



ANALYSING THE FINANCIAL STRENGTH OF NIGERIA: AN APPROACH TO ESTIMATE THE INDEX OF FINANCIAL SAFETY

Victor U. Oboh¹⁺

Adegoke I.

Adeleke²

Grace G. Bikefe³

^{1,2,3}Monetary Policy Department, Central Bank of Nigeria.

¹Email: vuoboh@cbn.gov.ng Tel: +2348062116918

²Email: ALADELEKE@cbn.gov.ng Tel: +2348023755663

³Email: GGBIKEFE@cbn.gov.ng Tel: +2347068556291



(+ Corresponding author)

ABSTRACT

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This study seeks to construct a financial safety index (FSI) for Nigeria. FSI is important for early detection of financial stress and ensures that the financial system is better positioned to reduce the likelihood of financial crisis and negative outcomes on real economic activities. It has capacity to guide policies that are likely to ensure the safety of financial system as well as those that are likely to distort the system. It also has ability of providing support for policy on external economic factors that can affect a country's financial system. Hence, the developed index incorporates factors that have made significant impacts on Nigeria's financial system in recent years. It is estimated using principal component analysis (PCA) and some major incidents of systemic pressure were identified from the constructed FSI. The constructed FSI was able to largely capture key macroeconomic trends and developments that shaped the financial industry within the study period. This confirms the relevance of the indicators selected for building the index and implies that the selected indicators played critical roles in the determination of Nigeria's financial safety. Therefore, the index would assist both the fiscal and monetary policymakers in taking preventive measures against financial instability.

Contribution/Originality: This study contributes to the existing literature by constructing a financial safety index (FSI) for Nigeria, based on major factors that have made significant impacts on the financial system in recent years. The study, therefore, tests previous theories with recent data and suitable methodology.

1. INTRODUCTION

The outcome of the recent global financial crisis has renewed the awareness of financial authorities about the importance of sound financial system as impetus to financial and macroeconomic stability. One of the lessons from the crisis was the inadequacy of the macroprudential regulations to detect systemic risk and other negative outcomes of financial system. It has also clearly shown the level of interconnectedness among financial institutions and the volatile nature of international capital flows, especially to emerging markets (Balakrishnan *et al.*, 2009). Consequently, policymakers have paid increasing attention to frameworks that can effectively monitor and evaluate financial sector stability. Hence, system-wide measures of financial stability and early warning indicators have taken central space in recent research agendas. Issues on financial stability have equally become an important subject on the national and international policy discourse, particularly among monetary authorities and policymakers. Many

central banks have therefore, devoted substantial resources to the monitoring and evaluation of the framework as well as the potential dangers posed by the absence of financial sector stability on the entire financial system and the economy in general (Albulescu, 2010). This underscores the need for an all-inclusive approach for detecting probable instability of financial system and the manifestation of systemic risk.

Early identification of financial stress ensures that the financial system is better-positioned to reduce the likelihood of financial crisis and negative outcomes on real activity. To prevent a financial crisis, it is ideal for a country to develop Financial Safety Indexes (FSI) which is part of the Early Warning Systems (EWS). These are models which help to detect financial stress in the economy, based on their ability to predict financial turmoil over a given period. The financial safety index as an example of EWS is constructed by combining several financial and economic variables. This index provides insight on policies that are likely to ensure the safety of financial system and those that are likely to distort the system. Also, through the index, further understanding is provided on external economic factors that affects a country's financial system. Information provided by the index would aid policy makers in taking preventive measures against financial instability.

Although, many central banks have devoted considerable attention towards the achievement of price stability goal, the same may not be true of financial system stability mandate. Given the critical role of financial intermediation to the growth of the economy, it is imperative to develop models and frameworks that would ensure early detection and likely risks that may destabilise the system.

Evidently, consensus has been built on the relevance of reliable data and economic analysis as veritable tools for effective surveillance and early warning signals. For instance, a Group of Twenty (G20) meeting in 2009 had stressed the need for the International Monetary Fund (IMF) and the Financial Stability Board (FSB) to design actionable steps towards closing the existing data gap. This could be achieved by developing reliable indicators for identifying potential risks in the financial system and improving the level of transparency in the statistical system including ensuring the timely dissemination of data in order to reduce potential threat to financial stability.

The main objective of this study, therefore, is to develop a financial safety index for Nigeria. Research work in this area using Nigerian data is scanty and the few available studies that attempted to construct a financial stability index for Nigeria employed a mix of financial soundness and macroeconomic indicators (Sere-Ejembi *et al.*, 2014; Udom and Doguwa, 2015). However, with the increasingly dynamic nature of the Nigerian economic environment, shaped by emerging domestic and external factors, it is imperative to review these indicators with a view to incorporating those that are relevant and significantly affect financial stability. In this regard, the major innovation and research gap to be filled by this paper include the use of recent data on carefully selected financial and macroeconomic variables that have made significant impacts on Nigeria's financial system in recent years but have not been adequately captured by previous existing studies.

