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EFFICIENCY OF BPRS IN INDONESIA USING A STAGES METHOD - DATA ENVELOPMENT ANALYSIS

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Abstract: The efficiency of BPRS in Indonesia is very important in supporting MSMEs, but the performance of BPRS is often constrained by internal financial conditions and external economic factors, raising concerns about its level of efficiency. This study aims to examine the efficiency of BPRS in Indonesia and the factors that influence it. This study uses a quantitative method with a Two-Stage DEA approach and time series data sourced from financial reports for the period 2014 to 2023. The first-stage analysis shows that BPRS in Indonesia is still in an inefficient condition. In the second stage, the Tobit regression results indicate that ROA, FDR, and NPF significantly affect the efficiency of BPRS in Indonesia, while CAR and BI Rate do not have a significant impact. These findings emphasize the importance of BPRS in improving asset management and risk control to enhance efficiency and strengthen its role in supporting the Islamic financial system.

Keywords: Efficiency; BPRS; DEA; Tobit Regression

Abstrak: *Efisiensi BPRS di Indonesia sangat penting dalam mendukung UMKM, kinerja BPRS seringkali terkendala oleh kondisi keuangan internal dan faktor ekonomi eksternal, yang menimbulkan kekhawatiran terkait tingkat efisiensinya. Penelitian ini bertujuan untuk mengetahui efisiensi BPRS di Indonesia serta faktor-faktor yang memengaruhinya. Penelitian ini menggunakan metode kuantitatif dengan pendekatan Two-Stage DEA dan data time series yang bersumber dari laporan keuangan periode 2014 hingga 2023. Analisis tahap pertama menunjukkan bahwa BPRS di Indonesia masih berada pada kondisi inefisien. Pada tahap kedua, hasil regresi Tobit menunjukkan bahwa ROA, FDR, dan NPF berpengaruh signifikan terhadap efisiensi BPRS di Indonesia, sedangkan CAR dan BI Rate tidak berpengaruh signifikan. Temuan ini menekankan pentingnya bagi BPRS untuk meningkatkan pengelolaan aset dan pengendalian risiko guna memperbaiki efisiensi serta memperkuat perannya dalam mendukung sistem keuangan syariah.*

Kata Kunci: *Efisiensi; BPRS; DEA; Regressi Tobit*

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Introduction

Improving economic welfare through increased business productivity is one of the primary objectives of Islamic banking financing.[1] Financing in this context is typically directed to micro, small, and medium enterprises (MSMEs) in the form of working capital, investment, or expansion of production capacity.[2] Financing for MSMEs has consistently been a focus, with BPRS in Indonesia channeling MSME financing, which has grown from around IDR 2.5 million in 2014 to IDR 9.7 million in 2023. Previous studies have shown that access to Islamic financing significantly contributes to business growth[3]. In addition to its role in empowering society, financing is also the main source of income for Islamic banks, as the funds disbursed generate returns through profit sharing and other Sharia-compliant contracts within a specified period.[4] This is because the core activities of Islamic banks involve mobilizing funds (funding) and distributing them (lending).[5] This dual role of financing supporting community welfare while sustaining bank profitability illustrates the strategic importance of Islamic banking in fostering inclusive economic development.[6]

Islamic banks, as financial institutions operating under sharia principles, play a strategic role in mobilizing public funds in the form of savings and redistributing. In relation to enhancing community welfare, Law No. 21 of 2008 defines BPRS as Islamic banks that do not provide payment system services but play a strategic role in supporting local economic development. Their financing activities are directed toward empowering individuals and businesses.[7] However, in practice, this role does not always operate optimally because it is faced with several structural and operational challenges. Although Islamic banks are relatively more resilient to interest rate shocks than conventional banks, risk management weaknesses and limited product diversification often hamper the effectiveness of the intermediary function.[8]

To support the performance of BPRS, one of the indicators used is its efficiency level.[9] Efficiency is one of the important parameters in assessing the performance of a

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[1] Rici Novika, "Pengaruh Pembiayaan Mudharabah Terhadap Peningkatan Keberhasilan Usaha Nasabah Pada PT. BPR Syariah Haji Miskin: Perspekti Nasabah," *Tamwil* 5, no. 2 (2020): 103.

[2] Alea Casta Supriyadi Et Al., "Peran Bank Dalam Pembiayaan UMKM Dan Dampaknya Terhadap Perekonomian Lokal," *OPTIMAL: Jurnal Ekonomi Dan Manajemen* 4, no. 2 (2024).

