

COMPETITION BETWEEN BANK SYARIAH INDONESIA AND BANK RAKYAT INDONESIA: EVIDENCE FROM A GAME THEORY ANALYSIS

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ABSTRACT

Differences between Islamic and conventional banking systems create strategic competition in profitability, efficiency, and financial intermediation. This study analyzes the competitive strategies of Bank Syariah Indonesia (BSI) and Bank Rakyat Indonesia (BRI) using a game theory approach. A descriptive quantitative method with a two-person zero-sum game model was applied based on the 2025 financial statements. The analysis employed Return on Equity (ROE), Operating Expenses to Operating Income (BOPO), Financing-to-Deposit Ratio (FDR), and Loan-to-Deposit Ratio (LDR), with optimal strategies determined through payoff matrix, maximin, and minimax analyses. The results show that the Nash equilibrium is achieved when BSI adopts an Islamic intermediation strategy represented by murabahah financing (popular akad) and BRI pursues operational efficiency, producing a game value of zero. Empirically, BRI demonstrates higher profitability and efficiency (ROE 18.86%; BOPO 71.5%), while BSI exhibits stronger intermediation stability with an optimal FDR of 84%. The findings indicate that the comparative advantage of Islamic banking extends beyond murabahah to mudharabah, musyarakah, and other Sharia-compliant contracts emphasizing asset-backed financing and risk sharing. Overall, conventional banking excels in short-term profitability, whereas Islamic banking provides greater resilience in liquidity management, risk mitigation, and sustainable financial intermediation.

Keywords: Game Theory, Islamic Banking, Conventional Banking, Murabahah, Risk Sharing

ABSTRAK

Perbedaan sistem perbankan syariah dan konvensional menciptakan persaingan strategis dalam profitabilitas, efisiensi, dan intermediasi keuangan. Penelitian ini bertujuan menganalisis strategi persaingan Bank Syariah Indonesia (BSI) dan Bank Rakyat Indonesia (BRI) menggunakan pendekatan teori permainan. Penelitian menggunakan metode kuantitatif deskriptif dengan model *two person zero sum game* berdasarkan laporan keuangan tahun 2025. Analisis dilakukan menggunakan indikator *Return on Equity* (ROE), Biaya Operasional terhadap Pendapatan Operasional (BOPO), *Financing to Deposit Ratio* (FDR), dan *Loan to Deposit Ratio* (LDR) melalui *matrix payoff* serta metode *maximin* dan *minimax*. Hasil penelitian menunjukkan bahwa keseimbangan Nash dicapai ketika BSI menerapkan strategi intermediasi berbasis pembiayaan syariah yang direpresentasikan oleh akad *murabahah* (populer), sedangkan BRI menerapkan strategi efisiensi operasional, dengan nilai permainan sebesar nol. Secara empiris, BRI unggul dalam profitabilitas dan efisiensi (ROE 18,86%; BOPO 71,5%), sedangkan BSI memiliki stabilitas intermediasi yang lebih baik dengan FDR sebesar 84%. Temuan menunjukkan bahwa keunggulan perbankan syariah tidak hanya berasal dari *murabahah*, tetapi juga *mudharabah*, *musyarakah*, dan akad syariah lainnya yang mengedepankan *asset-backed financing* dan *risk sharing*, sehingga lebih tangguh dalam pengelolaan risiko, likuiditas, dan keberlanjutan intermediasi keuangan.

Kata kunci: Perbankan Syariah, Perbankan Konvensional, Murabahah, Risk Sharing

INTRODUCTION

The development of the Islamic banking industry in Indonesia has demonstrated a significant growth trend in recent years, in line with the increasing public awareness of financial systems based on Sharia principles.¹ Data from the Otoritas Jasa Keuangan 2025 indicate that the Islamic banking sector continues to expand in terms of assets, financing, and third-party funds. As of October 2025, total Islamic banking assets reached IDR 1,028.18 trillion, reflecting an annual growth of 11.34%, while financing amounted to IDR 685.55 trillion (growing 7.78% YoY) and third-party funds reached IDR 820.79 trillion (growing 14.26% YoY). Furthermore, at the broader level of the Islamic financial industry, total assets reached IDR 3,131 trillion in 2025, with a growth rate of 8.61% YoY, highlighting the sector's increasing contribution to the national financial system.² This condition reflects the expanding role of Islamic financial institutions in the economy and intensifies competition among Islamic banks, including both large-scale institutions and digital-based players.

In this context, Bank Syariah Indonesia (BSI), as the largest Islamic bank in Indonesia, demonstrates strong advantages in terms of assets, profitability, and network. According to its 2025 Annual Report published on the Indonesia Stock Exchange, BSI recorded a net profit of IDR 7.57 trillion with total assets reaching IDR 456.19 trillion, indicating robust and stable financial performance.³ Moreover, BSI heavily relies on murabahah-based financing, which represents one of its dominant financing schemes characterized by fixed margins and relatively lower risk exposure. This strategy not only supports income stability but also strengthens its competitive positioning through efficiency and predictable returns, making murabahah a central instrument in BSI's overall business model.⁴

In contrast, Bank Rakyat Indonesia (BRI), as the largest conventional bank in Indonesia, relies on interest-based lending schemes that offer greater flexibility in pricing and market expansion. In 2025, BRI recorded a net profit of approximately IDR 56.65 trillion with total assets exceeding IDR 1,900 trillion, along with a Return on Assets (ROA) of 2.7%. Credit growth reached around 12% annually, predominantly driven by the MSME segment, supported by high operational efficiency as reflected in a BOPO ratio of approximately 71%. However, this aggressive expansion strategy is accompanied by relatively higher risk exposure, as indicated by a Non-Performing Loan (NPL) ratio of 3.1%.⁵ This comparison highlights a clear trade-off between the two banks, where Bank Syariah Indonesia (BSI) demonstrates advantages in stability and risk management through murabahah-based financing, while BRI is more competitive in terms of profitability, efficiency, and market expansion through interest-based lending. These differences create a compelling strategic interaction to be further

¹ Muhamad Yusuf Fatimah Tuzzuhro, Noni rozaini, "Perkembangan Perbankan Syariah di Indonesia," *Jurnal Pendidikan Ekonomi Akuntansi* 11, no. 2 (2023): 78–87.

