst of economic dynamics (Koch & MacDonald, 2015; Horobet et al., 2021).

Profitability is a key indicator of a bank's performance and health because it reflects the ability to generate profits from assets and capital under management. The two most commonly used measures are Return on Assets (ROA) and Return on Equity (ROE), which indicate the effectiveness of asset management as well as the rate of return for shareholders, respectively (Horobet et al., 2021; Koch & MacDonald, 2015).

The factors that affect the profitability of banks are divided into internal factors and external factors. Internal factors (bank specifications) include capital adequacy (CAR), non-performing loans (NPLs), liquidity (LDR), and operational efficiency (Laporšek et al., 2025; O'Connell, 2023). Meanwhile, external factors include macroeconomic conditions such as economic growth, inflation, and monetary policy, as well as the competitive structure of the banking industry (Horobet et al., 2021; Grubišić et al., 2022; Alvian & Soenhadji, 2025).

Data from the Financial Services Authority (OJK) shows that the average ROA of Indonesian banks since 2014 has been in the range of 2.26%, with a peak of 2.74% in December 2023 which signals post-pandemic recovery, and a low of 1.59% in December 2020 when the pandemic reached its peak.



Source : SPI December 2024

Figure 1. ROA Movement

Based on previous theories and research, capital adequacy, non-performing loans, and liquidity management are internal factors or bank specifications that reflect the health and function of banking intermediation. These three factors have a significant effect on the bank's profitability level, as evidenced by various previous studies (Athanasoglou et al., 2021).

THEORETICAL REVIEW

Paradigma Structure–Conduct–Performance (SCP)

The Structure–Conduct–Performance (SCP) paradigm introduced by Mason and developed by Bain describes the relationship between market structure, managerial behavior, and the financial performance of the industry (Mishkin & Eakins, 2018). In the context of banking, market structures influence the behavior of banks in setting pricing strategies, credit distribution, and risk management that ultimately determine profitability, which is measured through ROA and ROE (Horobet et al., 2021).

Based on the SCP framework, this study places market concentration as a moderation variable that affects the relationship between bank specification factors (CAR, NPL, LDR) and macroeconomic factors (economic growth, inflation) on banking profitability (Athanasoglou et al., 2005; Horobet et al., 2021). Thus, the SCP paradigm provides a comprehensive theoretical foundation in understanding the interaction between market structure, management behavior, and banking performance.

Bank Profitability

Profitability reflects the ability of banks to manage assets and capital to generate profits and maintain operational efficiency, liquidity, and risk management (Mishkin & Eakins, 2018). A high level of profitability indicates healthy performance, increases customer and investor confidence, and strengthens financial system stability (Horobet et al., 2021; Athanasoglou et al., 2005).

In the framework of SCP, profitability is positioned as a component of Performance, which is the result of the interaction between market structure, managerial behavior of banks, and external conditions (Athanasoglou et al., 2005). For regulators, stable profitability indicates the health of the industry; for investors, it is a positive signal for capital performance; and for the community, ensuring the sustainability of financial services for the productive sector (O'Connell, 2023; Mirović et al., 2024).

Non-Performing Loans (NPLs)

According to POJK No.11/POJK.03/2015, non-performing loans (NPLs) are loans with less current, doubtful, and stuck-in quality, which reflects the level of credit risk of a bank. Loans are categorized as problematic if there is a delay in principal or interest payments of more than 90 days, in accordance with national and international regulatory standards (POJK, 2019).

In the framework of Structure–Conduct–Performance (SCP), NPLs represent the Conduct dimension, which is the managerial behavior of banks in managing credit risk. Effective risk management keeps NPL levels low, thereby supporting bank profitability (Athanasoglou et al., 2005). On the contrary, high NPLs reflect weak credit supervision, lower interest income, and increased burden on Impairment Loss Reserves (CKPN) which negatively impact financial performance (Louzis et al., 2012).

