

THE IMPACT OF NSFR IMPLEMENTATION ON BANK FINANCIAL STABILITY IN INDONESIA AFTER BASEL III WITH MACROECONOMIC FACTORS AS MODERATING VARIABLES: A LITERATURE REVIEW

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Abstract

This study examines the impact of the Net Stable Funding Ratio (NSFR), a key component of the Basel III regulatory framework, on the financial stability of commercial banks in Indonesia following its implementation. Despite its formal adoption in 2021, empirical evidence regarding the effectiveness of NSFR in the Indonesian context remains limited. This study fills this gap by incorporating macroeconomic factors—namely inflation, interest rates, and GDP growth—as moderating variables to assess their influence on the NSFR-stability relationship. The study also explores whether the effect of NSFR varies according to bank size. A quantitative method is employed using panel data from commercial banks and macroeconomic indicators spanning 2015 to 2023. Financial stability is measured through multiple indicators, including the Z-score, Return on Assets (ROA), Capital Adequacy Ratio (CAR), and Non-Performing Loan (NPL) ratios. The findings are expected to confirm that a higher NSFR improves financial stability, with macroeconomic factors either reinforcing or weakening this effect. This study contributes theoretically and practically by enhancing the understanding of liquidity regulation in emerging markets and offering insights for policymakers and bank managers in aligning regulatory compliance with macroeconomic dynamics.

Keywords: NSFR, financial stability, Basel III, banking regulation, macroeconomic factors.

INTRODUCTION

The implementation of Basel III, especially the Net Stable Funding Ratio (NSFR), represents a global regulatory effort aimed at strengthening the long-term liquidity and resilience of the banking sector in response to vulnerabilities revealed by the 2008 financial crisis. NSFR is designed to ensure that banks maintain a stable funding profile that adequately supports their assets and off-balance sheet activities over at least a one-year horizon (Bank for International Settlements [BIS], 2014). In Indonesia, the Financial Services Authority (Otoritas Jasa Keuangan, OJK) mandated the implementation of NSFR beginning in 2021, with the intention of reinforcing structural liquidity positions and promoting overall financial system stability. Despite this formal adoption, empirical evidence concerning the effectiveness of NSFR in enhancing financial stability within the Indonesian banking context remains limited and inconclusive.

The selection of NSFR as the independent variable in this study is grounded both in regulatory importance and theoretical foundations. NSFR directly addresses liquidity risk management by reducing maturity mismatches between assets and liabilities, thereby mitigating potential liquidity shortfalls (Diamond & Rajan, 2001). It is a crucial metric under Basel III for promoting the sustainability of bank funding sources. Given that OJK's regulations have integrated NSFR into the

compliance framework for Indonesian banks, it is essential to empirically assess the extent to which NSFR adoption translates into tangible improvements in bank stability.

Financial stability, serving as the dependent variable, is a critical outcome of effective liquidity and risk management. Stability theories emphasize the need for adequate capital, sound asset quality, and consistent earnings to maintain a healthy banking system (Saunders & Allen, 2010). Quantitative measures such as the Z-score, Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL) ratios, and Return on Assets (ROA) are commonly employed to assess bank health and resilience. Prior studies within Indonesia (e.g., Wicaksono et al., 2022) indicate complex relationships between liquidity metrics like NSFR and these stability indicators, highlighting the need for further investigation.

The inclusion of macroeconomic factors as moderating variables reflects the recognition that the relationship between NSFR and financial stability may not be uniform across different economic conditions. Moderation theory, particularly within a contingency framework, suggests that the strength and direction of relationships between variables depend on contextual factors (Baron & Kenny, 1986). Empirical research (Bitar et al., 2021; Fungáčová et al., 2020) demonstrates that inflation, interest rates, and GDP growth significantly influence the effectiveness of liquidity regulation. These macroeconomic variables can either amplify or weaken the stabilizing effect of NSFR on banks, underscoring the importance of considering external economic dynamics.

Furthermore, the size of banks can also affect how NSFR impacts financial stability. Larger banks, typically possessing more diversified funding sources and greater access to capital markets, may benefit differently from NSFR regulations compared to smaller or medium-sized institutions (Berger & Bouwman, 2013). Recognizing this heterogeneity is important for understanding and generalizing the impact of NSFR across Indonesia's banking sector.