² OJK, "Statistik Perbankan Syariah," *OJK*, no. January (2025), [https://ojk.go.id/id/kanal/syariah/data-dan-statistik/statistik-perbankan-syariah/Documents/Pages/Statistik-Perbankan-Syariah---Januari-2025/STATISTIK PERBANKAN SYARIAH - JANUARI 2025.pdf](https://ojk.go.id/id/kanal/syariah/data-dan-statistik/statistik-perbankan-syariah/Documents/Pages/Statistik-Perbankan-Syariah---Januari-2025/STATISTIK_PERBANKAN_SYARIAH - JANUARI 2025.pdf).

³ (Laporan Tahunan BSI, 2025)

⁴ St Asmayaturrafaah, Dony Burhan, and Noor Hasan, "Strategi Mengatasi Pembiayaan Bermasalah Dengan Akad Murabahah Pada BSI Kcp. Trunojoyo," *Jurnal Tabarru' : Islamic Banking and Finance* 6, no. November (2023): 685–97, [https://doi.org/https://doi.org/10.25299/jtb.2023.vol6\(2\).15226](https://doi.org/https://doi.org/10.25299/jtb.2023.vol6(2).15226).

⁵ Laporan Tahunan BRI, 2025

analyzed using a game theory approach, particularly in understanding how both banks determine optimal strategies in an increasingly competitive environment.

The comparison of strategies between Bank Syariah Indonesia (BSI) and Bank Rakyat Indonesia (BRI) is essential to examine, as both represent two distinct business models within Indonesia's banking industry, namely Islamic banking and conventional banking. These differences not only reflect variations in operational approaches but also indicate potential imbalances in efficiency, profitability, and intermediation functions that may affect the overall stability of the financial system. Previous studies, such as Revita,⁶ suggest that BSI tends to emphasize stability and scale-based efficiency through financing schemes such as murabahah. In contrast, BRI is more oriented toward growth through aggressive interest-based credit expansion, particularly in the MSME sector, although such strategies may increase credit risk exposure.⁷ This condition creates dynamic strategic interactions, making it necessary to apply a structured analytical approach to determine the most optimal and sustainable strategies.

According to Saad Azmat, Competition between Islamic and conventional banks is not solely determined by each institution's internal performance but also by how each bank responds to the strategies adopted by its competitors. Decisions regarding financing schemes, operational efficiency, market expansion, and risk management constitute strategic choices that collectively shape competitive positioning within the banking industry. Consequently, every strategic action taken by one bank influences the opportunities and responses available to competing banks, creating a dynamic process of strategic interaction.⁸

In this context, the competition between Bank Syariah Indonesia (BSI) and Bank Rakyat Indonesia (BRI) extends beyond the distinction between Islamic and conventional banking models, as it also reflects strategic interdependence in decision-making. BSI seeks to maintain its competitive advantage through relatively stable and low-risk murabahah financing, whereas BRI emphasizes interest-based lending to achieve more aggressive market expansion and profitability.⁹ The effectiveness of each bank's strategy is therefore influenced not only by its own decisions but also by the strategic responses of its competitor in terms of market share, operational efficiency, and financial performance. Such strategic interdependence corresponds to the fundamental premise of Game Theory, which assumes that the outcome obtained by each player depends on the decisions made by other players. Therefore, Game Theory provides an appropriate analytical framework for examining the competitive strategies of both banks and identifying the equilibrium strategies that are most likely to emerge in a dynamic banking environment.¹⁰

⁶ Anggun Okta Fitri Revita Pratama Putri, "Analisis Kualitatif Atas Kontribusi Perbankan Syariah Terhadap Stabilitas: Studi Kasus Bank Syariah Indonesia (BSI)," *Jurnal Bersama Ilmu Ekonomi* 1, no. 2 (2025): 121–28, <https://doi.org/10.55123/ekonom.v1i2.184>.

⁷ Neng Rosinawati, "Etika Bisnis Syariah dalam Tata Kelola Fintech Perbankan Digital: Studi Kasus Bank Aladn Syariah," *Scripta Economica: Journal of Economics, Management, and Accounting* 1, no. 3 (2026): 193–201, <https://doi.org/https://doi.org/10.65310/ezcxpj04>.

⁸ Saad Azmat, "Islamic Banking, Costly Religiosity and Competition," *The Journal of Financial Research* XLIII, no. 2 (2020): 263–303, <https://doi.org/10.1111/jfir.12207>.

⁹ Risanda Alirastra Budiantoro, "Is The Marger Effective For Indonesian Islamic Banks?," *Share Jurnal Ekonomi dan Keuangan Islam* 13, no. 2 (2024): 636–63, <https://doi.org/10.22373/share.v13i2.22907>.

¹⁰ Damla Yalçiner Çal, "The Strategic Role of Game Theory in Financial Markets," *Research and Design* 2, no. 2 (2025): 1–19, <https://doi.org/10.17515/rede2025-009ec0904rs>.

