

# FORECASTING THE RESILIENCE AND STABILITY OF INDONESIAN ISLAMIC BANKING IN THE FACE OF GLOBAL ECONOMIC UNCERTAINTY IN 2030



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**Article History :**

Submission: August 29, 2025

Revision: October 29, 2025

Received: December 18, 2025

Published: December 31, 2025

**Keyword :**

Forecasting, Resilience,  
Stability, Islamic Banking,  
Economic Recession 2030.

## Abstrak

Penelitian ini bertujuan untuk mengeksplorasi stabilitas dan ketahanan perbankan syariah dalam menghadapi resesi global 2030, untuk kemudian memberikan landasan bagi implikasi manajerial dalam dunia perbankan syariah. Penelitian ini menggunakan pendekatan kuantitatif dengan indikator ketahanan keuangan seperti Return on Assets (ROA) dan Non – Performing Financing (NPF), dan indikator stabilitas seperti Capital Adequacy Ratio (CAR) dan Financing to Deposit Ratio (FDR). Data yang digunakan adalah data sekunder dari laporan keuangan untuk periode dari Q1 tahun 2019 hingga Q4 tahun 2024. Untuk memberikan gambaran dan peramalan tingkat ketahanan dan stabilitas, digunakan metode ARIMA. Untuk menggambarkan interelasi dan interaksi, serta besarnya kontribusi variabel ketahanan terhadap variabel stabilitas (CAR dan NPF) dengan stabilitas (ROA dan FDR) pada Perbankan Syariah di Indonesia, digunakan metode VECM. Hasil analisis menunjukkan bahwa secara keseluruhan, CAR berada dalam kategori sangat sehat, meskipun beberapa bank mengalami penurunan di akhir tahun 2024. NPF mengalami lonjakan selama resesi tetapi cenderung stabil setelahnya. Sementara itu, ROA dan FDR berfluktuasi akibat tekanan ekonomi global tetapi menunjukkan tren jangka panjang yang stabil. Estimasi model VECM menunjukkan hubungan yang signifikan antar variabel, di mana FDR dan NPF memengaruhi ROA dalam jangka panjang, sementara CAR lebih berperan sebagai penyangga risiko. Temuan ini menekankan pentingnya optimalisasi permodalan, penguatan manajemen risiko, dan keseimbangan fungsi intermediasi untuk menjaga keberlanjutan sektor perbankan syariah di tengah ketidakpastian ekonomi global menuju tahun 2030.

## Abstract

*This study aims to explore the stability and resilience of Islamic banking in the face of the 2030 global recession, providing a foundation for managerial implications in the world of Islamic banking. This research uses a quantitative approach with resilience indicators such as Return on Assets (ROA) and Non-Performing Financing (NPF), and stability indicators such as Capital Adequacy Ratio (CAR) and Financing to Deposit Ratio (FDR). The data used is secondary data from the financial statements for the period from the Q1 of 2019 to the Q4 of 2024. To provide an overview and to forecast of the level of resilience and stability, the ARIMA method is used. To illustrate the interrelationship and interaction, as well as the magnitude of the contribution of resilience variables to stability variables (CAR and NPF) with stability (ROA and FDR) in Islamic Banking in Indonesia, the VECM method is used. The analysis results show that overall, the CAR is in the very healthy category, although some banks experienced a decline at the end of 2024. NPF experienced a surge during the recession but tended to stabilize afterward. Meanwhile, ROA and FDR fluctuated due to global economic pressures but showed a stable long-term trend. VECM model estimates indicate a significant relationship between variables, where FDR and NPF influence ROA in the long run, while CAR plays more of a risk buffer role. This finding emphasizes the importance of capital optimization, strengthening risk management, and balance in intermediation functions to maintain the sustainability of the Islamic banking sector amidst global economic uncertainty toward 2030.*



## INTRODUCTION

By 2030, the global economy is expected to be marked by uncertainty due to various factors, including technological disruption, the climate crisis, geopolitical fragmentation, and the energy transition (World Economic Forum, 2024). This uncertainty creates systemic risks to global market stability (Lammi, 2024), particularly for developing countries such as Indonesia. According to a report by the International Monetary Fund (IMF, 2023), global economic challenges are no longer linear, but are influenced by interacting crises such as the pandemic, global inflation, and tensions between the US and China. Meanwhile, the Organisation for Economic Co-operation and Development (OECD, 2023) highlights that global economic resilience will heavily depend on how quickly countries adapt through policy innovation, economic diversification, and digital transformation. In Indonesia, several domestic risks are vulnerable to global shocks, such as exchange rate fluctuations, dependence on commodity exports, and unstable foreign capital flows (BPS, 2023). Therefore, there must be a strategy to face uncertainty toward 2030, including strengthening the financial system, increasing real sector productivity, and accelerating the adoption of technology and the green economy. Yuliana & Widodo (2022) confirmed that global uncertainty has a direct impact on Indonesia's economic stability, particularly through the exchange rate channel and the banking sector. The role of banks as financial intermediaries is a significant driver of economic growth. Banks are responsible for collecting and channeling savings into investments (Ouma and Kirori, 2019).

A very interesting fact during the panic caused by the global COVID-19 recession is that Islamic banks remained resilient and stable in the face of economic contraction. While the financial condition of conventional banks is deteriorating, the financial performance of Islamic banks, on the other hand, shows resilience and stability (Farooq and Zaheer, 2015; Iqbal, Hakim, and Aziz, 2024; Kazak et al., 2024; Suwito and Siskawati, 2022). Islamic banks are more stable and resilient to sudden declines in lending business, with large banks being more stable and resilient than small banks (Chaffai 2020). The Islamic banking credit system is more resilient to shocks and continues to grow during periods of low growth during the recession (Caporale et al., 2020).

This fact also applies to Islamic banks in Indonesia, demonstrating their resilience and stability in the face of economic recession. Data from the Financial Services Authority of the Republic of Indonesia shows that Indonesian Islamic banking performed very well during the COVID pandemic from 2019 to 2021. In 2019, it was observed that the total net profit recorded by Islamic Banks was 6278 billion. Although there was a decrease in net profit in 2020, recorded at 5508 billion, there was a decrease in Islamic banking financing of 770 billion, or -12.26 percent. However, in 2021, the net profit of Islamic banking reached 7285 billion, an increase of approximately 1777 billion or 32.26 percent from 2020 (Otoritas Jasa Keuangan, 2023). Various studies also present facts about resilience and stability in the face of recession, such as a study by Masrizal and Budi Trianto (Masrizal and Trianto, 2022) which shows that Islamic banking financing has a higher economic growth rate than conventional banks.

Although the resilience and stability of Islamic banks are generally stronger than those of conventional banks, previous studies have identified several weaknesses. In terms of capital and liquidity ratios, improvements in efficiency driven by capital and liquidity management are more pronounced in Islamic banks than in conventional banks (Bitar, Pukthuanthong, and Walker, 2020). This means that when capital and liquidity ratios increase, the positive impact on operational efficiency is felt more strongly by Islamic banks compared to conventional banks. In the aspect of income diversification toward

risk and profitability in Islamic and conventional banks, there is no significant relationship. However, the proportion of non – interest income in total income is positively correlated with profitability in both Islamic and conventional banks (Paltrinieri et al., 2021). This means that although banks diversify their sources of income, this does not directly impact the bank's risk level or stability. Therefore, both Islamic and conventional banks with varied sources of income do not automatically become more stable or less risky. Furthermore, a study reviewed by Nugroho et al (2020) showed the fact that the non – performing loan ratio for Islamic banks is higher than that for conventional banks. Several relevant studies show that strong and resilient capital and liquidity ratios are not accompanied by better asset quality. The high level of non – performing financing in Islamic banks indicates that capital strength and liquidity are not sufficiently matched by effective financing risk management. This suggests that capital and liquidity management are key factors in improving the operational performance of Islamic banks, while also signaling limitations in structural efficiency when capital support weakens. Therefore, strengthening capital, liquidity, and profitability in Islamic banks must be balanced with improvements in financing quality and risk governance so that resilience genuinely leads to long – term stability in the profitability indicator.

Several relevant studies show that strong and resilient capital and liquidity ratios are not accompanied by better asset quality. The high level of non – performing financing in Islamic banks indicates that capital strength and liquidity are not sufficiently matched by effective financing risk management. This suggests that capital and liquidity management are key factors in improving the operational performance of Islamic banks, while also signaling limitations in structural efficiency when capital support weakens. Therefore, strengthening capital, liquidity, and profitability in Islamic banks must be balanced with improvements in financing quality and risk governance so that resilience genuinely leads to long – term stability. Therefore, it is crucial to conduct a study on forecasting the readiness of Islamic banking in facing the economic recession approaching 2030. This research aims to gather accurate data on the stability and resilience of Islamic banking in facing the 2030 global recession, thus serving as a basis for managerial implications in the Islamic banking world. Some of the topics that will be discussed in this research are the overview and forecasting of the resilience and stability levels of Islamic banking in Indonesia, the relationship between resilience (CAR and NPF) and stability (ROA and FDR) in Islamic banking in Indonesia, and the magnitude of the contribution of resilience variable shocks to stability variables (CAR and NPF) with stability (ROA and FDR) in Islamic banking in Indonesia.

## LITERATURE REVIEW

### *Resilience of Islamic Banking*

Banking plays a crucial role in maintaining financial system stability and has a significant impact on the overall economy. The ability of each bank to withstand shocks from various sources, including internal and external banking, is called resilience in the banking industry. When shock symptoms appear, banks will be able to adapt, absorb risk, or react quickly to the shocks that occur. This will allow banks to predict various potential shocks that could affect their previous performance (Berry et al., 2015). Ramadhanty et al. (2022) identify three core ideas underlying definitions of resilience. First, the steady – state or single equilibrium concept suggests that a system can return to its original condition after a shock. Second, the multiple equilibria concept implies that a system may stabilize at different equilibrium points following a disturbance. Third, the complex or evolutionary adaptive system emphasizes adaptability and continuous adjustment. In the banking context, resilience can be enhanced through stronger supervision, deeper

financial markets, appropriate regulation of competition, and prudent banking regulation. This study examines Islamic banking resilience using the Capital Adequacy Ratio (CAR) and Non – Performing Financing (NPF), with particular attention to core capital adequacy as a key indicator of resilience, risk mitigation, and sustainable business development (Khusnul Imamah & Achmad Munif, 2018). The most important aspect of the banking industry is capital adequacy. Indicators show that banks with high capital adequacy ratios are healthy banks. For banks to have sufficient capital and reserves in accordance with international standards known as BIS (Bank for International Settlements) standards to withstand potential risks arising from business development or to anticipate potential losses now and in the future, banks must meet minimum capital adequacy requirements (Khusnul Imamah & Achmad Munif, 2018; Muhammad, 2014; Otoritas Jasa Keuangan, 2017).

The basis for calculating capital and risk – weighted assets is the applicable legislation regarding the minimum capital adequacy requirements for conventional banks based on Sharia principles. The CAR ratio calculates how much capital a bank or other financial institution has to cover potential risks, particularly those related to loans and investments. CAR is determined by comparing core capital to specific risks faced. Regulators and investors may feel more confident if the CAR value is high because it indicates that the institution has a large amount of cash to handle risks. A bank's resilience increases with its CAR value (Jameel and Siddiqui, 2023; Putri et al., 2024). The resilience of banks can also be evaluated by examining the quality of their fund disbursement, in addition to the Capital Adequacy Ratio (CAR). The public will receive their money back from the bank management within a certain timeframe, according to the plan provided by the bank.