Liquidity Management

Liquidity management describes the extent to which third-party funds (DPK) collected by banks are redistributed in the form of credit. This ratio is a key indicator of the effectiveness of the financial intermediation function, as it shows the bank's ability to productively allocate resources to generate revenue (Sousa & Almeida, 2025; Alvian & Soenhadji, 2025).

In the framework of Structure–Conduct–Performance (SCP), liquidity management is included in the Conduct dimension, which reflects the managerial behavior of banks in managing public funds. Optimally managed liquidity reflects effective intermediation behavior, strengthens interest income, and contributes to profitability as a component of Performance (O'Connell, 2023).

Capital Adequacy Ratio (CAR)

Capital adequacy describes the bank's ability to absorb risks on productive assets and maintain financial stability (OJK, 2024). The CAR ratio is the main indicator of banking resilience; the higher the CAR, the greater the bank's ability to bear risks and maintain public trust, which leads to increased profitability (Berger & Bouwman, 2013).

Economic Growth (Gross Domestic Product – GDP)

Economic growth describes an increase in the added value of all production activities of goods and services in a country (BPS, 2024). This indicator reflects macroeconomic conditions that have a direct impact on the banking sector through increased credit demand, improved asset quality, and opportunities for intermediation expansion (Greuning & Bratanovic, 2020; Mirović et al., 2024).

Inflation

Inflation is a condition of increasing the prices of goods and services in general and sustainably which has an impact on decreasing people's purchasing power (Kasmir, 2019). In the banking sector, inflation affects the cost of funds, the real value of assets, and interest margins, thus affecting profitability (O'Connell, 2023). Moderate inflation drives economic activity and credit expansion, while high inflation suppresses net *interest margins* and increases the risk of non-performing loans.

Market Concentration

Market concentration describes the degree of dominance of large banks in the banking industry and is a key indicator of *market power* and competition (Laporšek et al., 2025; O'Connell, 2023). The measurement was carried out through the Market Share (MShare) and the Herfindahl–Hirschman Index (HHI), where high values indicate an oligopolistic market structure, while low values indicate a competitive market (Mishkin & Eakins, 2018; Grubišić et al., 2023).

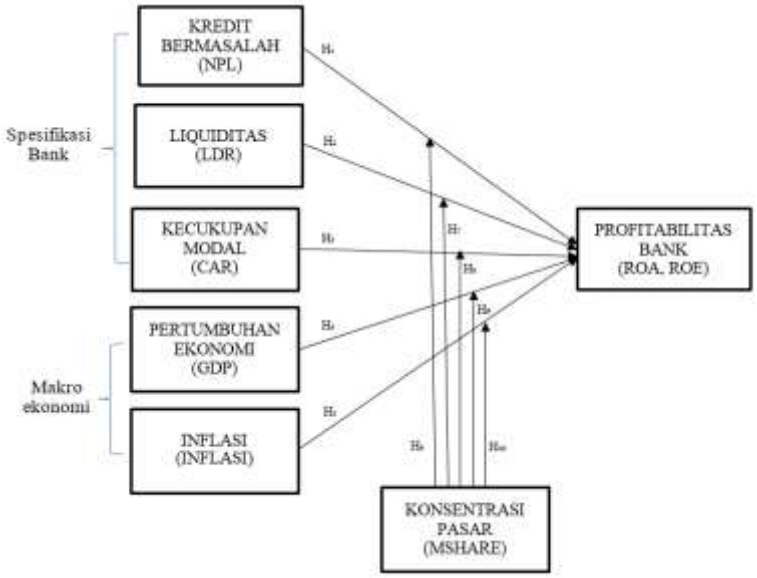


Figure. 2 Conceptual Framework

METHODOLOGY

Research Design

was chosen because it is able to observe the dynamics of variables over time, take into account differences between banks, and produce more efficient estimates (Basuki, 2021; Hair et al., 2019). This method is also in line with the views of Horobet et al. (2021) and O'Connell (2023), who state that panel data is effective for capturing the interaction between market structure and macroeconomic conditions such as economic growth and inflation in influencing banking profitability.