These phenomena can be explained using a game theory approach, as they involve interactions between rational entities in a competitive environment. In particular, the non-cooperative game model developed by John Nash through the concept of Nash Equilibrium is highly relevant in explaining how each bank determines its optimal strategy by considering the actions of its competitor. In this equilibrium condition, no player can improve its payoff unilaterally without altering the strategy of the other player.¹¹ Furthermore, the structural differences between BSI and BRI reflect the characteristics of a symmetric game, where each player possesses different resources, objectives, and cost structures. Therefore, the application of game theory is highly relevant for identifying optimal strategies and understanding the dynamics of competitive equilibrium in an increasingly complex banking industry¹².

Game theory is a fundamental approach in economics used to analyze strategic interactions among economic agents in competitive environments¹³. In simple terms, it can be understood as a decision-making framework involving multiple parties whose choices influence one another.¹⁴ The concept of game theory was first introduced by Émile Borel in 1921 and later developed by John von Neumann and Oskar Morgenstern through their seminal work *Theory of Games and Economic Behavior*, which emphasizes that the decision of one actor depends on the actions of others.¹⁵ Within this framework, economic agents are assumed to behave rationally in order to maximize their utility or profit.

The development of this theory was further strengthened by the concept of Nash Equilibrium proposed by John Nash. This concept explains that equilibrium is achieved when no player can improve their payoff by unilaterally changing their strategy.¹⁶ In other words, a player's optimal decision depends on the strategies chosen by others, creating interdependence in decision-making.

In empirical research, game theory has been widely applied to analyze competitive dynamics across various sectors, including the financial industry. Bhayangkara and Rakhman demonstrate that the application of game theory in finance can help design policies that shape incentive structures and influence strategic choices.¹⁷ Meanwhile, Juita concludes that game theory plays a significant role in financial decision-making in the modern era.¹⁸ Similarly, Tomi and Zefriyenni emphasize that this approach is capable of systematically explaining strategic interactions in complex and uncertain environments.

¹¹ Nok Ella Chen, "A Description of Game Theory," *Journal of Education, Humanities and Social Sciences* 2 (2022): 199–205.

¹² Alif Dzaki et al., "Pemanfaatan Metode Permainan (Game Theory) dalam Optimalisasi Strategi: Systematic Literature Review," *Josemb (Journal of Science Education and Management Business)* 5, no. 1 (2026): 426–33.

¹³ Chen, "A Description of Game Theory."

¹⁴ Juita, "Sistematis Literatur Review Penerapan Teori Permainan (Game Theory) dalam Pengambilan Keputusan Keuangan," *Journal of Science Education and Management Business (JOSEAMB)* 5, no. 1 (2026): 451–60, <https://rcf-indonesia.org/jurnal/index.php/JOSEAMB/index>.

¹⁵ Afifah Nabila Nasution, Ahmadsyah Fauzian Rambe, and Lilis Suryani Nasution, "Systematic Literature Review: Application of Game Theory in Promotional Strategies to Optimize Product Sales," *AL-Aqlu*, 2025, 56–65, <https://doi.org/https://doi.org/10.59896/aqlu.v3i1.132>.

¹⁶ Kristianus Pramudito Isyunanda, "Pemanfaatan Law and Economics Sebagai Analisis Hukum di Indonesia," *Mimbar Hukum Universitas Gadjah Mada* 3, no. 1 (2022), discovery.ucl.ac.uk.

¹⁷ Yulius Bhayangkara and Sitti Rakhman, "Kebijakan Pengembangan SDM Kepialangan Asuransi di Indonesia: Perspektif Teori Kritis dan Game Theory," *Jurnal Ilmu Manajemen Indonesia* 3, no. 2 (2025): 95–103, <https://doi.org/https://doi.org/10.55123/ekonom.v1i2.184>.

¹⁸ Juita, "Sistematis Literatur Review Penerapan Teori Permainan (Game Theory) dalam Pengambilan Keputusan Keuangan."

Therefore, the use of game theory in this study is highly relevant for understanding the competitive relationship between Islamic and conventional banks with different characteristics.¹⁹ In the banking context, the application of game theory enables the analysis of strategies associated with key financial performance indicators, such as profitability (Return on Equity/ROE), operational efficiency (BOPO), and intermediation functions (Financing to Deposit Ratio/FDR for Islamic banks and Loan to Deposit Ratio/LDR for conventional banks). These indicators represent the core performance of banks in generating profits, managing costs efficiently, and allocating financing or credit effectively.²⁰

This study is important because most previous research has primarily focused on MSMEs or simple service industries, such as coffee shops Enjeli, and has not extensively examined strategic interactions among large financial institutions.²¹ Moreover, there remains a gap in the empirical literature that specifically compares competitive strategies between Islamic and conventional banks in Indonesia using a quantitative game theory approach. Most existing studies are still descriptive or partial in nature, and therefore have not fully explained how strategic interactions among banks can lead to equilibrium outcomes or even potential market dominance. For instance, Putra²² only compared banking sector health without analyzing the underlying strategic behavior, while Rosinawati²³ focused primarily on business ethics without linking it to competitive dynamics. In contrast, from a game theory perspective, each decision made by one bank directly influences the outcomes of the other, particularly in key performance indicators such as ROE, BOPO, and intermediation ratios (FDR/LDR). Therefore, this study contributes significantly by integrating game theory, financial performance analysis, and the competitive context between BSI and BRI.

