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UNVEILING THE PERFORMANCE DRIVERS OF INDONESIA'S STATE-OWNED BANKS: A STRUCTURE–CONDUCT–PERFORMANCE PERSPECTIVE USING PANEL DATA ANALYSIS

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Abstract

Indonesia's state-owned banks play a strategic role in shaping the country's financial landscape, with substantial market dominance and influence over national banking performance. In an era marked by rapid digitalization and evolving market competition, it becomes crucial to examine how structural characteristics and internal efficiency influence financial outcomes. This study applies the Structure–Conduct–Performance (SCP) framework combined with panel data regression to examine how market dynamics and internal efficiency shape financial outcomes across five major banks: Bank Mandiri, BRI, BNI, BTN, and BRIS. Key variables include market share (MS), concentration ratio (CR4), and operational efficiency as proxied by the BOPO ratio (operating expenses to operating income), and their influence on banks' ROA. The results show that a larger market share significantly enhances profitability, while higher efficiency, as indicated by lower BOPO, also contributes positively. In contrast, market concentration does not exhibit a significant impact. These results offer valuable insights for regulators and bank management seeking to enhance competitiveness and sustainability in a digitally evolving financial ecosystem.

Keywords: state-owned banks, scp, panel data analysis

INTRODUCTION

The banking industry holds an increasingly strategic role in developing countries such as Indonesia, particularly in addressing the gap between savings and investment that cannot be fully covered by government budgets. The function of banks as financial intermediaries in mobilizing and allocating public funds is crucial for driving economic development. Consequently, it is not surprising that the banking sector plays a more dominant role in the economies of developing countries compared to developed nations (Ceysa et. al, 2024).

Among the key players in this industry, state-owned banks or State-Owned Enterprises (SOEs) in the banking sector (such as Bank Mandiri, BRI, BNI, BTN, and BRIS) hold a particularly strategic position. According to the Indonesian Banking Surveillance Report by the Financial Services Authority (OJK) for Q4 2024 (LSPI), these state-owned banks, which are the focus of this study, account for more than 42.35% of the total assets in the national banking industry and collect 43.71% of total Third-Party Funds (TPF/DPK). These figures reflect the public's high level of trust in state-owned banks in terms of fund mobilization, as well as their institutional capacity to support credit distribution and contribute to the stability of the national financial system.

As part of the banking industry, state-owned banks also run their business activities by relying on the difference between lending interest rates and deposit interest rates. The difference between the interest income received and the cost of funds spent is known as net interest income. In its development, the intensity of competition between banks in raising and channeling funds is increasing. The competition does not only occur between banking institutions, but also involves non-bank financial institutions such as venture capital companies, leasing, and the latest innovations such as FinTech (Purnamasari, K., 2020). This dynamic encourages banks to continuously improve their efficiency and operational performance to maintain competitiveness.

Nisa, et al (2019) explain that performance evaluation is seen as one of the effective approaches in an effort to improve organizational operations. Through the application of various performance measurement methods, organizations can assess the level of effectiveness and efficiency of processes that are aligned with predetermined strategic goals. In addition, performance measurement tools play an important role in supporting the process of allocating and distributing resources more optimally.

One of the most widely used approaches in industrial economics studies is the Structure-Conduct-Performance (SCP) framework. This framework assesses the relationship between market structure, business

conduct, and the resulting performance outcomes (Teguh, 2020). In Indonesia, the SCP approach has been applied in various studies, but the majority are not on state-owned banks. Yudaruddin (2015), in his study of 26 BPDs during 2004-2013, found that market concentration (HHI) had a significant positive effect on profitability (ROA). However, efficiency (proxied through the BOPO ratio) did not show a significant effect, indicating that efficiency has not been the main determinant of BPD performance. Another study by Siti Yuhanah (2016) on the Islamic banking industry found that market structure (market share) has no effect on profitability, while efficiency (BOPO) and non-performing financing ratio (NPF) significantly affect ROA. These results support the efficient structure hypothesis, and show that market power is not always relevant in explaining the performance of Islamic banks that are younger than conventional banks.