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[4] Wahyu Wastuti, Riris Aishah Prasetyowati, and Ratna Anggraini, "Financing Growth And Bank Risk : Empirical," *FINANSIA : Jurnal Akuntansi Dan Perbankan Syariah* 7, no. 1 (2024): 1.

[5] Muchtar Anshary Hamid Labetubun, et al, *Manajemen Perbankan (Sebuah Tinjauan Teori dan Praktis),* (Bandung: Widina Bhakti Persada, 2021), hal 180.

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[7] Abdul Wahab And Ilma Mahdiya, "Peran Lembaga Keuangan Syariah Terhadap Pertumbuhan UMKM Dalam Revitalisasi Ekonomi Pembangunan Di Indonesia," *Islamadina : Jurnal Pemikiran Islam* 24, no. 1 (2023): 109.

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[9] Fadhil Muhammad Naufal And Achmad Firdaus, "Analisis Efisiensi Bank Pembiayaan Rakyat Syariah (BPRS) Wilayah Jabodetabek Dengan Pendekatan Two Stage Data Envelopment Analysis (DEA)," *Equilibrium: Jurnal Ekonomi Syariah* 5, no. 2 (2018): 196.

company or organization, which refers to the ability to maximize output with available inputs.[10] Efficiency measurement is an important aspect in evaluating banking performance because efficiency in the banking sector is used as an indicator to assess whether the performance of a bank has progressed or decreased.[11] If a bank reaches an optimal level of efficiency, then the bank can be considered to have good performance or is experiencing development, and vice versa.[12] According to previous research, banks are required to have a healthy or good performance, which can be seen from the level of efficiency achieved.[13] In addition, economic improvement can be measured by increasing efficiency.[14] In terms of competitiveness, banks that can utilize their resources or inputs more efficiently to generate outputs are considered to have an advantage in enhancing their capacity to provide financing for MSMEs.[15] Bank efficiency is affected by managerial capability, which can be assessed using the cost-to-income ratio.[16]

The literature on efficiency in financial institutions has grown rapidly and has been the object of many studies. However, most of these studies focus more on measuring efficiency than on analyzing the factors that influence the level of efficiency. Studies on these factors are still relatively limited in number. In response to these limitations, a research approach known as Two Stage Data Envelopment Analysis (DEA) emerged. This approach consists of two main stages. In the first stage, efficiency measurement is conducted using the DEA method. Furthermore, the second stage involves analysis to identify factors that influence the efficiency level of financial institutions, which usually uses the Tobit model as an analytical tool. The purpose of this study is to measure the efficiency level of BPRS in Indonesia and see what factors affect efficiency. Based on this description, the hypothesis in this study is as follows:

H0: BPRS in Indonesia is not included in the inefficient level.
H1: BPRS in Indonesia belongs to the efficient level.
H2: CAR affects the efficiency of BPRS in Indonesia
H3: ROA affects the efficiency of BPRS in Indonesia
H4: FDR affects the efficiency of BPRS in Indonesia
H5: NPF affects the efficiency of BPRS in Indonesia
H6: BI rate affects the efficiency of BPRS in Indonesia

[10] Zaenal Abidin , R.Mahelan Prabantarikso , Rhisya Ayu Wardhani, And Endri Endri, "Analysis Of Bank Efficiency Between Conventional Banks And Regional Development Banks In Indonesia," *Journal Of Asian Finance, Economics And Business* 8, no 1 (2021): 741.

[11] Supriyadi, Jaka Darmawan, And Bandarsyah, "Pengaruh Financial Technology (Fintech) Terhadap Profitabilitas Perbankan Di Indonesia," *Prosiding Seminar Nasional Darmajaya*, (2023): 56.

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[16] Irfan Adhityo Dinutistomo And Arief Wibisono Lubis, "MSME Lending And Bank Efficiency: Evidence From Indonesia," *Banks And Bank Systems* 16, no. 3 (2021).

Methods

This research uses quantitative methods with the Two-Stage DEA approach. The data used is secondary data in the form of BPRS financial statements sourced from official publications of the Otoritas Jasa Keuangan (OJK) and the Badan Pusat Statistik (BPS) in the form of time series data for the period 2014-2023. The sampling technique used is saturated sampling, namely, all BPRS registered with OJK in the research period are sampled, so that the analysis results are more comprehensive and represent the population as a whole. The first stage of the research was conducted by measuring the efficiency level of BPRS using the nonparametric DEA method processed through Excel software with DEA Add-Ins. Furthermore, in the second stage, the factors influencing efficiency were analyzed using Tobit regression, which was processed with the help of Eviews 12 software.