Thus, this research holds substantial importance both academically and practically. Academically, it aims to fill the gap in the literature related to competitive analysis among banks using a quantitative game theory approach. Practically, the findings are expected to provide a rational and data-driven basis for strategic decision-making among banking industry players. This study seeks to analyze the competitive strategies between BSI and BRI using a game theory approach based on financial indicators. Furthermore, it is expected to contribute to the formulation of a healthy and sustainable competition model, particularly in response to the evolving dynamics of the financial industry. Without a comprehensive analysis of this nature, there is a risk that competition may lead to inefficiency, market imbalance, or even a decline in overall industry

¹⁹ Zefriyenni Tomi Indra, "Analisis Dinamika Strategi Kooperatif dan Non-Kooperatif Menggunakan Model Game Theory pada Lingkungan Kompetitif," *Journal of Science Education and Management Business (Joseamb)* 5, no. 1 (2026): 156–62, <https://ref-indonesia.org/jurnal/index.php/JOSEAMB/article/view/869/559>.

²⁰ Suryani Sri Lestari Berliana Dwi Angraeni, Saniman Widodo, "Analisis Pengaruh NPF, FDR, BOPO dan DER terhadap ROE Pada Bank Umum Syariah di Indonesia Periode 2016- 2020," *Jurnal Masharif Al-Syariah: Jurnal Ekonomi dan Perbankan Syariah* 7, no. 30 (2022): 128–55, <https://doi.org/http://dx.doi.org/10.30651/jms.v7i1.10032>.

²¹ Desta Cahaya Putri Enjeli, "Analisis Strategi Persaingan Cafe di Tuban dengan Metode Game Theory (Teori Permainan)," *Math Unesa : Jurnal Ilmiah Matematika* 10, no. 02 (2022): 344–48.

²² Oktapinanda Putra, "Studi Komparatif Tingkat Kesehatan Bank Nasional dan Bank Swasta di Indonesia," *Jurnal Manajemen Terapan dan Keuangan (Mankeu)* 11, no. 01 (2022): 91–104, <https://doi.org/https://doi.org/10.22437/jmk.v11i01.17271>.

²³ Rosinawati, "Etika Bisnis Syariah dalam Tata Kelola Fintech Perbankan Digital : Studi Kasus Bank Aladn Syariah."

performance.

METHOD

This study employs a descriptive-quantitative approach by integrating secondary data in the form of financial statements with mathematical analysis based on game theory using POM-QM for Windows Version 5. The analysis is conducted under the assumption of a two-person zero-sum game. This approach is selected because the study aims to describe competitive strategies while determining optimal strategies through the construction of a payoff matrix. Descriptive research is intended to systematically and factually explain phenomena,²⁴ while the quantitative approach is used to analyze strategic interactions among economic agents through numerical methods.²⁵ In this context, the analysis focuses on key financial performance indicators such as profitability, efficiency, and intermediation, which are essential in determining optimal decision-making within the framework of operations research. Therefore, the application of game theory in this study aims to identify competitive strategies that lead to an optimal equilibrium in the banking industry. The objects of this study are two banks with different characteristics, namely Bank Syariah Indonesia (BSI) as the largest Islamic bank with a focus on stability and efficiency, and Bank Rakyat Indonesia (BRI) as a conventional bank emphasizing credit expansion and market growth. These differences reflect the condition of asymmetric players, making them suitable for analysis using a game theory approach. The study covers the 2025 period, utilizing annual financial reports and official publications from both banks. The research process includes data collection, data processing, and the construction of a payoff matrix to determine optimal strategies.

The type of data used in this study is secondary data obtained from the 2025 annual financial reports, official bank publications, statistical data from the Otoritas Jasa Keuangan (OJK), and relevant academic literature such as international journals, textbooks, and previous studies.²⁶ These data are used to derive financial performance indicators, including Return on Equity (ROE) as a proxy for profitability, Operating Expenses to Operating Income (BOPO) as an efficiency indicator, and intermediation ratios (Financing to Deposit Ratio/FDR for Islamic banks and Loan to Deposit Ratio/LDR for conventional banks).²⁷ Data collection techniques are conducted through documentation studies and literature review. Documentation studies involve collecting financial statements and official publications from the respective banks, while literature review is used to establish the theoretical foundation and support the analytical framework of the study. The research variables are structured based on the strategic behavior of each bank, where Bank Syariah Indonesia (BSI) acts as Player A and Bank Rakyat Indonesia (BRI) as Player B. Each player is assumed to have three main strategies, which form the basis for constructing the payoff matrix in the game theory analysis. The variables in this study are structured based on the strategies of both banks. Each player, Bank Syariah Indonesia

²⁴ Susniwati Sukorina, Diana, Ardiansyah, "Good Governance di Era Digital: Studi Kasus Implementasi e-Government di Indonesia," *Pandita: Interdisciplinary Journal of Public Affairs* 8, no. 1 (2025): 220–34, <https://doi.org/https://doi.org/10.61332/ijpa.v8i1.277>.

²⁵ Murjani, "Prosedur Penelitian Kuantitatif," *Cross-Border* 5, no. 1 (2022): 687–713.

²⁶ OJK, "Statistik Perbankan Syariah."

²⁷ Berliana Dwi Angraeni, Saniman Widodo, "Analisis Pengaruh NPF, FDR, BOPO dan DER Terhadap ROE pada Bank Umum Syariah di Indonesia Periode 2016- 2020."

(Player A) and Bank Rakyat Indonesia (Player B), has three main strategies, which serve as the basis for constructing the payoff matrix in the game theory analysis.

