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Macroeconomic and Bank-Specific Factors Influencing Cost Efficiency in Islamic Banking: Evidence from Indonesia

Rino Purnomo
Department of Islamic Economics, Faculty of Islamic Economics and Business, IAI Nusantara Ash-Shiddiqiyah
Email: rinopurnomo50@gmail.com

Arsan Isro
Department of Islamic Economics, Faculty of Islamic Economics and Business, IAI Nusantara Ash-Shiddiqiyah
Email: arsanisro1996@gmail.com

Misbahul Munir
Department of Economics, Faculty of Economics and Business, Universitas Bangka Belitung
Email: misbahul@ubb.ac.id

Madqur
Department of Islamic Economics, Faculty of Islamic Economics and Business, IAI Nusantara Ash-Shiddiqiyah
Email: madqur@gmail.com

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Abstract

The dual banking system in Indonesia intensifies competition between conventional and Islamic banks, impacting operational costs and income. From 2015 to 2024, the BOPO (Operational Cost to Operational Income) ratio of Islamic banks fluctuated between 97% and 76%, reflecting inefficiencies influenced by internal and external factors. This study examines the determinants of BOPO in Indonesian Islamic banking using quantitative methods, specifically multiple linear regression analysis of monthly data (2015–2024). The independent variables include bank-specific metrics (Capital Adequacy Ratio/CAR and Return on Assets/ROA) and macroeconomic indicators (BI Rate, inflation, and economic growth). The results indicate that CAR, ROA, BI Rate, and inflation significantly and negatively affect BOPO, suggesting that higher capital adequacy, profitability, and interest rates, along with controlled inflation, improve operational efficiency. Conversely, economic growth shows no significant impact. These findings provide critical insights for

Islamic bank managers and policymakers to enhance efficiency through strategic capital allocation, risk management, and macroeconomic stability measures.

Keywords: CAR, ROA, BI Rate, Inflation, Economic Growth, and BOPO.

Abstrak

Hadirnya sistem dual banking di Indonesia menyebabkan persaingan antar perbankan semakin kompetitif. Kompetitifnya persaingan tersebut sampai meningkatkan biaya operasional dan pendapatan operasional perbankan syariah. Di mana pada tahun 2015 hingga tahun 2024 rasio BOPO perbankan syariah mencapai 97 persenan dan kemudian menurun menjadi 76 persenan. Tentu hal ini disebabkan oleh beberapa variabel internal maupun eksternal. Penelitian ini bertujuan untuk meneliti apa saja faktor yang dapat menentukan biaya operasional terhadap pendapatan operasional di perbankan syariah. Metode yang digunakan dalam penelitian ini deskriptif kuantitatif, dengan model analisis regresi linier berganda dari periode 2015-2024. Hasil penelitian menjelaskan jika secara parsial variabel independen diantara CAR, ROA, BI rate dan inflasi berpengaruh negatif signifikan terhadap BOPO perbankan syariah. Sedangkan pertumbuhan ekonomi tidak memberikan pengaruh yang signifikan. Secara simultan, seluruh variabel independen berpengaruh signifikan terhadap BOPO perbankan syariah.

Kata Kunci: CAR, ROA, BI Rate, Inflasi, Pertumbuhan Ekonomi, dan BOPO.

Introduction

In 1991, a Sharia bank was established, the first in Indonesia called Bank Muamalat Indonesia (BMI). Since then, Islamic banks in Indonesia have been developing more rapidly. This is proven by the number of Islamic Commercial Banks (BUS) that have reached 14 banks, 19 Sharia Business Units (UUS), and 173 Sharia People's Credit Banks (BPRS) (Financial Services Authority, 2025). However, the existence of the dual banking system in Indonesia causes competition more competition between conventional banks and Islamic banks. Competitive competition This causes the cost of operational banking to increase compared to operational income, where things are a consequence of existing activity like the collection and distribution of funds in institutional finance (Afkar, 2017).

Cost Operations and Revenue Operational (BOPO) is a ratio used for a bank's level of efficiency bank. The tall ratio indicates that the bank has a level less efficiency. On the other indicates a low BOPO ratio, meaning the bank has better efficiency. Komarudin & Saepudin (2021) explain the ideal ratio in general banks sharia is 70 per cent. Meanwhile, based on the data obtained from report statistics banking sharia, 15 to 2024, the BOPO ratio reached per cent. The following is the BOPO data for general banks sharia in Indonesia from 2015-2024.