Moreover, Sanuri (2011) in a study showed that the SCP approach has not been able to consistently explain the relationship between banking structure and performance in Indonesia due to many external factors that have not been included in the model. Meanwhile, Dina (2013) noted that market concentration in Islamic banks tends to be high (CR4 > 50%) but does not necessarily reflect collusive practices, given that the market is also influenced by product segmentation and service efficiency.

Interestingly, most of the existing studies have not explicitly combined the SCP theoretical framework with panel data regression methods systematically in the context of state-owned banks. In fact, the use of panel data regression provides advantages in capturing time dynamics and interbank variability, as well as strengthening the robustness of estimation results through controlling for individual heterogeneity (Gujarati, 2012; Juanda & Junaidi, 2012). Most of the studies found, such as by Yudaruddin (2015) and Yuhanah (2016), do use panel regression, but the object of research is limited to BPD and BUS, not targeting state-owned banks (BUMN) as a whole.

Therefore, there is a significant research gap in empirical studies on the factors driving the performance of state-owned banks in Indonesia. This study seeks to fill this gap by combining the SCP framework and panel data regression methods to examine the influence of market structure (CR4 and market share), operational efficiency (BOPO ratio), and profitability performance (ROA) of five major state-owned banks. Given the vital role of these banks in maintaining the resilience of the national financial system, the results of this study are expected to provide relevant empirical insights for regulators and policy makers in strengthening the competitiveness of the national banking sector.

METHODS

This study examines banking institutions categorized as State-Owned Enterprises (SOEs) during the period from 2020 to 2024. The research employs a quantitative method by integrating two analytical approaches. The first is the Structure-Conduct-Performance (SCP) paradigm, which is utilized to investigate the market structure and performance of SOE banks. The second is panel data regression, which is applied to assess the influence of market concentration (CR4), market share, and operational efficiency on the return on assets (ROA) of state-owned banks in Indonesia within the specified timeframe. The analysis is based on secondary data obtained from annual and financial reports of SOE banks, systematically collected from the official websites of the respective companies and the Indonesia Stock Exchange (IDX).

Structure-Conduct-Performance (SCP) Analysis

One of the fundamental frameworks in industrial economic analysis is the Structure-Conduct-Performance (SCP) paradigm. This paradigm states that market structure determines the behavior of industrial firms, and the behavior of industrial firms determines the state of market performance (Teguh, M., 2020). Based on the SCP paradigm, the following indicators are used to represent the elements of structure, conduct, and performance in this study.

1. Structure
    a. Market Share

Market share illustrates the relative position or competitiveness of a company within the industry landscape. (Amalia, S. A., & Firmansyah, F., 2021). Market share can be formulated as follows:

$$MS = \frac{Output_i}{Output_{sum}} \quad \text{(Eq. 1)}$$

    b. Market Concentration (CR4)

The concentration ratio is measured to see the form of market competition based on the number and size of firms in the market (Amalia, S. A., & Firmansyah, F., 2021), and can be formulated as follows:

$$CR_4 = \sum_{i=1}^{n} S_i \quad \text{(Eq. 2)}$$

    c. Hirschman-Herfindahl Index (HHI)

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The Hirschman-Herfindahl Index is defined as the square of the market shares of all companies in the industry (Rekarti, E., & Nurhayati, M., 2016), which can be formulated as follows:

$$HHI = \sum_{i=1}^{n} S_i^{\,2} \qquad \text{(Eq. 3)}$$

d. Minimum Efficiency of Scale (MES)

Minimum Efficiency Scale (MES) is an indicator used to measure market entry barriers, with an approach based on the minimum level of output that a company must achieve in order to obtain economies of scale (Amalia, S. A., & Firmansyah, F., 2021).

$$MES = \frac{Largest\ Company\ Output}{Total\ Output} \times 100\% \qquad \text{(Eq. 4)}$$

2. Conduct

a. Capital Labor Ratio (CLR)

The Capital-Labor Ratio (CLR) is utilized to determine the nature of production techniques employed within an industry. These techniques are generally categorized as either capital-intensive or labor-intensive. (Amalia, S. A., & Firmansyah, F., 2021).