The high percentage of Non – Performing Financing (NPF) indicates how resilient Islamic banks are in terms of allocating funds. There is a possibility that problematic financing will arise later when the bank distributes money to the general public. Financing that is not implemented according to the bank's expectations is called problematic financing or NPF. This financing includes profit sharing that is risky, financing that falls into the doubtful, bad, and special mention categories, and sustainable financing that can lead to arrears. In other words, a bank's NPF will increase if payments are late, which can be classified as non – performing financing, especially if the bank lacks liquidity or has low capital, making it unable to distribute bank funds effectively.

The bank will not be able to meet the public's demand to withdraw their money if the NPF percentage is too high and is not supported by adequate capital or excellent bank liquidity, as well as poor bank performance in raising funds from third parties (Yudistira, 2017). This can lead to bank runs, and public trust in banks to hold their money can decrease or even be lost. Furthermore, this influence can have significant cascading effects on the financial system (Maritsa & Widarjono, 2021; Taufiqi Lutfi Mustofa et al., 2023). When there is an increase in non – performing financing, the NPF percentage will indicate how well the bank is able to conduct its core business of distributing funds to the public. When NPF is low, it means the bank is also less resilient in disbursing funds; conversely, when NPF is high, it means the bank is very resilient in disbursing funds. The bank's own resilience will be impacted by its poor condition, ultimately leading to bank failure. Because the level of NPF in banks can provide early information and anticipation, it is very important to monitor the resilience of fund distribution in Islamic banks to maintain the resilience of the banking and national financial systems.

### ***Stability of Islamic Banking***

In order to effectively perform its functions of intermediation, payment, and risk distribution, the financial system must be robust and resilient to various economic shocks. Therefore, it can be concluded that the stability of conventional banking and Islamic banking is crucial for efficiently managing financial risks, ensuring the smooth operation of the payment system, and driving economic growth. The stability of the banking system is demonstrated by efficient intermediation functions and strong mobilization of public deposits within the banking environment. Smooth intermediation function and sufficient funding are indicators of bank health, demonstrating stability and resilience to monetary challenges. (Putri et al., 2024; Setyawati et al., 2022) Healthy banking conditions and the ability to efficiently mobilize public deposits for disbursement to other customers in the form of financing are indicators of banking system stability. In this case, banking stability supports the efficiency of monetary policy and the smooth transmission of economic policy mechanisms through the banking system, in addition to reflecting corporate health. (Fajriani and Sudarmawan, 2022; puteri et al., 2025).

Competition theory, which includes Competition Fragility Theory and Competition Stability Theory, is one of the ideas related to banking stability. According to the Competition Fragility Theory, banking stability and competition are negatively correlated. The fact that excessive bank competition can harm market power and profit margins serves as evidence of this. The existing competition will become more intense due to the emergence of new banks or bank mergers, which will negatively impact the profitability of each bank. Conversely, the Competition Stability Theory highlights bank stability as a result of an increased number of banks. According to this theory, banking stability and competition are positively correlated. This is evident from the decline in interest rates caused by more established banks competing with each other. Therefore, it can be said that competition will support businesses in maintaining their financial stability. Based on the method chosen according to the current conditions of each bank, these two ideas guarantee that competition will impact the operational conditions of the banks, both positively and negatively. Consequently, the actions of managers toward the conditions of each bank will have a significant impact on financial stability in the future (Ramadhanty et al., 2022). To maintain the stability of the bank, it must be considered healthy or free from financial difficulties. A number of variables and causes can lead to instability in the financial sector. Typically, behavioral and structural reasons contribute to market failure. Internal (domestic) and foreign (international) factors can contribute to market failure.

According to Bank Indonesia, examining variables that contribute to financial sector instability is essential for defining financial stability. Financial instability arises from various structural and behavioral factors that lead to market failure, driven by both internal and external influences. Key risks within the financial system include credit risk, liquidity risk, market risk, and operational risk. This study assesses Islamic banking stability using the Return on Assets (ROA) and the Financing to Deposit Ratio (FDR). ROA is a key profitability indicator that measures a bank's ability to generate earnings from its assets. These assets include resources financed through both internal capital and external funds that are managed and converted into productive banking assets. (Setyawati et al., 2022). The primary function of Sharia Commercial Banks (BUS) is to channel collected public funds into financing. The Financing to Deposit Ratio (FDR) measures the proportion of financing disbursed relative to third – party funds, serving as an indicator of bank liquidity (Setyawati et al., 2022). A high FDR reflects strong intermediation capacity but may reduce liquidity, as more funds are allocated to financing. Conversely, a low FDR indicates excess liquidity and ineffective intermediation, leading to idle funds and reduced profitability. Therefore, banks must manage public funds efficiently to balance liquidity and

profitability. Bank Indonesia regulates Islamic banks' FDR within the range of 80 – 100% to ensure financial stability and optimal performance.

### ***The Relationship Between Resilience and Stability***

In Islamic Banking, because banking is so vital, its resilience and stability must always be considered. The country's economic system can be affected, as can surrounding activities, if the banking sector's resilience begins to wane. It has become a global phenomenon that banks fail to remain resilient when lending money to the public. This includes the banking crises that hit Norway in 1993, Mexico in 1994 – 1995, China in 2000 – 2001, the United States in 2008, Indonesia in 1997, and many other countries. The high risk of fund disbursement or a large amount of problematic loans, or Non – Performing Loans (NPLs), was the reason behind the failure of banks in several countries. Due to their inability to effectively manage fund allocation, a number of banks were forced to go bankrupt as a result of the 1997 – 1998 crisis. This situation highlights the importance of maintaining banking resilience in channeling cash to ensure the stability of the banking system and the country's financial system.

This study aims to analyze the relationship between Islamic banking resilience variables, proxied by CAR and NPF, and Islamic banking stability variables, proxied by ROA and FDR. Therefore, to analyze the relationship between these variables, the Vector Autoregressive (VAR) / Vector Error Correction Model (VECM) will be used, treating all variables as endogenous. In other words, all research variables have interdependence with each other. The relationship between the Capital Adequacy Ratio (CAR) and Return On Assets (ROA). The performance or profit generated by a bank is positively correlated with its capital. Therefore, ROA increases with CAR. On the other hand, a lower CAR indicates a lower ROA and shows that the bank is performing poorly. Thus, there is a direct proportionality between CAR and ROA, or CAR positively influences ROA (Imamah & Munif, 2018).

According to Veithzal Rivai, banks with high Non – Performing Financing (NPF) tend to have a higher risk of financing that needs to be covered. A bank's ROA value will decrease as its NPF value increases. On the other hand, a bank's ROA value is higher if its NPF value is lower. Thus, there is an inverse proportionality between NPF and ROA, or NPF hurts ROA (Rivai and Arifin, 2010). Theoretically, a high FDR ratio means that Islamic banks are increasingly channeling funds to customers or the public. The increase in financing provided by Islamic banks to customers will ultimately impact the bank's profitability. The profits will be used to fund capital, meaning the more funds raised (without overly burdensome financing), the more funds will be raised. This indicates a relationship and connection between FDR and CAR. FDR has a positive impact on CAR, or both have a directly proportional relationship (Munandar, 2022). The NPF ratio is used to assess how well bank management is able to handle problematic bank financing. In other words, the better the bank's health, the lower the NPF ratio, the less problematic financing occurs, and conversely, the higher the NPF ratio, the greater the risk of financing borne by the bank. Meanwhile, the bank's management capacity to oversee time deposits, current accounts, savings, and other resources used to process customer loan applications is measured by the FDR ratio. If the bank can efficiently disburse financing, the number of non – performing loans will be small, and the FDR will be high, resulting in high company profits. The statement describes the need for effective management of the link between NPF and FDR. An aggressive approach to credit placement is indicated by a higher FDR; conversely, a lower FDR will result in lower bank profits. The bank will make a profit if it can distribute all the money it receives, but it also risks losing the opportunity to make a profit if it is unable to do so. A bank that lends out almost all of

its money has a high FDR ratio. This implies that the FDR increases with the amount of money disbursed for financing, and therefore, there is a greater chance of significant financing risk. On the other hand, banks will also provide less funding if the NPF level is high due to unstable economic conditions. Thus, NPF hurts FDR, or the relationship between NPF and FDR is inversely proportional (Munandar, 2022; Rosidah, 2018).

## METHOD

This research is a quantitative study using secondary data obtained from the financial statements of 11 Islamic Commercial Banks (ICBs), taken from quarterly reports from 2019Q1 to 2024Q4 for the 11 ICBs, resulting in a total of 264 data points (Financial Services Authority, 2024). Banking resilience refers to the adequacy of capital, which can be seen from the CAR and the quality of NPF assets (Ramadhanty, Wijaya, and Mahadwartha, 2022; Suwito and Siskawati, 2022), while banking stability refers to ROA and FDR (Khaymiri and Alsulami, 2023; Daoud and Kammoun, 2020; Hamda and Sudarmawan, 2023). The research framework is described as follows:

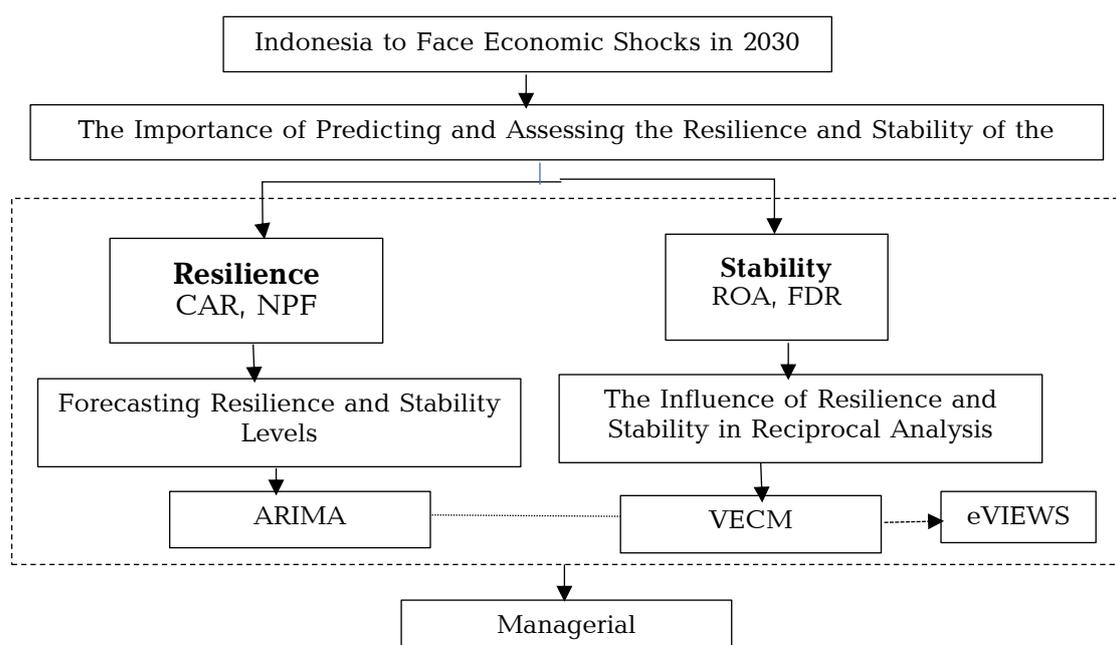


Figure 1. Research Framework

Table 1. Variable Dimensions and The Formula

Variabel Dimensions	The Formula Of Variable Dimensions
<i>Non Performing Financing/NPF</i>	$NPF = \frac{\text{Non - Performing Loans}}{\text{Total Financing}} \times 100\%$
<i>Capital Adequacy Ratio/CAR</i>	$CAR = \frac{\text{Modal of Bank}}{\text{risk - weighted assets}} \times 100\%$
<i>Financing to Deposit Ratio/FDR</i>	$FDR = \frac{\text{Total Financing}}{\text{Third - Party Funds}} \times 100\%$
<i>Return On Assets/ROA</i>	$ROA = \frac{\text{Net Income}}{\text{Total Asset}} \times 100\%$