Following this introductory section which provides the general framework for the study, the rest of the study is organized into four sections. Section two offers a brief discussion on issues relating to financial safety and empirical literature, while section three presents the data and methodology for constructing the financial safety index. Section four discusses results from the model estimations, while section five presents the conclusions with policy recommendations.

2. LITERATURE REVIEW

There is no consensus in the literature on the generally acceptable conceptualization and definition of financial system stability. This has been largely due to the diversity of opinions relating to relevant fundamental framework that would ensure stable financial institutions and financial markets. Also challenging is how to draw a clear line between the role of financial markets stability in fostering macroeconomic stability and sustainable economic growth on the one hand, and improving the stability and resilience of the financial institutions to meet their contractual obligations without default on the other hand. Essentially, most definitions attempt to emphasize the

critical role of a sound resilient financial sector in economic growth rather than its narrow function of supporting financial institutions especially, banking system stability (Houben *et al.*, 2004).

Other authors have attempted to describe financial stability as a state in which the financial system can ensure efficient allocation of resources, evaluation and management of financial risks in order to withstand shocks. Some other authors conceived financial stability as encompassing several intertwined elements including financial institutions, financial markets, financial infrastructure and the macro economy (Schinasi, 2004). It also involves the mobilization of savings, risk management and wealth accumulation that can support economic growth and development, as well as ensuring the resilience of the financial system to withstand the emergence of imbalances with potential threats to economic processes and the real economy (Houben *et al.*, 2004). This implies that due to these inter-linkages among the different components of the financial system (including financial markets, financial institutions and financial infrastructure), any disruptions or shocks emanating from one of these components may likely weaken the overall stability of the entire financial system (Gersl and Hermanek, 2006).

Hence, financial stability can be threatened by some potential risks, which may arise from both internal (within the financial system) as well as external sources. It is also possible to have contagious sources of risks emanating from the interaction of the domestic economy with the global economic system (Hawkins and Klau, 2000). While stability in the financial system is expected to promote trade and facilitates financial flows and development, systemic financial instability hurts sustainable economic growth, adversely affects foreign financial flows and undermine price stability. It is therefore not surprising that central banks have developed keen interest towards the preservation of financial stability and resilient financial markets due to their roles in inter-temporal distribution of savings and investments in the economy.

Based on these laudable objectives, several countries have recently adopted measures, including macro prudential policies to stem the rising systemic risk in the financial system. These measures are mostly designed and geared towards engendering a sound financial system. As a result of the imbalances and instability in the financial system, a quantifiable index and appropriate macro prudential instruments to assess the soundness of financial system provides some early warning signals towards maintaining financial system stability. In this regard, a country's choice of macro-prudential instruments often would depend on its specific circumstances, the types and sources of risk, the level of both economic and financial development, the ability of the financial system to absorb the cost of additional regulation and the nature of governance and accountability arrangements for macro-prudential policy tools and instruments.

Countries use different tools to prevent pro-cyclicalities or risks in the financial system. These include credit-related, liquidity-related, and capital-related measures. Most of those macro-prudential instruments are used in combination with other monetary and fiscal policy tools by different countries to prevent vulnerability to certain shocks or systemic risks. Also, countries adjust these instruments in combination with other macroeconomic policies to act in same way as automatic stabilizers. Macroprudential policy provides, therefore, the basis for limiting systemic risks and ensuring financial stability. Macro-prudential policy frameworks are structured to limit system-wide financial risks and this encompasses minimizing the build-up of financial imbalances and identifying common exposures, risk concentrations, linkages, and interdependencies that are sources of contagion that may endanger the smooth operation of the entire financial system (Vināls *et al.*, 2013).

Several studies have attempted to construct the index of financial stability for different countries. Albuлесcu (2010) used indicators linked to financial system soundness, vulnerability and international economic climate to develop a stability index for the Romanian economy. The outcomes of the constructed index captured the periods of financial instabilities and subprime crisis in Romanian. In another vein, Cheang and Choy (2011) built a banking sector aggregate financial stability index (AFSI) for Macao, which suggested that financial stability worsened during the Asian Financial Crisis, the late 1990s world recession and the financial crisis in 2008. The outcome for other time periods under examination however indicated that financial stability in Macao was essentially favourable.

Morris (2010) constructed an aggregate financial stability index (AFSI) for Jamaica, which captured key incidence of financial instability during the sample period. Also, findings from econometric estimations suggests a relationship between the indexes and changes in key macroeconomic indicators. However, forecasted values indicated deterioration in the index during the second half of 2010. Also, Matkovskyy (2014) developed an index of financial safety for South Africa and Turkey, and evaluated the strength of their financial system. These studies used sixteen macroeconomic variables over the period of 1992Q1- 2011Q1 for South Africa and 2001Q4-2011Q2 for Turkey. These studies showed that the index of financial safety is a good indicator for capturing distresses in the financial system. In a similar vein, Matkovskyy *et al.* (2016) developed an index of financial safety for Tunisia over the period 2000Q1 to 2014Q3. The results showed that the FSI captured the disturbances in the Tunisian financial system with adequate accuracy.