Result And Discussion

Descriptive Statistics

Descriptive analysis is employed to provide an overview of the data and summarize the statistical characteristics of each variable. CAR reflects the financial soundness of the bank in maintaining sufficient capital, while NPF indicates the level of credit risk faced by BPRS.[17] ROA measures the bank's profitability, showing how effectively it generates returns from its assets, whereas the FDR describes the proportion of third-party funds channeled into financing.[18] An FDR exceeding 100% suggests that financing activities surpass the available deposits, which may indicate an aggressive intermediation strategy but also carries potential liquidity risks. Meanwhile, the BI rate, as a macroeconomic variable, represents the benchmark interest rate that influences the cost of funds in the financial system.[19] Through descriptive statistics, the mean, minimum, maximum, and standard deviation of these variables are obtained, offering a clearer picture of their distribution. These results serve as the foundation for further empirical analysis to examine the determinants of efficiency in BPRS.

[17] Christophorus Indra Wahyu Putra, Adler Haymans Manurung, And Nera Marinda Machdar, "Effect Of Capital Adequacy Ratio, Credit Policy, Liquidity Risk And Non-Performing Loan On Financial Distress," *Greenation International Journal Of Economics And Accounting* 2, no. 4 (2024): 309.

[18] Devira Latviani Z And Iwan Setiawan, "The Effect Of Inflation , Exchange Rates And Third-Party Funds On Financing To Deposit Ratio (FDR) At Sharia Commercial Banks in 2019-2023" 5, no. 2 (2025): 216.

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Table 1. Descriptive Test

	N	Minimum	Maximum	Mean	Std. Deviation
CAR	120	17.99	33.26	22.7897	2.94974
ROA	120	1.63	2.81	2.2281	.29531
FDR	120	103.38	135.68	116.7690	7.35385
NPF	120	5.91	11.80	8.8382	1.39469
BI_RATE	120	3.50	7.75	5.3938	1.40552
EFISIENSI	120	.84	1.00	.9608	.04027
Valid N (listwise)	120				

Source: Data Processed 2025

The results of the descriptive analysis of BPRS in Table 1 show that the average CAR of 22.79% reflects good capital adequacy, while the average ROA of 2.23% shows stable profit efficiency. The average FDR of 116.77% indicates financing disbursements that exceed third-party funds, and the average NPF of 8.84% indicates unhealthy financing quality. The average BI rate of 5.39% reflects moderate fluctuations in interest rate policy, while the average efficiency of 0.96 indicates that BPRS in Indonesia is inefficient. This data provides an initial overview for analyzing the relationship between variables.

Analysis Data First Stage

Researchers used the DEA Add-ins Software to measure the efficiency level of BPRS in Indonesia during the period January 2014 to December 2023. The approach used in data processing is an intermediation approach with input orientation and Variable Return to Scale (VRS) assumptions. The efficiency of each BPRS is calculated based on the results of calculations that show the level of efficiency. An efficiency value of 1 indicates that the BPRS is efficient, while a value below 1 (<1) indicates that the BPRS is still at the inefficiency level. If a BPRS reaches an efficiency value of 1, then the BPRS can maximize all its resources to achieve an efficient output level. Conversely, if the value is below 1, it indicates that the management of resources is not optimal, so that the role of BPRS as an intermediary institution has not been fulfilled optimally.

Table 2. Efficiency Test Results

Year	Average Efficiency Score	Minimum Efficiency Score	Maximum Efficiency Score
2014	0.98177	0.93858 (Dec)	1.00000 (Jan, Jul)
2015	0.96317	0.92288 (Mar)	1.00000 (Jun, Aug)
2016	0.92341	0.85079 (Dec)	1.00000 (Jun)
2017	0.93836	0.84048 (Jan)	1.00000 (Apr, May, Jun)
2018	0.94907	0.87272 (Jan)	1.00000 (May, Nov)
2019	0.96342	0.90902 (Nov)	1.00000 (May)
2020	0.97891	0.93502 (Dec)	1.00000 (Apr, May, Jun, Aug, Sep)
2021	0.95777	0.93576 (Jan)	1.00000 (Apr)
2022	0.97542	0.94294 (Dec)	1.00000 (May, Apr)
2023	0.98669	0.96070 (Jan)	1.00000 (May, Jun, Sep, Oct, Dec)

