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MEASUREMENT AND MANAGEMENT OF FINANCIAL SYSTEM STABILITY: A MORE COMPREHENSIVE AND POLICY ORIENTED APPROACH FOR DEVELOPING COUNTRIES

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Abstract

This study develops and empirically validates a Composite Financial System Stability Index (FSSI) for a developing country like Nigeria, aimed at providing a more holistic and forward-looking framework for monitoring, analysing, and managing systemic financial risks. Motivated by the increasing complexity of the Nigerian financial system and its exposure to macroeconomic and external shocks, the study integrates key macroeconomic, banking, insurance, capital market, and other financial institution indicators into a single composite index covering the period 2006 to 2025. Using a combination of descriptive statistics, ARDL–Error Correction Models (ECM), principal component analysis, and backtesting techniques, the research examines how these indicators interact to influence financial stability over time.

The findings reveal that the FSSI effectively tracks financial stability dynamics, accurately identifying periods of vulnerability and recovery. Sectoral trends highlight that while the banking and insurance sectors have demonstrated resilience, the macroeconomic and capital market components have been more sensitive to shocks. The results further show that the FSSI can robustly estimate both short-run and long-run relationships between key macro-financial variables and system stability, with a fast speed of adjustment of approximately 82% per quarter. In addition, the study designs an Early Warning System (EWS) Dashboard built on the FSSI, offering a forward-looking surveillance tool capable of signalling emerging risks before they escalate into systemic crises.

Policy recommendations focus on institutionalising the FSSI framework within the Central Bank of Nigeria's financial stability architecture, enhancing data quality and sectoral coverage, and strengthening macroprudential coordination among financial regulators. The study contributes to knowledge by providing an empirically grounded, context-specific framework for financial stability monitoring in Nigeria—bridging the gap between traditional macroeconomic analysis and modern macroprudential policy practice. It underscores the critical role of integrated, evidence-based tools in building a more resilient, adaptive, and stable financial system.

Keywords: Financial System Stability, Composite Index, Early Warning System, ARDL–ECM, Macroprudential Policy, Nigeria.

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INTRODUCTION

Financial system stability has increasingly come to be recognized as a critical foundation for sustainable economic growth and development. It ensures that financial institutions and markets continue to function effectively, allocating capital efficiently, mobilizing savings, managing liquidity, and facilitating payments, even during periods of economic stress (International Monetary Fund, 2011). A stable financial system sustains investor confidence, supports long-term investment, enhances macroeconomic resilience, and helps economies absorb external shocks without degenerating into crises. Conversely, instability in the financial system can trigger credit crunches, sharp exchange rate depreciations, capital flight, inflationary spirals, and prolonged economic recessions, which may lead to significant socio-economic costs. These dynamics have been widely documented in both advanced and emerging market economies and have made financial stability a central objective of monetary and regulatory policy frameworks globally (Bank for International Settlements, 2011; Frederic S. Mishkin, 2007).

In Nigeria, the financial system plays a particularly strategic role in economic transformation and development. Over the past two decades, the sector has undergone extensive reforms aimed at strengthening banking sector resilience, deepening financial markets, and expanding access to finance. The landmark banking consolidation of 2005 reduced the number of banks from 89 to 25, increased capital adequacy, improved governance standards, and enhanced the capacity of banks to intermediate credit efficiently. This was followed by further reforms in monetary policy operations, foreign exchange market liberalization, insurance and pension sector regulation, and capital market deepening (Central Bank of Nigeria, 2020). These efforts collectively helped to create a more diversified and interconnected financial ecosystem comprising banks, insurance firms, pension funds, capital markets, microfinance institutions, and fintech companies.

However, despite these achievements, systemic vulnerabilities persist. Nigeria's financial system remains heavily exposed to both domestic and global shocks. Its macroeconomic environment is characterized by exchange rate volatility, inflationary pressures, fiscal imbalances, and an enduring dependence on oil revenues. Structural weaknesses in the financial sector, including shallow financial markets, high concentration in the banking sector, and regulatory capacity gaps, compound these vulnerabilities. Historically, major external shocks—such as the 2008 global financial crisis, the 2014 oil price collapse, the 2016 recession, and the COVID-19 pandemic—have all had direct and significant impacts on the country's financial system. These events triggered liquidity tightening, exchange rate misalignments, capital outflows, declining credit quality, and overall financial fragility. For instance, the 2014–2016 oil price collapse sharply reduced foreign exchange reserves, weakened the naira, and triggered macro-financial instability. Likewise, the COVID-19 pandemic exposed how swiftly external shocks can disrupt macroeconomic stability and impair the balance sheets of financial institutions.

Macroeconomic conditions in Nigeria play a decisive role in determining financial stability outcomes. Because the economy remains highly dependent on oil exports, fluctuations in

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international crude oil prices exert a strong influence over external reserves, fiscal balances, exchange rates, and inflation dynamics. When oil prices decline, the country often faces sharp exchange rate depreciation, depleted reserves, rising inflation, and increased fiscal stress. These macroeconomic shocks cascade into the financial system, heightening credit risk, weakening liquidity buffers, and amplifying systemic vulnerabilities (International Monetary Fund, 2019). Exchange rate instability increases foreign exchange exposures for banks and corporates, while inflation erodes real asset values and weakens financial intermediation. A sluggish real economy constrains loan repayment capacity, further increasing non-performing loans and putting pressure on capital adequacy.

Efforts to monitor and manage financial system stability in Nigeria have traditionally relied on a narrow set of indicators, including GDP growth, inflation, interest rates, exchange rate movements, capital adequacy ratios, and NPL ratios. While useful, these indicators fail to capture the multidimensional and interconnected nature of systemic risks. Modern financial systems—especially in emerging economies—are shaped by complex interactions across banking, capital markets, non-bank financial institutions, foreign exchange markets, and increasingly, fintech platforms. Crises can be triggered or amplified in non-traditional areas of the financial system that are often outside the immediate focus of conventional monitoring frameworks (Claudio Borio & Philip Lowe, 2002).

These developments underscore the need for a more comprehensive financial stability framework, one that integrates macroeconomic, macroprudential, and microprudential perspectives into a single analytical structure. This research is anchored on the recognition that financial stability is not merely the absence of crises but the presence of resilience—the capacity of the financial system to withstand and absorb shocks while continuing to support real economic activity. In recent years, composite financial stability indices (FSI) and early warning systems (EWS) have emerged globally as effective tools for capturing systemic risk. By aggregating multiple indicators across sectors, these tools provide policymakers with timely signals of vulnerabilities, enabling proactive interventions rather than reactive crisis management (International Monetary Fund, 2006). For countries like Nigeria, where vulnerabilities stem from a mix of external shocks, macroeconomic imbalances, and sectoral fragilities, such tools can be transformative.

This study seeks to advance the discourse on measuring and managing financial system stability for economic growth and development in developing countries by broadening the scope of risk factors to be considered, given the evolving financial system ecosystem, thereby addressing and minimising existing blind spots in assessing and administering financial system stability. Furthermore, it aims to enhance the effectiveness of regulatory frameworks and models for ensuring financial system stability in developing countries.

LITERATURE REVIEW

This section provides a comprehensive review of concepts, theoretical and empirical literature on financial system stability, drawing from both global perspectives and country-specific studies. It explores the evolution of the concept of financial stability, its various definitions and

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dimensions, and how it has been measured in different jurisdictions. The review also examines the role of macroeconomic indicators, macroprudential and microprudential tools, and regulatory frameworks, as well as the impact of financial innovations such as fintech and digital banking, which are increasingly shaping financial ecosystems around the world. In doing so, the chapter situates Nigeria's experience within a broader international context, identifying the lessons, gaps, and unique characteristics relevant to its financial system.

A financial system is the network of institutions, markets, instruments, and regulatory frameworks that facilitate the mobilization of funds, allocation of capital, and management of risks within an economy (International Monetary Fund, 2004; Bank for International Settlements, 2011; Frederic S. Mishkin, 2007). It connects savers and investors, supports payment and settlement activities, and plays a critical role in promoting economic growth, financial intermediation, and systemic stability.

Mishkin, F. S. (2019)[1] defined financial system as a network of institutions, markets, instruments, and regulations designed to facilitate the flow of funds between savers and borrowers. It serves as the backbone of an economy by enabling the efficient allocation of resources and providing mechanisms for risk management. He posited that the key components of the financial system include financial institutions (banks, non-bank financial institutions, insurance companies, pension funds, and investment firms); financial markets (money markets, capital markets, foreign exchange markets, and derivatives markets); financial instruments (bonds, equities, loans, deposits, derivatives, and other securities); and regulatory frameworks (policies and laws governing financial transactions, including central banking regulations, prudential guidelines, and macroprudential policies).