Population and Sample

The population of this study includes **18 banks** KBMI 3 and KBMI 4. The selection of focus on this group is in accordance with the *Structure-Conduct-Performance theory* (Berger, 1995), which emphasizes the importance of analysis of **leading firms** to understand the dynamics of the banking market. Samples are determined by **purposive sampling** using **saturated samples**, based on the following criteria:

1. Banks are included in KBMI 3 and 4 with relatively comparable sizes to avoid extreme scale bias (Gujarati & Porter, 2009).
2. The Bank publishes **its annual financial statements consistently** during the **2020–2024 period**, in order to maintain the relevance of results to dynamic economic conditions (Adiatmayani & Bagus, 2021; Horobet et al., 2021).
3. The bank has **complete data** for all research variables, namely CAR, NPL, LDR, ROA, and ROE.

   With these criteria, only banks that meet the completeness and consistency of the data used as research **samples**.

Data Types and Sources

This study uses secondary data obtained from official institutions as it is easily accessible and covers an appropriate time period for panel data analysis (Saunders et al., 2018).

Data Collection Methods

This research uses **a documentation study method**, which is the collection of data from official sources such as financial statements, government publications, and online databases (Creswell, 2018). The collection stages include: (1) downloading the bank's annual financial statements from the official website, (2) accessing *Indonesian Banking Statistics* from the OJK, (3) obtaining macroeconomic data from BPS, Bank Indonesia, and *the World Bank*, and (4) collecting banking industry data for the calculation of market concentration (CRn, HHI). This method is considered appropriate for quantitative research based on secondary data because it guarantees the validity, reliability, and efficiency of the analysis (Hair et al., 2019; Saunders & Cornett, 2021).

RESULTS

Descriptive Analysis

Descriptive analysis was used to provide an overview of the characteristics of the research variables which included profitability (ROA, ROE), internal bank factors (NPL, LDR, CAR), macroeconomic factors (GDP, Inflation), and moderation variables (Market Concentration). The data analyzed is **panel data** from **18 KBMI 3 and 4 banks** during the **2020–2024 period**, with a total **of 90 observations**.

Model Estimation (ROA)

In estimating with panel regression models, there are three approaches that are often used, including Common Effect Model (CEM), Fixed Effect Model (FEM), Random Effect Model (REM):

1. Chow Test (CEM)

Table 1. Common Effect Model (CEM)

Redundant Fixed Effects Tests
Equation: EQ01_ROA_CEM
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	10.317281	(17,62)	0.0000
Cross-section Chi-square	120.832733	17	**0.0000**

Source: data processed by researchers (2025)

2. Hausman Test (FEM)

Table 2. Fixed Effect Model (FEM)

Correlated Random Effects - Hausman Test
Equation: EQ01_ROA
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	10	**1.0000**

Source: data processed by researchers (2025)

3. Lagrange Multiplier Test (REM)

Table 3. Random Effect Model (REM)

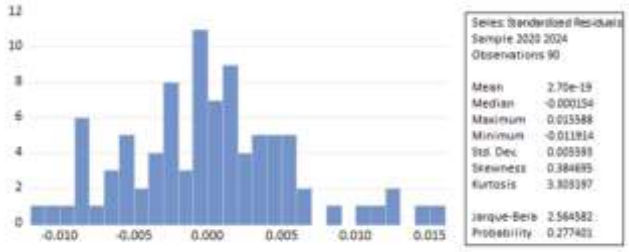
Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	66.15287	2.631897	68.78476
	(0.0000)	(0.1047)	(0.0000)
Honda	8.133441	-1.622312	4.604064
	(0.0000)	(0.9476)	(0.0000)
King-Wu	8.133441	-1.622312	2.090073
	(0.0000)	(0.9476)	(0.0183)
Standardized Honda	9.647583	-1.018447	2.837496
	(0.0000)	(0.8458)	(0.0023)
Standardized King-Wu	9.647583	-1.018447	0.418133
	(0.0000)	(0.8458)	(0.3379)
Gourieroux, et al.	--	--	66.15287
			(0.0000)

Source: data processed by researchers (2025)

Classic Assumption Test

1. Normality Test



Source: data processed by researchers (2025)

Figure 2. Normality Test

Based on the results of the normality test, a Jarque-Bera Probability value of 0.469 was obtained, which is >0.05, meaning that the data is normally distributed.