Recently, several empirical research efforts were made using new approaches to develop financial stability index for the financial sector. Abdullah *et al.* (2017) constructed the Financial Stress Index (FSI) for the Malaysian economy and investigated the link between the FSI and the level of economic activity. The authors employed principal component analysis to combine the key financial and economic indicators into a single index. The study also used the asymmetric causality and structural vector autogressions to examine structural impulse responses in economic activities resulting from financial distress related shocks. Findings suggested a negative effect of changes in the Malaysian FSI on the country's economic activity, while changes in economic activity affects Malaysian FSI positively. Further analysis showed that economic activity was affected by high financial stress during the period of economic recession but economic activity had no effect on the Malaysian FSI either during the boom or recession period.

A new analytical tool known as the composite financial stability index (CFSI) was developed to assess the Euro Area's financial system (Denis and Ioana-Alina, 2018). The paper incorporated multidimensional determinants of financial stability including financial factors, external vulnerability factors, macroeconomic indicators, bank soundness indicators and global economic indicators. Using quarterly data covering 1998-2012, the index successfully identified the period of the Euro Area financial crisis. In addition, external vulnerability factors played the most significant role in the prediction of the crisis. The authors employed the Monte Carlo simulator approach to forecast future level of financial stability of the European financial sector.

Similarly, Akosah *et al.* (2018) computed the aggregate financial stability index for Ghana to examine financial sector performance since the introduction of inflation targeting in 2007. The components of the aggregate financial stability index include financial soundness index, financial development index, world economic climate index and financial vulnerability index. Findings clearly identified three development epochs in the Ghanaian economy. These include the period of the global financial crisis (2007-2010) characterised by financial stress, period of sustained financial stability (2010-2015) and period of relapse to financial stress (2015-2016). The study identified financial vulnerability index, financial development index and financial soundness index as persistent risk factors to financial stability between 2012 and 2016.

A financial stability index was also developed for the Pakistani financial sector (Babar *et al.*, 2019). Three different approaches used in the study include linear probability method, variance-equal weighted approach and logistic method. Findings indicated significant determinants of banks' financial stress to include non-performing loans, liquid liabilities to liquid asset, profitability, ratio of inter-fund to liquid liabilities, interest spread and uncovered liabilities. In terms of predictive accuracy, the logistic model outperformed others in the prediction of distressed and non-distressed banks.

Another work that measured financial stability used the Croatian data and adopted an approach that identified the main sources of systemic risks for small open economies instead of examining the level of stability of component subsectors in the financial system (Dumicic, 2016). Principal component analysis was used to construct a composite index. The result suggested the accumulation of major systemic risks in the financial sector during the global

financial crisis. Specifically, public debt and degree of euroization experienced rapid growth as the global financial crisis deepened.

In Nigeria, studies on constructing financial stability index are scanty. A good attempt was made by [Sere-Ejembi *et al.* \(2014\)](#) who used a mixture of financial soundness indicators and macro-fundamentals to build a banking system stability index (BSSI) for Nigeria. The constructed index traced the incidents of crisis in the system over the study period. The outcome of the study suggested that the BSSI for Nigeria was capable of acting as an early warning signal to likely financial instability. Also, [Udom and Doguwa \(2015\)](#) used indicators of stability in the banking, insurance and capital market sectors, to build a composite financial system stability index for Nigeria. The index captured incidents of stability and vulnerability in the Nigerian financial system during the study period.

The present study is aimed at developing a financial safety index for Nigeria, using several financial and economic variables. Based on the scanty empirical work on the application of the Nigerian data to the construction of financial stability index, this study is intended to add to the existing literature. It will also attempt to incorporate carefully selected variables that have recently made significant impact and are relevant to Nigeria's financial system.

3. METHODOLOGY

3.1. *Measurement of the Level of Financial Safety of an Economy*

In the context of this study, we define financial safety of a country as a condition in which the financial system including its components is protected substantially against real and potential threats emanating from both the domestic and external environments. A safe financial system is one that effectively carries out its financial intermediation role.

A reliable measurement of the level of financial safety of a country depends largely on the selection of a set of relevant indicators that can provide leading information on the financial strength of the economy. Two major characteristics of such a measurement include the suitability of the selected variables for international comparison and the ability to reflect the macro-level performance of the entire domestic financial system ([Matkovskyy *et al.*, 2016](#)).

A country's FSI is derived from the aggregation of the partial features of the synthetic components that define the operations and performance of a financial system. The composition of the nature, number and content of the specific indicators depends on the theoretical and operational relevance of the variables over a reasonable period of time. Thus, in the process of developing the FSI, appropriate combination of the component variables presents one of the most difficult tasks. This is largely attributed to the difficulty in choosing a standard reference for allocating weights ([Illing and Liu, 2003](#)). Researchers are therefore careful in ensuring a correct combination of relevant variables to ensure that the chosen variables provide reasonable and consistent signals that reflect the dynamic changes in the country's financial system.