A well-functioning financial system is vital for fostering economic growth and development Levine, (1997). It does so by enhancing capital formation through efficient savings and investment mechanisms and encouraging innovation by providing funding for new technologies and ventures, as well as promoting financial inclusion by expanding access to credit and financial services for underserved populations. Empirical studies (e.g., Levine, 1997) suggest a positive correlation between financial system development and economic growth, emphasizing the importance of deep, stable, and inclusive financial markets.

In emerging economies like Nigeria, this linkage is particularly significant. Financial systems are critical to mobilizing domestic resources for investment, deepening credit markets, and financing infrastructure and private sector development. However, these systems are often more vulnerable to macroeconomic shocks, commodity price fluctuations, and global financial volatility. This makes financial system stability not just a complement to growth but a prerequisite for sustaining it. By fostering resilience, managing systemic risk, and ensuring efficient intermediation, a stable financial system can help smooth economic cycles, mitigate the effects of shocks, and support inclusive and sustainable development.

Several strands of economic thought provide the theoretical foundations of financial development and financial stability through which they evolved. Early work by Schumpeter

[1] Mishkin, F. S. (2019). *The Economics of Money, Banking, and Financial Markets* (12th ed.). Pearson.

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(1911) emphasised the catalytic role of finance in stimulating innovation, entrepreneurship, and long-run economic growth. According to Schumpeter, well-functioning financial systems mobilise savings, allocate capital efficiently, and fund transformative projects, thereby accelerating technological progress. This argument situates finance as a central mechanism in the growth process rather than a passive intermediary, a view that remains influential in contemporary debates on the relationship between financial development and macroeconomic stability.

Keynes' liquidity preference theory provides another perspective by explaining how uncertainty shapes the demand for money (Keynes, 1936). In periods of heightened economic stress, economic agents shift their portfolios toward cash and highly liquid assets, reducing the effectiveness of monetary policy and tightening credit conditions. While this framework offers insights into liquidity stress, it relies on assumptions that do not always hold in modern financial systems, where diverse asset classes, speculative activity, and policy interventions influence liquidity behaviour. Nigeria's experience with inflation volatility, exchange-rate pressures, and unstable capital flows illustrates the limitations of the classical liquidity preference model in predicting real-world liquidity outcomes.

Modern Portfolio Theory (Markowitz, 1952) introduced the principle of diversification as a means of reducing portfolio risk by combining assets with low or negative correlations. At the systemic level, the theory implies that concentrated exposures amplify shocks, while diversified portfolios enhance stability. Nigeria's banking sector, with its historical concentration in oil and gas lending, provides a practical example of the consequences of inadequate diversification, as downturns in global oil markets have repeatedly triggered spikes in non-performing loans and erosion of capital buffers. Although MPT offers useful guidance, its reliance on stable correlations and rational investor behaviour limits its applicability during crises, when correlations tend to converge, and diversification benefits diminish.

Information asymmetry has also been central to understanding financial fragility. Akerlof's (1970) seminal contribution on adverse selection demonstrated how asymmetric information between lenders and borrowers can lead to mispricing of risk, credit rationing, and market failure. These frictions are particularly pronounced in developing economies such as Nigeria, where weak disclosure standards, limited credit histories, and enforcement challenges undermine credit allocation. Reforms such as the establishment of credit bureaus and the Secured Transactions in Movable Assets Act attempt to address these gaps, yet information asymmetry remains more complex and dynamic than the original theoretical model suggests.

Agency theory, as articulated by Jensen and Meckling (1976), extends information-based explanations of instability by highlighting conflicts of interest between managers and owners. In banking, weak governance structures enable managers to engage in excessive risk-taking, especially in environments with limited oversight and diffuse accountability. Nigeria's 2009 banking crisis exposed instances of related-party lending, inadequate board supervision, and governance failures that compounded systemic vulnerabilities. Although agency theory offers a strong diagnostic lens, it often understates the influence of institutional factors—such as legal

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enforcement or political interference—that shape governance outcomes in developing financial systems.

The dynamics of credit supply have been further examined by Stiglitz and Weiss (1981), who showed that under asymmetric information, banks may ration credit instead of raising interest rates because higher rates attract riskier borrowers. This framework is highly relevant for Nigeria, where access to credit—particularly for SMEs—remains constrained despite ample liquidity in the banking system. However, technological innovations in alternative credit scoring and digital lending have introduced complexities not considered in the original theory.

The inherent fragility of banking institutions was formalised by Diamond and Dybvig (1983), who demonstrated that banks' maturity transformation function exposes them to runs, even when solvent. Their model explains how confidence shocks can trigger liquidity crises and justifies the need for deposit insurance and lender-of-last-resort facilities. Nigeria's episodes of depositor anxiety during periods of macroeconomic and banking stress reflect the continuing relevance of this framework, though modern financial systems exhibit more complex triggers for liquidity shortages, including currency depreciation and inflation spikes.

Minsky's Financial Instability Hypothesis (1986) adds a cyclical dimension by arguing that long periods of stability encourage economic agents to take on increasing levels of risk, moving from hedge financing to speculative and Ponzi-type structures. This progression makes the financial system more vulnerable to shocks. Nigeria's experience with credit expansions during oil booms, followed by contractions during downturns, aligns with Minsky's insights. Yet, while the hypothesis is powerful in describing instability dynamics, it provides limited guidance on the timing of crises.

The role of structural change was advanced by Perron (1989), who demonstrated that major shocks or policy reforms can cause structural breaks that alter the relationships among economic variables. For Nigeria, developments such as banking recapitalisation constitute clear structural breaks that must be incorporated into financial stability assessments. However, the reliability of structural break analysis depends heavily on data quality, which can be a challenge in many emerging markets.

Kaminsky and Reinhart (1999) extended crisis prediction frameworks by developing early-warning indicators that track variables such as credit growth, exchange-rate misalignment, and reserve depletion. While these indicators offer practical policy value, they often produce false alarms or miss crises, particularly in economies where external shocks such as commodity price swings dominate macro-financial dynamics.

The financial accelerator model developed by Bernanke, Gertler and Gilchrist (1999) further explains how declines in asset prices reduce collateral values, raise external finance premia, and tighten credit conditions, thereby amplifying economic downturns. Nigeria's reliance on collateral tied to volatile oil and FX-sensitive assets makes this amplification mechanism especially pronounced, though real-world frictions often diverge from model assumptions.

Understanding how shocks spread across institutions is central to contagion theory. Allen and Gale (2000) highlighted how interbank linkages and common exposures can transmit distress

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across the financial system. Nigeria's interconnected banking sector, shared exposure to government securities, and vulnerability to global oil price movements make these insights particularly relevant, though practical application is constrained by limited data on financial linkages.

The regulatory response to systemic risk has been shaped by the Basel frameworks (BIS, 1988; 2004; 2010), which introduced progressively stronger standards for capital adequacy, liquidity, and macroprudential oversight. Nigeria's adoption of Basel II/III principles has enhanced regulatory resilience, but implementation challenges persist due to data limitations, capacity constraints, and compliance costs.

Borio (2014) advanced the understanding of financial cycles, demonstrating that credit and asset-price cycles tend to be longer and more pronounced than business cycles. His work underscores the importance of macroprudential tools that "lean against the wind" to prevent imbalances from building up. For Nigeria, monitoring credit-to-GDP gaps, debt-service ratios, and asset-price cycles is crucial for timely policy intervention.

Collectively, these theories provide a multidimensional framework for analysing financial stability in Nigeria. While each offers valuable insights, their limitations—especially when applied to complex, resource-dependent economies—underscore the need for a composite and context-specific framework. This rationale supports the development of a Financial Stability Index and Early Warning System tailored to Nigeria's macro-financial structure, institutional characteristics, and vulnerability to external shocks.

Empirical research on financial system stability generally falls into three categories: (1) studies that focus on developing stability measurement frameworks, (2) studies that assess the effectiveness of policy measures in enhancing stability and (3) those that focus on financial system stability evolving issue, Borio, C. (2014). This section reviews relevant empirical works, focusing on studies that have developed or tested financial stability models in both developed and emerging economies.

Over the past few decades, the increasing frequency and severity of financial crises have brought renewed attention to the importance of developing robust frameworks for measuring and monitoring financial system stability (International Monetary Fund, 2011). These crises have shown that traditional, institution-focused indicators are often inadequate for detecting emerging systemic vulnerabilities in an increasingly interconnected global financial environment. In response, several conceptual and empirical models have been developed, employing macroeconomic and microeconomic indicators to assess the health of financial systems (Borio & Zhu, 2012). As global financial systems grow more complex and prone to shocks, financial system stability (FSS) has become indispensable for ensuring that economies function smoothly. A stable financial system is one that can provide adequate liquidity, facilitate efficient capital allocation, support productive investment, and minimize systemic risk (Borio & Lowe, 2002). Yet, despite its significance, measuring financial stability remains conceptually and operationally challenging—particularly in emerging economies like Nigeria, where the financial system remains vulnerable to both domestic and external shocks.