Source: Data Processed 2014-2023

Based on the efficiency analysis of BPRS with the input variables of savings and total assets and the output variable of MSME financing in 2014-2023, the efficiency level of BPRS in Indonesia showed significant fluctuations. BPRS that reached the full efficiency level with an efficiency value of 1 indicates that in those months, the utilization of inputs, namely savings and total assets, has been optimal to produce outputs in the form of MSME financing. In other words, there is no waste of resources. This can be caused by the management's success in managing public savings and assets maximally to increase financing to MSMEs.

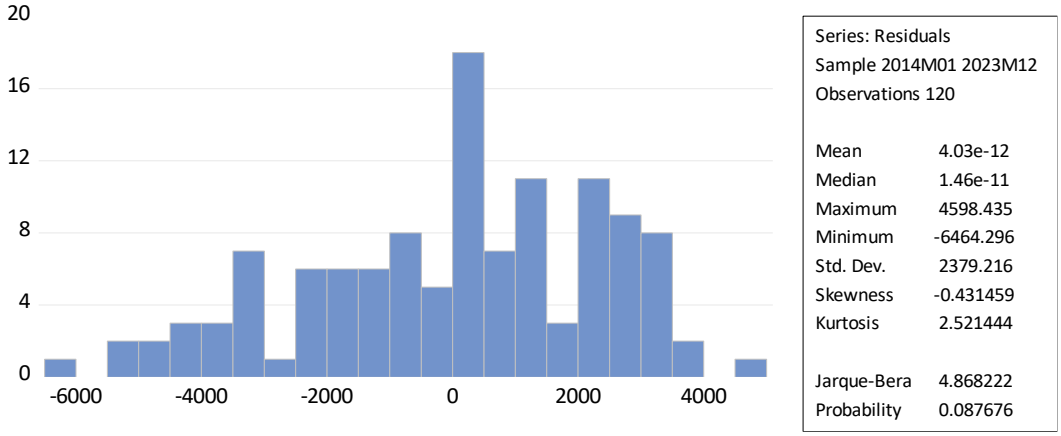
The lowest efficiency was recorded in January 2017, where the efficiency score was 0.84048. The savings slack in this month reached 115,578.36, indicating that there were excess savings that were not fully utilized. This inefficiency can be caused by low demand for financing or a lack of effective marketing strategies. This inefficiency reflects the potential for waste in the use of inputs or suboptimal resource allocation, which means that the amount of savings funds was not successfully optimized to increase MSME financing. When viewed as a whole, BPRS in Indonesia is still not efficient or is still in an inefficient condition, meaning that H0 is accepted and H1 is rejected. This states that Islamic banks in Indonesia are still in a state of inefficiency.[20]

Analysis Second Stage

Normality Test

The Jarque-Bera Normality Test is one of the statistical tests used to test whether a sample of data is normally distributed or not. The purpose of this test is to ensure that the basic assumptions of most parametric statistical techniques are met.

Figure 1. Normality Test Results



Source: Data Processed 2025

The test results above show that the Probability Jarque-Bera value is 0.08 or greater than 0.05 (>0.05), so it can be concluded that the distribution is normal or passes the normality test.

[20] Yuliana Fitroh, Dikdik Harjadi, And Iqbal Arraniri, "Identifikasi Faktor-Faktor Yang Mempengaruhi Efisiensi Perbankan Syariah Indonesia," *Demand: Digital, Economic, Management And Accounting Knowledge Development* 02, no. 01 (2020): 17.

Heteroscedasticity Test

The heteroscedasticity test is a statistical test used to check whether the variability of the residuals (the difference between the observed value and the value predicted by the statistical model) in a linear regression is not constant. That is, this test is used to identify whether the variability of the measurement error changes throughout the range of values of the independent variable. Heteroscedasticity can affect the results and interpretation of the linear regression analysis. The White test is one of the methods used to test for the presence of heteroscedasticity in a regression model. The White test, also known as the White-Godfrey test or White-Huber test, uses the square of the residual values and the independent variable as an additional predictor. In the context of quantitative research, the White test is used to test whether the variability of the residuals in a regression model is not constant, by comparing the test statistic results with certain critical values.