3.1.1. *Key Indicators of Financial Safety Index for Nigeria*

The performance of the financial sector industry is largely affected by both the domestic and foreign factors. Therefore, the construction of the first level index of financial safety requires the inclusion of factors from both the external and local economic environments. The domestic economy includes the macroeconomic environment, the monetary sector and the financial and policy environment.

In this study, we consider two indicators: Gross Domestic Product (GDP) growth rate and inflation rate as representatives of the macroeconomic environment. The GDP provides the aggregate monetary value of all final goods and services produced within a given period of time in a country. The choice of the GDP as an indicator of FSI is intended to capture the overall performance of the macro-economy. Financial safety depends substantially on

economic growth. For instance, firms and households tend to demand more financial services during the period of economic expansion (Creel *et al.*, 2015).

The monetary policy environment is key to ensure monetary safety of the economy. This requires that a country's monetary system is robust enough to perform its traditional functions as a medium of exchange, store of value, accounting unit and a standard means of payment. In analysing the monetary conditions and the monetary policy environment, we adopt the money supply (M2) as the representative indicator. The M2 as the key monetary aggregate captures the degree of monetization in the financial system and plays a counterpart role to credit development.

Three indicators were selected to represent the international economic environment. These are the foreign direct investments (FDIs), foreign portfolio investments (FPIs) and real effective exchange rate (REER). The key measures of capital flows are included to capture their financial stability inducing effects. Even though, foreign capital flows tend to expose economies to external shock during periods of reversals, they play a vital role in providing the much-needed capital to supplement domestic finances for investment and growth (Baum *et al.*, 2017). The selection of exchange rate in the construction of the index is justified on the ground that its fluctuations poses significant risk to financial system safety and stability due to its influence on prices, foreign currency denominated loans and foreign exchange assets (Golovnin and Oganessian, 2018).

The financial industry environment is measured by four indicators. Given the recent peculiar characteristics and dynamic features of the Nigerian financial industry such as high liquidity, high risk and high speculative nature, we categorize the indicators into operational and robustness indicators. Two selected indicators to gauge the operational status of the financial industry include the interbank interest rate (IBR) representing the money market and the All Share Index (ASI) representing the capital market. The IBR indicates the rate at which commercial banks lend to each other while the ASI shows the price level of stocks and represents the extent of safety of the entire stock market. Given the critical role of the stock market in providing long term finances to the real sector as well as its potential for inter-industrial, inter-sectoral and inter-regional transfer of capital, any persistent decline in the ASI may be indicative of a weak stock market which could affect the financing needs of the economy.

For the robustness status analysis, we employ the non-performing loan ratio of total commercial bank loans (NPL_GL) and the NPL provisioning coverage ratio of commercial banks (NPL_PRO). The NPL ratio (NPL_GL) measures the nominal value of non-performing loans in relation to the total commercial bank loans. It indicates the extent of deterioration or otherwise of the quality of loans extended by the banks and should therefore be a critical determinant of the financial safety of a country. The NPL provisioning coverage ratio which measures the bank's capacity to absorb potential losses from its NPLs indicates the level of financial safety of the industry. Quarterly data of these variables spanning 2007Q1 and 2017Q3 were sourced from the database of Central Bank of Nigeria and National Bureau of Statistics and used for the analysis.

Table-1. Relevant variables included in the financial safety index.

| Variable classification | Specific variables |
|------------------------------------|--|
| Macroeconomic environment | <ul style="list-style-type: none"> • GDP growth rate (GDP) • Inflation rate (INF) |
| Monetary policy environment | <ul style="list-style-type: none"> • Broad Money (M2) |
| International economic environment | <ul style="list-style-type: none"> • Foreign direct investments (FDI) • Foreign portfolio investments (FPI) • Real effective exchange rate (REER). |
| Financial industry environment | <ul style="list-style-type: none"> • Interbank interest rate (IBR) • All Share Index (ASI) • Non-performing loan ratio of total commercial bank loans (NPL_GL) • NPL provisioning coverage ratio of commercial banks (NPL_PRO) |

3.2. Constructing the Financial Safety Index Using the Model of Linear Weighted Comprehensive Evaluation

The relevant variables that are to be considered in the construction of financial safety index are shown in Table 1. Thereafter, we proceed with the construction of the index using the following steps: unification or normalization of the data, calculation of the weight coefficients and derivation of the aggregate index.

3.3. Data Normalization

Given that the estimation of FSIs entails the collection of several indicators, it is important to form an aggregate set of indicators. However, the selected indicators contain different directions of information. This therefore calls for a normalization of information to be able to perform the additive aggregation. We adopt the following method to normalise the variables as shown in Equation 1.

$$X^* = X - \frac{\mu}{\sigma} \quad (1)$$

Where

X^* = Normalized value.

X = sample data.

μ = mean value of all sampled data.

σ = standard deviation of all sampled data.

3.4. Principal Component Analysis

We obtain the weighted coefficients by the application of the factor analysis and principal components. The principal components analysis (PCA) is a form of factor analysis that extract weighted linear combinations of a selected group of variables. The process entails the rotation of the scatter plot of the observations in order to extract the factors. By so doing, the variance of the factors is maximized while the variance around the factor is minimized such that the most possible variances of the selected variables are captured by the first factor. Subsequently, other factors that account for the remaining variances are extracted in a similar fashion.