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One of the most widely adopted approaches to measuring financial stability is the Financial Soundness Indicator (FSI) framework developed by the IMF in 2006. FSIs are designed to evaluate the overall health and resilience of financial institutions—particularly banks—by examining their ability to absorb shocks and maintain stable operations. These indicators typically include capital adequacy ratios, non-performing loan (NPL) ratios, return on assets (ROA), return on equity (ROE), and liquidity ratios (IMF, 2006). FSIs provide a standardized framework that allows for cross-country comparability and have been applied extensively in financial stability assessments. However, as Borio (2014) observes, FSIs have important limitations: while they offer critical insights into institutional soundness, they often understate interconnectedness and systemic transmission channels, which are key sources of financial vulnerability.

Stress testing has emerged as another critical tool for assessing financial system resilience. Unlike static indicators, stress tests evaluate how financial institutions and systems respond to adverse shocks (Central Bank of Nigeria, 2014). These exercises often include sensitivity analyses, scenario analyses, and reverse stress tests, which explore extreme but plausible situations to reveal vulnerabilities. Stress testing frameworks gained prominence globally after the 2008 financial crisis and have been adapted for different contexts, including Nigeria. Uche (2020), for instance, conducted scenario-based stress tests to examine the impact of exchange rate volatility and oil price shocks on Nigerian banks, revealing that their balance sheets are particularly vulnerable to external shocks. Similarly, Otekunrin and Ibraheem (2018) found that inflation and interest rate spikes exacerbate liquidity and solvency challenges in the Nigerian financial system.

Ibok and Okereke (2019) demonstrated that, in Nigeria, sharp oil price collapses or sudden naira depreciations could destabilize even large banks, underscoring the importance of incorporating extreme but plausible shocks into regulatory assessments. Also, Akpan and Ita (2019) showed that rising inflation and volatile exchange rates were strong predictors of banking sector stress. Similarly, Ayadi et al. (2020) linked high external debt levels to heightened financial system vulnerability, emphasizing the need for continuous monitoring of external exposures. Olufisayo et al. (2018) and Anadu and Uchenna (2020) demonstrated that combining macroeconomic and banking sector indicators significantly enhanced early detection of financial instability in Nigeria.

As financial crises exposed the limitations of traditional indicators, research increasingly turned toward macroprudential frameworks that account for systemic and interconnected risks. Borio and Lowe (2002) identified the credit-to-GDP gap as a leading indicator of financial instability. This measure signals excessive credit expansion, often associated with asset price bubbles and future crises. Similarly, Acharya et al. (2010) proposed the CoVaR (Conditional Value at Risk) framework, which measures the systemic risk contribution of individual institutions by estimating the value at risk of the financial system conditional on the distress of a specific entity. Although powerful, these models rely on high-quality, high-frequency data, which may be difficult to obtain in developing economies like Nigeria.

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Network-based approaches provide another lens for understanding systemic vulnerabilities. Allen and Gale (2000) showed that the structure of financial networks affects the way shocks propagate, with highly connected networks being more resilient under normal conditions but more fragile under extreme shocks. Battiston et al. (2012) introduced the "DebtRank" concept to measure systemic importance, demonstrating how central nodes in financial networks can amplify contagion. Minoiu and Reyes (2013) extended this analysis to cross-border linkages, emphasizing the role of international financial integration in amplifying systemic risk. These network-based studies underline the importance of monitoring interconnectedness, which is particularly relevant in Nigeria's evolving financial landscape with growing fintech and cross-border banking activities.

Recent work elevates climate risks, physical (extreme weather) and transition (policy and technology shifts), as material for financial stability (UNEP, 2022). Nigerian evidence points to sectoral loan exposures and collateral values as potential transmission channels, motivating climate scenario analysis, disclosure, and supervisory guidance (Kukoyi & Obakponovwe, 2020; Osinubi & Soyibo, 2022). Integrating climate metrics into the stability toolkit is now part of global—and increasingly Nigerian—best practice.

The literature converges on three messages. First, no single instrument suffices: capital and liquidity requirements, borrower-based limits, and sectoral tools must be layered and time-varying. Second, monetary and macroprudential policies are joint products. Coordination improves outcomes, especially in commodity-exposed, FX-sensitive systems. Third, credibility rests on measurement: FSIs, stress tests (including reverse tests), early-warning dashboards, and network analytics should be integrated and Nigeria-calibrated. Given the country's exposure to oil cycles, exchange-rate swings, and governance frictions, a composite, adaptive framework is the most promising path to durable financial stability.

METHODOLOGY

This section presents the research methodology adopted to achieve the objectives of the study. The study utilizes both primary and secondary data sources to construct and validate the Financial Stability Index (FSI). Primary data comprises qualitative information obtained through expert interviews and focus group discussions with key stakeholders in the Nigerian financial system, particularly through the Financial Services Regulation Coordinating Committee (FSRCC) platform. The objective of collecting primary data is to capture expert judgment on the relative importance (weights) of macroeconomic, macroprudential, and sectoral indicators of financial stability and systemic risk. Secondary data consist of existing macroeconomic and financial sector statistics compiled by regulatory and statistical agencies. These data are essential for constructing the composite financial stability indices, performing simulations, and validating model outcomes.

The variables selected for this study are grounded in theoretical and empirical literature, reflecting the multidimensional and evolving nature of financial system stability. The choice of variables is guided by data availability, their relevance to emerging economies' financial systems, like Nigeria and their applicability in real-world policy formulation to drive financial stability. As Schinasi (2004) emphasizes, financial stability encompasses macroeconomic,

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sectoral, and institutional factors, necessitating a comprehensive approach to capture systemic risks from multiple dimensions. Furthermore, the financial system is dynamic, evolving due to changing macroeconomic conditions, policy interventions, and market dynamics (Mishkin, 1999). This study adopts a holistic framework to assess and measure financial system stability in Nigeria, utilizing the following categories of variables:

Model Specification

The study employs a composite index framework, integrating macroeconomic, macroprudential, and sectoral indicators to assess Nigeria's financial stability. The framework involves two major components: (1) Construction of Sector & Financial System Stability Indices (SeFSI & SyFSI) and (2) Estimation of dynamic relationships between stability indices and their determinants using the Autoregressive Distributed Lag (ARDL) model.

Sectors and Financial Stability Indices

The Financial Stability Index (FSI) in time (t) is generated from deviation of key sector financial stability indicators from their respective regulatory minimum (if minimum threshold is available); and the deviation from the 4-quarter moving average of key financial stability indicators from the macro environment and each sector, respectively. Thus, the sector financial stability indices (SeFSIs) and the overall financial stability index (SyFSI) for Nigeria are generated using the following equations:

- $SeFSI1 = \sum_i^n \{(X - \ddot{X}) * w_i^n\}$ ----------(3.1)
- $SeFSI2 = \sum_i^n \{(\ddot{X} - X) * w_i^n\}$ ----------(3.2)
- $SeFSI3 = \sum_i^n \{(X - \bar{X}) * w_i^n\}$ ----------(3.3)
- $SeFSI4 = \sum_i^n \{(\bar{X} - X) * w_i^n\}$ ----------(3.4)
- $SeFSI5 = \sum_i^n \{(\bar{X} - X) * w_i^n\}$ ----------(3.5)
- $SyFSI = \sum_i^n \{(SeFSI_{i-j}) * w_i^n\}$ ----------(3.6)

Where:

- $\ddot{X}$ and $\bar{X}$ are the minimum regulatory threshold and the 4-quarter moving average, respectively;
- $SeFSIs\ are\ the\ respective\ sector\ financial\ stability\ indices$:
- SmFSI1= Macroeconomic Sector Stability Index
- SbFSI2= Banking Sector Stability Index
- SoFSI3= Other Financial Institutions Stability Index
- ScFSI4= Capital Market Stability Index
- SiFSI5= Insurance Stability Index
- While SyFSI is the weighted Financial system stability Index for Nigeria.

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Financial Stability Band or range

As highlighted in the conceptual review, financial stability is a dynamic and multifaceted concept that can be understood as existing in a spectrum or continuum (Schinasi, 2004). Rather than being a fixed state, it encompasses the overall health and resilience of the financial system, including its institutions, infrastructure, and markets (Mishkin, 1999). To determine the lower and upper band, the following equations were used:

Mean (μ): $\mu = \sum x / n$ ---------- (3.7)

Standard Deviation (σ): $\sqrt{(\sum(x - \mu)^2 / N)}$ ---------- (3.8)

Where:

- **"∑"**: Represents the sum of all sector stability index.
- **"x"**: Represents an individual stability index point.
- **"μ"**: Represents the sample mean of the stability index
- **"μ"**: Represents the sample standard deviation of the stability index
- **"N"**: Represents the total number of data points of the indices

Autoregressive Distributed Lag (ARDL) model and Principal Component (PCs)

This study adopts the Autoregressive Distributed Lag (ARDL) model to examine the determinants of respective sectors' stability, proxied by their respective stability indices. The ARDL approach is selected due to its flexibility in accommodating both I(0) and I(1) variables and its robustness in capturing both short-run dynamics and long-run equilibrium relationships in a single framework.