2. Multicollinearity Test

The multicollinearity test aims to detect the presence of strong linear relationships between independent variables in the regression model. According to Gujarati and Porter (2012), multicollinearity occurs when the freely correlated variables are very high. Centered VIF check several Interaction variables has >10 so has to use robust standard eror (EGLS-White cross-section).

Table 3. Multicollinearity Test

Variance Inflation Factors
Date: 10/23/25 Time: 09:13
Sample: 1 90
Included observations: 90

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.46E-05	70.77617	NA
NPL	0.008189	16.72356	1.990040
LDR	1.67E-05	37.44633	1.632478
CAR	0.000276	48.08469	1.762297
G_GDP	0.001411	4.679418	2.614317
INFLASI	0.003671	18.01691	2.866460
NPLXMSHARE	2.729924	22.97355	13.35382
LDRXMSHARE	0.007349	62.43962	33.40396
CARXMSHARE	0.077878	50.61246	27.30899
G_GDPXMSHARE	0.343787	4.913117	3.948042
INFLASIXMSHARE	1.128468	23.68719	14.63727

3. Heteroskedastisitas Test

The heteroscedasticity test was performed to find out whether in the regression model there is variance of variance from residual between observations. A good regression model must meet the assumption of homoscedasticity, i.e. the same residual variant for each observation. Residual

variance inequality (heteroscedasticity) can cause the estimation results to be inefficient and the coefficient variance unreliable.

Table. 4 heteroscedasticity test

Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

F-statistic	2.635684	Prob. F(54,35)	0.0015
Obs*R-squared	72.23620	Prob. Chi-Square(54)	0.0493
Scaled explained SS	60.58970	Prob. Chi-Square(54)	0.2503

4. Autocorrelation Test

The autocorrelation test aims to detect the relationship between the residual of period t and the residual of the previous period (t–1). If autocorrelation occurs, then the estimation results become inefficient and the standard error tends to be biased.

Tabel 5. Autocorrelation Test

R-squared	0.415540	Mean dependent var	-4.72E-18
Adjusted R-squared	0.324455	S.D. dependent var	0.005270
S.E. of regression	0.004331	Akaike info criterion	-7.912951
Sum squared resid	0.001445	Schwarz criterion	-7.551867
Log likelihood	369.0828	Hannan-Quinn criter.	-7.767341
F-statistic	4.562126	Durbin-Watson stat	**1.930534**
Prob(F-statistic)	0.000016		

Source: data processed by researchers (2025)

Based on the results of the autocorrelation test obtained from *the output of Eviews*, a Durbin–Watson value of 1.930 was obtained.

Analysis of the Regresi Data Panel

Multiple linear regression analysis is used to measure the influence of independent variables on bank profitability (ROA), both simultaneously and partially. Estimation was carried out using **the EGLS (Cross-Section Random Effect) Panel method**. Based on the results of **the Hausman test** with a probability value of > 0.05, the **Random Effect** model was chosen as the most suitable model.

Tabel 6. Analysis of the Regresi Panel Data

Dependent Variable: ROA (REM)
Method: Panel EGLS (Cross-section random effects)
Periods included: 5
Cross-sections included: 18
Total panel (balanced) observations: 90
Swamy and Arora estimator of component variances
White cross-section (period cluster) standard errors & covariance (d.f. corrected)
WARNING: estimated coefficient covariance matrix is of reduced rank
Warning: estimated covariance matrix is singular (number of coefficients exceeds number of clusters)
Standard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	0.023567	0.003668	6.424585	0.0030
NPL	-0.440045	0.016858	-26.10305	0.0000
LDR	-0.008888	0.001592	-5.582670	0.0050
CAR	0.034628	0.010730	3.227370	0.0321
G_GDP	0.059624	0.010374	5.747402	0.0045
INFLASI	-0.009147	0.019498	-0.469114	0.6634
NPLXMSHARE	-1.377816	0.484162	-2.845776	0.0466
LDRXMSHARE	-0.050597	0.043511	-1.162871	0.3095
CARXMSHARE	0.653054	0.175735	3.716131	0.0205
G_GDPXMSHARE	-0.223187	0.160341	-1.391948	0.2363
INFLASIXMSHARE	1.153887	0.348498	3.311028	0.0296