The two key objectives of performing the factor analysis are to trim down the number of variables to most relevant ones and also to determine the structure of the relationships between them (Illing and Liu, 2003). The outputs of a PCA include component scores also known as factor scores and factor loadings. Factor scores are the values of the transformed variables and correspond to a particular data point while factor loadings are the weight that is multiplied by each standardized original variable to produce the component score (Jia and Li, 2015).

The factor loading matrix indicates the degree of impact that the extracted factors have on original variables. Higher absolute values of the factor loadings suggest higher correlation between common factors and original variables. It is also an indication that the obtained common factors truly represent the information in the original variables. After selecting the key principal components that largely reflects the information in the original variables, the scores of the selected principal components are calculated for each year. Thereafter, we compute the comprehensive evaluation score of the five principal components for each year through the following formula as indicated in Equation 2:

$$L_t = d_i f_i + \dots + d_n f_n \quad (2)$$

Where

L_t = comprehensive evaluation score for the period t .

d_i = variance contribution rates of the selected principal components i .

f_i = scores of the selected principal components i .

The final stage involves the calculation of financial safety indexes for each year. This is achieved by mapping the calculated L value into the [0 100] interval.

To achieve the FSI for each year, the conversion formula is as follows in Equation 3:

$$FSI_t = \frac{(L_t - \text{MinL})}{(\text{MaxL} - \text{MinL})} \tag{3}$$

Where

Max L = maximum value of the comprehensive evaluation score.

Min L = minimum value of the comprehensive evaluation score.

4. RESULTS

We commenced the analytical process by deploying the normalized data to perform the principal components analysis (PCA). Using the ten selected variables, the output of the PCA is shown in Table 2.

Table-2. Principal Component analysis showing the eigenvalues and contribution rates.

| Components | Eigenvalue | Difference | Proportion | Cumulative value | Cumulative proportion |
|------------|------------|------------|------------|------------------|-----------------------|
| 1 | 2.630453 | 0.302772 | 0.263 | 2.630453 | 0.263 |
| 2 | 2.327682 | 0.83339 | 0.2328 | 4.958135 | 0.4958 |
| 3 | 1.494292 | 0.235037 | 0.1494 | 6.452427 | 0.6452 |
| 4 | 1.259254 | 0.512036 | 0.1259 | 7.711681 | 0.7712 |
| 5 | 0.747219 | 0.162097 | 0.0747 | 8.4589 | 0.8459 |
| 6 | 0.585122 | 0.112522 | 0.0585 | 9.044022 | 0.9044 |
| 7 | 0.4726 | 0.256917 | 0.0473 | 9.516622 | 0.9517 |
| 8 | 0.215683 | 0.042946 | 0.0216 | 9.732304 | 0.9732 |
| 9 | 0.172736 | 0.077777 | 0.0173 | 9.905041 | 0.9905 |
| 10 | 0.094959 | --- | 0.0095 | 10.0000 | 1.0000 |

The results indicated that all the first four eigenvalues exceed the value of one with the fifth eigenvalue getting close to one. In addition, the cumulative variance contribution rate of the first five eigenvalues totaled 84.6 per cent, indicating that the key information in all the indexes are contained in them. The scree plot in Figure 1 provided further graphical clarity that the remarkable change in the cumulative value of eigenvalues occurred after the first five principal components.

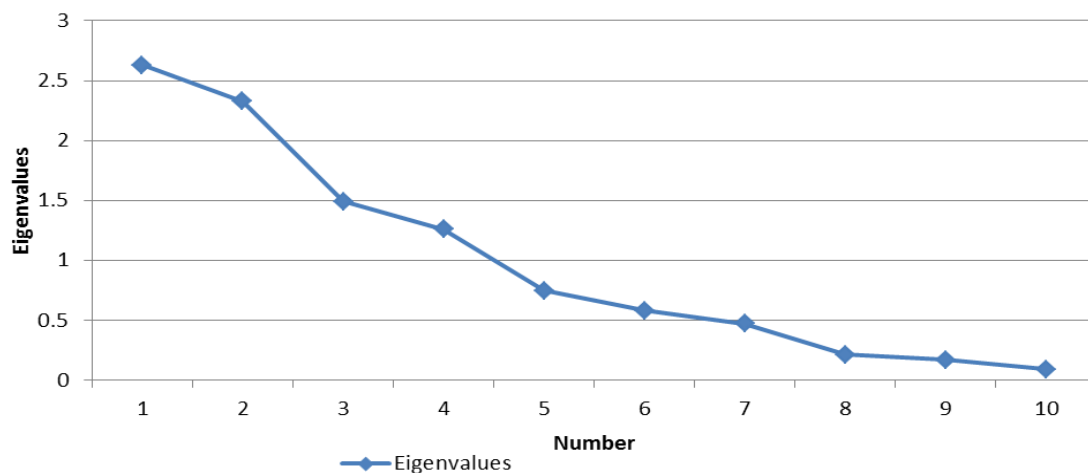


Figure-1. Screen plot of the principal components analysis.