The Short-Run ARDL Model

The general form ARDL model estimated via ordinary least squares (OLS) is expressed as follows:

$$Y_t = \propto + \beta_1 Y_{t-1} + \sum \gamma_i X_{i,t} + \sum \delta_{j,i} X_{t-1} + \varepsilon_t \qquad (3.9)$$

Where:

$Y_t = Stability\ indices\ at\ time, t.$

$\beta_1 Y_{t-1} = lagged\ dependent\ variables$

$\sum \gamma_i X_{i,t} = contempranous\ explanatory\ variables$

$\sum \delta_{j,i} X_{t-1} = lagged\ explanatory\ variables$

$\varepsilon_t = White\ noise\ error\ term$

The model captures the partial adjustment behaviour of the stability index in response to shocks in its explanatory variables.

The sector-specific reduced form short-run ARDL models are specified as follows:

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- $SmFSI1_t = \propto + \beta_1 SeFSI1_{t-1} + \sum \gamma_i \, m_{i,t} + \sum \delta_{j,i} \, m_{t-1} + \varepsilon_t$ (3.10)

Where:

- $SmFSI1_t$ = Macroeconomic Sector Stability Index
- $\sum \gamma_i \, m_{i,t}$ and $\sum \delta_{j,i} \, m_{t-1}$ are the contemporaneous and lagged independent variables, respectively, which include: Gross Domestic Product, inflation, exchange rate, crude oil price, balance of payment, and the month of import cover.

- $SbFSI2_t = \propto + \beta_1 SbFSI2_{t-1} + \sum \gamma_i \, b_{i,t} + \sum \delta_{j,i} \, b_{t-1} + \varepsilon_t$ (3.11)

Where:

- $SbFSI2_t$ = Banking industry Stability Index

$\sum \gamma_i \, b_{i,t}$ and $\sum \delta_{j,i} \, b_{t-1}$ are the contemporaneous and lagged independent variables, respectively, which include key banking industry soundness indicators. They include: CAR,LR,NPL,ROA/ROE,etc.

$SoFSI3_t = \propto + \beta_1 SoFSI3_{t-1} + \sum \gamma_i \, o_{i,t} + \sum \delta_{j,i} \, o_{t-1} + \varepsilon_t$ (3.12)

Where:

$SoFSI3_t$ = OFIs Stability Index

$\sum \gamma_i \, o_{i,t}$ and $\sum \delta_{j,i} \, o_{t-1}$ are the Principal Components derived from all the key soundness indicators of Micro-Finance Banks (MFBs), Primary Mortgage Banks (PMBs), Finance Companies (FCs) and Development Financial Institutions (DFIs), which include the combined CAR, NPL, LR, ROE, ROA.

- $ScFSI4_t = \propto + \beta_1 ScFSI4_{t-1} + \sum \gamma_i \, c_{i,t} + \sum \delta_{j,i} \, c_{t-1} + \varepsilon_t$ (3.13)

Where:

- $ScFSI4_t$ = Capital Market Sector Stability Index

$\sum \gamma_i \, c_{i,t}$ and $\sum \delta_{j,i} \, c_{t-1}$ are the contemporaneous and lagged independent variables, respectively, of capital market key soundness indicators, which include: All share index (ASI), Market Capitalization (MCap), Market liquidity (MkL), Foreign transaction to total transaction, etc)

- $SiFSI5_t = \propto + \beta_1 SiFSI5_{t-1} + \sum \gamma_i \, i_{i,t} + \sum \delta_{j,i} \, i_{t-1} + \varepsilon_t$ (3.14)

Where:

- $SiFSI5_t$ = Insurance Industry Stability Index

$\sum \gamma_i \, i_{i,t}$ and $\sum \delta_{j,i} \, i_{t-1}$ are the contemporaneous and lagged independent variables, respectively, of insurance industry key soundness indicators, which include: CAR, LR, CR, ER, UPM and ROA. The CR, ER, UPM refer to claim ratio, expense ratio, underwriting profit margin, respectively.

- $FSI6_t = \propto + \beta_1 FSI6_{t-1} + \sum \gamma_i \, f_{i,t} + \sum \delta_{j,i} \, f_{t-1} + \varepsilon_t$ (3.15)

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Where:

- $SFSI6_t$ = Financial System Stability Index

$\sum \gamma_i \, i_{i,t}$ and $\sum \delta_{j,i} \, i_{t-1}$ are the Principal Components derived from all the key soundness indicators across the financial system (Banking, OFIS, Capital Market and Insurance).

The Long Run ARDL Model and Error Correction Model (ECM)

To derive the long-run relationship, the ARDL model is reparameterised into its error correction form, which provides a mechanism for reconciling short-run deviations with long-run equilibrium. The general form of ECM is specified as:

$$\Delta Y_t = \gamma_0 + \sum_{i=1}^{r} \delta_i \, \Delta Y_{t-1} + \sum_{j=0}^{r} \theta_j \, \Delta X_{t-j} + \emptyset ECT_{t-1} + \mu_t \quad (3.16)$$

Where:

- Δ (Delta) denotes the first difference operator
- X_{t-j} is the vector of explanatory variables
- ECT_{t-1} is the lagged **error correction term**, derived from the long-run relationship
- ∅ is the speed of adjustment coefficient
- μ_t is the white noise disturbance term

The coefficient ϕ is expected to be negative and statistically significant, confirming that any short-run deviation from the long-run path is gradually corrected over time.

The long-run equation from which the ECT is derived for the respective sectors' ARDL ECM are as follows:

$$\Delta SmFSI1_t = \gamma_0 + \sum_{i=1}^{r} \delta_i \, \Delta\beta_1 SmFSI1_{t-1} + \sum_{j=0}^{r} \theta_j \, \Delta X_{t-j} + \emptyset mECT_{t-1} + \mu_{mt} \quad (3.16)$$

$$\Delta SbFSI1_t = \gamma_0 + \sum_{i=1}^{r} \delta_i \, \Delta\beta_1 SbFSI1_{t-1} + \sum_{j=0}^{r} \theta_j \, \Delta X_{t-j} + \emptyset bECT_{t-1} + \mu_{bt} \quad (3.17)$$

$$\Delta SoFSI1_t = \gamma_0 + \sum_{i=1}^{r} \delta_i \, \Delta\beta_1 SoFSI1_{t-1} + \sum_{j=0}^{r} \theta_j \, \Delta X_{t-j} + \emptyset oECT_{t-1} + \mu_{ot} \quad (3.18)$$

$$\Delta ScFSI1_t = \gamma_0 + \sum_{i=1}^{r} \delta_i \, \Delta\beta_1 ScFSI1_{t-1} + \sum_{j=0}^{r} \theta_j \, \Delta X_{t-j} + \emptyset cECT_{t-1} + \mu_{ct} \quad (3.19)$$

$$\Delta SiFSI1_t = \gamma_0 + \sum_{i=1}^{r} \delta_i \, \Delta\beta_1 SiFSI1_{t-1} + \sum_{j=0}^{r} \theta_j \, \Delta X_{t-j} + \emptyset iECT_{t-1} + \mu_{it} \quad (3.20)$$

$$\Delta SFSI1_t = \gamma_0 + \sum_{i=1}^{r} \delta_i \, \Delta\beta_1 SFSI1_{t-1} + \sum_{j=0}^{r} \theta_j \, \Delta X_{t-j} + \emptyset ECT_{t-1} + \mu_t \quad (3.21)$$

Once the cointegrating relationship is established using the Bounds Testing Approach, the ECT (i.e., residuals from the long-run model) is included in the short-run ECM to quantify the speed at which respective sectors and financial system stability indices return to equilibrium following a shock.

Estimation Process

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The estimation procedure followed these steps: Stationarity tests using ADF and PP to confirm that none of the variables is I(2). Although we adopted a reduced form ARDL approach to have parsimonious ARDL models for simplicity, we used the Akaike Information Criterion (AIC) to determine the lag length. The ARDL bounds test was conducted to establish the existence of a long-run relationship. Furthermore, the log-run coefficients are estimated, and their respective coefficients, generated. Lastly, short-run ECM for the respective sectors' stability indices were estimated, including the ECM term.

Diagnostic and Stability Checks

Standard diagnostic tests were performed to assess residual normality, serial correlation (using the Breusch-Godfrey LM test), and heteroskedasticity (via White's test). Stability of the model was assessed using the CUSUM and CUSUMSQ plots.

Weighting Techniques

Weights (w_i^n) represent the relative importance of each indicator or sector in the overall FSI. In determining the weights, we combined Principal Component Analysis (PCA) and expert judgement to validate. PCA identifies the most significant indicators contributing to financial stability by reducing dimensionality and assigning weights based on the variance explained by each principal component. Expert opinion from financial regulators, economists, and industry stakeholders is used to assign subjective weights based on their years of experience and regulatory importance in their oversight function.