$$CLR = \frac{Capital\ Cost\ Share}{Labor\ Cost\ Share} \times 100\% \qquad \text{(Eq. 5)}$$

3. Performance

a. Price Cost Margin

The price-cost margin indicates a firm's capacity to set prices above its production costs, and it can be expressed using the following formula.:

$$PCM = \frac{TR-TC}{TR} \qquad \text{(Eq. 6)}$$

Panel Data Regression Analysis

Following the completion of the SCP analysis, the variables representing market structure were identified, and subsequently, panel data regression analysis was conducted. This study employs panel data, which combines cross-sectional and time series characteristics, involving multiple entities observed over several periods (Winarno, 2011). The panel data regression model is applied to examine the relationship between the independent variables (market share, CR4, and BOPO) and the dependent variable, return on assets (ROA), of state-owned banks.

$$ROA_{it} = \mu_{it} + \alpha + \beta_1 MS_{it} + \beta_2 CR_{it} + \beta_3 BOPO_{it} + \varepsilon_{it} \qquad \text{(Eq. 7)}$$

Where ROA is Return on Asset, MS is Market Share, CR is Concentration Ratio, and BOPO is Operating Cost of Operating Income, all variables used are measured in units of percent.

Basuki and Yuliadi (2015) state that there are three main approaches for estimating regression models using panel data: the Common Effect Model (CEM), the Fixed Effect Model (FEM), and the Random Effect Model (REM). Among these, the most appropriate model will be selected to estimate the parameters of the panel data regression. In general, there are three kinds of tests that can be used, which are:

The Chow Test is used to determine whether the Common Effect Model (CEM) or the Fixed Effect Model (FEM) is more appropriate, based on the probability (p-value). If the p-value is less than the significance level ($\alpha = 0.05$), then the FEM is chosen, otherwise, the CEM is preferred. The Hausman Test is applied to decide between the Random Effect Model (REM) and FEM. If the p-value is greater than $\alpha = 0.05$ under the cross-section random assumption, the REM is selected; if not, FEM is used. Meanwhile, the Lagrange Multiplier (LM) Test compares the CEM and REM. If the cross-section p-value is below $\alpha = 0.05$, the REM is deemed more appropriate; otherwise, the CEM is selected.

Gujarati and Porter (2012) explain that panel data models estimated using the random effect approach employ the Generalized Least Square (GLS) method, whereas the common effect and fixed effect models utilize the Ordinary Least Square (OLS) method. A key advantage of the GLS method is that it does not require the fulfillment of classical assumptions. Therefore, if the regression model used is random effect, testing of classical assumptions is not required. Otherwise, if the regression model used is common effect or fixed effect, then the classical assumption test still needs to be done.

Model evaluation based on statistical criteria is conducted to measure the accuracy of the regression model in estimating the actual value (Zen, N., 2015). Statistical tests are carried out with several tests including the following:

The t-statistic test is employed to determine the individual (partial) influence of each independent variable on the dependent variable, under the assumption that other independent variables are held constant (Ghozali, 2014). If the p-value associated with the t-statistic is less than or equal to the significance level ($\alpha = 0.05$), the variable is deemed to have a significant effect, and vice versa.

The F-statistic test is used to assess the joint or simultaneous influence of all independent variables on the dependent variable within the regression model (Ghozali, 2014). A probability value of the F-statistic that is less than or equal to $\alpha = 0.05$ indicates a statistically significant overall effect.

The coefficient of determination serves to evaluate how well the regression model accounts for variations in the dependent variable (Kosmaryati, 2019). This can be measured through the Adjusted R^2, which ranges between 0 and 1. A higher R^2 or Adjusted R^2 value approaching 1 suggests that the independent variables in the model explain most of the variation observed in the dependent variable.