Effects Specification		
	S.D.	Rho
Cross-section random	0.005799	0.7636
Idiosyncratic random	0.003227	0.2364

Weighted Statistics			
Root MSE	0.002936	R-squared	0.704649
Mean dependent var	0.004640	Adjusted R-squared	**0.667263**
S.D. dependent var	0.005433	S.E. of regression	0.003134
Sum squared resid	0.000776	F-statistic	18.84785
Durbin-Watson stat	1.242426	Prob(F-statistic)	0.000000

Source: data processed by researchers (2025)

Hypothesis Test

1. T test (Hypothesis)

Tabel 7. T test

Dependent Variable: ROA (REM)
Method: Panel EGLS (Cross-section random effects)
Periods included: 5
Cross-sections included: 18
Total panel (balanced) observations: 90
White cross-section (period cluster) standard errors & covariance (d.f. corrected)
Standard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.023567	0.003668	6.424585	**0.0030**
NPL	-0.440045	0.016858	-26.10305	**0.0000**
LDR	-0.008888	0.001592	-5.582670	**0.0050**
CAR	0.034628	0.010730	3.227370	**0.0321**
G_GDP	0.059624	0.010374	5.747402	**0.0045**
INFLASI	-0.009147	0.019498	-0.469114	**0.6634**
NPLXMSHARE	-1.377816	0.484162	-2.845776	**0.0466**
LDRXMSHARE	-0.050597	0.043511	-1.162871	**0.3095**
CARXMSHARE	0.653054	0.175735	3.716131	**0.0205**
G_GDPXMSHARE	-0.223187	0.160341	-1.391948	**0.2363**
INFLASIXMSHARE	1.153887	0.348498	3.311028	**0.0296**

The regression results showed that the variables NPL,LDR,CAR,G_GDP,Inflasi, NPLxMshare, CARxMshare dan InflasixMshare interactions had a significant effect on ROA, while the other variables had no effect.

2. F test (Simultan)

Tabel 8. Uji F

Weighted Statistics			
Root MSE	0.002936	R-squared	0.704649
Mean dependent var	0.004640	Adjusted R-squared	**0.667263**
S.D. dependent var	0.005433	S.E. of regression	0.003134
Sum squared resid	0.000776	F-statistic	**18.84785**
Durbin-Watson stat	1.242426	**Prob(F-statistic)**	**0.000000**

Simultaneously, all the variables together affects ROA because the probability value (F-statistic) is less than 0.05 (0.000 < 0.05).

3. R2 test (Determinant Coef.)

Tabel 9. Uji R-Square

Weighted Statistics			
Root MSE	0.002936	R-squared	0.704649
Mean dependent var	0.004640	Adjusted R-squared	**0.667263**
S.D. dependent var	0.005433	S.E. of regression	0.003134
Sum squared resid	0.000776	F-statistic	18.84785
Durbin-Watson stat	1.242426	Prob(F-statistic)	0.000000

The result of the Adjusted R-Square value is 0.6672 or 66,72%, which indicates that the variables are able to explain the ROA variable by 67%. While the remaining 33% was explained by other variables that were not included in the research model.