Aggregation Techniques

The FSI is constructed by aggregating weighted indicators at different levels:

1. Sector Financial Stability Index (SeFSI):

$$SeFSI = \sum_{i=1}^{n}(X - \mu) * w_i^n \qquad (3.22)$$

This step involves aggregating indicators within a specific sector (e.g., banking, insurance, capital market and other financial institutions).

2. Systemic Financial Stability Index (SyFSI):

$$SyFSI = \sum_{i=1}^{n}(X - \mu) * w_i^n \qquad (3.23)$$

This aggregates sector-level indices into a systemic-level index to capture macroeconomic and intersectoral dependencies. This combines macroeconomic, macroprudential, and microprudential indicators into a single composite index.

Evaluation Techniques

The evaluation phase is critical to ensuring the reliability, validity, and robustness of the constructed Financial Stability Index (FSI). This phase employs a combination of quantitative and qualitative techniques to rigorously test the FSI's performance and applicability. The following methods are used:

Sensitivity Analysis

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Sensitivity analysis is conducted to assess the impact of changes in input data, weighting schemes, and aggregation methods on the FSI. This enables the testing of the robustness of the index under different scenarios by adjusting the weights assigned to individual indicators, applying appropriate deviation and normalization techniques to the data. Also, by using aggregation methods to compute the FSI.

By observing variations in the FSI under these adjustments, sensitivity analysis ensures that the index is not overly dependent on specific assumptions or methodologies. This step is crucial for validating the stability and reliability of the FSI (Saltelli et al., 2008).

Backtesting

Backtesting evaluates the predictive accuracy of the FSI by comparing its historical values against known periods of financial instability or crises. For instance, the FSI is tested against events such as Nigeria's banking crises (e.g., the 2009 financial crisis) to determine whether it would have provided early warning signals.

This method involves matching historical FSI values to periods of financial instability and assessing the FSI's ability to identify vulnerabilities or crises in advance. Backtesting provides empirical evidence of the FSI's effectiveness as a monitoring tool for financial stability (Borio & Drehmann, 2009).

Statistical Validity Tests

Statistical validity test was conducted to assess the reliability of the FSI using variance decomposition, which analyzes how much variance in the FSI is explained by each indicator or sector. This helps identify the relative contribution of individual components to the overall index, ensuring that no single indicator dominates the results disproportionately.

Visualization and Interpretation

After estimation and evaluation, the FSI is presented graphically to facilitate interpretation and analysis. Visualization techniques include time Series Plots, which show trends in financial stability over time, highlighting periods of stability and instability, as well as aligning it with events. Sectoral Comparisons illustrate the contributions of individual sectors (e.g., banking, insurance, capital markets) to systemic risks. The Band Range incorporate upper and lower bands to define the critical decision rules of stability or instability, providing clear reference points for policymakers.

ANALYSIS AND DISCUSSION OF FINDINGS

This section presents the analysis and interpretation of the results of the study, focusing on the measurement and management of financial system stability in Nigeria from Q1 2006 to Q4 2024.

Stability Indices

Below is the analysis of the sub-sectors' indices' movements, drivers, and their implications for financial stability.

Macroeconomic Stability Index

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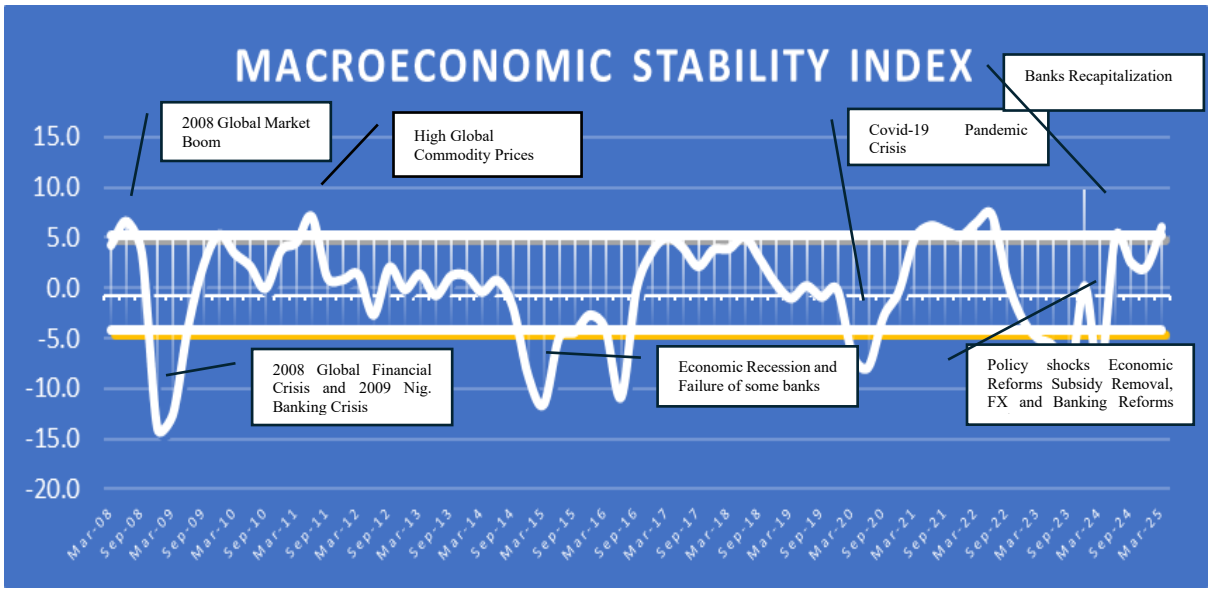
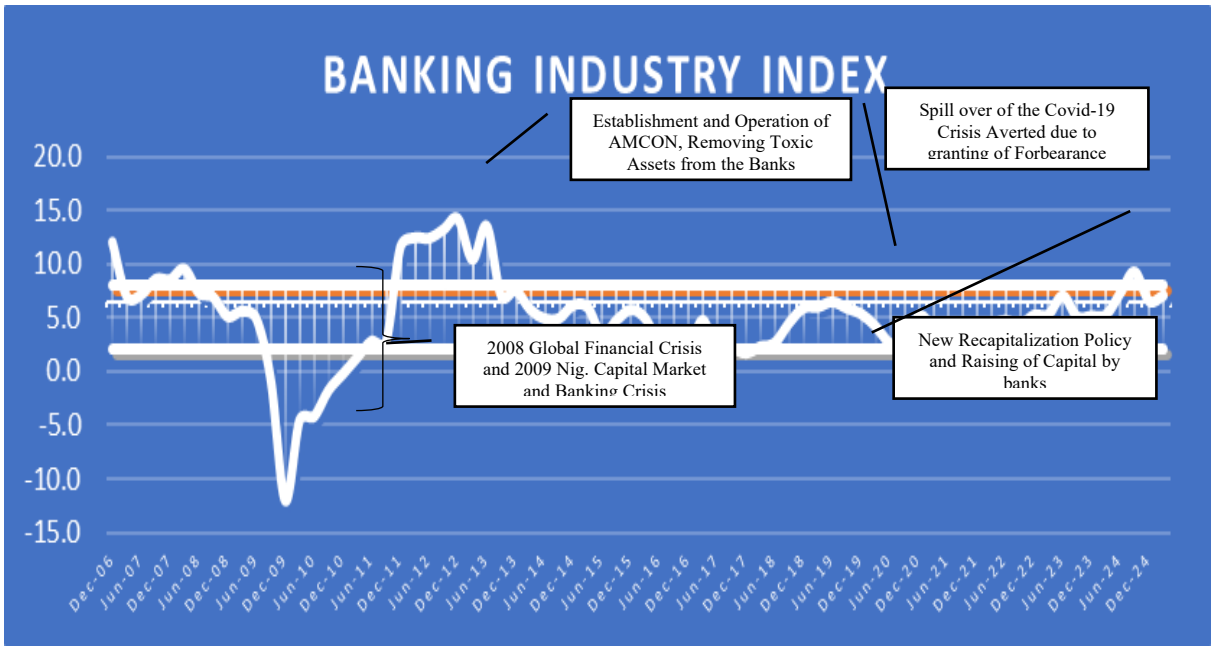


The Macroeconomic Stability Index provides a comprehensive view of Nigeria's economic stability over time. Key events, such as the 2008 global financial crisis, the 2015-2016 oil price collapse, the COVID-19 pandemic, and global uncertainty in 2023, were captured by the index. These events are closely linked to developments in macroeconomic indicators, including GDP growth, inflation, exchange rates, and current account balances.

Banking Industry Stability Index



The instances where the banking industry stability index fell outside the stability band highlight the banking sector's vulnerability to external shocks and domestic economic challenges. These periods of instability were characterized by deteriorating key indicators, such as rising NPLs, declining CAR, and reduced profitability, which undermined financial system stability.