RESULTS AND DISCUSSIONS

Structure-Conduct-Performance (SCP) Analysis

1. Structure
   a. Market Share

Table 1 Market Share Results

Company	2020	2021	2022	2023	2024
BBNI	0.1701	0.1571	0.1545	0.148	0.1368
BBRI	0.4088	0.4177	0.4374	0.4332	0.4313
BBTN	0.0628	0.0617	0.0435	0.0409	0.0724
BMRI	0.3136	0.3181	0.3162	0.3295	0.3108
BRIS	0.0447	0.0454	0.0485	0.0483	0.0487

Source: Data Processing Result, 2025

The chart of Indonesia's five state-owned banks for the 2020-2024 period shows BBRI's dominance as the market leader with a stable share above 40%, supported by a strong focus on the MSME segment, extensive service networks to remote areas, digital transformation (BRImo), and government support through the KUR program. BMRI remained consistent in second place with a share of 31-33%, while BBNI experienced a significant decline from 17.01% to 13.68%. BBTN showed a surge from a low of 4.09% (2023) to 7.24% (2024), indicating strengthening in the housing segment, and BRIS grew steadily in the range of 4.5-4.8% in the sharia sector.

   b. Concentration Ratio

Table 2 Concentration Ratio Results

Year	2020	2021	2022	2023	2024
CR4	0.9553	0.9546	0.9565	0.9591	0.9513

Source: Data Processing Result, 2025

The data in the table indicate that the market concentration level (CR4) in Indonesia's banking sector during the 2020–2024 period is considerably high, stabilizing in the range of 95.13%-95.91%, signaling strong dominance by the big four banks. Despite minor fluctuations, the market structure remains highly concentrated and reflects a strong oligopoly, where competition is limited to large players and barriers are high for new entrants, potentially affecting efficiency, innovation and competitive dynamics.

   c. Hirschan-Herfindhal Index (HHI)

Table 3 HHI Results

Year	2020	2021	2022	2023	2024
HHI	0.3003	0.3062	0.3194	0.3222	0.3090

Source: Data Processing Result, 2025

In Indonesia's state-owned banking industry, the HHI value is stable in the range of 0.30-0.32. This range indicates an oligopoly market structure, where only a few large players dominate the market, in line with the high CR4 data. This dominance reflects that market control remains in the hands of large banks, potentially affecting competition, innovation and consumer bargaining power.

d. Minimum Efficiency of Scale (MES)

Table 4 MES Results

Year	2020	2021	2022	2023	2024
MES	0.4088	0.4177	0.4374	0.4332	0.4313

Source: Data Processing Result, 2025

The stable Minimum Efficient Scale (MES) value of 43% indicates that cost efficiency can only be achieved by large banks with a wide scale of operations. This means that to compete efficiently, a bank would need to hold a market share close to this figure or be part of a dominant group. The stability of MES reflects the relatively constant cost structure over the past five years and indicates high entry barriers for new players in the banking industry.

2. Conduct
   a. Capital Labor Ratio (CLR)

Table 5 Capital to Labor Ratio Results

Company	2020	2021	2022	2023	2024
BBNI	6.146344	4.303171	2.096741	1.880941	1.717164
BBRI	3.539828	2.957842	1.785326	1.821744	2.187275
BBTN	7.445112	5.683765	2.216945	2.209945	5.886266
BMRI	4.781598	3.745028	1.826103	1.662245	1.941767
BRIS	3.070887	2.78468	1.785974	1.6	1.133323

Source: Data Processing Result, 2025

The chart shows the capital-labor ratio (CLR) of Indonesia's five state-owned banks over 2020-2024, with CLR values >1 indicating capital-intensive characteristics. The general trend shows a decrease in the ratio until 2023, reflecting efficiency or a shift to the utilization of labor and technology, as seen in BBNI which decreased from 6.15 to 1.88. However, in 2024 there is a spike in some banks, such as BBTN which rises to 5.89, indicating an increased reliance on capital. In contrast, BRIS recorded the lowest ratio (1.13), indicating high efficiency or a technology and human capital-based approach.

3. Performance
   a. Price Cost Margin

Table 6 Price Cost Margin Results

Company	2020	2021	2022	2023	2024
BBNI	0.0698	0.177	0.3725	0.4107	0.4126
BBRI	0.1654	0.2146	0.3695	0.4184	0.3862
BBTN	0.0843	0.1073	0.2206	0.2621	0.112
BMRI	0.1756	0.2632	0.4465	0.5344	0.5187
BRIS	0.1549	0.1837	0.2854	0.3612	0.385

Source: Data Processing Result, 2025

The chart shows that Indonesia's five state-owned banks experienced a significant increase in PCM post-2020, signaling economic recovery and improved efficiency. BMRI consistently recorded the highest PCM, with a peak of 53.44% in 2023, indicating the most efficient performance. BBRI, BBNI, and BRIS also recorded positive trends, while BBTN experienced a sharp decline in 2024 (11.20%), a concern in terms of strategy. This data emphasizes the importance of cost efficiency and operational strategies to maintain competitiveness in the banking sector.