Tabel 1. Player Strategies

Player	Code	Strategy	Deskripsion
Bank Syariah Indonesia (Player A)	A1	Profit Strategy	A strategy focused on increasing Return on Equity (ROE) through optimizing financing margins based on <i>murabahah</i> contracts, which provide fixed and stable returns.
	A2	Efficiency Strategy	A strategy aimed at controlling operational costs to reduce the BOPO ratio and improve efficiency through economies of scale.
	A3	Intermediation Strategy (Murabahah)	A strategy that emphasizes optimizing financing distribution through the Financing to Deposit Ratio (FDR), using an asset-based financing approach with relatively controlled risk.
Bank Rakyat Indonesia (Player B)	B1	Growth Strategy	A strategy focused on expanding interest-based lending, particularly in the MSME sector, to increase credit volume and market share.
	B2	Efficiency Adjustment Strategy	A strategy aimed at improving operational efficiency by reducing the BOPO ratio and optimizing technology and network utilization.
	B3	Intermediation Strategy (Interest-Based Lending)	A strategy that focuses on optimizing credit distribution through the Loan to Deposit Ratio (LDR), with flexible interest rate determination that enhances competitiveness but carries relatively higher credit risk

Source : Annual report BSI & BRI 2025

The quantitative data in this study are used to construct payoff values representing the relative advantages between banks within a game theory framework. The analysis applies a two-person zero-sum game approach, where one player's gain reflects the other's loss. Bank Syariah Indonesia (BSI) as Player A adopts profit, efficiency, and intermediation strategies, while Bank Rakyat Indonesia (BRI) as Player B focuses on growth, efficiency, and interest-based intermediation strategies. A 3×3 payoff matrix is then constructed based on differences in financial performance, measured by Return on Equity (ROE), BOPO, and intermediation ratios (FDR for BSI and LDR for BRI). Optimal strategies are determined using the Maximin approach for BSI and the Minimax approach for BRI. The value of the game is subsequently assessed to identify whether equilibrium occurs through a pure strategy (saddle point) or a mixed strategy. Finally, the results are interpreted to explain competitive dynamics and identify optimal strategies, providing insights into how strategic interactions

between Islamic and conventional banks shape outcomes in a competitive financial environment.

RESULTS AND DISCUSSION

Research Findings

The analysis results, based on a comprehensive examination of the financial statements of Bank Syariah Indonesia (BRIS) and Bank Rakyat Indonesia (BBRI), indicate that both banks have three main strategies as follows:

Tabel 2. Database Strategies

Player	Code	Strategy	Proof
Bank Syariah Indonesia (Player A)	A1	Profit Strategy	Following the merger period of 2021–2024, Bank Syariah Indonesia (BSI) implemented a strategy explicitly focused on profitability, as reflected in the consistent increase in its Return on Equity (ROE), from 11.18% in 2020 to 13.71% in 2021, and reaching 17.77% in 2024, before slightly declining to 16.85% in 2025. This performance indicates BSI's ability to optimize earnings, largely supported by its dominant use of <i>murabahah</i> -based financing, which provides fixed margins and stable income streams.
	A2	Efficiency Strategy	In terms of efficiency, BSI pursued cost-control strategies that successfully reduced its Operating Expenses to Operating Income (BOPO) ratio from 80.46% to 69.93% during the 2021–2024 period. However, in 2025, the BOPO ratio increased again to 83.74%, suggesting rising operational costs during expansion phases. Despite this fluctuation, the earlier efficiency gains highlight the bank's efforts to improve operational performance through scale and cost management.
	A3	Intermediation Strategy (Murabahah)	From an intermediation perspective, BSI actively expanded its financing portfolio and optimized fund distribution, as evidenced by the increase in its Financing to Deposit Ratio (FDR) from 73.39% to 84.97% over the 2021–2024 period. In 2025, the FDR remained stable within the range of approximately 75%–85 or 84%, indicating a well-maintained balance between liquidity and financing activities. This intermediation strategy is closely linked

			to <i>murabahah</i> financing, where asset-based transactions support controlled risk exposure while ensuring steady financing growth.
Bank Rakyat Indonesia (Player B)	B1	Growth Strategy	Following the 2021–2025 period, Bank Rakyat Indonesia (BRI) implemented strategies focused on profitability, as reflected in its consistently strong Return on Equity (ROE), which remained at a high level in the range of approximately 18%–22% during 2021–2024, before stabilizing at around 18.86% in 2025. This indicates BRI's ability to generate high returns through its interest-based lending model.
	B2	Efficiency Adjustment Strategy	In terms of efficiency, BRI maintained strong operational cost control, as shown by its BOPO ratio, which consistently remained in the range of 68%–72% during 2021–2024 and was recorded at approximately 71.50% in 2025. This reflects BRI's high efficiency level, supported by its large-scale operations and optimized cost structure
	B3	Intermediation Strategy (Interest-Based Lending)	BRI strengthened its intermediation function through aggressive credit expansion, as indicated by its Loan to Deposit Ratio (LDR), which was maintained within the range of approximately 85%–92% during 2021–2024 and remained stable 91.4% in 2025. This demonstrates BRI's strong capability in channeling funds into credit, supported by the flexibility of its interest-based lending system, which allows for adaptive pricing but also involves relatively higher credit risk.

Source : Annual report BSI & BRI 2025

Payoff Matriks

The payoff values are derived from a comprehensive analysis of the 2025 financial statements, based on the percentage changes in performance resulting from the strategies implemented by Bank Syariah Indonesia (Player A) and Bank Rakyat Indonesia (Player B). A positive (+) value indicates a relative advantage for BSI, while a negative (–) value indicates that BRI performs better.