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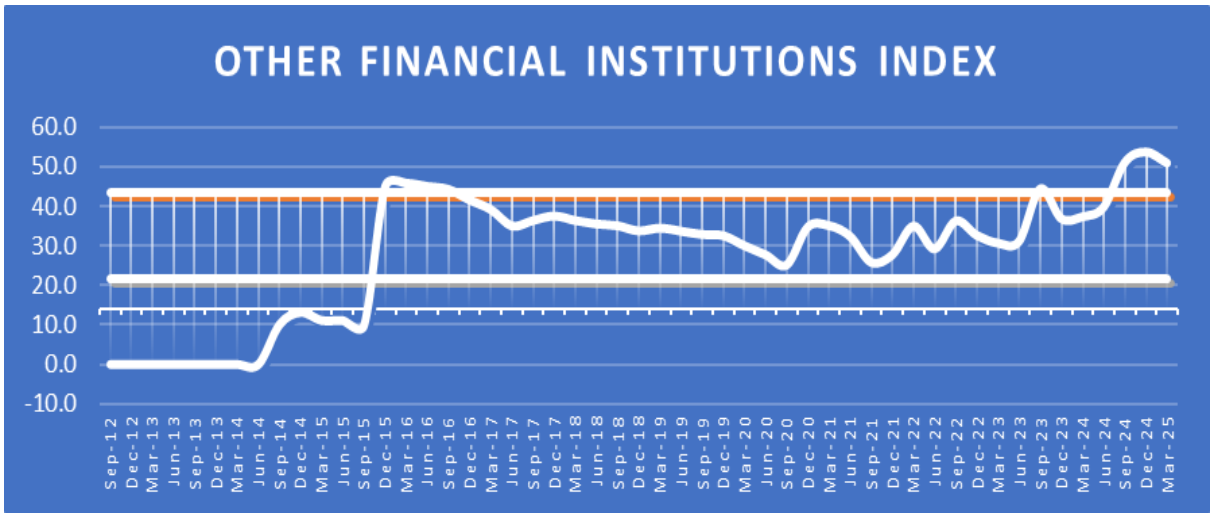
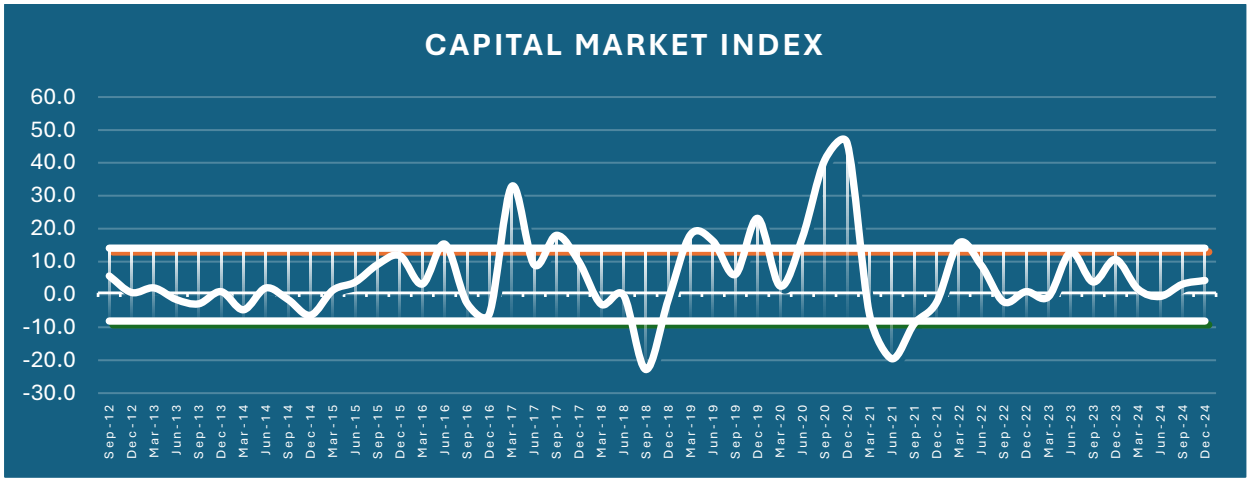
Other Financial Institutions Stability Index



Similarly, where the OFIs index fell outside the stability band, it indicates instability, induced by vulnerability of the OFIs to external and domestic economic shocks and challenges. These periods of instability are often associated with weakening key indicators, such as rising NPLs, declining CAR, and reduced profitability, which undermine the stability of the non-bank financial sector.

Capital Market Stability Index



The periods of instability highlighted by the index underscore the capital market's sensitivity to external shocks and domestic economic challenges. To enhance stability, policymakers must focus on diversifying the investor base, improving market transparency, and strengthening regulatory frameworks. By addressing these vulnerabilities, the capital market can play a more robust role in mobilizing long-term capital for economic development.

Insurance Stability Index

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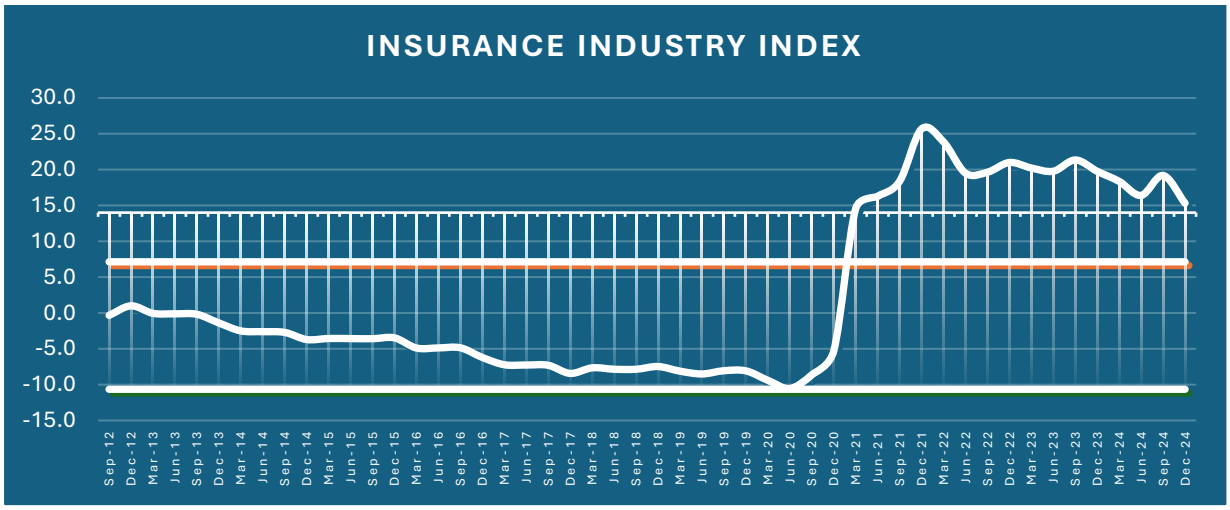
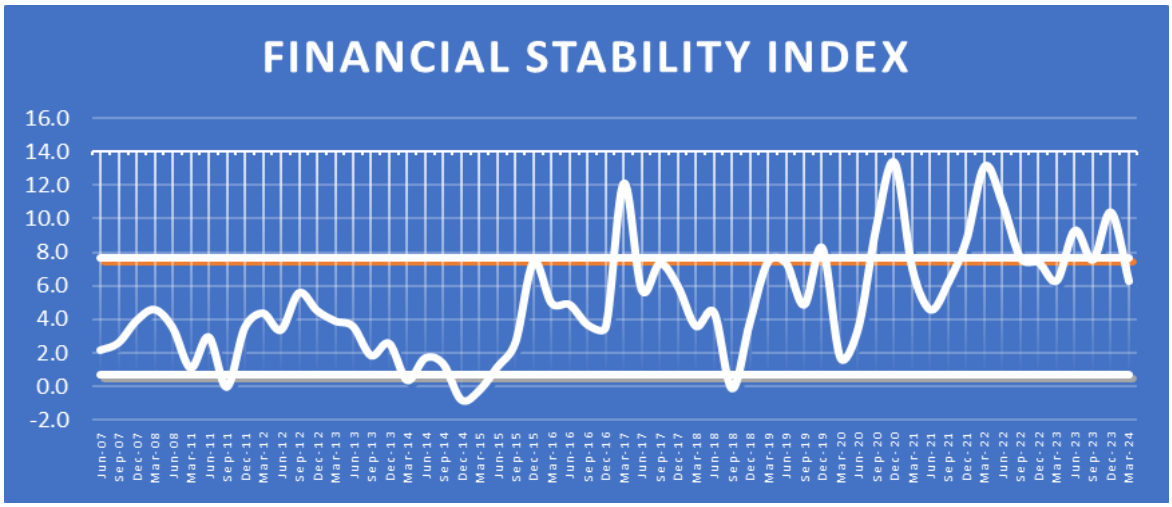


In the early years, from 2006 to mid-2008, the index remained within the stability band, reflecting a relatively stable insurance sector supported by strong economic growth and increasing awareness of insurance products. However, due to several issues, which include regulatory reforms and structural breaks, the index hovered above the stability index.