Given these considerations, this study is positioned to fill critical gaps by empirically examining the influence of NSFR on financial stability in Indonesian banks, while also exploring how macroeconomic conditions and bank size moderate this relationship. The findings are expected to provide valuable insights for regulators and bank management, contributing to more effective risk management strategies and policy formulations in a dynamic economic environment.

The research questions guiding this study are as follows:

1. How do macroeconomic factors moderate the relationship between NSFR and financial stability of banks?
2. Does the impact of NSFR on bank stability vary according to bank size?

LITERATURE REVIEW

Liquidity Risk Management Theory

Liquidity risk management is one of the most crucial functions in the banking sector, as it ensures financial institutions' ability to meet both short-term and long-term obligations without facing excessive costs or potential losses. The concept of liquidity risk revolves around the risk that a bank may not be able to acquire enough liquid assets to meet its obligations when they come due, without incurring significant costs or financial distress (Kashyap et al., 2008).

A foundational aspect of liquidity risk management is maturity transformation, as described by Diamond and Rajan (2001). This concept is central to banking practices, where banks use short-term liabilities, such as customer deposits or short-term borrowing, to fund long-term loans and investments. While this practice is profitable and allows for the growth of the banking sector, it inherently carries liquidity risks. Mismatches between the maturity of assets and liabilities can create liquidity shortfalls if a large number of depositors or creditors demand their funds at once. This phenomenon, known as a "bank run," can have severe implications for the stability of individual institutions and the financial system as a whole.

Brunnermeier and Pedersen (2009) further emphasize the interconnectedness between market liquidity and funding liquidity. Market liquidity refers to the ease with which assets can be bought or sold in the market without causing significant price changes. Funding liquidity, on the other hand, refers to a bank's ability to acquire funds when needed, either through customer deposits or borrowing in the interbank market. These two forms of liquidity are highly interdependent. A disruption in one can cause a crisis in the other. For example, a sudden decline in market liquidity—such as during a financial crisis—can lead to banks' inability to access the necessary funding, even if they hold sound assets, exacerbating the financial crisis.

The global financial crisis of 2008 brought to light the vulnerabilities inherent in the reliance on short-term funding sources, which are often subject to sudden withdrawals by investors. The crisis revealed that many banks had been able to maintain high returns by engaging in aggressive maturity transformation but were ultimately vulnerable when the market for short-term funding dried up. In response, regulatory bodies like the Basel Committee on Banking Supervision introduced liquidity requirements like the Net Stable Funding Ratio (NSFR) under the Basel III framework (BIS, 2014). These regulations aim to mitigate liquidity risk by encouraging banks to hold more stable, long-term funding sources and to reduce their dependence on volatile short-term funding.

Moreover, liquidity risk management is not only about balancing funding sources but also involves strategies for handling unforeseen liquidity shocks. Contingency funding plans (CFPs) are now an essential part of liquidity management, outlining the measures banks should take in response to liquidity stress. The Bank for International Settlements (BIS) (2010) suggests that effective liquidity management requires banks to regularly conduct liquidity stress tests to assess their ability to withstand extreme but plausible market conditions.

Expanded Concepts in Liquidity Risk Management

Liquidity risk management theory has also evolved to address broader systemic risks. For instance, the concept of systemic liquidity risk emerged post-2008, which refers to the risk that liquidity shortages in one institution can spread throughout the financial system, causing a systemic crisis. Gorton (2009) and Hellwig (2009) argue that liquidity is not just a firm-specific concern but a system-wide issue, as the financial markets are interconnected. This view has led to a greater emphasis on the macroprudential regulation of liquidity, including coordinated policy measures by central banks and financial regulators to ensure system-wide stability.

Furthermore, liquidity buffers have become an essential component of effective liquidity risk management. According to Acharya and Mora (2015), liquidity buffers, such as holding excess reserves or highly liquid assets, act as a cushion in times of stress, ensuring that banks can continue operations even when normal funding sources are unavailable. The idea of building liquidity buffers is reflected in the design of the NSFR, which ensures that banks maintain a stable funding structure to support their assets over a one-year horizon. Additionally, Laksana et al.