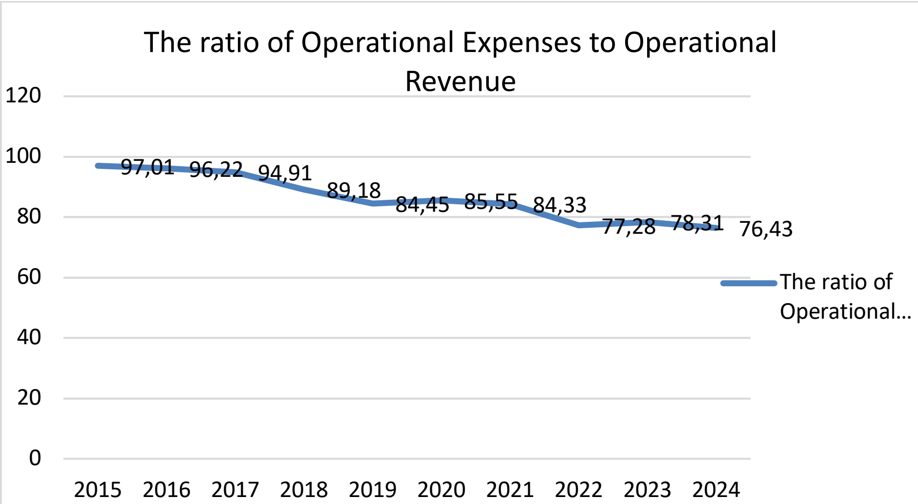

Figure 1. Ratio Cost Operations and Revenue Operational Cost (BOPO) of Islamic Commercial Banks for 2015 – 2024.

Source: Statistics Islamic Banking, (processed 2025).

Based on the data in the image, the BOPO ratio of Islamic General Banks in Indonesia is valued at not yet so efficient. In 2015, the BOPO ratio was at 97.01 per cent, which indicates that the very high level of efficiency banking Sharia law in Indonesia is appalling. In 2016, the BOPO ratio was 96.22 per cent, although it had decreased piously from the previous year. However, the ratio is still is appalling. In 2017, the BOPO ratio returned a decrease of 94.91 per cent. From 2018 to 2021, the BOPO ratio was still more than 80 per cent, indicating that the level of operational cost is high enough If compared to income operational. However, it will decrease to 70 percent in 2022-2024.

According to Anggraini et al. (2019), BOPO rats, which is only 70 per cent, indicate that banking efficiency in Sharia in Indonesia is already improving. However, the occurrence of turmoil efficiency in banking sharia in some years was previously caused by several factors, for example, performance banking That is Alone, like ratio capital adequacy, level profitability banking, bad credit, and others. In addition, there are variable macroeconomics: Inflation, interest rate, growth economy, and others.

Research about BOPO determinants is still very seldom done. However, several results by Ramly & Hakim (2017) and Anwar (2019) (2024) explain that several variables, including performance banking sharia capability, significantly affect BOPO. However, another study by Muttaqin et al. (2020) explains that variables do not substantially affect BOPO. Knowing there are still inconsistencies from previous studies, we need to do a study again to the truth from the results.

The novelty in this study lies in the variables used, where the author not only uses Islamic banking performance variables but also uses macroeconomic variables such as inflation, interest rate, and economic growth as independent variables. In addition, the data used in the study is data from 2024, newer compared to the previous research, including Fafa & Permana (2015), Ramly & Hakim (2017), Afkar (2017), Putri et al. (2024), who used data from 2010.

This research aims to determine the cost operational to income general bank operations sharia in Indonesia for 2015-2024.

Review Theoretical

Capital Adequacy Ratio (CAR)

Is the ratio used to measure the level of capital adequacy in banking (Munir, 2018). Putri et al. (2024) explain that the higher the capital adequacy ratio, the more profit, the more profit things. This can used For press cost operations in banking sharia. So, the level of efficiency of the banking sharia will become good. Capital resilience can cover burdens from previous activity operations; this is supported by research by Ramly and Hakim (2017), who explain that CAR is influential and negatively significant against BOPO. The results findings of Muttaqin et al. (2020) state that there is no significant correlation between the two variables.