Financial System Stability Index (FSSI)

The Overall Financial Stability Index provides a comprehensive measure of the stability of Nigeria's financial system, capturing the interplay of macroeconomic, banking, Other Financial Institutions (OFIs), capital market, and insurance sector indicators. Just like the sectoral stability index, it operates within a stability band defined by an upper bound of 7.41 and a lower bound of 0.78, with values outside this band indicating periods of instability. The analysis of the index reveals significant fluctuations over the period from December 2006 to December 2024, reflecting the impact of both domestic and global economic developments on Nigeria's financial system.



Instances Outside the Stability Band and Key Drivers

The FSSI fell below the lower bound during three major episodes: the global financial crisis (2008-2009), the oil price collapse and economic recession (2015-2016), and the COVID-19 pandemic (2020). These periods of instability were characterized by deterioration in key

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indicators across all sectors of the financial system. Banking sector witness rising NPLs, declining CAR, and liquidity stress. The OFIs sub-sector of the banking sector also recorded increased credit risk and reduced profitability, particularly in the mortgage and microfinance sectors. In the same manner, capital market experienced reduced market capitalization, declining FPI, and increased volatility. Insurance sector saw rising claims ratios and reduced premium income. Overall macroeconomic condition witnessed falling oil prices, currency depreciation, and rising inflation.

Conversely, the index exceeded the upper bound during periods of strong economic growth and financial sector resilience, such as in December 2022 (13.36) and December 2024 (12.04), reflecting improved investor confidence, robust regulatory oversight, and effective policy interventions. However, there are significant potential risks which could be associated with an overheated system and stretched asset pricing regime.

Overall Financial Stability Index Dashboard and Heatmap

The Financial System Stability Dashboard presents a quarterly aggregation of sector-specific vulnerability indices, weighted and combined into a composite Financial Stability Index (FSI) over the period from Q3 2020 to Q1 2025. The dashboard applies distinct zones—**Downside Risk**, **Stability**, and **Upside Risk**—to evaluate financial conditions based on the magnitude and direction of each sector's index values.

Red coloured cell indicate periods outside the stability band, while green coloured cell indicates periods where the index is within the stability band.

← Financial Stability →

State of Instability — State of Stability

3 Qtrs Simulation: Desired State

Sector Vulnerabilities	WEIGHT	Mar-22	Jun-22	Sep-22	Dec-22	Mar-23	Jun-23	Sep-23	Dec-23	Mar-24	Jun-24	Sep-24	Dec-24	Mar-25	Jun-25	Trend	Sep-25	Dec-25	Mar-26
Macro	0.25	6.52	7.36	0.83	-3.11	-4.97	-5.83	-9.56	0.24	-8.72	5.27	2.75	6.00	5.13	-1.32	⇩	1.06	0.62	1.18
Banking	0.3	4.32	4.79	4.32	5.25	5.30	7.05	5.11	5.17	5.27	7.32	9.29	6.56	7.09	6.60	⇩	6.60	6.60	6.60
OFIs	0.1	19.88	18.42	20.17	18.46	15.98	17.68	26.67	23.94	17.93	20.76	25.72	24.60	23.20	24.09	⇧	24.09	24.09	24.09
Capital Market	0.2	15.65	8.84	-2.27	0.86	-0.73	12.81	3.78	10.64	1.65	-0.60	3.12	4.26	21.48	21.45	⇩	8.01	8.87	2.99
Insurance	0.15	11.09	12.67	12.83	13.11	14.01	13.14	14.10	12.62	11.82	10.67	12.63	10.65	11.03	9.98	⇩	10.26	10.58	10.96
The Financial Stability Index		8.59	7.71	3.78	3.73	2.93	6.12	3.15	6.72	2.34	6.23	7.58	7.27	10.68	8.80	⇩	6.74	6.83	5.83

Discussion of Findings

Overall Stability Dashboard and Heatmap

The Financial System Stability Dashboard aggregates sectoral indicators into a quarterly composite Financial System Stability Index (FSSI/FSI) over Q3 2020–Q1 2025, and classifies observations into downside risk, stability, and upside risk zones using empirically derived stability bands. In this framework, red cells denote quarters outside the stability band and green cells denote periods within it. The macroeconomic index is the most visibly volatile over the sample. A modest improvement in 2021 was followed by a sharp deterioration in 2023, with a trough of –9.56 in Q3 2023, a pattern consistent with elevated inflation, exchange-rate

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misalignments and fiscal stress. A gradual recovery sets in during 2024 and is projected to culminate in a rebound to 6.08 by Q1 2025. In contrast, the banking sector index remains positive and comparatively stable throughout, fluctuating between roughly 4.1 and 7.3 and peaking around Q2 2024 and Q1 2025, which is suggestive of adequate solvency and liquidity buffers despite macro headwinds.

Other Financial Institutions (OFIs) post persistently strong readings, culminating at 53.64 in Q4 2024 and 50.83 in Q1 2025; this likely reflects structural gains from financial inclusion and the expansion of digital financial services. Capital market stability is notably more erratic, with deep negative prints in 2021 (–19.56 in Q2) followed by progressive normalisation into 2024; the projected 21.48 in Q1 2025 indicates improved market depth and a recovery in investor confidence. The insurance sector exhibits a steady improvement from its 2020 low (–8.63 in Q3), surpassing 20 in several quarters of 2022–2023 and stabilising around 18.38 in Q1 2025, consistent with the effects of improved solvency oversight, better liquidity management and product diversification. Aggregating these patterns, the composite FSI dips into downside risk in Q2 2021 (4.55), then strengthens by Q1 2022 (13.13) and reaches 15.78 in Q1 2025. The troughs of the composite index align temporally with macroeconomic and capital market stress, while the marked improvement from mid-2023 is broad-based and driven by the macro, banking and capital-market components.

Reduced-Form Short-Run ARDL Models

The macroeconomic ARDL model reveals significant state dependence, with the lagged macro index (MACRO(–1) = 0.4569; $p < 0.01$) indicating persistence in macro conditions. Short-run growth impulses (ΔGDPG) raise macro stability (0.4839; $p < 0.05$), while lagged inflation is supportive ($p < 0.05$), consistent with the role of anchored expectations. Exchange-rate movements exert a negative and significant contemporaneous effect, underscoring the destabilising role of FX volatility, and lagged crude oil prices also depress stability, plausibly through delayed fiscal/external adjustment. Positive contributions from the balance of payments are consistent with the value of external buffers, whereas a negative and significant MOIC coefficient suggests that ineffective or costly FX/market-clearing arrangements can dampen macro-financial resilience. Model diagnostics are satisfactory ($R^2 = 0.77$; DW ≈ 1.81).

The banking model likewise displays strong persistence (BANK(–1) = 0.6294; $p < 0.01$). Capital adequacy and liquidity strengthen bank stability in the short run, whereas increases in non-performing loans reduce it ($p < 0.05$). The model fits the data well (Adj. $R^2 = 0.87$; $F = 111.62$; $p < 0.01$). In the capital-market model, both the contemporaneous and lagged All-Share Index are positive and significant; liquidity shows a mixed profile—positive contemporaneously ($p \approx 0.07$) but negative with a lag, consistent with the tendency for liquidity surges to reverse as markets correct. While the R^2 is modest (~0.40), the overall specification is statistically significant (F-test $p < 0.01$), which is common in high-noise market settings. The insurance model is particularly strong (Adj. $R^2 = 0.967$). Current capital adequacy and earnings support stability, while several lagged terms display corrective or mean-reverting effects; claims ratios behave as expected, with elevated claims weakening stability. These results underscore the primacy of solvency, liquidity and profitability for insurance-sector resilience.

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The OFIs model is estimated using principal components that summarise multiple risk factors. The first, second and fourth components are positively associated with stability, while the third and fifth are negatively associated. The overall fit is strong ($R^2 = 0.90$), reflecting the multi-dimensional risk structure in non-bank finance. At the system level, the FSI model that includes principal components (PC1D–PC5D) and a lagged dependent variable is robust ($R^2 = 0.87$; Adj. $R^2 = 0.82$; $F = 56.06$; $p < 0.01$; DW = 1.87). PC1D–PC3D are positive and significant; PC4D is marginally positive ($p \approx 0.07$); and PC5D is negative and significant, which is consistent with a component capturing sovereign, external or policy-uncertainty risk. The positive and significant lagged FSI (0.179) indicates inertia typical of macro-financial aggregates. Alternative specifications that incorporate sectoral fundamentals alongside macro variables consistently outperform macro-only models, highlighting the value of microprudential granularity and feedback effects when explaining system-wide dynamics.