The financial data for each player are presented as follows:

Tabel 3. Indicators Strategic

Player	Code	Strategy	Indicator	Value (%)
Bank	A1	Profit Strategy	ROE	16.85
Syariah	A2	Efficiency Strategy	BOPO	83.74
Indonesia	A3	Intermediation Strategy	FDR	84

(Player A)		(Murabahah)		
Bank Rakyat Indonesia	B1	Growth Strategy	ROE	18.86
	B2	Efficiency Adjustment Strategy	BOPO	71.5
(Player B)	B3	Intermediation Strategy (Interest-Based Lending)	LDR	91.4

Source : Annual report BSI & BRI 2025

The results of the comparison of the three strategies are as follows:

- ROE difference = $16.85 - 18.86 = -2.01$ (BSI lose, BRI win)
- BOPO difference = $71.5 - 83.74 = -12.24$ (BSI lose, BRI win)
- Intermediation difference = $84 : 91.4 =$ (BSI win, because in the range of 75%-85%)

Tabel 4. Indicators Payoff Matriks

BSI/BRI	B1 (Growth)	B2 (Efficiency)	B3 (Intermediation)
A1 (Profit)	-2	-2	-1
A2 (Efficiency)	-2	-2	-1
A3 (Intermediation)	1	0	+1

The results of data processing using POM-QM V5 are as follows :

Figure 1. Game Theory result

	B1 (Growth)	B2 (Efficiency)	B3 (Intermediation)	Row Mix
A1 (Profit)	-2	-2	-1	0
A2 (Efficiency)	-2	-2	0	0
A3 (Murabahah)	1	0	1	1
Column Mix-->	0	1	0	
Value of game (to row)	0			

Source : POM-QM V5 game theory output

The game theory results indicate that the optimal strategy for Bank Syariah Indonesia (Player A) is A3 (Intermediation/Murabahah) with a probability of 1 (pure strategy), while Bank Rakyat Indonesia (Player B) selects B2 (Efficiency) as its optimal response. The value of the game is 0, indicating that neither player gains a dominant absolute advantage, thus reaching an equilibrium condition. This implies that BSI maximizes its strength through stable *murabahah*-based intermediation, while BRI strategically responds by improving operational efficiency. This interaction reflects a competitive equilibrium where each bank adopts its best strategy given the opponent's choice.

Figure 2. Row's Expected Values

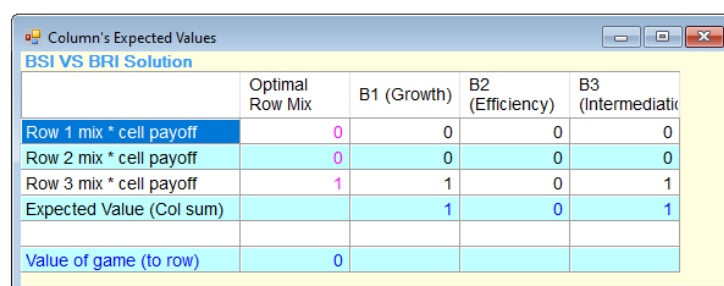
	Col mix 1 * cell payoff	Col mix 2 * cell payoff	Col mix 3 * cell payoff	Expected Value (row sum)
Column's Optimal Mix	0	1	0	
A1 (Profit)	0	-2	0	-2
A2 (Efficiency)	0	-2	0	-2
A3 (Murabahah)	0	0	0	0
Value of game (to row)				0

Source : POM-QM V5 game theory output

The Row's Expected Values output indicates that the optimal strategy for Bank Rakyat Indonesia (Player B) is to fully choose B2 (Efficiency) with a

probability of 1. As a result, the expected payoff for each strategy of Bank Syariah Indonesia (Player A) is calculated based on this column. The results show that A1 (Profit) and A2 (Efficiency) yield expected values of -2 , while A3 (Murabahah/Intermediation) yields 0 , which is the highest among the available options. This confirms that the optimal strategy for BSI is A3 (Intermediation/Murabahah), as it minimizes losses and reaches a break-even point. The value of the game is 0 , indicating an equilibrium where neither player gains a net advantage, but both adopt optimal strategies in response to each other.

Figure 3. Column's Expected Values

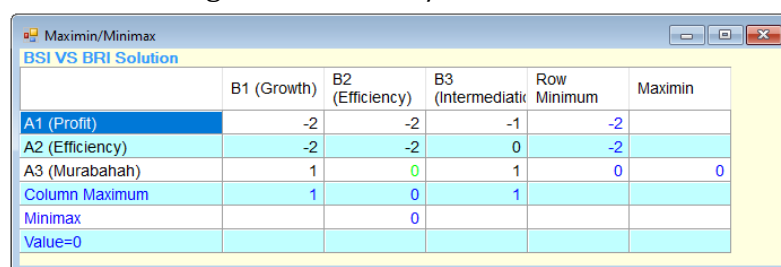


	Optimal Row Mix	B1 (Growth)	B2 (Efficiency)	B3 (Intermediation)
Row 1 mix * cell payoff	0	0	0	0
Row 2 mix * cell payoff	0	0	0	0
Row 3 mix * cell payoff	1	1	0	1
Expected Value (Col sum)		1	0	1
Value of game (to row)	0			

Source : POM-QM V5 game theory output

The *Column's Expected Values* output indicates that the optimal strategy for Bank Syariah Indonesia (Player A) is to fully choose A3 (Intermediation/Murabahah) with a probability of 1. Consequently, the expected values for each strategy of Bank Rakyat Indonesia (Player B) are calculated based on this row. The results show that if BRI chooses B1 (Growth) or B3 (Intermediation), the payoff is 1 (beneficial for BSI), while choosing B2 (Efficiency) results in a payoff of 0 . Since BRI acts rationally to minimize losses, its optimal strategy is B2 (Efficiency), which yields the lowest payoff for BSI. The value of the game remains 0 , confirming an equilibrium where BSI commits to murabahah-based intermediation, while BRI strategically responds through operational efficiency to neutralize BSI's advantage.