Return on Assets (ROA)

Is the ratio used to measure the profitability of Islamic banking (Munir, 2018). A bigger ROA ratio will then influence BOPO's banking rate. Because the profitability obtained can be used to cover the cost of operational banking sharia, the operational costs are far lower If compared to income operational Final.ly, which will create efficiency in institution finance. This is. This is supported by Fathurrahman and Rahmadani (2024), who state that ROA hurts ROA things. This is also in line with the findings of Prasetyo and Darmayanti (2015), who explained that increasing profitability can weaken the cost of operational banking sharia.

BI rate

Bank Indonesia previously set interest rate policies. The increase in ethnic groups, interest rates said, can increase the financing of banking sharia because customers choose to finance with a system for results rather than conventional banks with system rate. Easing the amount of funding will increase revenue and profitability in Banking Sharia until we can close operational banking costs. This is supported by Rahma (2018), who stated that the bi rate could increase profitability so that profit can be used To cover the expenses of operational companies. However, the research results by Lusiana & Musthofa (2025) state That interest rate can weaken the profitability of banking. Indirectly, these findings explain that the emergence of interest rates has a negative impact on banking profitability, thus the existence of interest rates can reduce income so that banks are unable to cover operational costs.

Inflation

Is a condition that continuously increases the price of goods and services over time. When inflation increases, automatic operational costs in banking sharia also increase. This has impacted the efficiency of banking sharia. When inflation increases can be an influential positive against BOPO banking. This is supported by Anwar (2019), who states that increasing inflation can increase the ratio cost compared to income bank operations, weakening the efficiency of banking sharia. This is also proven by the data obtained from the Central Bureau of Statistics and Statistics Islamic banking, where the level of inflation in 2015 was 7.69 per cent (yoy), and then in the same year, BOPO also increased to 97.01 per cent.

Growth economy

It is an indicator of knowing the welfare community in a region. The economy's growth is usually measured using the Gross Domestic Product (GDP). Abdulahi et al. (2023) explain that increasing the economy's growth can increase the performance in baofing sharia thin, which means that an increase in GDP can increase the revenue of operational banking. When the growth economy increases, the request for credit by home stairs and industry also increases, increasing bank income and putting pressure on the cost of operational banking. This can cause growth economy influential negative against BOPO so that efficiency banking sharia become a good. Findings This is supported by Trabelsi & Trad (2017), while Goswami et al. (2019) state the contrary.

Method

Study This uses a descriptive quantitative. Types of methods research applied is method observation in which data is used is something that can measured. The data type used is time series data in the quarter from 2015-2024. The data used in the study includes BOPO, CAR, ROA, inflation, interest rate, and growth economy. BOPO is cost Operational and income operational in units per cent. CAR is the ratio of capital adequacy in units per cent. ROA is the ratio measuring profitability banking yang, as stated in unit per cent. The BI rate is the interest rate reference set by Bank Indonesia in units per cent. Inflation is a change in the price base level compared to consumers' index prices. The growth economy is GDP in units per cent. Research data was obtained through Statistics Islamic Banking, Bank Indonesia, and the Central Bureau of Statistics. Complementary data is obtained through books, articles, and others relevant to the study.

Selection method sample used in study This is a saturated technique, namely, using all the member populations as a sample (Sahir, 2021). The sample used is sector banking sharia, especially those registered in public banks sharia in Indonesia. The reasons Why use the technique sample fed up Because the population is relatively small and available data only covers 2015-2024. Analysis model in study This uses multiple linear regression supported by eviews 10 software. Regression This uses six variables at once, one as variable dependent and five as variable independent. Here is an equation model used in the study.

$$\boldsymbol{Y = a + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \beta 5X5 + e}$$

Results and Discussion

Statistics Descriptive

It is a standard first test used to analyze data. This test aims to explain research data.

Table 1. Statistical Results Descriptive

	BOPO	CAR	ROA	BI RATE	INFLATION	PE
Mean	86.09725	20.78350	1.520250	5.218750	3.283000	4.261000

Median	85.91500	20.53500	1.505000	5.250000	3.095000	5.035000
Maximum	97.01000	26.28000	3.350000	7,500,000	7.270000	7.070000
Minimum	75.78000	14.09000	0.490000	3.500000	1.330000	-5.320000
Std. Dev.	7.203739	4.054197	0.633689	1.239297	1.445692	2.487460
Observation	40	40	40	40	40	40

Table 1 explains all 40 data from each variable obtained from quarterly time series data during the observation period (2015-2024). The following is an explanation of the research data.