Note: Blue is the Sharia Banking Resilience Variable, Yellow is the Sharia Banking Stability Variable

## RESULTS AND DISCUSSIONS

### Results

#### Overview and Forecasting of Islamic Bank Resilience 2024–2030

The Capital Adequacy Ratio (CAR), also known as the capital adequacy ratio, is a ratio that indicates a bank's ability to absorb losses from its assets. It is calculated by comparing capital to risk-weighted assets. In Indonesia, the minimum CAR is set at 8% by the Financial Services Authority (OJK). If the CAR is above 12%, it indicates that the bank is in good health and capable of handling financial risks. From the average CAR data for Islamic Banks, the following results were obtained:

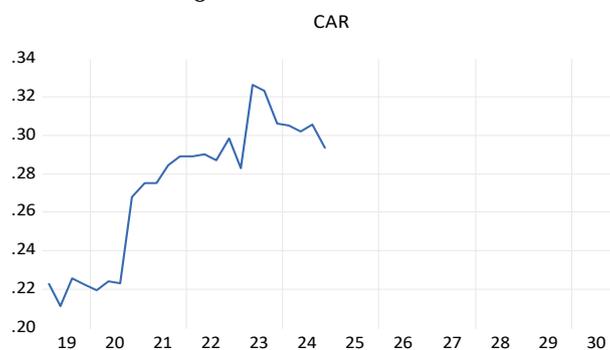


Figure 2. Overview of CAR of Islamic Banks in Indonesia (Data Processed from 2019–2024)

From the image above, the economic recession affects the bank's ability to bear the risk of losses from its assets. Although the Islamic Bank's CAR implies the bank is in a healthy and improving condition after the recession, there was a decrease in 2024. Although the bank is in very good condition, there was a decrease in CAR in the fourth quarter of 2024. Ideally, the CAR is high enough for safety, but still optimal to support business expansion. To see the ROA forecast up to 2030, the following data is presented:

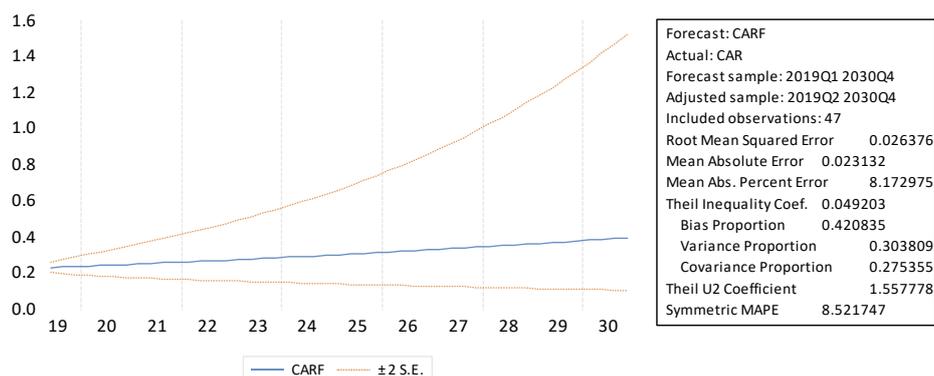


Figure 3. Forecasting of Islamic Bank CAR in Indonesia up to 2030

The results of data analysis using the ARIMA method show that the CAR at Islamic Banks will increase until 2030 if the CAR remains stable until 2024. Looking at the CAR indicator for Islamic Banks, it shows a healthy state as it is more than 12%. The following graph illustrates the CAR for each Islamic Bank in Indonesia:

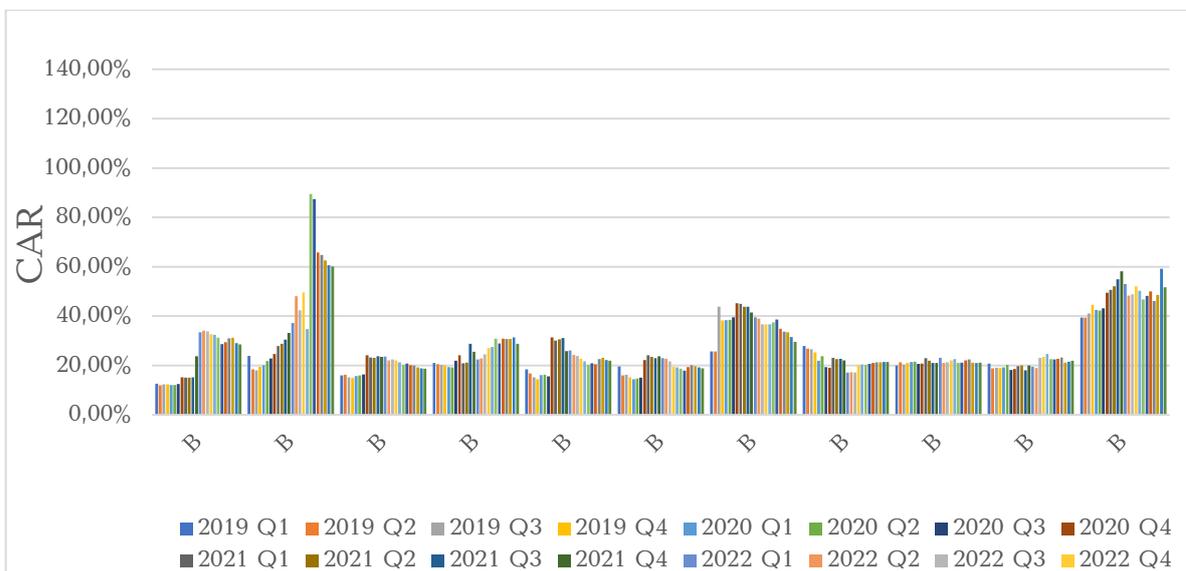


Figure 4. CAR Overview of Each Islamic Bank in Indonesia

The image above shows that Islamic banks in Indonesia demonstrate good resilience in terms of CAR, with the percentage value being above 12% or very healthy. Nevertheless, some Islamic banks require attention because they have not significantly improved their ability to bear the risk of losses from their assets after the recession. This occurred at Bank Jabar Banten Syariah, Bank Panin Dubai Syariah, Bank Syariah Bukopin, Bank Syariah Indonesia, Bank Riau Kepri, and Bank Aceh Syariah. Specifically, Bank Jabar Syariah, Bank Syariah Bukopin, and Bank Panin Syariah experienced a decline in ROA until Q4 2024.

The second variable of resilience is Non-Performing Financing (NPF), which is a ratio used to indicate the level of problematic financing in Islamic banks, specifically financing that is overdue or whose payments are not current. NPL is calculated by dividing the total non-performing loans by the total loans provided. The higher the NPF, the greater the credit risk borne by the bank. The Financial Services Authority (OJK) sets a maximum NPF limit of 5%; if this figure is exceeded, the bank's condition is considered unhealthy. An overview of NPF can be seen in the following image:

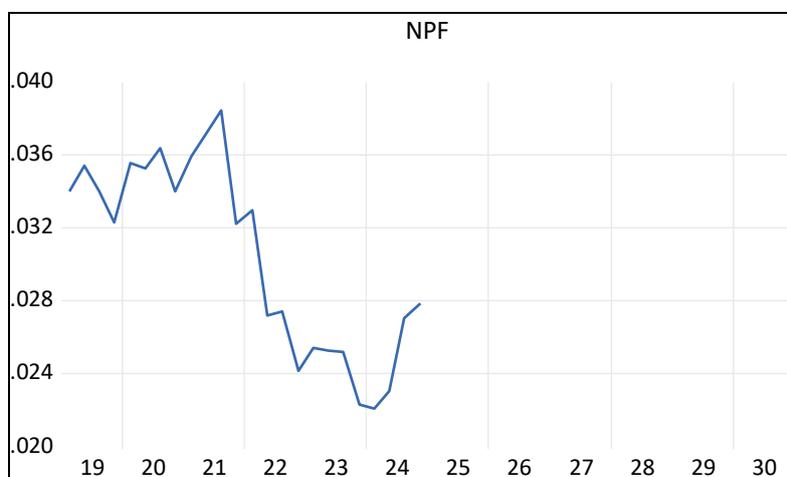


Figure 5. Overview of NPF Islamic Banks in Indonesia (Data Processed from 2019–2024)

The image above shows that the recession leads to an increase in non-performing loans. This can be seen from the upward trend of the graph from 2019 to 2021. From 2021

to 2023, there is a downward trend, but by the end of 2024, it shows an increase again. To see the NPF forecasting up to 2030, the following data is presented:

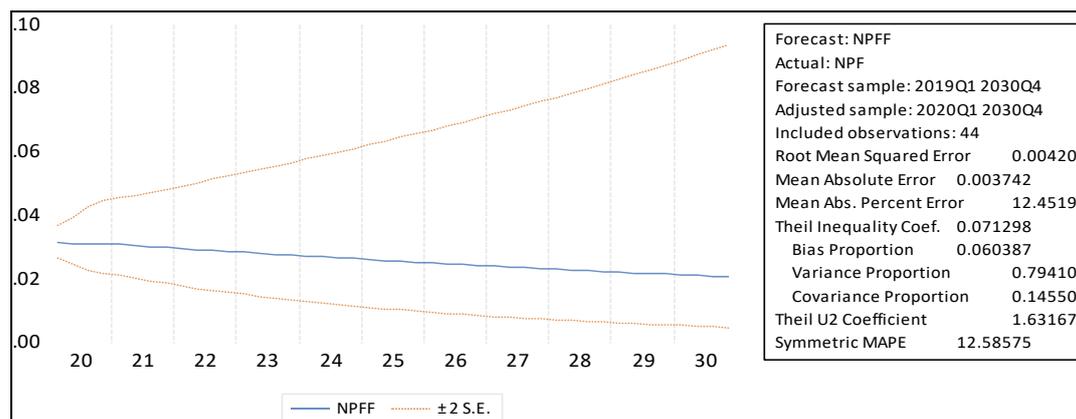


Figure 6. Forecasting of Islamic Bank NPF in Indonesia Until 2030

Based on the forecasting results shown in the graph, NPF is projected to remain relatively stable until 2030, without showing any significant upward or downward trend. The main prediction line appears flat, indicating that the level of non – performing loans is not expected to experience a sharp increase or drastic decrease in the coming years. However, prediction uncertainty gradually increases over time, as shown by the widening upper bound of the confidence interval. This reflects that the further into the future, the greater the likelihood of deviation from the predicted value, so the risk of changes occurring outside the projection remains. The NPF picture for each Islamic Bank can be seen in the graph below:

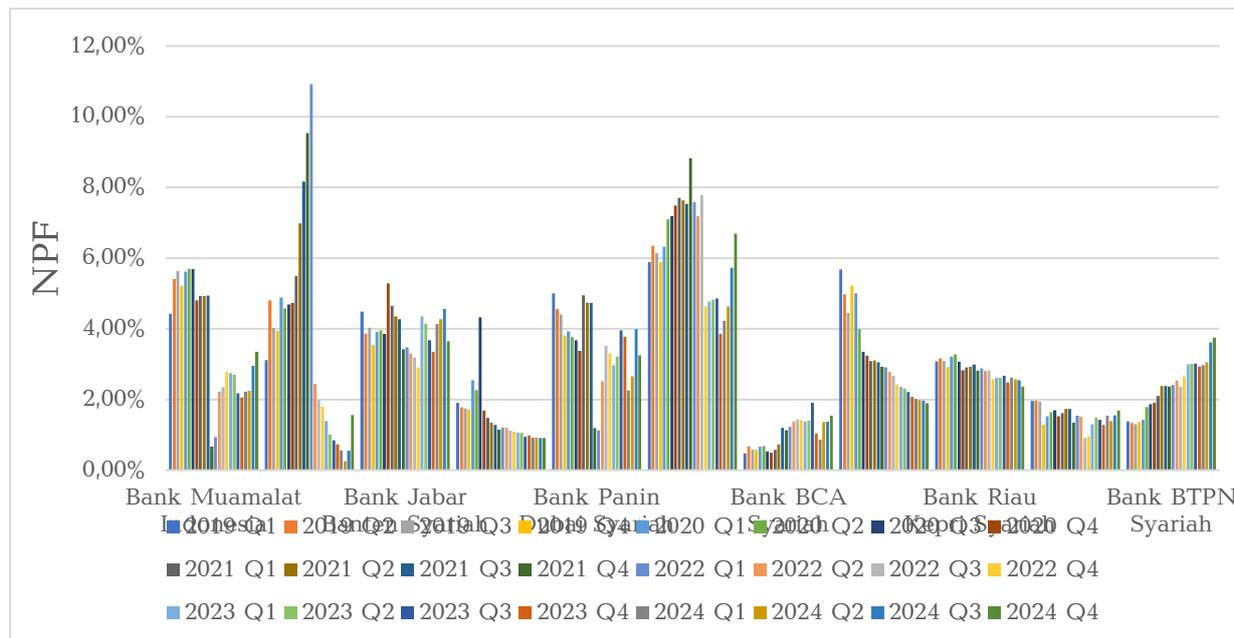


Figure 7. Overview NPF of Each Islamic Bank in Indonesia

Although NPF shows a declining trend by 2030, some banks require attention because they show an increase in NPF during the fourth quarter of 2024. Some of these banks are Bank Muamalat, Bank Jabar Banten Syariah, Bank Panin Dubai Syariah, Bank Bukopin Syariah, and Bank BTPN Syariah. Meanwhile, Bank Riau Kepri showed a stagnant graph for Bank Riau Kepri and Bank Aceh Syariah.

### Overview and Forecasting of Islamic Bank Stability 2024–2030

Return on Assets (ROA) is a financial ratio used to measure how effectively a company utilizes all its assets to generate profit. The higher the ROA value, the better the company's performance, as it indicates that the assets used are capable of generating optimal profits. OJK sets the limit at  $\leq 1.25$ , indicating the bank is unhealthy. ROA reflects a bank's efficiency in managing assets such as third-party funds, financing, and investments to generate profit. The ROA condition at Islamic Banks is as follows:

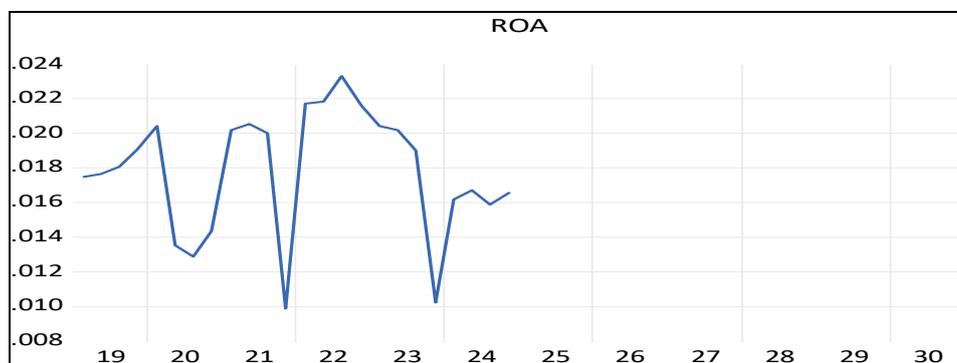


Figure 8. Overview of ROA Islamic Bank in Indonesia (Data Processing 2019 – 2024)

ROA graph from 2019 to 2024 shows a fairly sharp fluctuation at the beginning of the period, particularly between 2019 and 2023. During that time, ROA experienced drastic declines several times, most likely due to global economic pressure from the impact of the recession. In 2024, ROA shows a stable increase. The ROA forecast for the period up to 2030 is shown in the image below:

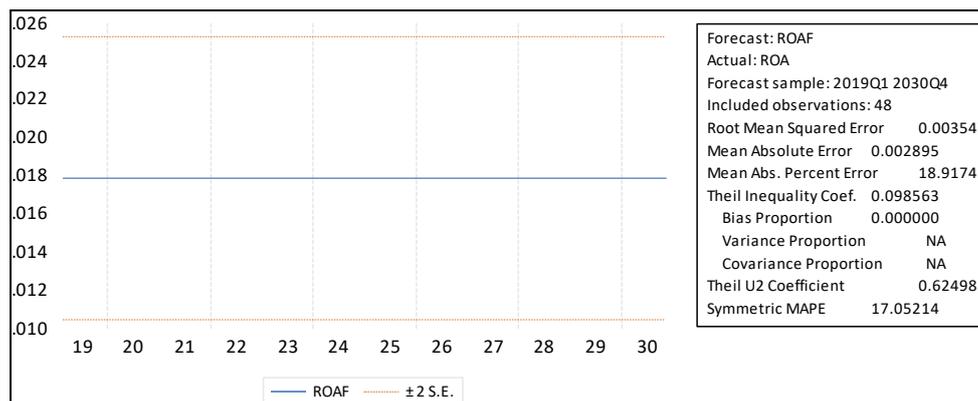


Figure 9. Forecasting of Islamic Bank's ROA in Indonesia Until 2030

The image above shows that ROA in the long term, from 2019 to the projected year 2030, is expected to remain stagnant and constant throughout the projection period. The ROA line appears straight and horizontal without fluctuations, with a relatively constant value, and the upper and lower bounds also show a very small width. This indicates that ROA is not expected to experience any significant changes in the bank's asset profitability level until 2030, with a very healthy category. The ROA figures for each Islamic Bank are as follows:

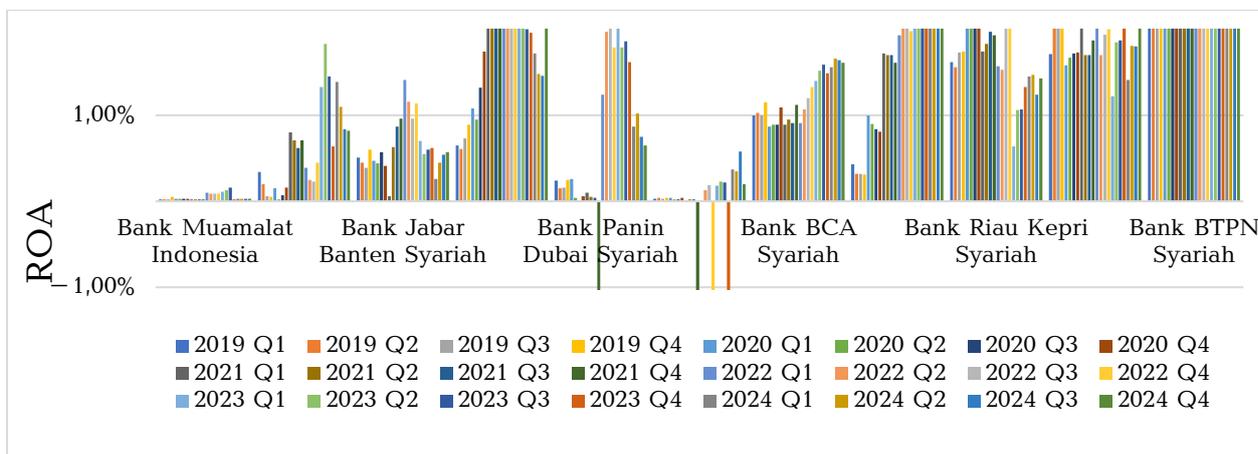


Figure 10. Overview of ROA at Islamic Banks in Indonesia

The image above shows that during the economic recession, there was a significant impact on the ROA level. This means that Islamic Banks were ineffective in utilizing all their assets to generate profit. Several banks require attention because they show unhealthy ROA, namely Bank Muamalat, Bank Victoria, Bank Jabar Banten Syariah, Bank Panin Dubai Syariah, and Bank Bukopin. Two banks were unable to generate profits from their assets during the economic recession, namely Bank Panin Syariah and Bank Dubai Syariah. In the post-recession period, there are several banks that require attention because the stability of their ROA level is still in the unhealthy or fairly healthy category.

The Financing to Deposit Ratio (FDR) is a ratio that measures liquidity risk in a bank. Liquidity risk is the risk arising from a bank's inability to meet its maturing obligations from cash flow funding sources and/or from high-quality liquid assets that can be pledged, without disrupting the bank's activities or financial condition. FDR is known in conventional banks as the Loan to Deposit Ratio (LDR). The Financial Services Authority (OJK) sets a maximum loan-to-deposit ratio (LDR) of  $\leq 85\%$ ; if this figure is exceeded, the bank's condition is considered unhealthy. The following is a description of FDR's view on Islamic banks:



Figure 11. Overview of Islamic Bank FDR in Indonesia (Data Processing 2019 – 2024)

From the image above, FDR fluctuates with a fairly sharp value. From the beginning of 2019 until 2020, FDR experienced a significant increase, reflecting the bank's increased aggressiveness in disbursing financing funds compared to the third-party funds (DPK) collected. However, it began to experience a sharp decline, especially from 2021 to 2022, which was most likely related to the impact of the economic recession, leading to a weakening of financing activities and increased banking caution. From 2022 to 2024, FDR

experienced a resurgence. Although FDR is still in the category of being quite healthy, it should be a major concern. For a forecast of FDR, it is illustrated as follows:

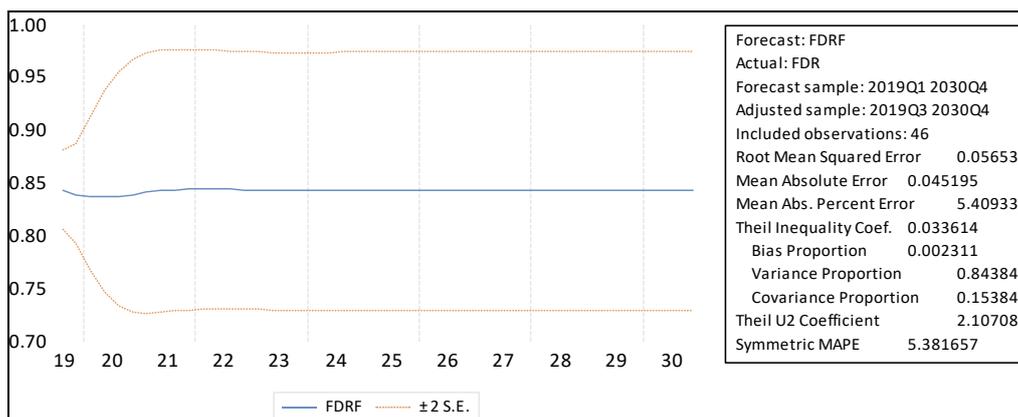


Figure 12. Forecasting of Islamic Bank's FDR in Indonesia up to 2030

Forecasting on FDR shows that from the first quarter of 2019 to the fourth quarter of 2030, FDR forecast is relatively stable in average value. The long – term stability of the FDR line indicates that the forecasting model predicts no significant fluctuations in the forward FDR ratio, meaning that the liquidity conditions of financing to third – party funds in the Islamic banking sector are expected to remain constant. However, for an overview of the FDR at each Islamic Bank, it can be seen as follows:

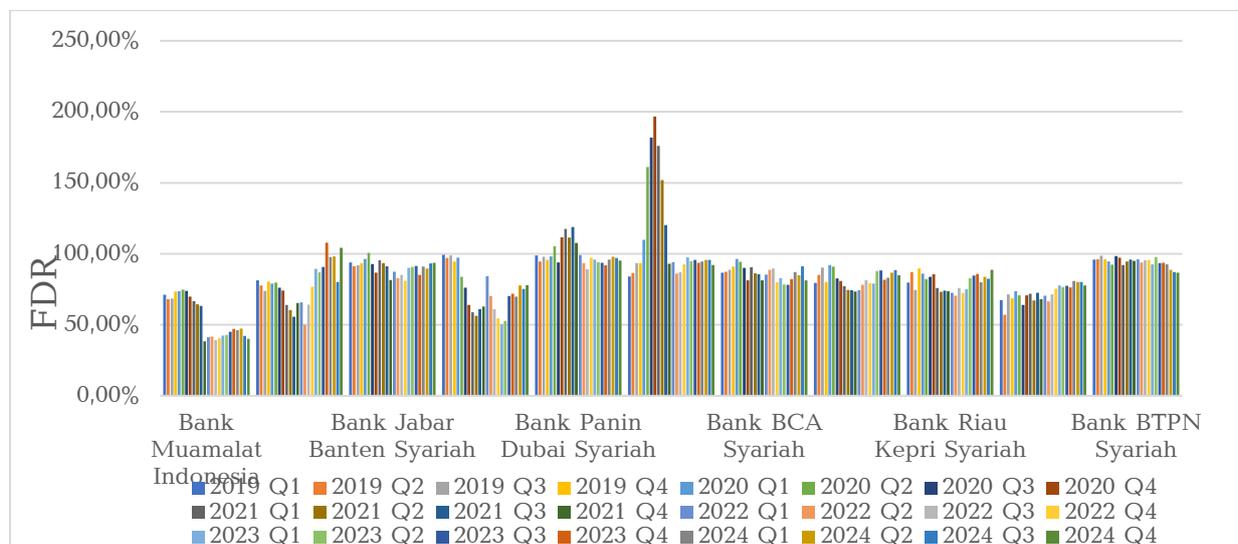


Figure 12. Illustration of FDR at Islamic Banks in Indonesia

Based on image above, the bank that is most capable in meeting its obligations to repay withdrawals made by customers using credit as a source of liquidity is Bank Muamalat. Bank Syariah Bukopin has several FDR values that are in the unhealthy category, especially from the second quarter of 2020 to the third quarter of 2021. This means that during the economic recession Bank Syariah Bukopin was deemed unable to meet its obligations to repay withdrawals made by customers using credit as a source of liquidity. Additionally, Panin Dubai Bank, Bank Jabar Banten, Bank BTPN Syariah, and Bank Victoria Syariah require attention because their FDR ratios are increasing, placing them in the unhealthy category.

### Interaction of Variable Influence Between Bank Resilience and Bank Stability Long–Term Influence

VECM shows both short – term and long – term relationships. Based on the research period, the short – term period is one year (Q1 – 2019 to Q4 – 2019), and the long – term period is over three years (Q1 – 2022 to Q4 – 2024). In the short term, the variables in the study will tend to adapt to other variables, forming a long – term equilibrium. Here are the results of the VECM estimation on long – term effects:

**Table 2.** Long – Run VECM Estimates

Variable	Coefficient	t-statistic	t-table	Interpretation
ROA(-1)	1.000000	–		–
NPF(-1)	13.73336	7.16151	1.9613	Significant
CAR(-1)	–3.7200005	–0.28517		No Significant
FDR(-1)	0.000154	5.79103		Significant
C	–0.553417	–		–

Source: EViews 13 (Data Processed)

The basis for testing significance in VECM estimation is done by comparing the calculated statistical values with the table statistical values at a significance level of 5 percent or 0.05. If the calculated t – value is greater than the table t – value, it can be said to have a significant effect, and conversely, if the calculated t – value is less than the table t – value, it can be said to have an insignificant effect. The t – table value is found to be  $t(5\%,260) = 1.9613$ , so it can be determined that the variables influencing the long term are NPF and FDR, while CAR does not have an effect.

### Short–Term Influence

VECM shows short – term relationships. In the short term, the variables in the study will tend to adapt to each other, forming a long – term equilibrium. Here are the results of the VECM lag 8 estimations based on the LR, FPE, AIC, and HQ criteria for determining the optimal lag:

**Table 3.** Short – Term VECM Estimation on ROA Variable

Variable	Coefficient	t-statistic	t-table	Interpretation
CointEq1	–0.003284	[ –2.50622]		–
D(ROA(-1))	–0.436761	[ –5.50397]		Significant
D(ROA(-2))	–0.193850	[ –2.25117]		Significant
D(ROA(-3))	–0.258960	[ –3.05306]		Significant
D(ROA(-4))	–0.043273	[ –0.52587]		No Significant
D(ROA(-5))	0.018913	[ 0.22615]		No Significant
D(ROA(-6))	–0.079250	[ –1.00428]		No Significant
D(ROA(-7))	–0.056583	[ –0.77154]		No Significant
D(ROA(-8))	0.172470	[ 2.52073]		Significant
D(NPF(-1))	0.037799	[ 1.46969]	1.9613	No Significant
D(NPF(-2))	0.053312	[ 1.67614]		No Significant
D(NPF(-3))	–0.021277	[ –0.60414]		No Significant
D(NPF(-4))	–0.028038	[ –0.81241]		No Significant
D(NPF(-5))	–0.025434	[ –0.77398]		No Significant
D(NPF(-6))	–0.040749	[ –1.41431]		No Significant
D(NPF(-7))	–0.044566	[ –1.83609]		No Significant
D(NPF(-8))	0.003059	[ 0.17446]		No Significant

<b>D(CAR(-1))</b>	2.98E -07	[ 0.51413]	No Significant
<b>D(CAR(-2))</b>	6.43E -07	[ 1.06953]	No Significant
<b>D(CAR(-3))</b>	1.21E -07	[ 0.15428]	No Significant
<b>D(CAR(-4))</b>	1.98E -07	[ 0.23988]	No Significant
<b>D(CAR(-5))</b>	1.39E -06	[ 1.32382]	No Significant
<b>D(CAR(-6))</b>	-2.36E -07	[ -0.22106]	No Significant
<b>D(CAR(-7))</b>	8.57E -07	[ 0.71330]	No Significant
<b>D(CAR(-8))</b>	-3.44E -07	[ -0.31064]	No Significant
<b>D(FDR(-1))</b>	-1.56E -06	[ -1.80238]	No Significant
<b>D(FDR(-2))</b>	-6.68E -07	[ -1.01743]	No Significant
<b>D(FDR(-3))</b>	-8.22E -07	[ -1.41642]	No Significant
<b>D(FDR(-4))</b>	-4.12E -07	[ -0.75988]	No Significant
<b>D(FDR(-5))</b>	1.52E -06	[ 3.03700]	Significant
<b>D(FDR(-6))</b>	-9.70E -07	[ -1.86558]	No Significant
<b>D(FDR(-7))</b>	2.18E -07	[ 0.48593]	No Significant
<b>D(FDR(-8))</b>	1.59E -06	[ 3.89537]	Significant
<b>C</b>	-0.000781	[ -1.00795]	-

Source: EViews 13 (Data Processed)

The basis for testing significance in VECM estimation is done by comparing the calculated statistical values with the table statistical values (t-table) of 1.9613. The estimation results show that in the short term, ROA(t-1) to ROA(t-3) have an effect on ROA in the current period. The findings also show that ROA(t-8) has a significant effect on ROA in the current period. This means that an increase in ROA in the last 8 quarters will lead to an increase in profit or the value of ROA in the current period. The NPF and CAR during the research period did not have a significant effect on ROA. CAR affects ROA in a negative direction, which means that the larger the assets held by Islamic Banks, the less likely it is to be accompanied by an increase in income or profit.

FDR(t-8) has a positive and significant effect on current period ROA. This means that the increase in the amount of funds disbursed to customers and the public, implemented in the previous 8 periods, will lead to an increase in the current period's ROA achievement. This condition occurs because the results of a policy set by Bank Indonesia and the Financial Services Authority (OJK) take time to show. When banking profits were positive (in the black) in the previous 8 periods, a policy was then implemented to increase the allocation and amount of financing by selecting the right products for customers and investors, and the results were only seen in the achievement of ROA in the following few periods (Setyawati et al., 2022). This means that a policy requires a time lag to show its impact because the results cannot be seen immediately.

**Table 4.** Short – Term VECM Estimation on NPF Variable

Variable	Coefficient	t-statistic	t-table	Interpretation
<b>CointEq1</b>	-0.024782	[ -13.3749]		-
<b>D(ROA(-1))</b>	0.095781	[ 0.85368]		No Significant
<b>D(ROA(-2))</b>	0.138128	[ 1.13452]		No Significant
<b>D(ROA(-3))</b>	0.001969	[ 0.01642]		No Significant
<b>D(ROA(-4))</b>	-0.086183	[ -0.74074]		No Significant
<b>D(ROA(-5))</b>	-0.016465	[ -0.13925]		No Significant
<b>D(ROA(-6))</b>	-0.026643	[ -0.23880]		No Significant
<b>D(ROA(-7))</b>	-0.100942	[ -0.97347]		No Significant

Variable	Coefficient	t-statistic	t-table	Interpretation
D(ROA(-8))	-0.078005	[ -0.80635]	1.9613	No Significant
D(NPF(-1))	-0.530364	[ -14.5848]		Significant
D(NPF(-2))	-0.416907	[ -9.27073]		Significant
D(NPF(-3))	-0.297250	[ -5.96945]		Significant
D(NPF(-4))	-0.213032	[ -4.36573]		Significant
D(NPF(-5))	-0.126914	[ -2.73157]		Significant
D(NPF(-6))	-0.073483	[ -1.80387]		No Significant
D(NPF(-7))	-0.066930	[ -1.95028]		No Significant
D(NPF(-8))	-0.029002	[ -1.17001]		No Significant
D(CAR(-1))	-2.59E -06	[ -3.15439]		Significant
D(CAR(-2))	-2.78E -06	[ -3.26274]		Significant
D(CAR(-3))	-4.00E -06	[ -3.59925]		Significant
D(CAR(-4))	-3.81E -06	[ -3.26535]		Significant
D(CAR(-5))	-4.07E -06	[ -2.74189]		Significant
D(CAR(-6))	-4.89E -06	[ -3.24792]		Significant
D(CAR(-7))	-3.65E -06	[ -2.14769]		Significant
D(CAR(-8))	-3.93E -06	[ -2.50687]		Significant
D(FDR(-1))	2.49E -06	[ 2.04049]		Significant
D(FDR(-2))	3.08E -06	[ 3.31453]		Significant
D(FDR(-3))	1.21E -06	[ 1.47062]		No Significant
D(FDR(-4))	6.75E -07	[ 0.87951]	No Significant	
D(FDR(-5))	1.28E -06	[ 1.80871]	No Significant	
D(FDR(-6))	1.03E -06	[ 1.40205]	No Significant	
D(FDR(-7))	6.25E -07	[ 0.98429]	No Significant	
D(FDR(-8))	2.49E -07	[ 0.43124]	No Significant	
C	-0.004301	[ -3.92448]		-

Source: EViews 13 (Data Processed)

The estimation results show that in the short term, NPF affects NPF itself from the NPF(t-1) to NPF(t-5) period. This means that NPF in the previous one to five periods influences NPF in the current period. This implies that problematic financing occurring in the previous 5 periods will impact problematic financing in future periods. In other words, the policies and regulations implemented internally by Islamic banks in providing financing will affect the amount of non-performing financing not in the current period, but in subsequent periods.