Table 3. Heteroscedasticity Test Results

F-statistic	1.371642	Prob. F(16,103)	0.1707
Obs*R-squared	21.07748	Prob. Chi-Square(16)	0.1756
Scaled explained SS	11.81290	Prob. Chi-Square(16)	0.7568

Source: Data Processed 2025

The test results above show that the probability chi-square value is 0.7568 or greater than 0.05, so it can be concluded that the Heteroscedasticity test assumption has been met, or the data has passed the heteroscedasticity test.

Likelihood Ratio Test

The Likelihood Ratio test is used to determine whether the Tobit model is feasible to use or not. The Likelihood Ratio test results produce a probability value, which is the basis for assessing the feasibility of the Tobit model.

Table 4. Likelihood Ratio Test Results

	Value	Probability
Likelihood ratio	5.096613	0.0240

Source: Data Processed 2025

The Likelihood Ratio test results show a probability value of 0.024. This value is smaller than the commonly used significance level of 0.05. Thus, the Tobit model is considered feasible to use because there is evidence that the model has a significant ability to explain the data.

Tobit Test

The variables used in this study include dependent and independent variables. The dependent variable in this study comes from the first stage of testing, namely the level of efficiency, and the independent variables used in this study are CAR, ROA, FDR, NPF, and BI rate.

Table 5. Tobit Test Results

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	79921.79	7640.893	10.45974	0.0000
CAR	0.935710	1.303084	0.718073	0.4727
ROA	-3000.336	1314.926	-2.281752	0.0225
FDR	2.499460	0.821036	3.044277	0.0023
NPF	-892.4181	302.0325	-2.954709	0.0031
BI_RATE	-109.1208	414.5945	-0.263199	0.7924

Source: Data Processed 2025

Based on Table 5, which presents the results of the Tobit regression analysis in the first model, the initial Tobit regression model or equation estimation can be arranged as follows:

$$Y = 79921.79 + 0.9357 \times CAR - 3000.336 \times ROA + 2.4995 \times FDR - 892.4181 \times NPF - 109.1208 \times BI\ rate + \epsilon$$

CAR is an indicator of financial health that shows the ability of a bank to bear the risk of loss from its assets.[21] CAR has a probability value of 0.4727, which is greater than the significance level of 0.05. This shows that CAR is not statistically significant in influencing efficiency. In other words, changes in CAR have no meaningful effect on the level of efficiency in this model. This is in accordance with research that has been conducted, which states that CAR does not affect efficiency.[22] This consistency suggests that capital adequacy is not the main determinant of efficiency in small-scale Islamic banking, where the intermediary function of fund mobilization and financing distribution plays a greater role. This is because BPRS is more oriented towards intermediary functions, such as fundraising and financing distribution, so that efficiency is more influenced by operational management than capital ratios.

ROA is a financial performance indicator that shows the ability of BPRS to generate profit from its assets.[23] The probability value of ROA is 0.0225, smaller than 0.05, so this variable is statistically significant on efficiency. The negative coefficient (-3000.336) shows that the increase in ROA is inversely proportional to efficiency. This means that the higher the ROA, the lower the efficiency level. This finding is also found in previous research, which says that ROA has a negative effect on efficiency.[24] This inverse relationship can occur because a temporary increase in profitability may come from non-recurring income or aggressive financing that raises costs in the long term. In the context of BPRS, high ROA may also reflect limited reinvestment of profits into productive efficiency-improving activities,

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[23] Elen Puspitasari, Bambang Sudiyatno, Nur Aini, And Gladis Anindiansyah, "The Relationship Between Net Interest Margin And Return On Asset: Empirical Study Of Conventional Banking In Indonesia," *Academic Journal Of Interdisciplinary Studies* 10, no. 3 (2021): 2281.

[24] Mikhael Garda Prasetya And Gideon Setyo Budiwitjaksono, "Efisiensi Bank Digital Di Indonesia Menggunakan Data Envelopment Analysis (DEA)," *Journal Of Management And Bussines (JOMB)* 5 (2023): 391.

such as digitalization or human resource training. Thus, although profitability is a sign of good performance, it does not always correspond to technical or operational efficiency.