Figure 4. Maximin/Minimax



	B1 (Growth)	B2 (Efficiency)	B3 (Intermediation)	Row Minimum	Maximin
A1 (Profit)	-2	-2	-1	-2	
A2 (Efficiency)	-2	-2	0	-2	
A3 (Murabahah)	1	0	1	0	
Column Maximum	1	0	1		
Minimax		0			
Value=0					

Source : POM-QM V5 game theory output

The *Maximin–Minimax* analysis indicates that the optimal strategy for Bank Syariah Indonesia (Player A) is A3 (Intermediation/Murabahah), as it has the highest row minimum value of 0 , compared to A1 and A2 which both have -2 . On the other hand, Bank Rakyat Indonesia (Player B) selects B2 (Efficiency) since it has the lowest column maximum value of 0 , thereby minimizing potential losses. Since the maximin equals the minimax (both equal to 0), a saddle point exists at the strategy combination (A3, B2), indicating that equilibrium is achieved in a pure strategy. The value of the game is 0 , meaning neither player gains a net advantage, but both adopt optimal strategies rationally in response to competition.

Figure 5. Result

BSI VS BRI Solution	
ROW	
A1 (Profit)	0
A2 (Efficiency)	0
A3 (Murabahah)	1
COLUMN	
B1 (Growth)	0
B2 (Efficiency)	1
B3 (Intermediation)	0

Source : POM-QM V5 game theory output

The *results in list form* confirm that the optimal strategies in the game between Bank Syariah Indonesia (BSI) and Bank Rakyat Indonesia (BRI) are A3 (Murabahah/Intermediation) for BSI with a probability of 1, and B2 (Efficiency) for BRI with a probability of 1. The other strategies have values of 0, indicating they are not chosen in equilibrium. This reflects a pure strategy equilibrium, where BSI maximizes its advantage through stable murabahah-based intermediation, while BRI responds rationally by enhancing operational efficiency. This strategic combination leads to a stable equilibrium with no incentive for either player to deviate.

Discussion

The game theory analysis reveals that the Nash equilibrium is achieved through the combination of Strategy A3 (Islamic Intermediation Financing) implemented by Bank Syariah Indonesia (BSI) and Strategy B2 (Operational Efficiency) adopted by Bank Rakyat Indonesia (BRI), producing a game value of zero. This equilibrium indicates that neither bank possesses absolute strategic dominance; instead, each institution adopts the strategy that best aligns with its business model, financial structure, and intermediation mechanism. Empirically, BRI outperforms BSI in terms of profitability and operational efficiency. BRI records a Return on Equity (ROE) of 18.86%, exceeding BSI's 16.85%, while its Operating Expenses to Operating Income (BOPO) ratio of 71.5% is substantially lower than BSI's 83.74%. These indicators explain why profit-oriented and efficiency-oriented strategies generate negative payoffs for BSI within the game matrix. The interest-based lending system allows greater pricing flexibility, faster loan expansion, and higher short-term profit margins, thereby improving operational efficiency. Nevertheless, these financial advantages are accompanied by greater intermediation risk. BRI's Loan-to-Deposit Ratio (LDR) reaches 91.4%, exceeding the generally accepted optimal range, suggesting a more aggressive lending strategy that potentially exposes the bank to higher liquidity and credit risks. Therefore, superior profitability under the interest-based system is associated with increased vulnerability to financial risk.

Conversely, BSI demonstrates superior performance in intermediation stability and risk management. Its Financing-to-Deposit Ratio (FDR) of 84% falls within the optimal regulatory range (75–85%), indicating a healthier balance between financing expansion and liquidity preservation. This finding suggests

that Islamic financing provides a more sustainable intermediation framework than conventional interest-based lending. This findings Aligns with Hammami and Yachine, this advantage is not solely attributable to murabahah financing but also reflects the broader characteristics of Islamic contracts, including mudharabah, musyarakah, *ijarah*, and other Sharia-compliant partnership arrangements. These contracts are fundamentally built upon profit-and-loss sharing, asset-backed financing, and risk-sharing principles. Unlike the interest-based system, where financial risk is largely transferred to borrowers through predetermined interest obligations regardless of business performance, Islamic contracts distribute risks proportionally among contracting parties according to their respective contributions. Consequently, Islamic financing offers stronger protection against excessive leverage, speculative behavior, and moral hazard while enhancing long-term financial stability.²⁸ Within the game-theoretical framework, these characteristics are reflected in Strategy A3, where Islamic intermediation continues to generate positive payoffs even when competing against BRI's efficiency-oriented strategy. This finding suggests that the primary strength of Islamic financing lies not in maximizing short-term profitability but in preserving sustainable intermediation, stable income generation, and long-term banking resilience.

From an ontological perspective, this study demonstrates that Islamic and conventional banking represent fundamentally different conceptions of financial intermediation. Conventional banking conceptualizes credit primarily as a financial commodity traded through interest-bearing contracts. In contrast, Islamic banking treats financing as participation in real economic activities supported by tangible assets and productive business transactions.²⁹ Therefore, Islamic intermediation is not merely an alternative financing technique but represents a fundamentally different financial paradigm grounded in asset-backed transactions, risk-sharing mechanisms, and ethical economic principles. The superiority of Strategy A3 reflects these underlying philosophical distinctions rather than merely differences in financial performance.