The BOPO variable has a mean of 86.09725, median of 85.91500, maximum of 97.01000, minimum of 75.78000, and standard deviation of 7.203739. It is known that the mean value does not exceed the marked maximum and is not enough from the minimum value, so we Can conclude that BOPO data is not called outliers.

The CAR variable has a mean value of 20.78350, a median of 85.91500, a maximum of 26.28000, a minimum of 75.78000, and a standard deviation of 4.054197. It is known that the mean value exceeds the not enough from the not enough from the minimum value, so we can conclude that CAR data are not called outliers.

The ROA variable has a mean value of 1.520250, median of 1.505000, maximum of 3.350000, minimum of 0.490000, and standard deviation of 0.633689. It is known that the mean value does not exceed the mark maximum and is not enough from the minimum value, so Can concluded that ROA data is not called outliers.

The BI Rate variable has a mean value of 5.218750, a median of 5.250000, a maximum of 7.500000, a minimum of 3.500000, and a standard deviation of 1.239297. It is known that the mean value does not exceed the marked maximum and is not enough from the minimum value, so we can conclude that BI RATE data is not called an outlier.

The inflation variable has a mean value of 3.283000, median of 3.095000, maximum of 7.500000, minimum of 7.270000, and standard deviation of 1.445692. It is known that the mean value exceeds the does not exceed enough from the not enough from the minimum value, so the inflation data concluded that there were no outliers.

The growth economy variable own mean value of 4.261000, median 5.035000, maximum 7.070000, minimum -5.320000, and standard deviation 2.487460. It is known that the mean value exceeds the does not exceed the mean figure not enough from the minimum value, so the inflation data concluded that there are no outliers.

Assumption Test Classic

This test becomes conditions that must be met so that we can know the research data nature *of the Best Linear Unbiased Estimator* (BLUE), which consists of multicollinearity, normality, heteroscedasticity, and autocorrelation tests (Widarjono, 2018).

Multicollinearity

The multicollinearity test aims to know if there is no linear relationship between regression models and variable-free research. Testing in the study used the VIF approach. Criteria were used to decide can be seen from VIF values of no more than 10 (Widarjono, 2018).

Table 2. Multicollinearity Test Results

Variable	Coefficient Variance	Uncentered VIF	Centred VIF
C	7.362188	94.80191	NA
CAR	0.014934	86.14712	3.081747
ROA	0.551536	19.19459	2.780613
BI RATE	0.062367	23.07495	1.202591
INFLATION	0.058000	9.571578	1.521921
PE	0.017092	5.323868	1.327786

The VIF value is less than 10 based on the multicollinearity test results. Knowing the testing criteria, where the VIF value is no more than 10, it can be concluded that the data passes the multicollinearity test.

Normality

The normality test aims to ensure that the residual value in the regression model is usually distributed. Testing this uses the Kolmogorov-Smirnov approach. The criteria for determining that the data is normally distributed can be reviewed from the probability output value (Widarjono, 2018).

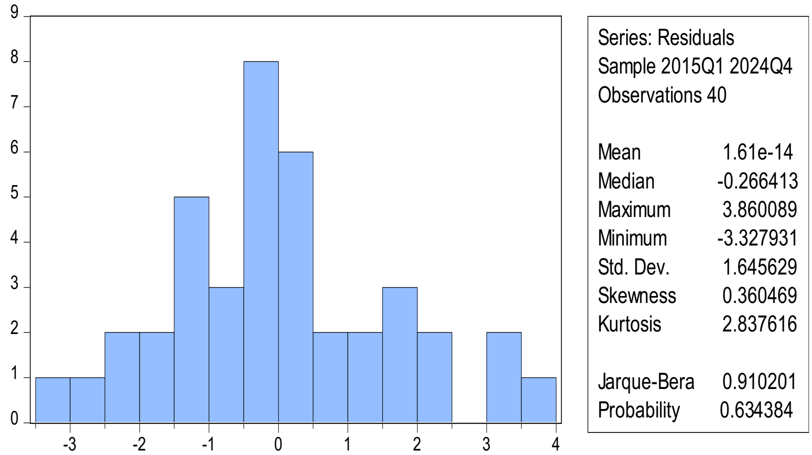

Figure 2. Normality Test Results

Based on the normality test results obtained, the mark probability Jarque -Bera is 0.229321; the value is larger than 0.05, so it is concluded that the data is usually distributed.