The change in eigenvalues tends to become relatively steady after the fifth principal components. This provided the basis for us to select the first five principal components to replace the previous ten indexes.

Furthermore, the PCA provided the factor loading matrix which showed the degree of correlation between the common factors and the original variables. The factor loading matrix is shown in Table 3. According to the results, principal components 1 comprehensively represented the information in two indexes as reflected by their highest absolute values.

Table-3. Factor loading matrix for the first five principal components.

| Index | PC 1 | PC 2 | PC 3 | PC 4 | PC 5 |
|---------|----------|----------|----------|----------|----------|
| ASI | 0.116769 | 0.523963 | 0.242817 | -0.23808 | 0.308954 |
| FDI | 0.360158 | 0.024848 | 0.082565 | 0.597688 | -0.02382 |
| FPI | -0.09499 | -0.11976 | 0.394619 | 0.553593 | 0.524198 |
| GDP | 0.48768 | -0.12485 | -0.30405 | 0.141888 | -0.23624 |
| IBR | -0.39063 | -0.03235 | -0.40848 | -0.30494 | -0.08118 |
| INF | -0.13323 | -0.50975 | -0.35226 | -0.14215 | -0.197 |
| M2 | 0.306714 | 0.314562 | 0.457605 | -0.05314 | 0.325105 |
| NPL_GL | -0.33135 | -0.47125 | -0.03708 | -0.1873 | -0.023 |
| NPL_PRO | -0.26486 | -0.32368 | -0.18938 | -0.26118 | -0.6216 |
| REER | 0.40674 | 0.090702 | 0.385309 | 0.20043 | 0.188106 |

These indexes include the gross domestic product and the real effective exchange rate. Similarly, three variables: the all share index, inflation rate and non-performing loan ratio of total commercial bank loans were most comprehensively explained by principal components 2. In principal component 3, the absolute values of load coefficients of interbank rate and money supply were quite high suggesting that these two indexes were substantially represented by principal component 3. In the same vein, principal component 4 showed a better reflection of the foreign capital flows variables: foreign direct investment and foreign portfolio investment while the principal component 5 mainly represented the NPL provisioning coverage ratio of commercial banks.

Following the selection of the five principal components as the new indexes, we compute their scores for each quarter. The quarterly change in trend among the scores of the first five principal components is shown in Figure 2. The chart indicates a co-movement among all the principal components scores suggesting a substantial degree of correlation.

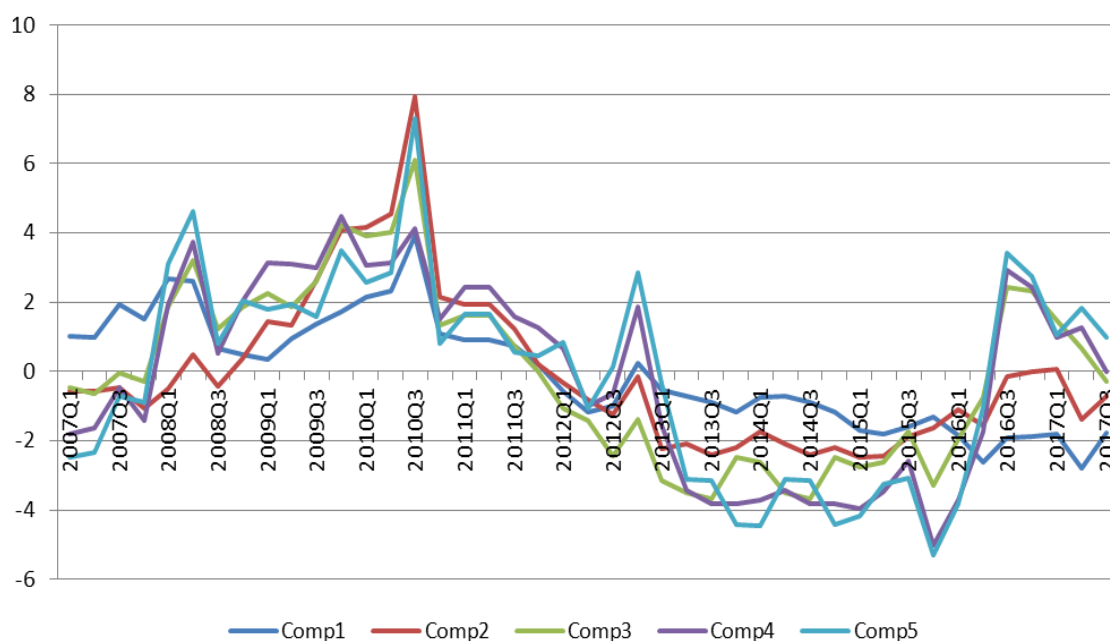


Figure-2. Factor scores of the first five principal components.