4. Moderating Test

Table. 10 Moderating test

Weighted Statistics			
Root MSE	0.003351	R-squared	0.595500
Mean dependent var	0.003821	Adjusted R-squared	**0.571423**
S.D. dependent var	0.005299	S.E. of regression	0.003469
Sum squared resid	0.001011	F-statistic	24.73277
Durbin-Watson stat	1.049037	Prob(F-statistic)	0.000000

Moderating test variabel independent such as NPL, LDR, CAR, G-GDP and Inflation are able to explain ROA by 57% than increasing by moderating interaction become 67%. It indicates market concentration has moderating role for independent varibel to explain ROA

Estimasi Model (ROE)

In estimating with the panel regression model, there are three approaches that are often used, including Common Effect Model (CEM), Fixed Effect Model (FEM), Random Effect Model (REM):

1. Chow Test (CEM)

Tabel 11. Common Effect Model (CEM)

Redundant Fixed Effects Tests
Equation: EQ02_ROE
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	7.590418	(17,62)	0.0000
Cross-section Chi-square	101.279995	17	**0.0000**

2. Hausman Test (FEM)

Tabel 12. Fixed Effect Model (FEM)

Correlated Random Effects - Hausman Test
Equation: EQ02_ROE
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	10	**1.0000**

3. LM Test (REM)

Tabel 13. Random Effect Model (REM)

Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	55.54832 **(0.0000)**	2.149609 (0.1426)	57.69793 (0.0000)
Honda	7.453075 (0.0000)	-1.466154 (0.9287)	4.233392 (0.0000)
King-Wu	7.453075 (0.0000)	-1.466154 (0.9287)	1.933637 (0.0266)
Standardized Honda	8.906295 (0.0000)	-0.793269 (0.7862)	2.367880 (0.0089)
Standardized King-Wu	8.906295 (0.0000)	-0.793269 (0.7862)	0.201075 (0.4203)
Gourieroux, et al.	--	--	55.54832 (0.0000)

Classic Assumption Test

1. Normality Test

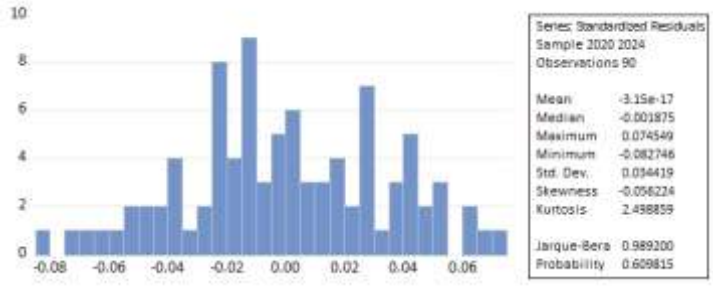


Figure 3. Normality Test

Based on the results of the normality test, a Jarque-Bera Probability value of 0.796 was obtained, which was >0.05, meaning that the data was normally distributed.

2. Multicollinearity Test

The multicollinearity test aims to detect the presence of strong linear relationships between independent variables in the regression model. According to Gujarati and Porter (2012), multicollinearity occurs when the freely correlated variables are very high. Centered VIF check several Interaction variables has >10 so has to use robust standard eror (EGLS-White cross-section).

Table. 14 multicollinearity test

Variance Inflation Factors
Date: 10/23/25 Time: 10:03
Sample: 1 90
Included observations: 90

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.000987	70.77617	NA
NPL	0.328414	16.72356	1.990040
LDR	0.000669	37.44633	1.632478
CAR	0.011057	48.08469	1.762297
G_GDP	0.056573	4.679418	2.614317
INFLASI	0.147214	18.01691	2.866460
NPLXMSHARE	109.4872	22.97355	13.35382
LDRXMSHARE	0.294751	62.43962	33.40396
CARXMSHARE	3.123401	50.61246	27.30899
G_GDPXMSHARE	13.78803	4.913117	3.948042
INFLASIXMSHARE	45.25871	23.68719	14.63727

3. Heteroskedastisitas Test

The heteroscedasticity test was performed to find out whether in the regression model there is variance of variance from residual between observations. A good regression model must meet the assumption of homoscedasticity, i.e. the same residual variant for each observation. Residual

variance inequality (heteroscedasticity) can cause the estimation results to be inefficient and the coefficient variance unreliable.