CAR throughout the study period had a negative and significant impact. This means that to overcome problematic financing, capital must be increased. It can also be seen that CAR(t-1) to CAR(t-8) negatively affects CAR. This means that the higher the CAR, the lower the NPF, and vice versa. This means that the size of capital in Islamic banks can be one of the indicators of the bank's ability to bear risk, which is improving (Yudistira, 2017). FDR(t-1) and FDR(t-2) have a positive and significant impact on NPF. This indicates that policies in allocating funds for appropriate and efficient financing will be able to have a positive impact (minimize) on non-performing financing.

**Table 5.** Short – Term VECM Estimation for the CAR Variable

Variable	Coefficient	t-statistic	t-table	Interpretation
CointEq1	297.8166	[ 1.51832]		-

Variable	Coefficient	t-statistic	t-table	Interpretation
D(ROA(-1))	7291.913	[ 0.61392]		No Significant
D(ROA(-2))	- 408.0599	[ -0.03166]		No Significant
D(ROA(-3))	- 1335.261	[ -0.10517]		No Significant
D(ROA(-4))	1397.666	[ 0.11347]		No Significant
D(ROA(-5))	- 1683.516	[ -0.13449]		No Significant
D(ROA(-6))	- 3996.473	[ -0.33835]		No Significant
D(ROA(-7))	3993.792	[ 0.36383]		No Significant
D(ROA(-8))	3977.293	[ 0.38837]		No Significant
D(NPF(-1))	- 6674.055	[ -1.73370]		No Significant
D(NPF(-2))	- 8119.052	[ -1.70544]		No Significant
D(NPF(-3))	- 5470.587	[ -1.03778]		No Significant
D(NPF(-4))	975.0645	[ 0.18876]		No Significant
D(NPF(-5))	1376.129	[ 0.27978]	1.9613	No Significant
D(NPF(-6))	2475.296	[ 0.57398]		No Significant
D(NPF(-7))	2532.332	[ 0.69704]		No Significant
D(NPF(-8))	1881.092	[ 0.71685]		No Significant
D(CAR(-1))	- 0.251711	[ -2.90029]		Significant
D(CAR(-2))	- 0.818664	[ -9.09144]		Significant
D(CAR(-3))	- 0.356963	[ -3.03616]		Significant
D(CAR(-4))	- 0.716177	[ -5.79600]		Significant
D(CAR(-5))	- 0.574068	[ -3.64926]		Significant
D(CAR(-6))	- 0.506668	[ -3.17686]		Significant
D(CAR(-7))	- 0.583510	[ -3.24434]		Significant
D(CAR(-8))	- 0.474323	[ -2.86026]		Significant
D(FDR(-1))	0.241052	[ 1.86318]		No Significant
D(FDR(-2))	0.000330	[ 0.00336]		No Significant
D(FDR(-3))	0.050525	[ 0.58134]		No Significant
D(FDR(-4))	0.031491	[ 0.38768]		No Significant
D(FDR(-5))	0.026890	[ 0.35784]		No Significant
D(FDR(-6))	- 0.024867	[ -0.31955]		No Significant
D(FDR(-7))	- 0.060850	[ -0.90508]		No Significant
D(FDR(-8))	0.005562	[ 0.09117]		No Significant
C	137.1337	[ 1.18186]		-

Source: EViews 13 (Processed)

The estimation results show that in the short term, only CAR(t – 1) to CAR(t – 8) have an impact on the current period's CAR. This indicates that in the research year, the sources of Islamic banking capital in Indonesia were determined on average more by shareholder equity, institutional sources, and public contributions. In other words, the source of capital from retained earnings is not very significant. This is demonstrated by the finding that ROA has no significant impact. High earnings mean that the profit earned is treated more favorably for dividend distribution to shareholders than for retained earnings. Therefore, a small percentage of retained earnings does not always increase the bank's capital (Yokoyama and Mahardika, 2019).

**Table 6.** Short – Term VECM Estimation for the FDR Variable

Variable	Coefficient	t-statistic	t-table	Interpretation
CointEq1	- 853.9428	[ -6.81522]		-

Variable	Coefficient	t-statistic	t-table	Interpretation
D(ROA(-1))	19485.40	[ 2.56815]		Significant
D(ROA(-2))	20147.63	[ 2.44707]		Significant
D(ROA(-3))	5964.140	[ 0.73541]		No Significant
D(ROA(-4))	1826.499	[ 0.23214]		No Significant
D(ROA(-5))	3341.996	[ 0.41794]		No Significant
D(ROA(-6))	5215.565	[ 0.69125]		No Significant
D(ROA(-7))	611.2289	[ 0.08717]		No Significant
D(ROA(-8))	5981.911	[ 0.91439]		No Significant
D(NPF(-1))	14323.04	[ 5.82446]		Significant
D(NPF(-2))	13670.87	[ 4.49536]		Significant
D(NPF(-3))	-304.8733	[ -0.09054]	1.9613	No Significant
D(NPF(-4))	-633.5406	[ -0.19199]		No Significant
D(NPF(-5))	4076.034	[ 1.29729]		No Significant
D(NPF(-6))	2698.036	[ 0.97939]		No Significant
D(NPF(-7))	403.2572	[ 0.17376]		No Significant
D(NPF(-8))	-1427.739	[ -0.85174]		No Significant
D(CAR(-1))	0.001780	[ 0.03211]		No Significant
D(CAR(-2))	-0.148377	[ -2.57948]		Significant
D(CAR(-3))	0.058748	[ 0.78223]		No Significant
D(CAR(-4))	0.457775	[ 5.79959]		Significant
D(CAR(-5))	-0.256090	[ -2.54842]		Significant
D(CAR(-6))	-0.078373	[ -0.76927]		No Significant
D(CAR(-7))	-0.030017	[ -0.26127]		No Significant
D(CAR(-8))	0.605034	[ 5.71146]		Significant
D(FDR(-1))	-0.253582	[ -3.06830]		Significant
D(FDR(-2))	0.253760	[ 4.04286]		Significant
D(FDR(-3))	-0.017744	[ -0.31960]		No Significant
D(FDR(-4))	-0.121143	[ -2.33468]		Significant
D(FDR(-5))	-0.151631	[ -3.15874]		Significant
D(FDR(-6))	0.054397	[ 1.09427]		No Significant
D(FDR(-7))	-0.037730	[ -0.87850]		No Significant
D(FDR(-8))	-0.072206	[ -1.85291]		No Significant
C	-179.3820	[ -2.42012]		-

Source: EViews 13 (Data Processed)

The estimation results in the short term for FDR(t-1), FDR(t-2), FDR(t-4), and FDR(t-5) influence the FDR in the current period. This means that the third-party funds (DPK) of Islamic banks disbursed for financing in the previous period will impact the allocation of those funds in the next period. If the FDR of a bank is high, it means the bank has excellent capabilities and can effectively fulfill its role as an intermediary. Therefore, policies and regulations related to fund distribution, especially in the form of financing, must be well-planned and evaluated so that they will also have a positive impact on fund distribution in subsequent periods (Setyawati et al., 2022).

As for ROA and NPF in the previous two periods, they influenced the current period's FDR. This means that the previous period's income and non-performing loans from the previous period will affect the current period's FDR. The increase and stability of profits earned, as well as the decreasing number of non-performing loans, will increase customer confidence, thereby attracting customer interest in saving and investing. In the

long run, this trust will impact the amount of third-party funds raised by an Islamic bank. Therefore, it can be concluded that good capital resilience and low non-performing financing will be able to maintain the stability of Islamic banking, as proxied by the ROA and FDR variables.

### Variable Shock Contribution Between Bank Resilience and Bank Stability Impulse Response Function (IRF) Analysis

The dynamic behavior of the VECM model can be seen through the response of each variable to shocks from other variables, which is called the Impulse Response Function (IRF). This IRF analysis is not only for the short term but can also be analyzed for several horizons ahead as long-term information. IRF analysis also serves to see how long the effect lasts. If the impulse response image is above the horizon line and in the same direction, the response is positive; conversely, if it is below the horizon line and in the opposite direction, the response is negative. On the other hand, non-response is indicated by a graph where the response tends to be flat near the horizontal line. If the impulse response graph shows movement that is increasingly approaching the equilibrium point (convergence) or returning to the previous equilibrium, this means that the response of a variable due to a shock occurring in another variable will disappear over time, so that the shock will not leave a permanent effect on that variable. In this study, the results of the IRF test will be presented in the form of a graph plotted over 24 periods (quarters). Next, it will be examined over three time periods: short-term, which is a period of one year (4 quarters); medium-term, which is a period of three years (12 quarters); and long-term, which is a period of over three years (24 quarters).

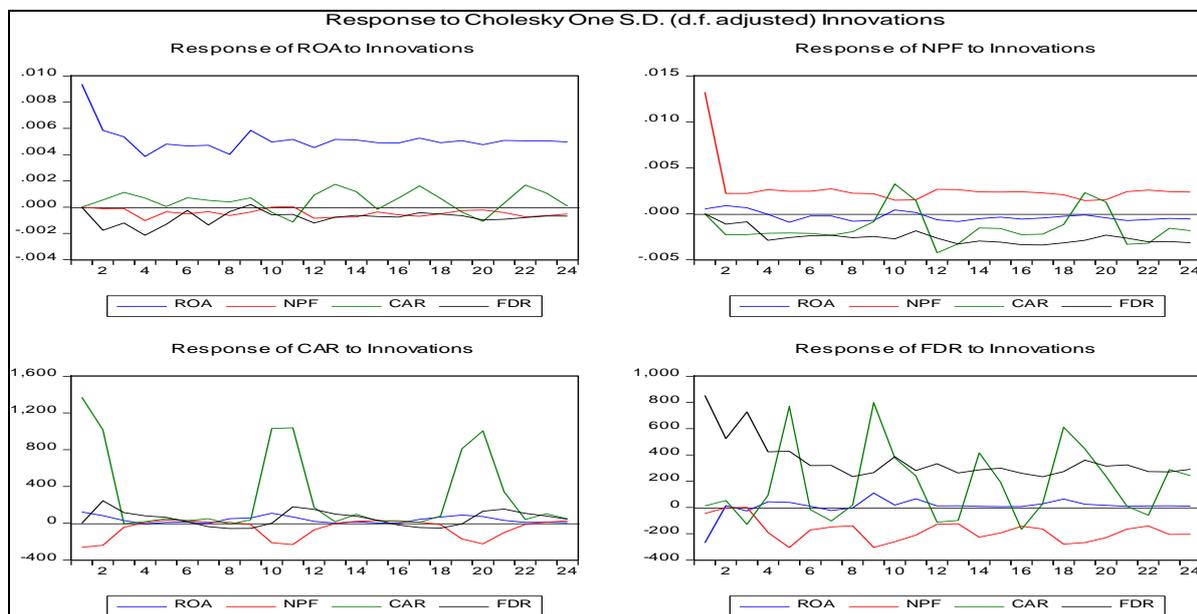


Figure 13. IRF ROA, NPF, CAR, and FDR against the fourth variable shock

The impulse response function in the top-left graph illustrates the response of Return on Assets (ROA) to shocks originating from ROA itself, Non-Performing Financing (NPF), Capital Adequacy Ratio (CAR), and Financing to Deposit Ratio (FDR). Over the 24 observed periods, ROA responds positively and persistently to its own shocks, indicating a permanent effect. This suggests that changes in ROA, whether increases or decreases, tend to carry forward and influence profitability in subsequent periods. In contrast, ROA predominantly exhibits a negative response to shocks in NPF and FDR, reflecting the adverse impact of problematic financing and liquidity pressures on bank profitability. However, the impulse responses to NPF and FDR gradually converge toward equilibrium, implying that their negative effects on ROA are temporary and dissipate over

time. This indicates that non-performing financing is not the sole or dominant determinant of declining Islamic bank profits. Furthermore, ROA generally responds positively to shocks in CAR, despite occasional short-term negative responses. This finding suggests that adequate capital strengthens Islamic banks' capacity to implement effective strategies and sustain higher profitability, supporting prior evidence that strong capitalization contributes to improved ROA performance (Khusnul Imamah and Achmad Munif, 2018).