Long-Run ARDL and Error-Correction Representation

Let λ denote the coefficient on the lagged dependent variable in the short-run ARDL (here, $\lambda = 0.1789$). The long-run effects are given by $\gamma_i = \beta_i/(1–\lambda)$, with $(1–\lambda) = 0.8211$. The implied error-correction term (Φ) is $-(1–\lambda) = -0.8211$, indicating a rapid speed of adjustment: approximately 82 per cent of any deviation from long-run equilibrium is corrected within a single quarter. This adjustment speed is consistent with active supervisory responses and policy actions that anchor expectations following shocks. The explicit short-run equation (4.1), long-run transformation (4.2), long-run model (4.3) and ECM (4.4) follow directly from these estimates and are omitted here for brevity, but are fully available in the model appendix.

Backtesting and Model Validation

Backtests comparing fitted and actual indices demonstrate that the macro model captures major turning points, including the 2020–2021 COVID-era instability, and that residuals tighten thereafter as conditions stabilise. Banking-sector backtests show very tight tracking, with minor short-term divergences around quarters of intense policy intervention or liquidity operations, which may not be fully spanned by the regressors. The OFIs model tracks the general trend credibly but exhibits some lag at inflection points, likely reflecting sector-specific reforms or licensing dynamics that are only partially proxied in the data. Capital-market backtests are noisier—directional accuracy is preserved but performance weakens during sharp corrections or rallies driven by sentiment and herding; nevertheless, re-convergence after volatility spikes suggests the model captures trend dynamics adequately. The insurance model delivers the best fit overall, which is consistent with the structural nature and lower volatility of its fundamental drivers (solvency, earnings and claims). For the composite FSI, specifications that integrate sectoral variables outperform macro-only models, particularly around crisis turning points, thereby validating the composite, multi-layered modelling strategy.

Taken together, the dashboard evidence, stationarity diagnostics, ARDL/ECM estimates and backtests validate the composite FSSI as a credible surveillance instrument for Nigeria. The index reliably tracks conditions over time, the econometric models provide statistically and economically meaningful short-run and long-run relationships, the EWS has practical utility

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for early identification of vulnerabilities, and the framework yields clear policy levers for macroprudential, supervisory and crisis-management responses.

SUMMARY, CONCLUSION AND RECOMMENDATION

The study set out to develop and empirically validate a Composite Financial System Stability Index (FSSI) for Nigeria and to assess its usefulness in modelling, forecasting, and policy design for financial system stability. The major findings are presented below.

Objective i: To determine whether a composite FSSI derived from key financial, macroeconomic, cross-sectional, market, and sub-sector indicators can effectively measure and track financial stability dynamics in Nigeria over time. The study finds that the FSSI effectively tracks system stability by accurately reflecting periods of vulnerability and recovery in Nigeria's financial system between Q3 2020 and Q1 2025. Periods of macroeconomic and capital market stress (notably Q2 2021 and Q3 2023) were captured in the downside risk zone, while phases of recovery (e.g., Q1 2022 and Q1 2025) were reflected within or above the stability band. Sectoral dynamics reveal clear and interpretable trends: the macroeconomic sector was the most volatile, banking and OFIs remained resilient, the insurance sector showed steady structural improvements, and the capital market reflected investor sentiment and external shocks. The composite index is shown to be statistically robust, with a high explanatory power (adjusted R^2 above 0.80 in the preferred specification) and a significant autoregressive component, confirming its ability to capture the temporal persistence of financial conditions. Cross-validation through backtesting confirms that the FSSI accurately detects turning points in systemic stability, validating its use as a reliable monitoring tool.

Objective ii: To examine the extent to which the FSSI can be used to estimate short-run and long-run financial stability models to evaluate the impact of key macro-financial indicators on overall system stability. The econometric results from the ARDL–ECM framework show that the FSSI responds significantly to macro-financial fundamentals in both the short run and the long run. In the short run, GDP growth and balance of payments strengthen stability, while exchange rate volatility and credit risk weaken it. Bank capital adequacy and liquidity ratios contribute positively to resilience, while NPLs exert a negative effect. Insurance fundamentals such as solvency, earnings, and claims ratios are stable predictors of sectoral strength. In the long run, the error correction mechanism reveals a fast speed of adjustment (–0.82), indicating that over 80% of deviations from long-run equilibrium are corrected within one quarter. This suggests a strong regulatory response and high system adaptability. The inclusion of sectoral fundamentals alongside macroeconomic indicators significantly improves model performance relative to macro-only models, underlining the importance of integrated macro-microprudential modelling for Nigeria.

Objective iii: To assess whether an Early Warning System (EWS) Dashboard can be designed and operationalised, based on the estimated models, as a forward-looking tool for systemic risk monitoring and management. The EWS Dashboard constructed from the FSSI and sectoral indices successfully identifies episodes of vulnerability in advance of or concurrent with major macro-financial stress events. The heatmap and stability bands provide a simple but powerful visual tool for signalling systemic risk conditions, enabling regulators to detect downside

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movements early and act pre-emptively. The backtesting exercises show that cross-sector models outperform macro-only specifications, especially around turning points, confirming the predictive validity of the EWS framework. The findings affirm that a well-designed EWS Dashboard can be integrated into Nigeria's macroprudential surveillance and supervisory architecture to support forward-looking risk monitoring.

Objective iv: To identify actionable policy options and regulatory measures derived from the FSSI and EWS framework to strengthen financial system resilience and stability.

The analysis reveals multiple policy levers embedded in the model's structure. Exchange rate volatility and weak external buffers point to the need for sustained FX market reform, effective reserve management, and contingency liquidity lines. Banking sector results support stronger credit risk supervision, countercyclical capital and liquidity buffers, and improved problem loan resolution frameworks.

Capital market findings underscore the importance of liquidity enhancement measures, transparency improvements, and market infrastructure strengthening to manage volatility.

Insurance sector stability highlights the value of solvency and earnings supervision, claims management standards, and product diversification incentives. OFI dynamics call for targeted oversight of credit expansion and funding structures, particularly within digital financial services. The fast ECM speed suggests that timely macroprudential adjustments—quarterly or semi-annual—can help mitigate systemic risks effectively.

Collectively, these insights provide a coherent macroprudential policy toolkit anchored in empirical evidence.

Conclusion

This study demonstrates that a **Composite Financial System Stability Index** is both conceptually sound and empirically robust for tracking and modelling financial stability in Nigeria. The FSSI not only reflects historical dynamics accurately but also provides a structured lens through which regulators can understand macro-financial linkages, sectoral resilience, and evolving vulnerabilities. Its integration with ARDL–ECM modelling offers a rigorous framework for short- and long-run analysis, while the EWS Dashboard translates complex systemic information into actionable regulatory signals. Overall, the findings underscore that financial stability in Nigeria is multi-dimensional, requiring a holistic approach that blends macroeconomic, prudential, market and institutional indicators.

Recommendations

Based on the findings of this study, several strategic policy actions are recommended to strengthen Nigeria's financial system stability framework and ensure a more proactive regulatory environment. First, the Composite Financial System Stability Index (FSSI) should be institutionalised within the Financial Services Regulation Coordinating Committee and the

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Financial System Stability Directorate of the Central Bank of Nigeria. By embedding the index into the routine financial surveillance cycle, policymakers can ensure that financial stability monitoring becomes a structured and continuous process rather than an ad hoc exercise.

In addition, macroprudential policy coordination should be enhanced by ensuring that supervisory responses across different financial subsectors are closely aligned with signals from the FSSI and the Early Warning System (EWS) Dashboard. This alignment will foster a more timely and targeted regulatory response to emerging risks. A crucial enabler of this is the improvement of data quality and coverage, particularly for non-bank financial institutions and market-based indicators. More comprehensive and reliable data will enhance the accuracy, sensitivity, and timeliness of financial stability models, ensuring that policy decisions are grounded in solid evidence.

Furthermore, it is important to establish formal trigger thresholds for policy intervention linked to downside movements in the FSSI. Such thresholds will allow regulators to act pre-emptively, preventing risks from escalating into crises. The relative resilience observed in the insurance sector should also be leveraged by expanding solvency and claims-based supervisory practices to other subsectors where appropriate, thereby strengthening overall systemic resilience.

To operationalize these measures effectively, capacity-building programmes should be developed for financial analysts and supervisors. Training them to interpret EWS signals accurately and translate insights into targeted supervisory actions will be essential for timely and impactful interventions. Strengthened cross-agency collaboration—involving the CBN, Nigeria Deposit Insurance Corporation, Securities and Exchange Commission (Nigeria), National Insurance Commission (Nigeria), and Financial Reporting Council of Nigeria—will further ensure coherent and coordinated actions during periods of systemic stress.

Finally, the integration of climate risk indicators and external shock variables into the FSSI is strongly recommended. This will help regulators better anticipate and respond to evolving vulnerabilities in the global and domestic financial environment. Together, these strategic actions provide a practical pathway toward a stronger, more resilient, and more forward-looking financial stability architecture for Nigeria.

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