Finally, we computed the comprehensive evaluation score which is mapped into the [0 100] interval to obtain the quarterly financial safety indexes. The final output of this computation as shown in Figure 3 showed the quarterly changes in the financial safety indexes between 2007Q1 and 2017Q3.

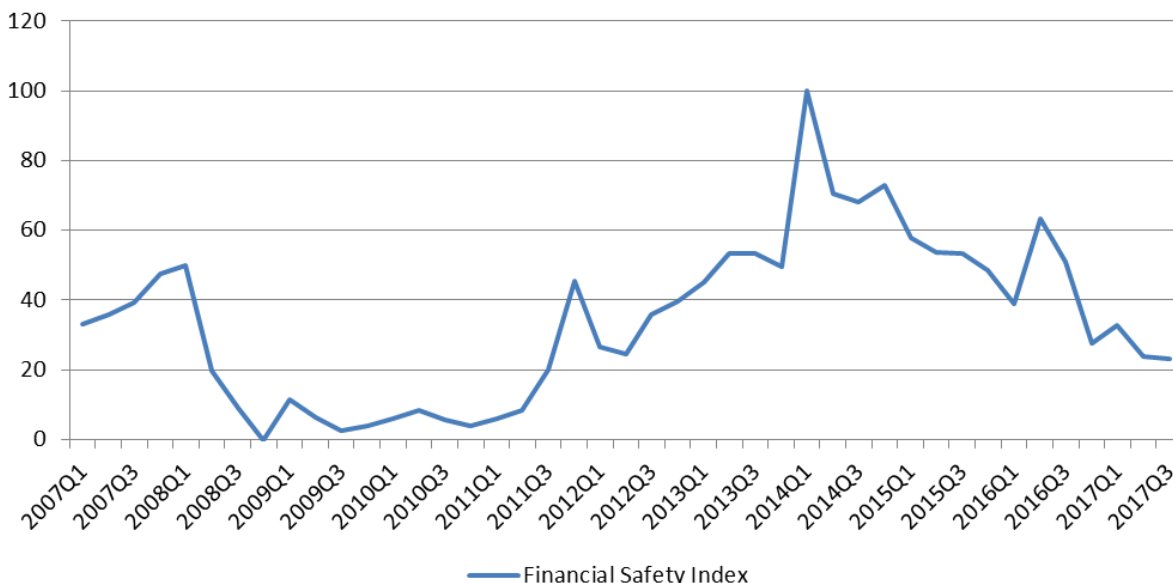


Figure-3. Quarterly changes in the financial safety indexes between 2007Q1 and 2017Q3.

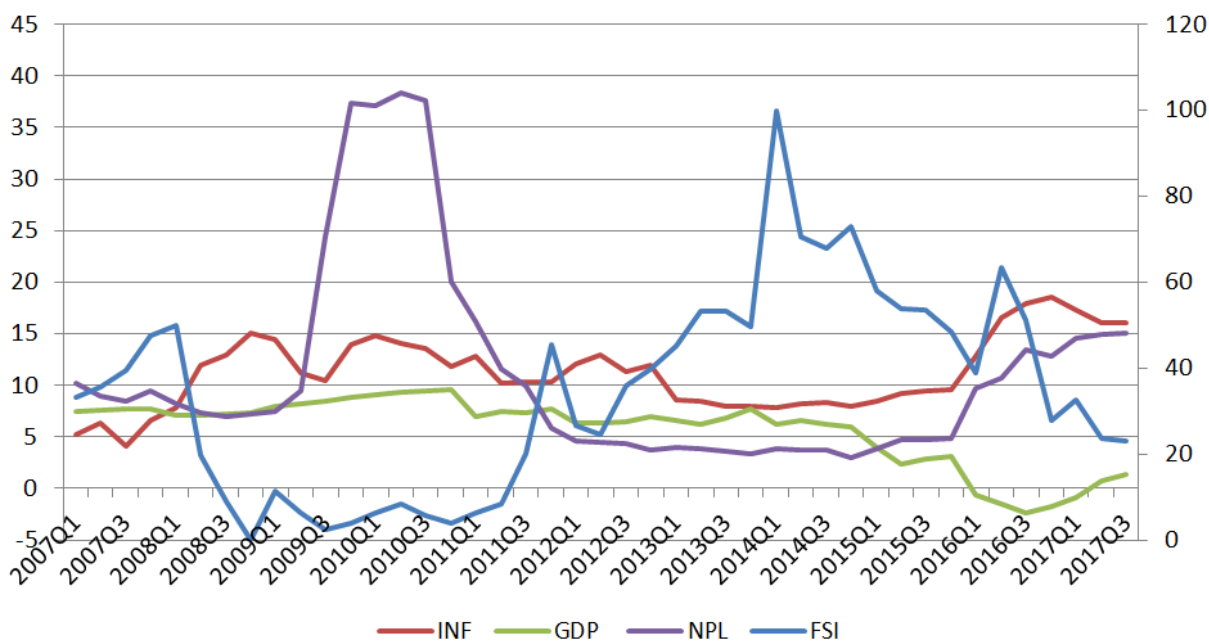


Figure-4. FSI performance with other selected macroeconomic indicators.