The graph above (top right) shows the response of NPF to shocks in the NPF variable itself, ROA, CAR, and FDR. Throughout the study period, NPF responded to shocks from the NPF variable itself with a positive trend. However, a significant decline in response occurred in the short term during the second quarter, as can be seen in the graph showing a steep line during that period. In the following quarter, the NPF impulse response showed movement increasingly approaching the equilibrium point, which means that the NPF response to the shock occurring in the NPF variable itself will disappear toward the end of the long-term period. It can be seen from the graph that NPF did not respond to the shock occurring in the ROA variable, where the response tended to flatten near the horizon line. Fluctuating responses were shown to shocks occurring in the CAR variable. This means that the size of Islamic banking capital will influence financing allocation, which will ultimately determine policies on non-performing financing (Munandar 2022). Meanwhile, over the short to long term, NPF responded negatively to shocks in the FDR variable.

The graph above (bottom left) shows the response of CAR to shocks from the variable CAR itself, ROA, NPF, and FDR. Throughout the study period, NPF responded to shocks from the variable NPF itself with a fluctuating trend. The graph shows the CAR line going up and down over a specific period. At the end of the short term (specifically, the third and fourth quarters of 2019), CAR did not respond to shocks in the CAR variable itself. This indicates that capital conditions or capital allocation do not have a significant impact. This period coincides with COVID-19. Approaching the end of the medium term, the response turned positive again. It can be seen from the graph that CAR does not respond to shocks occurring in the ROA and FDR variables, as its response tends to be flat near the horizontal line. In contrast, the response of CAR to shocks in the NPF variable is predominantly negative, and this impulse response shows movement increasingly approaching the equilibrium point. This means that the response of CAR to shocks occurring in the NPF variable will disappear toward the end of the long-term period.

The graph above (bottom right) shows the FDR response to shocks in the FDR variable itself, ROA, CAR, and NPF. Throughout the study period, FDR responded to shocks from the FDR variable itself with a positive trend. However, the largest decrease in response occurred in the medium term, in the eighth quarter. It can be seen from the graph that the FDR does not respond to the shock that occurs in the ROA variable, as its response tends to flatten out near the horizontal line. A fluctuating response was shown to the shock that occurred in the CAR variable. This means that the size of Islamic banking capital will influence the allocation of funds for financing products in Islamic banking. This indicates that the size of the capital will impact the amount of financing funds allocated by the bank to customers or the public. Meanwhile, throughout the short to long term, the RDR responded negatively to shocks in the FDR variable.

### ***Variance Decomposition Analysis (VD)***

The characteristics of the VECM model can be seen through variance decomposition. The purpose of variance decomposition analysis is to explain the contribution of each

research variable to the shocks it causes to the main observed endogenous variable. This analysis is used to predict the extent to which the variance of each influential variable contributes to other variables at present and in the future. The results of the variance decomposition analysis show the magnitude of the simultaneous contribution of one variable to another. Each variable will be influenced by other variables, and the total composition of these variable contributions is 100%. This indicates an interdependent relationship between each existing variable, and the composition of these variable contributions will be evenly distributed over a long period. Additionally, the results of the variance decomposition also show the variables that have the greatest contribution in the short, medium, and long term. Short – term is a period of one year (4 quarters), medium – term is a period of three years (12 quarters), and long – term is a period of over three years (24 quarters). The results of the variance decomposition analysis are as follows:

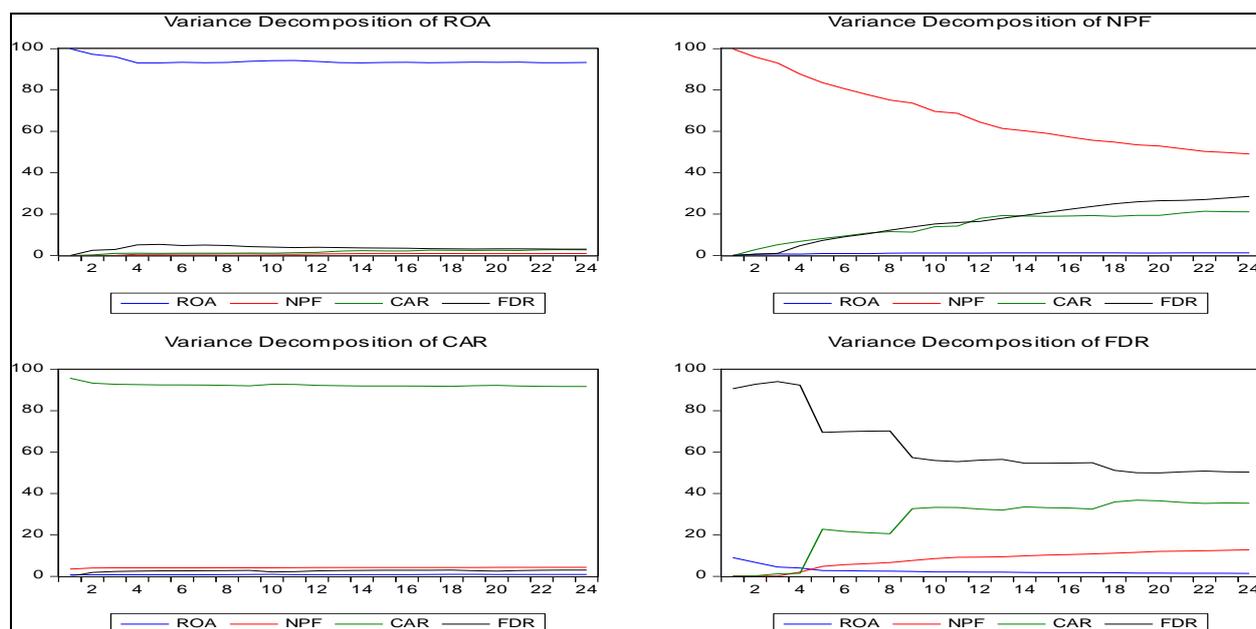


Figure 14. Variance Decomposition of ROA, NPF, CAR, and FDR

The graph above (image top left of figure 14) shows the results of the ROA variance decomposition. The results indicate that among the four variables, in the first quarter, the variance decomposition of ROA was determined by the ROA variable itself, accounting for 100 percent, while the contribution of the other three variables was 0 percent. The contribution of the ROA variable itself shows a continuous downward trend until the 24th quarter. However, the decline in contribution is still within the range of 90 percent. This indicates that in the short, medium, and long term, the value of ROA itself is one of the most important indicators determining the profitability of banks. Meanwhile, the contribution of CAR and FDR up to the 24th period was at most below 5 percent.

The graph above (image top right of figure 14) shows the results of the NPF variance decomposition. The results indicate that among the four variables, in the first quarter, the variance decomposition of NPF was determined by the NPF variable itself at 99 percent and by the ROA variable at 1 percent, while the contribution of the CAR and FDR variables was 0 percent. The contribution of the NPF variable itself shows a continuous downward trend until the 24th quarter, with a contribution below 50 percent. Meanwhile, the increasing contribution to NPF in each quarter is shown by the CAR and FDR variables. This means that in the long run, the CAR and FDR variables will have a significant impact on resolving problem financing, as their contribution value continues to increase until the 24th quarter. Sufficient capital, good liquidity, and the allocation of funds to appropriate

banking products will have a positive impact on preventing an increase in the value of NPF in banking.

The graph above (Image bottom left of figure 14) shows the results of the CAR variance decomposition. In the first quarter, the variance decomposition of CAR was determined by the CAR variable itself, accounting for 95 percent, and continued to decrease until the 24th quarter. At the end of the short – term quarter, the contribution of other variables in determining CAR was not very significant, with each contributing 2 percent from FDR, 4 percent from NPF, and only 0.8 percent from ROA. This finding indicates that the source and amount of capital held by Islamic banks are among the most important indicators in determining the bank's resilience (Berry, Ryan – Collins, and Greenham 2015).

The graph above (image bottom right of figure 14) shows the results of the variance decomposition FDR. The results indicate that among the four variables, in the first quarter, the variance decomposition of FDR is determined by the FDR variable itself, accounting for 90 percent. The contribution of each variable in this study increased and decreased in each quarter. The FDR variable itself and ROA decreased from the short term to the long term. Meanwhile, the CAR and NPF variables increased from the short term to the long term. In the long term, the variable that contributed the most to FDR was the FDR variable itself at 50 percent, followed by the CAR variable at 35 percent. This indicates that bank capital is one of the indicators that determines the allocation of financing products in the future. The need for government supervision and intervention, both by Bank Indonesia and the Financial Services Authority (OJK), in maintaining the stability of Islamic banking in Indonesia, both through the stability variables themselves (ROA and FDR) and through the resilience variables (CAR and NPF), to prevent shocks to the financial health of Islamic banking in Indonesia.

## Discussions

### *Overview of the Current Situation and Forecasting of Resilience*

The Capital Adequacy Ratio (CAR) is an important indicator for assessing the banking sector's resilience to losses. The results of the CAR analysis of Islamic banks in Indonesia show that the overall capital condition of Islamic banks is in the very healthy category, with an average CAR value above 12% during the period 2019 – 2024. However, there was a decline in the fourth quarter of 2024, indicating certain pressure on the capital adequacy of Islamic banks in Indonesia. Overall, this decline cannot yet indicate a threat to resilience, but it should still be monitored because it may reflect declining capital efficiency or excessive caution by banks in disbursing financing, leading to stagnant capital growth. Excessive CAR can also indicate that banks are not aggressive enough in expanding financing, resulting in sub – optimal utilization of capital (Fang et al., 2018).

The forecasting results using the ARIMA method show a steadily increasing CAR trend until 2030, indicating that Islamic banks in Indonesia have the potential to maintain financial resilience if there are no significant economic disruptions. However, some Islamic banks, such as Bank Jabar Banten Syariah, Bank Panin Dubai Syariah, Bank Syariah Bukopin, and Bank Riau Kepri, showed a CAR performance that did not develop significantly after the recession period. This needs attention because capital stability is crucial for supporting the ability to face future financing risks. In this context, it is also emphasized that CAR has a significant positive relationship with Return on Assets (ROA), so a decrease in CAR risks lowering bank profitability (Mursal, Darwanis, and Ibrahim, 2019; Asy – syihab et al., 2024). Meanwhile, the CAR data from these banks also shows a downward trend in 2024, indicating a decline in efficiency in managing the bank's productive assets.