Table. 15 heteroscedasticity test

Heteroskedasticity Test: White
Null hypothesis: Homoskedasticity

F-statistic	0.996674	Prob. F(54,35)	0.5130
Obs*R-squared	54.53517	Prob. Chi-Square(54)	0.4540
Scaled explained SS	31.76331	Prob. Chi-Square(54)	0.9932

4. Autocorrelation Test

Based on the results of the autocorrelation test on the EViews output, the Durbin–Watson value of 0.792085 indicates a weak indication of positive autocorrelation but is not significant because the residual pattern is random and does not show a systematic relationship between periods.

Tabel 16. Autokorelasi Test

R-squared	0.393292	Mean dependent var	-4.47E-17
Adjusted R-squared	0.298741	S.D. dependent var	0.033374
S.E. of regression	0.027948	Akaike info criterion	-4.184059
Sum squared resid	0.060144	Schwarz criterion	-3.822975
Log likelihood	201.2826	Hannan-Quinn criter.	-4.038449
F-statistic	4.159543	Durbin-Watson stat	**1.901043**
Prob(F-statistic)	0.000052		

Analysis of the Data Panel Regresion

Table 17. Panel Data Regression Analysis

Dependent Variable: ROE
Method: Panel EGLS (Cross-section random effects)
Sample: 2020 2024
Periods included: 5
Cross-sections included: 18
Total panel (balanced) observations: 90
Swamy and Arora estimator of component variances
White cross-section (period cluster) standard errors & covariance (d.f. corrected)
WARNING: estimated coefficient covariance matrix is of reduced rank
Warning: estimated covariance matrix is singular (number of coefficients exceeds number of clusters)
Standard error and t-statistic probabilities adjusted for clustering

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.251820	0.038523	6.536853	0.0028
NPL	-2.618570	0.338570	-7.734205	0.0015
LDR	-0.128298	0.030262	-4.239522	0.0133
CAR	0.043484	0.107803	0.403366	0.7073
G_GDP	0.401818	0.078878	5.094157	0.0070
INFLASI	-0.228055	0.153395	-1.486717	0.2113
NPLXMSHARE	-12.37226	4.409568	-2.805776	0.0485
LDRXMSHARE	0.268986	0.309524	0.869033	0.4339
CARXMSHARE	1.402538	1.481600	0.946637	0.3974
G_GDPXMSHARE	-0.150996	2.427940	-0.062191	0.9534

INFLASIXMSHARE	11.75356	4.328021	2.715689	0.0532

Effects Specification	S.D.	Rho
Cross-section random	0.034674	0.6985
Idiosyncratic random	0.022780	0.3015

Weighted Statistics			
Root MSE	0.020623	R-squared	0.694693
Mean dependent var	0.032830	Adjusted R-squared	**0.656047**
S.D. dependent var	0.037533	S.E. of regression	0.022012
Sum squared resid	0.038278	F-statistic	17.97559
Durbin-Watson stat	1.406264	Prob(F-statistic)	**0.000000**

The results of the Y2 regression model show that NPL, LDR, and G_GDP have significant effect on ROE, while GDP, inflation, and market concentration not significant, except NPLxMshare and InflasixMshare that has significant result

Hypothesis Test

1. T test (Hypothesis)

Tabel 18. T Test

Dependent Variable: ROE
Method: Panel EGLS (Cross-section random effects)
Sample: 2020 2024
Periods included: 5
Cross-sections included: 18
Total panel (balanced) observations: 90
Swamy and Arora estimator of component variances
White cross-section (period cluster) standard errors & covariance (d.f. corrected)
WARNING: estimated coefficient covariance matrix is of reduced rank
Warning: estimated covariance matrix is singular (number of coefficients exceeds number of clusters)
Standard error and t-statistic probabilities adjusted for clustering

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NPLXMSHARE	-12.37226	4.409568	-2.805776	0.0485
LDRXMSHARE	0.268986	0.309524	0.869033	0.4339
CARXMSHARE	1.402538	1.481600	0.946637	0.3974
G_GDPXMSHARE	-0.150996	2.427940	-0.062191	0.9534
INFLASIXMSHARE	11.75356	4.328021	2.715689	0.0532