5. DISCUSSIONS

The final index of financial safety is presented in Figure 3 while Figure 4 compared the FSI performance with other selected macroeconomic indicators. Generally, the FSI tends to reflect the major macroeconomic trends and developments that shaped the financial industry within the study period. We discuss the results along three major periods. The first period (2007Q1- 2010Q4) reviewed developments during, and shortly after the global financial crisis. The second period (2011Q1-2014Q1) covered the post GFC era during which government embarked on concerted policy reforms to achieve financial market stability. The third era (2014Q2-2017Q3) reviewed the Nigeria’s slippage into recession.

5.1. The Era of the Global Financial Crisis (2007Q1- 2010Q4)

During the early part of this period, the financial safety index exhibited a generally positive but short movement. This performance could be attributed to the initial resilience demonstrated by the financial system at the onset of the global financial crisis. Though, the crisis had substantial adverse effect on Nigeria's financial system, especially the banking sector, the initial or first round effects were largely withstood. The financial sector's resilience to the initial shock could be explained by Nigeria's low level of integration with the global financial market as well as the banking consolidation reform that preceded the crisis. The 2004/2005 banking sector consolidation increased banks' minimum capital base from N2billion to N25 billion and boosted public confidence in the industry.

However, the financial sector became overwhelmed by the second round effects of the crisis. Consequently, the performance of the financial system nosedived with financial safety index dropping sharply in 2008Q1 and continued on a low trajectory till 2010Q4. The deterioration in the levels of financial safety within the period could be traced to a sharp decline in the banks' quality of risk assets especially the non-performing loans which rose sharply from 7 per cent in 2008Q3 to 37.6 per cent in 2010Q3. Also, the crisis significantly depressed the Nigerian stock market, shedding more than 70% of its value between March 2008 and April 2009. This resulted largely from acute decline in capital inflows as both direct and portfolio foreign investments and diaspora remittances contracted substantially. Even though, the GDP recorded relatively high growth rate during the period; a combination of these factors including liquidity tightening by banks tended to undermine the general safety level of the financial system.

5.2. The Post GFC Period (2011Q1-2014Q1)

Between 2011 and 2014Q1, the financial safety index improved substantially reaching its peak in Q1 of 2014. This development corresponds to the substantial progress made in some macroeconomic indicators despite some challenges. Specifically, the economy achieved strong GDP growth, low inflation, exchange rate stability, capital market recovery and growth in external reserves. The combined effects of the improved macroeconomic environment and the improved risk management and corporate governance practices adopted by the Central Bank of Nigeria led to a significant decline in the ratio of non-performing loans (NPLs) to gross loans. NPLs ratio to total gross loans declined from 16.2 percent in 2011Q1 to 6.21 per cent in 2014Q1.

5.3. The Period Preceding and During Economic Recession (2014Q2 – 2017Q3)

The third and final segment of the FSI curve analysed developments between 2014Q2 and 2017Q3. The FSI generally showed a declining performance during the period with most of the key macroeconomic indicators trending downwards. First, it was the period that the economy slipped into a recession following the report of two consecutive quarters of negative GDP growth by the second quarter of 2016. Prior to that development, Nigeria's growth rate declined sharply from over 7 per cent in 2013Q3 to about 2.1 per cent in 2015Q4. Within the same period, inflation trended upwards gradually from 7.96% in 2013Q4 to 9.55% in 2015Q4 and crossed to double digit, rising to as high as 18.5 per cent by 2016Q4. The Nigerian stock market also recorded a considerable loss of 17.36% in 2015 and 6.17% in 2016 due largely to low investors' confidence. Similarly, the ratio of non-performing loans to total gross loans increased sharply from about 3.7 per cent in 2014Q2 to about 14.6 per cent in 2017Q1 far above the 5 per cent threshold.

6. SUMMARY AND CONCLUSION

This study seeks to analyse the financial strength of the Nigerian economy. It employed the linear weighted comprehensive evaluation model to construct the financial safety index for Nigeria using factors that are most relevant to the economy. The results from the constructed FSI, clearly shows the relevance of the methodology as it was able to largely capture key macroeconomic trends and developments that shaped the financial industry within

the study period. Based on these results, the financial sector demonstrated substantial resilience at the onset of the global financial crisis, resulting in positive movement of the FSI. However, the sector's failure to overcome the second round effect of the crisis was shown by a weak performance of the index. The post-global financial crisis period recorded substantial improvement in the safety of the financial sector due mainly to strong macroeconomic fundamentals such as high GDP growth, low inflation and stable exchange rate. We finally analysed developments before and during the recent economic recession in Nigeria. As expected, the FSI declined significantly due to the poor performance of key macroeconomic indicators as shown by a slow-down in growth, rise in inflation and increase in NPLs.

The ability of the constructed FSI to capture major developments in the financial industry and the overall macro-economy confirms the relevance of the indicators selected for building the index. This implies that the selected indicators played critical roles in the determination of Nigeria's financial safety.

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