(2023) emphasize that the adoption of Sharia fintech products (FTPs) during the COVID-19 pandemic helped enhance the liquidity position of banks, particularly in emerging markets where access to stable funding was limited. This highlights the importance of fintech in improving liquidity management.

Lastly, market expectations play a significant role in liquidity risk management. According to Diamond and Dybvig (1983), the behavior of market participants—such as depositors, investors, and creditors—can amplify liquidity risk, especially in times of market uncertainty. Market participants' perceptions of a bank's financial health often drive liquidity runs, highlighting the importance of transparent communication and credible commitments by banks to maintain public confidence.

Basel III and the Role of NSFR

The Basel III framework was introduced by the Basel Committee on Banking Supervision (BCBS) in response to the vulnerabilities exposed during the 2008 global financial crisis. The crisis revealed the fragility of financial institutions that relied heavily on short-term funding, which became unavailable during periods of financial stress. In an effort to address these vulnerabilities and strengthen the banking sector's resilience, Basel III introduced two key liquidity ratios: the Liquidity Coverage Ratio (LCR) and the Net Stable Funding Ratio (NSFR) (BIS, 2014).

The Liquidity Coverage Ratio (LCR) focuses on ensuring that banks hold sufficient high-quality liquid assets (HQLA) to survive potential liquidity shocks over a 30-day stress period. LCR was designed to address short-term liquidity needs and ensure that banks can meet their obligations during periods of market turmoil. In contrast, the Net Stable Funding Ratio (NSFR) is designed to address medium- to long-term funding stability. The NSFR requires that banks maintain a stable funding structure over a one-year horizon by ensuring that the amount of stable funding (such as long-term deposits, equity, or stable debt) is sufficient to cover the liquidity risk profiles of their assets (BIS, 2014).

NSFR directly addresses liquidity risks by promoting the use of long-term and stable funding sources for banks' long-term assets. The primary goal of the NSFR is to reduce the risk of a bank's reliance on short-term wholesale funding, which was a significant factor in the collapse of major financial institutions during the 2008 crisis. Banks are incentivized to adopt funding structures that are more resilient to market disruptions and less vulnerable to sudden funding shocks.

According to King and Tarbert (2017), the NSFR is crucial in reducing liquidity problems by encouraging banks to rely less on short-term funding sources, which are more volatile and prone to sudden withdrawals. Banks with a higher NSFR are better equipped to withstand financial shocks because they are less susceptible to liquidity pressures. This not only stabilizes individual banks but also contributes to the overall health of the financial system by ensuring that banks have the funding necessary to meet their long-term obligations. In addition, Laksana et al. (2023) argue that the rapid adoption of fintech during the COVID-19 crisis has helped banks, especially Islamic banks, to better manage liquidity risk, highlighting the role of Sharia fintech products (FTPs) in supporting financial stability in turbulent times.

The introduction of the NSFR is also tied to broader systemic stability. By incentivizing stable funding structures, the NSFR aims to reduce the likelihood of financial contagion, where the collapse of one bank could lead to a wider financial crisis. A stable funding base allows banks to maintain their operations without needing to rely on volatile short-term funding during periods of financial stress, thereby limiting the potential for systemic risk.

Empirical studies on the effectiveness of the NSFR, however, have yielded mixed results, particularly in emerging markets. For example, Wicaksono et al. (2022) found that higher NSFR levels correlated with lower risk profiles for banks in Indonesia. Banks with higher NSFRs were found to have better capital positions and were more resilient to liquidity shocks. However, the study also indicated that the NSFR did not have a clear impact on profitability and solvency indicators such as Return on Assets (ROA) and Z-scores. This suggests that while the NSFR improves liquidity and stability, its direct influence on a bank's overall profitability and solvency is less definitive.