On the other hand, Non – Performing Financing (NPF) as an indicator of problematic financing also shows good health post – recession (Rizal, 2024), but the dynamics of fluctuations in problematic credit also need to be watched out for. During the 2019 – 2021 recession period, there was a significant increase in NPF, leading to non – performing loans, followed by a decline until 2023 (Plikas, Kenourgios, and Savvakis, 2024), but it rose again in the fourth quarter of 2024. Forecasting results show that, in aggregate, NPF is expected to remain stable until 2030 without any significant upward or downward trend. However, the widening upper bound of the prediction interval reflects that the risk of deviation remains, and banks need to have adaptive mitigation strategies. Islamic banks in Indonesia need to be more selective in providing financing to customers in order to minimize financing risks. (Sjarief, Abdul Ghoni, and Affandi, 2023)

Furthermore, the analysis results indicate that several banks, such as Bank Muamalat, Bank Jabar Banten Syariah, Bank Panin Dubai Syariah, and Bank Syariah Bukopin, experienced an increase in NPF by the end of 2024. This indicates challenges in maintaining the quality of financing. In this context, research shows that CAR is not directly significant to NPF, which means that the quality of financing is more influenced by external factors such as macroeconomic conditions, public purchasing power, and the business sectors being financed. Therefore, banks showing an upward trend in NPF need to implement an adaptive risk management approach and a strict financing monitoring system.

Overall, the results of the CAR and NPF analysis for Islamic banks in Indonesia indicate that the resilience of Islamic banking is still quite well maintained. However, special attention should be given to some banks that have experienced a decline in CAR and an increase in NPF, as both variables significantly impact the bank's long – term performance and resilience. Strengthening capital strategies, optimizing financing distribution, and improving risk management efficiency are important steps that must be taken to maintain the resilience and growth of the Islamic banking sector amidst global economic uncertainty toward 2030.

Overall, the discussion indicates that the capital resilience of Islamic banks in Indonesia remains relatively strong as the country approaches 2030. The consistently high Capital Adequacy Ratio (CAR) reflects Islamic banks' commitment to upholding amanah (trust) and maintaining stability (istiqrr) in safeguarding public funds. Nevertheless, further optimization of the intermediation function is still required. Fluctuations in Non – Performing Financing (NPF) suggest that financing risk is not merely an internal issue but is also significantly influenced by macroeconomic conditions and real sector dynamics. In response, Islamic banks have strengthened risk – sharing mechanisms, improved contract selectivity, and promoted financing aligned with halal, productive, and sustainable economic activities. Accordingly, sustaining Islamic banking resilience toward 2030 requires not only robust capitalization but also more equitable, productive, and inclusive financing distribution, enabling Islamic banks to balance economic and social roles in line with the objectives of Islamic economics and the pursuit of falh (social welfare).

### ***Overview of the Situation and Forecasting of Stability***

Based on the analysis of Return on Assets (ROA) for Islamic Banks in Indonesia from 2019 to 2024, there is a significant fluctuation closely related to global economic conditions, especially during the recession. ROA experienced a sharp decline during that period, reflecting the bank's decreasing efficiency in managing assets to generate profits. Nevertheless, in 2024, ROA began to show improvement and a more stable trend. Forecasting results up to 2030 indicate that the ROA value will move consistently and

remain flat within a healthy range, without significant fluctuations. This indicates that the profitability of Islamic banks' assets is predicted to remain stable, although it tends to stagnate. Mollah and Zaman (Mollah and Zaman, 2015). explain that this stability is a distinctive characteristic of Islamic banks, which are more cautious in their expansion and have strict Sharia supervision, thus tending to produce non – aggressive but stable growth.

Meanwhile, analysis of the Financing to Deposit Ratio (FDR) shows that this ratio also experienced quite sharp fluctuations between 2019 and 2022. At the beginning of the period, FDR showed an increase, indicating the banks' aggressiveness in providing financing. However, during the pandemic period, there was a significant decline because banks became more cautious in their expansion due to the increased risk of financing. In their research, Tajuddin et al. (2018) showed that during times of crisis, Islamic banks in OIC countries tend to tighten liquidity policies and reduce financing levels to maintain financial stability. In the 2022 – 2024 period, the FDR increased again, but it was still in the fairly healthy category. Forecasting the FDR until 2030 shows a relatively stable pattern, approaching the average, without significant fluctuations. Nevertheless, the FDR value not falling into the very healthy category is an important indicator that Islamic banks need to improve their liquidity management strategies and efficiently strengthen third – party fund mobilization.

Based on data per bank, it was found that several banks showed weak performance in terms of ROA and FDR. Bank Panin Dubai Syariah, Bank Muamalat, Bank Jabar Banten Syariah, and Bank Bukopin Syariah showed ROA values that were in the unhealthy category during the recession. This condition indicates that these banks failed to utilize their assets to generate optimal profits. Meanwhile, from an FDR perspective, Bank Bukopin Syariah experienced unhealthy conditions from the second quarter of 2020 to the third quarter of 2021, indicating an inability to maintain liquidity amidst economic pressure. Additionally, Bank BTPN Syariah, Bank Panin Dubai Syariah, and Bank Victoria Syariah also showed quite high FDR trends, indicating pressure on liquidity if not balanced by healthy third – party fund growth.

Overall, the results of this analysis provide important insights that, although long – term projections for ROA and FDR indicate stability, there are challenges that each Islamic bank must overcome. Islamic banks need to strengthen the efficiency of asset management as a manifestation of their mandate in managing public funds, while simultaneously improving transparent and accountable governance to maintain ROA stability. Furthermore, liquidity risk management must be carried out carefully and in a balanced manner to maintain a healthy FDR level by ensuring a match between funding sources and financing disbursements and minimizing uncertainty. Optimizing the intermediate function by channeling funds to productive and equitable real sectors, particularly through profit – sharing schemes, is a crucial step in realizing justice and economic well – being. Strengthening financing risk management by improving the quality of analysis and supervision reflects a shared responsibility between banks and customers. All these efforts must be accompanied by the ability to adapt to global economic fluctuations and changes in domestic regulations without compromising Sharia compliance, so that the stability and resilience of Islamic banking in Indonesia can be maintained sustainably over the long term.

### ***The Interaction of Variable Influence Between Bank Resilience and Bank Stability***

The results of the Vector Error Correction Model (VECM) estimation show that there is a significant relationship between bank resilience variables (NPF, CAR) and bank stability (ROA and FDR) in both the short and long term. In the long term, the two variables that are proven to be significant for bank stability (ROA) are Non – Performing Financing (NPF) and Financing to Deposit Ratio (FDR). The coefficient of NPF( – 1) shows a positive and significant direction toward ROA, indicating that an increase in non – performing financing is actually correlated with an increase in ROA in the long term. This finding may reflect a long – term phenomenon where banks with high NPF remain profitable, possibly due to aggressive risk management or successful financing restructuring strategies (Laryea, Ntow – Gyamfi, and Alu, 2016). On the other hand, FDR's significance demonstrates that bank liquidity plays a crucial role in supporting long – term financial stability. The higher the FDR, the greater the financing disbursed by the bank, and if accompanied by good risk management, this will have a positive impact on ROA (Al – Harbi, 2017)

Conversely, the Capital Adequacy Ratio (CAR) did not show a significant influence on ROA in the long run, indicating that the amount of capital held by Islamic Banks does not necessarily increase efficiency in generating profits. This aligns with the findings stating that a high capital adequacy ratio does not necessarily directly contribute to bank profitability if not balanced by optimal financing expansion (Fuddin et al., 2024). In the short term, the VECM results provide a more dynamic picture of the interaction between variables. The ROA variable in the previous period (lag – 1 to lag – 3) significantly affects the current ROA. Meanwhile, NPF and CAR during the research period did not significantly influence ROA. CAR affects ROA negatively, meaning that the larger the assets held by Islamic Banks, the less likely it is to be accompanied by an increase in income or profit. FDR(t – 8) has a positive and significant influence on current period ROA, indicating a profit adjustment effect on the bank's ability to disburse financing. High ROA in the previous period tends to encourage an increase in FDR, reflecting the bank's confidence in disbursing funds. (Anginer et al., 2019)

On the other hand, NPF has a significant influence on itself up to five periods prior, indicating the persistence or historical attachment of non – performing financing risk. FDR(t – 1) and FDR(t – 2) have a positive and significant influence on NPF, meaning that the level of financing disbursement in the past will affect the non – performing financing ratio and liquidity in the current period. If financing disbursement is not managed prudently, this will increase the risk of non – performing financing in the future. This finding reinforces the study by Boamah et al. (2022), which emphasizes the importance of balancing financing expansion and liquidity risk management in maintaining the resilience of the Islamic banking system. Furthermore, the CAR variable consistently hurt NPF and itself from the first to the eighth period. This indicates that the capital increase actually occurred in the context of prudence to reduce the risk of non – performing financing, but on the other hand, it also indicates inefficiency in capital utilization, as the increase in CAR was not followed by an increase in the bank's ability to disburse financing. This states that banks with high capitalization are more stable but not cost – efficient, proving that banks with large capital fail to leverage the leverage effect (Miah and Uddin, 2017).

As for the entire research period, from CAR(t – 1) to CAR(t – 8), it has a significant influence on the current period's CAR. This indicates that in the research year, the sources of Islamic banking capital in Indonesia were, on average, more determined by shareholder equity, institutional sources, and public funds. In other words, the source of capital from retained earnings is not very significant. FDR(t – 1), FDR(t – 2), FDR(t – 4), and FDR(t – 5) influence the current period's FDR. This means that third – party funds (DPK) from Islamic

banking that were disbursed for financing in the previous period will impact the allocation of those funds in the next period. NPF also affects the FDR, indicating that problematic financing in the previous period can hinder the bank's ability to disburse further funds and stating that poor bank asset quality will reduce the bank's intermediate capacity in the short term.

The findings indicate that the financial stability of Islamic banks in Indonesia, in both the short and long run, is predominantly shaped by liquidity conditions, as reflected in the Financing to Deposit Ratio (FDR), and by financing quality, measured through Non Performing Financing (NPF). In contrast, Capital Adequacy Ratio (CAR) primarily functions as a risk absorbing buffer and has not yet contributed optimally to enhancing bank productivity. Accordingly, Islamic banking institutions should strengthen their intermediation function in a selective and prudent manner by prioritizing effective financing risk management, given that FDR and NPF are the principal determinants of stability over time. Financing expansion should be directed toward productive and sustainable real sectors, supported by rigorous post – financing monitoring and effective restructuring mechanisms to prevent excessive NPF accumulation amid higher FDR levels. Moreover, relatively strong capital positions should be utilized more productively through prudent leverage, enabling capital to serve not only as a safeguard against risk but also as a catalyst for efficiency and profitability. Strengthening Sharia governance, enhancing profit and loss sharing based financing analysis, and adopting countercyclical liquidity management strategies are therefore essential to sustaining both stability and resilience in Islamic banking.

## CONCLUSION

The analysis results show that the resilience of Islamic banks in Indonesia in terms of capital (CAR) and financing quality (NPF) is generally in quite good condition until 2024 and is projected to remain stable until 2030. However, some banks still show a declining trend in CAR and an increase in NPF, which requires special attention as it has the potential to weaken long – term resilience. In terms of stability, ROA and FDR fluctuated due to economic pressure but showed a stable trend in the long run. The interaction between variables through VECM estimation reveals that FDR and NPF have a significant influence on bank profitability stability, while CAR acts as a risk buffer but is not yet effective in supporting productivity. Therefore, to maintain long term resilience and stability, Islamic banks need to balance capital adequacy, healthy financing expansion, and adaptive risk management.

## Author Contributions

[**Gadis Arniyati Athar**]: Conceptualization, Formal analysis, Methodology, Writing – Original Draft

[**T. Citra Nisa Farza**]: Supervision, Resource, Investigation, Writing – review & editing.

[**Muhammad Fitri Rahmadana**]: Supervision, Resource, Investigation, Writing – review & editing

[**Nayla Salsabila Batubara**]: Investigation, Resources, Data Curation, Software.

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