Panel Data Regression Analysis

Table 7 Chow Test Results

Cross-section F (Stat.)	Prob.
8.399497	0.0006

Source: Data Processing Result, 2025

The results of the Chow test reveal that the probability value of the cross-section F is 0.0006, which is below the 0.05 significance threshold. Therefore, the null hypothesis (H_0) is rejected, and the Fixed Effect Model (FEM) is selected as the appropriate model.

Table 8 Hausman Test Results

Cross-section random (Chi-Sq. Stat.)	Prob.
3.240231	0.3560

Source: Data Processing Result, 2025

According to the Hausman test, the cross-section random probability value is 0.3560, which exceeds the 0.05 significance level. As a result, the Random Effect Model (REM) is preferred. Since the Chow test suggests FEM and the Hausman test indicates REM, the Lagrange Multiplier (LM) test is employed to determine the final model selection.

Table 9 Lagrange Multiplier Test Results

Breusch-Pagan (Cross-section)	Prob.
10.38262	0.0013

Source: Data Processing Result, 2025

Based on the test results above, it can be seen from the Breusch-Pagan Cross-section probability value of 0.0013 that this value is smaller than 0.05, so the final model chosen is the Random Effect Model (REM).

According to Gujarati (2012), the random effect model estimation method uses the generalized least square (GLS) method which does not require a classical assumption test. Based on the theory, because in this study the regression model was selected using random effect, this study did not conduct a classical assumption test.

Table 10 t Test Results

Variables	Prob.
C	0.6497
MS	0.0274
CR	0.9212
BOPO	0.0000

Source: Data Processing Result, 2025

The results of the partial t-test demonstrate that the Market Share (MS) and Operating Cost to Operating Income (BOPO) variables have a statistically significant effect on Return on Assets (ROA). In contrast, the Concentration Ratio (CR) variable does not show a significant impact on ROA.

Table 11 F Test Results

F-Statistic	Prob.
99.12013	0.000000

Source: Data Processing Result, 2025

Based on the F-statistic test, the resulting p-value is 0.000000, which is below $\alpha = 0.05$. This indicates that the independent variables collectively have a significant influence on the dependent variable. Thus, it can be concluded that Market Share (MS), Concentration Ratio (CR), and BOPO jointly affect ROA in a statistically significant manner.

Table 12 Coefficient of Determination Results

R-Squared	Adj. R-Squared
0.934037	0.924614

Source: Data Processing Result, 2025

The Adjusted R-Squared value from the regression output is 0.924614, suggesting that approximately 92.2% of the variation in ROA can be explained by the variables Market Share (MS), Concentration Ratio (CR), and BOPO, while the remaining 7.8% is attributable to other factors not included in the model.

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Table 13 Regression Equation Results

Variables	Coefficient
C	0.06346
MS	0.02708
CR	0.01435
BOPO	-0.07880

Source: Data Processing Result, 2025

Persamaan yang dihasilkan dapat diaktualisasikan melalui persamaan :

$$ROA_{it} = \alpha + \beta_1 MS_{it} + \beta_2 CR_{it} + \beta_3 BOPO_{it} + \varepsilon_{it} + \mu_{it} \quad \text{(Eq. 8)}$$

$$ROA_{it} = 0.06346 + 0.02708 MS_{it} + 0.01435 CR_{it} - 0.07880 BOPO_{it} + \varepsilon_{it} + \mu_{it} \quad \text{(Eq. 9)}$$

From the estimated regression equation, the intercept value of 0.06346 indicates that when all independent variables are held at zero, the predicted Return on Assets (ROA) is 6.34%. Furthermore, assuming other variables remain constant, a 1% increase in each independent variable will result in the following changes: (1) Market Share (MS) will increase ROA by 0.02708 or 2.7%; (2) Concentration Ratio (CR) will increase ROA by 0.01435 or 1.43%; and (3) BOPO will decrease ROA by 0.07880 or 7.88%.