2. F test (Simultan)

Tabel 19. F test

Weighted Statistics

Root MSE	0.020623	R-squared	0.694693
Mean dependent var	0.032830	Adjusted R-squared	0.656047
S.D. dependent var	0.037533	S.E. of regression	0.022012
Sum squared resid	0.038278	**F-statistic**	**17.97559**
Durbin-Watson stat	1.406264	**Prob(F-statistic)**	**0.000000**

Simultaneously, all independent and moderation variables had a significant effect on Y1 because the probability value (F-statistic) was 0.000 < 0.05.

3. R2 test (Determinan Coef.)

Tabel 20. R-Square test

Weighted Statistics			
Root MSE	0.020623	R-squared	0.694693
Mean dependent var	0.032830	Adjusted R-squared	**0.656047**
S.D. dependent var	0.037533	S.E. of regression	0.022012
Sum squared resid	0.038278	F-statistic	17.97559
Durbin-Watson stat	1.406264	Prob(F-statistic)	0.000000

An Adjusted R-Square value of 0.50 indicates that independent and moderation variables explain 65% of Y1 variation, while the remaining 35% is influenced by factors outside the model.

DISCUSSION

The findings indicate that both internal and external factors significantly influence the profitability of Indonesian commercial banks, although the direction and strength of the effects vary across indicators and profitability measures.

Non-performing loans (NPLs) show a significant negative effect on both ROA and ROE, confirming that higher credit risk deteriorates profitability by reducing asset quality and return efficiency.

Liquidity management (LDR) also has a significant negative relationship with ROA and ROE, implying that excessive credit expansion relative to deposits reduces profitability—especially during periods of tight monetary policy and higher funding costs.

Capital adequacy (CAR) exerts a positive and significant influence on ROA, but not on ROE, suggesting that well-capitalized banks tend to be more resilient and efficient in generating asset-based returns, although the effect on shareholder returns may be limited.

Economic growth (GDP) consistently shows a positive and significant impact on both ROA and ROE, indicating that favorable macroeconomic conditions stimulate lending activities and profitability.

Meanwhile, inflation has no significant effect on either measure, implying that inflationary pressures during the study period were relatively manageable and did not materially affect bank profitability.

Regarding market concentration, the interaction terms reveal a moderating effect: market share (MSHARE) weakens the negative impact of NPLs and

strengthens the positive influence of CAR and inflation on ROA, consistent with the Quiet Life Hypothesis (QLH) where dominant banks in concentrated markets tend to enjoy pricing power and risk tolerance that alter the profitability dynamics.

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that the profitability of Indonesian commercial banks is jointly determined by internal performance indicators and external macroeconomic factors.

Empirical results show that NPLs and LDR have significant negative effects, while CAR and GDP positively influence profitability. Inflation remains statistically insignificant, reflecting its limited direct impact on bank performance during the observation period.

The moderation analysis confirms that market concentration modifies several relationships, particularly weakening the effect of credit risk and strengthening the impact of capital adequacy and inflation on profitability.

It is therefore recommended that banks:

- Strengthen credit risk management to maintain asset quality and reduce NPL ratios.
- Improve liquidity and capital efficiency, ensuring that credit growth aligns with risk appetite and funding capacity.
- Adopt adaptive strategies in response to macroeconomic fluctuations, especially in periods of economic expansion or inflationary pressure.

For regulators, maintaining a competitive and stable market structure and enhancing prudential supervision remain essential to ensure sustainable profitability and financial system resilience.

FURTHER STUDY

The next research is suggested to expand the variables used, such as operational efficiency (BOPO), bank size, digitalization level, and governance index to provide a more comprehensive understanding of the determinants of banking profitability.

Future research should incorporate a longer observation period and additional variables—such as digital transformation, interest rate policy, or ESG-related factors—to provide a broader understanding of profitability dynamics in Indonesia's banking sector.

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