Heteroscedasticity

This test aims to determine whether or not each variable has a residual similarity. The chosen approach in testing this is white. As for the decision in testing this, the data is stated to pass heteroscedasticity if the mark chi-square probability is greater than 0.05 (Widarjono, 2018).

Table 3. Heteroscedasticity Test Results

Obs *R-squared	27.62562	Chi-Square Prob. (20)	0.1186

Based on the results obtained, obtained of e chief -square probability bigger 05. we can conclude that the data passes the heteroscedasticity test.

Autocorrelation

This test aims to determine the connection between variables that are independent of the research. The approach used in testing this is LM (Lagrange Multiplier). The autocorrelation test requires that no autocorrelation may occur in the regression model. The decision can be made based on acquisition mark probability, where the data is stated to pass autocorrelation if the value obtained exceeds the significance level (Widarjono, 2018).

Table 4. Autocorrelation Test Results

Obs *R-squared	4.971543	Chi-Square Prob. (2)	0.0833

Based on the autocorrelation test results, the mark chi-square probability is 0.0833, which means more from level significant 0.05. So, it can be concluded that the data passes the autocorrelation test.

T-Statistic Test

In multiple linear regression, the t-statistic test is a test that is carried out to know partially whether variable gratis has a significant influence on the variable bound. Research results stated influential significance If the mark probability is not enough from 0.05 (Widarjono, 2018).

Table 5. Results of T-Statistic Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	125.1804	2.713335	46.13523	0.0000
CAR	-1.366771	0.122204	-11.18432	0.0000
ROA	-3.708804	0.742655	-4.993983	0.0000
BI RATE	-0.704760	0.249733	-2.822051	0.0079
INFLATION	-0.637766	0.240831	-2.648189	0.0122
PE	0.172081	0.130738	1.316235	0.1969

From the table above, we can draw the following conclusion.

CAR, ROA, BI Rate, and inflation variables own t- statistical value with direction connection negative (-) and probability not enough of 0.05. In the t-test-- statistic test, the value probability variable free must be compared to the significance level. Knowing that mark significance in the study is not enough, from 0.05, with a negative direction relationship, it can be concluded that CAR, ROA, BI Rate, and inflation variables are influential and negatively significant against BOPO. While the variable growth economy does not significantly contribute to BOPO for 2015-2024.

F-Statistic Test

A statistic test is a test that is carried out to know in a way that is simultaneous whether variable free has a significant influence on the variable bound. Research results stated influential significance If the probability value is not enough from 0.05. (Widarjono, 2018).

Table 6. F-Statistic Test Results

F-statistic	123.5049
Prob(F-statistic)	0.00000

Based on the f-statistic test results, the probability value is 0.00000, which is not enough from the level significant 0.05. So, simultaneously, all independent variables, including CAR, ROA, BI Rate, Inflation, and growth economy, affect BOPO significantly.

Coefficient Test Determination

Testing This aims to determine the impact caused by the variable free to variable bound. The adjusted R-squared value obtained in the study can be reviewed to determine its influence (Widarjono, 2018).

Table 7. Coefficient Test Results Determination

R-squared	0.947815
Adjusted R-squared	0.940140

Based on the coefficient test results determination, an Adjusted R-squared value of 0.940140. So, it can be concluded that the impact caused variable free to variable bound by 94%. 6% of the rest was influenced by variables outside the model, such as bad credit, level liquidity, bank size, etc.

Discussion

1. The Influence of Capital Adequacy Ratio on Cost Operations and Revenue Operational

Based on the research results, a mark coefficient as significant as -1.366771, t- statistic -4.993983 with a probability of 0.0000 was obtained. Research results show that if CAR increases by one per cent, BOPO will be reduced by 1.366771. Research results also explain that the CAR variable hurts the banking BOPO sharia period from 2015 to 2024. CAR is ratio capital adequacy for close risk losses incurred consequence activity operational. BOPO is index efficiency for measuring the ability of bank management to manage operational costs and income existing operations. Increasing ratio capital adequacy can help reduce operational costs that are not under control. A healthy capital structure improves risk management, reduces risk credit, and reduces operational costs. This causes CAR to hurt the banking of BOPO Sharia. Research results This is supported by Ramly & Hakim (2017), who explained a significant negative correlation between the capital adequacy ratio to cost Operational and income operational banking sharia.