Furthermore, research by Bitar et al. (2021) on liquidity regulations in emerging markets suggests that the effectiveness of the NSFR may be influenced by local market conditions. In some cases, banks may face challenges in meeting NSFR requirements due to limited access to long-term, stable funding, especially in countries with less-developed capital markets. Therefore, while the NSFR can enhance liquidity resilience, its effectiveness in improving overall financial stability depends on the broader economic and financial environment.

These mixed results underscore the need for further investigation into the real-world effectiveness of the NSFR in emerging markets like Indonesia, where banks may have different access to stable funding sources compared to developed economies. Understanding the nuanced impact of NSFR in these contexts is crucial for policymakers and regulators to adjust and fine-tune the Basel III framework to better fit local conditions.

Bank Size as a Moderating Variable

Bank size plays a crucial role as a moderating variable in the effectiveness of liquidity regulations, including the Net Stable Funding Ratio (NSFR). The size of a bank influences how it responds to liquidity regulations due to differences in access to funding sources, risk management capabilities, and market positioning. Larger banks typically have more diversified funding options, including retail deposits, long-term debt, and access to capital markets, which makes them more resilient to liquidity shocks compared to smaller institutions (Berger & Bouwman, 2013).

Larger banks are better positioned to meet the requirements of the NSFR because they have access to a wide range of funding sources, including sophisticated capital market instruments, which allow them to manage long-term funding needs more effectively. As a result, they can more easily comply with the stable funding requirements imposed by the NSFR without significantly altering their business models. In fact, larger banks are often able to leverage economies of scale in managing liquidity, which enables them to better absorb regulatory costs without a major impact on profitability (Berger & Bouwman, 2013).

Moreover, larger banks have stronger relationships with investors and institutional lenders, which provide them with easier access to stable long-term funding sources. Their size and reputation also enhance their ability to manage and mitigate risks in the financial system. King and Tarbert (2017) argue that the presence of large banks in the financial system enhances overall stability, as they are able to absorb liquidity shocks more effectively due to their diversified funding sources.

In contrast, smaller banks, which often rely more heavily on short-term funding or have less access to diversified funding sources, may face greater challenges in complying with NSFR. These banks are more susceptible to liquidity pressures, particularly during periods of market turmoil or sudden disruptions in funding markets. Smaller banks typically have less bargaining power in capital markets and may face higher costs for long-term funding. Demirgüç-Kunt and Huizinga (2010) suggest that the regulatory requirements imposed by Basel III, including NSFR, could

disproportionately affect smaller banks by imposing higher compliance costs, potentially forcing them to alter their business models or take on more risky funding practices.

The NSFR's requirement for banks to have sufficient stable funding to cover their long-term assets could thus create a more significant burden for smaller institutions. They may need to increase their reliance on more expensive, short-term funding or reduce lending activity to maintain liquidity, which could impact their profitability and long-term sustainability. Furthermore, smaller banks may struggle to meet the regulatory thresholds set by NSFR, particularly if they have limited access to stable funding sources like retail deposits or long-term debt.

As such, Laksana et al. (2023) suggest that the role of fintech and the integration of Sharia fintech products can help smaller banks cope with NSFR regulations by providing additional, more accessible sources of liquidity. These findings highlight the need for tailored regulatory approaches that account for the varying characteristics of financial institutions.

From a regulatory perspective, the challenges faced by smaller banks suggest the need for differentiated regulatory treatment based on bank size. While larger banks may be better equipped to handle the costs and compliance requirements of NSFR, smaller banks may require additional support or flexibility in meeting these standards. Tailored regulatory policies could help mitigate the negative effects of NSFR on smaller banks, thereby ensuring that financial stability is maintained without disproportionately burdening smaller institutions.

Financial Stability: Concepts and Indicators

Financial stability is a core concept in the banking sector, reflecting the ability of banks to maintain smooth operations and meet their financial obligations, even in periods of financial distress or economic shocks. It is an essential measure of the overall resilience of the financial system and the stability of individual institutions within that system. According to the International Monetary Fund (IMF) (2011), financial stability is not just about preventing bank failures but also ensuring that financial institutions can operate effectively during times of stress, avoiding systemic crises that could have widespread economic repercussions.