The probability value of FDR is 0.0023, which is smaller than 0.05, indicating that this variable is statistically significant on efficiency. The positive coefficient (2.4995) shows that an increase in FDR will increase efficiency. This is in line with the results of previous research, which states that FDR has a positive effect on efficiency.[25] This indicates that the more financing provided compared to deposits, the efficiency level tends to increase. A high FDR indicates that the available funds are not idle and are utilized for productive activities such as financing MSMEs.[26] Good fund management can increase the output of BPRS, such as financing income, which in turn increases efficiency. In addition, the high FDR also reflects the success of BPRS in carrying out its financial intermediation function. However, excessive FDR must still be managed carefully, as overly aggressive lending without strong risk control can raise NPF levels and reduce efficiency in the long run.

The probability value of NPF is 0.0031, which is smaller than 0.05 and thus statistically significant. The negative coefficient (-892.4181) indicates that an increase in NPF, which reflects non-performing financing, will reduce efficiency. In other words, the higher the level of non-performing financing, the lower the efficiency level.[27] This is in line with the results of previous research, which states that NPF has a positive effect on efficiency. The high NPF indicates that most of the financing that has been channeled does not generate income as expected.[28] In addition, the high NPF also reflects the suboptimal quality of credit analysis, both in terms of prospective customer selection, supervision, and risk mitigation.[29] This results in a decrease in customer trust in BPRS, which in turn can reduce the collection of third-party funds. Thus, high NPF not only reduces profitability but also hampers the ability of BPRS to maximally utilize inputs to produce optimal outputs, thus negatively impacting the efficiency of the institution. Moreover, high NPF can erode customer trust, reducing third-party fund collection and limiting liquidity for future financing. Therefore, maintaining low NPF levels is essential not only for profitability but also for sustaining long-term operational efficiency.

The probability value of the BI rate is 0.7924, which is greater than 0.05, indicating that the BI rate is not statistically significant in influencing efficiency. Thus, changes in the BI rate do not have a strong enough influence on efficiency in this model. BPRS operates based on sharia principles, which prioritize profit-sharing financing instead of fixed interest

[25] Yuliana Fitroh, Dikdik Harjadi, And Iqbal Arraniri, "Identifikasi Faktor-Faktor Yang Mempengaruhi.

[26] Enny Puji Lestari, Agus Alimuddin, Jeni Syahpira, And Rubianti Novita Irma Wati, "The Effectiveness of Using Digital Technology (QRIS) in the Payment System for the Development of MSMEs of Metro City," *Al-Iqtishadiyah : Ekonomi Syariah dan Hukum Ekonomi Syariah* 10, no. 2 (2024): 1.

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[29] Sri Mulyaningsih And Iwan Fakhruddin, "Pengaruh Non Performing Financing Pembiayaan Mudharabah Dan Non Performing Financing Pembiayaan Musyarakah Terhadap Profitabilitas Pada Bank Umum Syariah Di Indonesia," *Jurnal Manajemen Dan Bisnis Media Ekonomi* 16, no. 1 (2016): 196.

as in conventional banks.[30] Therefore, changes in the BI rate that affect lending rates in conventional banking do not directly affect the cost or yield of financing in BPRS. Although BPRS can also be affected by macroeconomic conditions influenced by the BI rate, the financing mechanism applied is based on the principle of profit sharing, which is more flexible, rather than fixed interest. In addition, BPRS generally has a smaller and more localized customer base compared to commercial banks. This makes BI rate fluctuations less impactful on their financing decisions or efficiency levels. This is in line with the results of previous research, which states that the Bi rate has no effect on Islamic banks.[31]

Conclusion

Based on the analysis of BPRS efficiency in Indonesia from 2014 to 2023, the results show fluctuating efficiency levels, with occasional full efficiency but overall dominance of inefficiency due to resource misallocation, particularly in the suboptimal use of savings linked to weak financing demand, limited marketing, and ineffective operations. Regression findings indicate that CAR and BI rate have no significant effect, implying that BPRS efficiency is driven more by internal factors than by capital adequacy or macroeconomic conditions, while ROA, FDR, and NPF significantly influence efficiency in varying directions. Methodologically, the study's reliance on financial variables and the DEA's homogeneity assumption limit its scope, suggesting cautious interpretation. Future studies should incorporate non-financial aspects such as technology use, marketing strategies, and human resource quality through surveys or case studies for a more comprehensive understanding of efficiency determinants.

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Author Contributions Statement

RC was responsible for writing the manuscript and analyzing the data. UO gave permission and supported the study by providing direction to RC. All authors contributed to the study and approved the final manuscript.

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