From an axiological perspective, the findings suggest that banking performance should not be evaluated solely through profitability and operational efficiency. Although interest-based banking generates higher ROE and lower operating costs, Islamic financing through murabahah, mudharabah, musyarakah, and other Sharia-compliant contracts creates greater value by promoting financial stability, equitable risk allocation, and sustainable intermediation.³⁰ This conclusion is empirically supported by BSI's optimal FDR (84%), compared with BRI's relatively high LDR (91.4%), indicating lower liquidity risk within the Islamic banking model. Accordingly, the value generated by Islamic banking extends beyond financial returns to include systemic resilience, equitable risk sharing, ethical finance, and long-term economic sustainability. Rather than claiming universal superiority over interest-based banking, the evidence suggests that Islamic financing is more robust in managing

²⁸ Yacine Hammami and Youssef Riahi, "Leverage and Balance-Sheet Size: A Comparative Study between Islamic and Conventional Banks," *Applied Economics*, (2021): 1–12, <https://doi.org/10.1080/00036846.2021.1912283>.

²⁹ Abderazak Bakhouch, Teheni El, and Mohammad Alshiab, "Heliyon Does Islamicity Matter for the Stability of Islamic Banks in Dual Banking Systems?," *Heliyon* 8, no. 4 (2022): e09245, <https://doi.org/10.1016/j.heliyon.2022.e09245>.

³⁰ Alimshan Faizulayev, "Empirical Examination of ESG and Fintech Factors on Financial Sustainability: A Comparative Study of Islamic vs Conventional Banks in Islamic Finance-Oriented Countries," *AJAR* 11, no. 1 (2026): 2–21, <https://doi.org/10.1108/AJAR-09-2024-0382>.

banking risk and maintaining sustainable intermediation, whereas conventional interest-based banking remains comparatively stronger in short-term profitability and operational efficiency.³¹ This distinction explains why the Nash equilibrium emerges between Islamic intermediation (BSI) and conventional efficiency (BRI), with each institution maximizing its comparative advantage under different banking paradigms.

This study provides empirical, theoretical, and methodological contributions to the Islamic banking literature by demonstrating that competition between Islamic and conventional banks should not be evaluated solely in terms of profitability and operational efficiency but also through the perspectives of intermediation stability and risk management. Unlike previous studies that primarily compare financial performance using isolated financial ratios, this research positions the strategic interaction between Bank Syariah Indonesia and Bank Rakyat Indonesia within a game theory framework, thereby explaining how each institution optimizes its comparative advantage under different banking paradigms. Furthermore, the findings extend the existing literature by showing that the competitive advantage of Islamic banking is not limited to murabahah financing but also derives from the broader characteristics of mudharabah, musyarakah, ijarah, and other Sharia-compliant contracts, which emphasize asset-backed financing, profit-and-loss sharing, and risk-sharing principles.³² These characteristics provide a stronger foundation for financial stability, prudent risk management, and sustainable financial intermediation than conventional interest-based lending, thereby enriching the theoretical discussion on strategic competition in dual banking systems.³³

CONCLUSION

The game theory analysis reveals that the Nash equilibrium is achieved when Bank Syariah Indonesia (BSI) adopts an Islamic intermediation strategy represented by murabahah financing, while Bank Rakyat Indonesia (BRI) implements an operational efficiency strategy, resulting in a game value of zero. This equilibrium indicates that neither bank possesses absolute strategic dominance; instead, each maximizes its comparative advantage according to its business model. Empirically, BRI demonstrates superior short-term profitability and operational efficiency, as reflected by its higher ROE (18.86%) and lower BOPO (71.5%) than BSI. However, BSI exhibits stronger intermediation stability, supported by an optimal FDR of 84%, indicating healthier liquidity management and lower intermediation risk. These findings suggest that the competitive advantage of Islamic banking extends beyond murabahah to other Sharia-compliant contracts, including mudharabah, musyarakah, ijarah, and partnership-based financing, which are founded on asset-backed financing, profit-and-loss sharing, and equitable risk-sharing principles. Consequently, Islamic financing offers greater resilience in liquidity management, risk mitigation, and long-term financial sustainability, whereas interest-based

³¹ Mustafa Raza Rabbani et al., "Exploring the Role of Islamic Fintech in Combating the Aftershocks of COVID-19 : The Open Social Innovation of the Islamic Financial System," *Journal of Open Innovation* 7, no. 136 (2021): 1–19, <https://doi.org/10.3390/joitmc7020136>.

³² Mahesa Dayanti, "Comparison Of Capital Structure , Profitability , And Third-Party Funds (DPK) Between Bank Bri And Bank Syariah Indonesia : A Comparative Analysis," *Al-Kharaj: Journal of Islamic Economic and Business* 6, no. 1 (2024): 113–29, <https://doi.org/10.24256/kharaj.v6i1.4934>.

³³ Ayi Ahadiat et al., "Analysis of Strategic Group of State-Owned Banks VS Private- Owned Banks : Application of Game Theory," *ICEBE*, 2021, <https://doi.org/10.4108/cai.1-10-2020.2305003>.

banking remains more competitive in achieving short-term profitability and operational efficiency. Therefore, the strategic competition between Islamic and conventional banking reflects a trade-off between financial performance and sustainable risk management rather than absolute superiority.

The recommendation is BSI should strengthen its comparative advantage by expanding productive Sharia-compliant financing, particularly through murabahah, mudharabah, musyarakah, and other partnership-based contracts, while improving operational efficiency to enhance competitiveness without compromising financial stability. Conversely, BRI should maintain its strengths in profitability and efficiency while improving liquidity and credit risk management by maintaining a prudent LDR. Future studies are recommended to employ dynamic or repeated game models, include additional banking risk indicators such as NPF and NPL, and incorporate macroeconomic variables to better capture strategic interactions under changing economic conditions.

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