There are several indicators commonly used to assess financial stability, with each focusing on different aspects of a bank's financial health and resilience. These include the Z-score, Return on Assets (ROA), Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL) ratios, and liquidity ratios. Together, these indicators provide a comprehensive view of the bank's solvency, asset quality, profitability, and overall operational health (Saunders & Allen, 2010).

Z-Score: A Key Measure of Insolvency Risk

The Z-score is one of the most widely used indicators of financial stability. It is a forward-looking measure that combines profitability, leverage, and earnings volatility to estimate the likelihood of insolvency. A higher Z-score indicates a lower probability of bank failure, as it suggests that the bank has sufficient capital to absorb losses and withstand external shocks. The Z-score formula typically incorporates the following components:

- Return on Assets (ROA): Measures profitability relative to total assets.
- Equity-to-Assets Ratio: Indicates the bank's financial leverage and its ability to cover potential losses.
- Volatility of Earnings: Reflects the stability of the bank's income over time.

Laeven and Levine (2009) argue that the Z-score is a robust and effective measure of financial stability. It serves as a predictive indicator, capturing a bank's ability to withstand shocks from various sources, such as market volatility, credit losses, or macroeconomic downturns. The Z-score is particularly useful because it combines both profitability and risk factors, offering a comprehensive picture of a bank's financial health.

Return on Assets (ROA) and Profitability

Return on Assets (ROA) is another critical indicator of financial stability, as it measures the bank's profitability relative to its total assets. A higher ROA indicates that a bank is efficiently utilizing its assets to generate profits. ROA is essential for evaluating the overall operational efficiency of a bank. According to Saunders and Allen (2010), banks with consistently high ROA tend to have better risk management systems and are more capable of handling economic downturns.

However, ROA alone does not capture all risks related to a bank's financial stability. It must be analyzed alongside other indicators, such as the Capital Adequacy Ratio (CAR), to provide a fuller picture of a bank's financial strength.

Capital Adequacy Ratio (CAR)

The Capital Adequacy Ratio (CAR) is another fundamental indicator of financial stability, reflecting the capital a bank holds in relation to its risk-weighted assets. It is a measure of a bank's ability to absorb potential losses, with higher ratios indicating greater financial stability. CAR is crucial for determining whether a bank can withstand financial stress or losses without becoming insolvent.

The Basel Committee on Banking Supervision has established minimum CAR requirements for banks, and these standards are integrated into the Basel III regulations (BIS, 2014). According to King and Tarbert (2017), banks with a high CAR are better positioned to maintain stability in turbulent financial conditions, as they have a cushion to absorb losses.

Non-Performing Loan (NPL) Ratio

The Non-Performing Loan (NPL) ratio is an essential indicator of asset quality. It measures the percentage of loans that are not being repaid as agreed and are at risk of default. A high NPL ratio signals that a bank has significant exposure to credit risk, which can undermine its financial stability. NPLs are particularly concerning during economic downturns, as they can indicate broader systemic issues within the bank's lending practices or the economy.

Banks with high NPL ratios often face difficulties in raising capital or meeting their obligations, as they must allocate more resources to cover potential loan defaults. Managing and reducing NPLs is a key part of ensuring financial stability, particularly for emerging-market banks that may be more exposed to economic volatility (Demirgüç-Kunt & Huizinga, 2010).

The CAMEL Framework

The CAMEL framework is widely used to evaluate the financial health of banks. It includes five critical components:

- Capital Adequacy
- Asset Quality
- Management Quality

- Earnings Quality
- Liquidity

Each of these components contributes to the overall assessment of financial stability. According to Saunders & Allen (2010), the CAMEL model provides a comprehensive approach to evaluating a bank's ability to withstand financial shocks, particularly when used in conjunction with liquidity ratios and solvency indicators like the NSFR. This framework helps regulators, investors, and analysts identify potential risks in a bank's operations and take corrective actions before problems escalate.

The NSFR, in particular, relates closely to the liquidity component of the CAMEL framework, emphasizing the importance of maintaining a stable and diversified funding base to avoid liquidity crises. As such, banks with higher NSFRs are more likely to maintain a healthy liquidity profile, which supports their overall financial stability.