2. The Influence of Return on Assets on Cost Operations and Revenue Operational

Based on the results, research that has been done obtained a mark coefficient as significant as -3.708804, t- statistic -4.993983 with a probability of 0.0000. Research results: If ROA showsncreases One per cent it will reduce BOPO by -3.708804. The results of this study also explain that ROA hurts banking BOPO sharia period 2015 - 2024. ROA is a ratio used to measure a bank's profitability level. At the same time, BOPO is a ratio used to measure a bank's efficiency level. Increasing ROA indicates that the bank can benefit more from the assets owned. Thus, this can lower operational banking sharia costs and improve efficiency. Research results This aligns with Ramly & Hakim (2017) and Fathurrahman & Rahmadani (2024), who explain a significant negative influence between ROA and BOPO. In addition, Prasetyo and Darmayanti (2015) explained that increasing profitability could weaken operational costs to income operational banking sharia.

3. The Influence of BI Rate on Cost Operations and Revenue Operational

Based on the research that has been done, a mark coefficient as significant as -0.704760, t-statistic -2.822051, with a probability of 0.0079, was obtained. Research results explain that increasing the bit rate by one per cent will reduce banking BOPO sharia by as much as -3.708804. The results of the study also explain that the BI rate affects the BOPO of Islamic banking during 2015 - 2024. In this case, namely when interest rates increase, customers tend to finance Islamic banks because the cost of borrowing from conventional banks is higher than Islamic banks that implement a profit-sharing system. Then, easing the amount of financing in Islamic banks can increase revenue and profitability of banking, pressing costs of operational banking sharia. So that matters; this is why increasing the BI rate can weaken the banking BOPO ratio sharia. Research results This is supported by Rahma (2018), who stated that increasing can increase financing in banking sharia, improve profitability, and Finally press cost operational to income operational banking.

4. Influence Inflation to Cost Operations and Revenue Operational

Based on the results, research that has been done obtained a mark coefficient as significant as -0.637766, t- statistic -2.648189 with probability 0.0122. Research results explain that increasing the inflation by one per cent will reduce banking BOPO sharia by as much as -0.637766. Research results also explain that variable inflation is influential negative, and significant against banking BOPO sharia period 2015-2024. Increasingly high inflation causes efficiency banking sharia to become weak. This is because high inflation levels influence the condition of the economy and the performance of industry finance, such as banking. As for the increase in the price of goods and services, no direct increas in operational costs in the banking sector can lower the efficiency of banking sharia. This result, in line with research conducted by Putri et al. (2024) shows that inflation is influential negative and significant to efficient banking. This incident indicates that if there is an increase in inflation, the bank will experience an improvement burden on operations that, ultimately, will cause activity in banking to become inefficient.

5. Influence Growth Economy to Cost Operations and Revenue Operational

Based on research, the value t-statistic, is 316235 with probability 0.1969. Findings explain that variable growth economy is Not influential significant against BOPO or efficiency banking sharia. This is happening because the taller a country's economy is, the more investors will be attracted to build new local and international banks. Thus, indirectly, competition in the financial industry, such as banking, will increase. Banks operating in countries with higher economic growth tend to compete with other banks that generate more competitive margins and profits. This makes it challenging to achieve banking efficiency, resulting in economic growth that does not significantly contribute to the operational costs and operating income of Islamic banking. This study's results align with research by Abdulahi et al. (2023) and Putri et al. (2024), which explains that economic growth does not significantly affect the efficiency of Islamic banking.

Conclusion

Findings explain that independent variables, including CAR, ROA, BI rate, and inflation significantly negatively affect the operating costs and operating income of Islamic banking. However, the economic growth variable does not provide a significant contribution. Knowing that the findings can be a reference for the financial industry sector, Islamic banking needs to manage the risk and efficiency of Islamic banking to minimize the negative impact of a variable on the efficiency of Islamic banking. As for further research, this article is considered to still have limitations, especially in the number of independent variables, so further researchers can add other variables that have not been used in this study so that understanding the factors that determine the efficiency of Islamic banking is more comprehensive.

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