To find out the value of the influence of each BUMN company object, the following are the results of the intercept value of each BUMN company object.

Table 14 Intercept Value of Each Object

Variables	Coefficient
BBNI	0.000094341562
BBRI	0.001919179944
BBTN	0.000146797657
BMRI	-0.003652807621
BRIS	0.001492488458

Source: Data Processing Result, 2025

Based on the table above, each state-owned bank has different individual effects on ROA when the market share, concentration ratio, and BOPO variables do not change. The largest firm effect is owned by BBRI (0.1919%), then BRIS (0.1492%), BBTN (0.01467%), and BBNI (0.00943%). Meanwhile, BMRI showed a negative effect of -0.3652%.

The Effect of Market Share (MS) on Return on Asset (ROA)

The Market Share coefficient of 0.02708 indicates that a 1% increase in market share can increase the profitability of state-owned banks by 2.7%, assuming other variables are constant. This reflects the benefits of economies of scale, service diversification and wider market reach. For example, BBRI, which controls >40% of the market share, is able to maintain high profitability due to its focus on MSMEs, network to villages, digitalization, and KUR support (Andriyani et al., 2021). Large market share also supports capital strength for investment and innovation, which is reflected in higher ROA.

The Effect of Concentration Ratio (CR) on Return on Asset (ROA)

The regression output indicates that the Concentration Ratio (CR) exerts a positive yet statistically insignificant influence on Return on Assets (ROA), with a p-value of 0.9212 (> 0.05) and a coefficient of 0.01435. This result aligns with the studies of Rini (2018) and Smirlock (1985), who argue that market concentration does not directly determine profitability. Instead, it reflects the efficiency of banks that are capable of capturing a larger market share. Therefore, the high concentration in Indonesia's banking sector is more indicative of efficiency rather than monopolistic or anti-competitive behavior.

The Effect of Operating Expenses Operating Income (BOPO) on Return on Asset (ROA)

The partial test results also reveal that the BOPO variable has a significant negative impact on bank profitability, with a regression coefficient of -0.07880 and a p-value of 0.0000 (< 0.05). This suggests that an increase in operating costs relative to operating income leads to a decrease in ROA. This is in line with the findings of Nurmasari (2022) which states that high operational efficiency can signal problematic conditions because the cost of overcoming risk is greater than income. Witjaksono & Natakusumah (2021) added that high BOPO is also influenced by the high cost of funds and low interest income. The BOPO ratio itself is used to measure the effectiveness of bank operations-the lower it is, the more efficient it is and leads to higher

profitability. Similar conclusions were also drawn by Mennawi & Ahmed (2020) and Putra (2020), who found a significant negative relationship between BOPO and bank profitability.

Conclusions

Based on the results and discussion, it can be concluded that the SOE banking industry in Indonesia has the characteristics of a tight oligopoly market, indicated by CR4 which is above 95% and HHI values between 0.2 and 0.6. Bank Rakyat Indonesia (BBRI) is the dominant player with a stable market share above 40% during 2020-2023. The MES of 43% indicates that the industry has a high barrier to entry, making it difficult for new SOE players to enter and compete with large banks. The capital-intensive structure is also reflected in the CLR value > 1, signaling the dominance of capital expenditure, one of which is reflected in mobile banking innovation as a form of operational efficiency. In terms of performance, BMRI shows the highest efficiency with PCM remaining dominant in 2024 with 51.87%.

In the partial regression analysis, Market Share is shown to have a statistically significant positive influence on ROA, BOPO exerts a significant negative effect, and CR4 shows a positive but insignificant effect. When considered simultaneously, all three variables—market share, BOPO, and CR4—have a significant impact on ROA. The Adjusted R-Squared value of 0.922 implies that approximately 92.2% of the variation in ROA is explained by these independent variables, while the remaining 7.8% is attributed to other factors not included in the model.

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