Financial Stability in the Context of NSFR

The NSFR (Net Stable Funding Ratio) plays a significant role in influencing a bank's ability to remain stable during times of financial distress. By promoting the use of long-term, stable funding sources, NSFR helps ensure that banks have adequate liquidity to withstand prolonged periods of market stress. As a result, NSFR directly impacts key indicators of financial stability, such as the Z-score, CAR, and NPL ratios, by improving the bank's funding profile and reducing its reliance on volatile short-term funding.

CONCLUSION

The review of the Liquidity Risk Management Theory and its integration with Net Stable Funding Ratio (NSFR) under the Basel III framework highlights several key aspects that are critical for understanding how liquidity risk can be managed within the banking sector. The NSFR aims to mitigate risks associated with the reliance on volatile short-term funding sources and encourages banks to adopt stable long-term funding structures. This approach reduces the likelihood of liquidity crises, especially during times of financial stress, as demonstrated by the global financial crisis of 2008, which exposed the vulnerabilities inherent in short-term funding reliance.

In examining the broader implications of liquidity risk management, the theory has evolved to address systemic liquidity risks, emphasizing the interconnectedness of financial institutions and markets. The concept of systemic liquidity risk, introduced post-2008, underscores the need for regulatory measures that address the financial system as a whole, rather than just focusing on individual institutions. The introduction of liquidity buffers, such as reserves or highly liquid assets, has become a crucial part of ensuring that banks can absorb shocks and continue operating even when access to normal funding sources is limited.

The NSFR, as part of Basel III, addresses medium- to long-term liquidity stability by incentivizing banks to reduce reliance on short-term wholesale funding. Studies have shown that banks with higher NSFR levels are better equipped to handle financial shocks and are more resilient in the face of liquidity pressures. However, empirical research has revealed mixed results, especially in emerging markets like Indonesia, where access to stable funding sources can be more limited.

Local market conditions, therefore, play a significant role in determining the effectiveness of the NSFR in improving overall financial stability.

The role of bank size has also been identified as a significant moderating factor. Larger banks, with more diversified funding sources and greater access to capital markets, are better positioned to comply with NSFR regulations without substantial operational disruptions. In contrast, smaller banks may face greater challenges in meeting NSFR requirements, as they tend to rely more heavily on short-term funding sources and face higher costs for long-term capital.

Furthermore, macroeconomic factors such as inflation, interest rates, and GDP growth can significantly affect the relationship between NSFR and bank stability. In countries with volatile economic conditions, such as Indonesia, the stabilizing effects of NSFR could be weakened by external shocks or economic instability. This suggests that NSFR's effectiveness in improving financial stability may depend not only on regulatory compliance but also on the broader economic environment.

Key Takeaways:

- NSFR plays a crucial role in enhancing liquidity resilience in banks, especially by promoting long-term stable funding and reducing reliance on short-term funding sources. However, its impact on overall financial stability is less clear, especially in emerging markets.
- Macroeconomic factors and bank size serve as important moderators in the effectiveness of NSFR. The stabilizing effects of NSFR may be more pronounced in stable economic environments and larger institutions.
- The introduction of liquidity buffers and systemic risk management strategies has proven to be essential in protecting banks from liquidity crises, but further research is needed to understand how these measures interact in different regulatory and economic contexts.

Research Gaps and Future Directions:

While the existing literature offers valuable insights into the role of NSFR in enhancing liquidity stability, several gaps remain, particularly in the context of emerging markets like Indonesia. Future research could focus on:

- The effectiveness of NSFR in improving profitability and other financial stability indicators, such as Return on Assets (ROA) and Z-scores, in emerging economies.
- The interaction between NSFR and macroeconomic factors—how inflation, interest rates, and GDP growth specifically affect the stability-enhancing role of NSFR in countries with volatile economies.
- The need for differentiated regulatory approaches based on bank size to ensure that both large and small institutions can comply with NSFR without adversely affecting their stability.

By addressing these gaps, future studies can help policymakers and regulators refine the Basel III framework and tailor it to better fit the unique characteristics of different economies, ensuring that NSFR remains an effective tool for liquidity risk management across diverse banking sectors worldwide.

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