



Interest Rate Spread, Financial Vulnerability Index and Financial System Stability in Nigeria

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Abstract

The study examined the impact of interest rate spread and financial vulnerability index on financial systems stability in Nigeria. In pursuance of the above, relevant secondary data covering the period of 1989 to 2017 were collected from the Annual Reports, the Statistical Bulletin, Statistics Database, Financial Stability reports of the Central Bank of Nigeria (CBN) and the National Bureau of Statistics. Descriptive statistics and correlation analysis were conducted to give a general appropriate characterization and the relationship among the variables in the model while the Ordinary Least Square (OLS) technique was used to determine the relationship among the interest rate spread, financial vulnerability index and financial system stability in Nigeria. The findings revealed that interest rate spread was negative and did not have any statistically significant impact on financial stability. It was also found that the financial vulnerability index had a negative and a statistically significant impact on the financial systems stability. It was also observed that the earlier levels of financial system stability have robust, positive and a significant relationship with the subsequent levels of financial systems stability. Based on the findings, the study recommends that the policy makers should not rely on interest rate spread as a tool of financial system stability. It is also recommended that the policy makers should ensure that excessive financialization does not imperil financial stability by constant monitoring of the ratio of financial asset and liabilities to the nation's real GDP. Since it is one of the variables that drives financial system stability in Nigeria, it must be considered in the management of the Nigerian financial sector.

Key words: Interest Rate Spread, Financial Vulnerability Index, Ordinary Least Square

JEL Classification: E43, E32, E44

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Introduction

It is interesting to know that the finance sector contributes significantly to the productive and economic base of every country. It provides the necessary and essential lubricant that turns the wheel of every economy through the process of resource mobilization and allocation. Its other critical activities include the provision of securities markets, fund management, insurance, pension services and risk management. It is a combination of network of institutions ranging from the

banking to non-banking institutions, the central banks, organized financial markets, relevant regulatory and supervisory institutions and financial safety nets.

However, if the financial system is to function effectively and efficiently, it needs to be stable always. Accordingly, it is expected that through reforms, the financial system can be made more resilient, viable and stable. Reforms in the financial sector have become inevitable in emerging and developing economies of the world and Nigeria is not exempted. The financial system reforms have been embarked upon in Nigeria to ensure that the economy is stable and viable and notable among these reforms are interest rate spread and financial vulnerability index.

Interest rate spread is the difference between deposit and lending rates. When there is a large spread, it impedes and inhibits the development and expansion of the process of financial intermediation. This is largely because potential savers will be discouraged as there will be low returns on the bank deposits thus limiting financing opportunities for prospective borrowers. The resulting effect on the economy is that opportunities for investment that are feasible are reduced thus limiting the potentials for growth that are futuristic. Overtime, it has been noticed that spreads that are large usually occur in developing and emerging economies due to the high costs of operation, financial repression or taxation, finance and banking sector that is not competitive and instability of the macro economy. These have exposed the deposit money banks to a high degree of risk. Therefore, it is expected that as financial liberalization is accomplished overtime and the development of the financial sector is achieved, interest rate spread will reduce. The degrees of spread of the interest rate vary from country to country. It has an inverse relationship with the efficiency of the finance sector which results from a financial environment that is competitive.

The financial vulnerability index measures the extent to which countries are vulnerable to the financial and economic meltdown and stock market crashes. It is interesting to know that the economies of emerging markets rely heavily on external funding and borrowing and other sources of inflow of capital for the growth of their economy. As such, they are especially vulnerable to instability and reversals in the behavioral sentiment of investors. On that note, a significant attention has been paid to these economies by the International Monetary Fund (IMF) in its work of assessing countries vulnerability to financial shocks. However, due to the instability and turmoil that occur at times in the financial markets of the world, many countries at various developmental stages may experience crisis. An effort is being made to strengthen and consolidate the framework for analyzing financial vulnerabilities in emerging economies. Many of the works conducted by IMF on measuring financial vulnerability has its major focus on improving the transparency and quality of data. A detailed, timely and necessary data on debt that are external, international reserves and inflow of capital strengthen the capacity and ability to detect financial shocks and vulnerabilities giving ample time and opportunity for the policy makers to enact and implement actions that are remedial. These efforts are meant to improve the ability of the International Monetary Fund (IMF) to gather and analyze key information such as conducting stress tests, formulating and developing early warning systems signals and identifying critical vulnerability indicators.

The reforms of the financial sector by way of interest rate spread and the development of the financial vulnerability index could be traced back to competitive actions of the banks coupled with a continuous increase in the regulations of the government over banks soundness and strong financial and economic positions (Kent & John, 2017). These reforms involve the processes of financial innovations, globalization and deregulation in the financial systems of developed, emerging and developing markets especially the Nigerian financial system which is characterized

by frequent changes in the structure, growth, political instability, financial crisis and other critical challenges.

Following the recent Global Economic and Financial Meltdown (GEFC), there have been renewed academic and professional interests in the reforms that have taken place at the institutional and organizational levels and the financial supervision and regulations that have occurred at the systemic, regional and national levels. It is on record that one of the major causes of the global economic and financial crisis which affected banks stability in every economy was the proliferation of credit risk in terms of growth of loans that are non-performing and the increase in their share to total gross loans. (Howlett & Lejano, 2013; Howlett, Mukherjee, & Woo, 2015). The GEFC also showed that there were inherent weaknesses in the already existing regulatory institutions and policy which inhibited the ability of policymakers to foresee the crises and give attention to its possible cause. Therefore, financial systems in African countries including Nigeria have gone through a series of changes that have significantly affected their financial systems' stability. Prior to the global economic and financial crisis, the banking sector in Nigeria had undergone several reforms counting from the 2004 reforms. These reforms had direct influence on the daily behavior of the various actors in the financial market within the context of the supply and demand for credits. They also had indirect impact by helping to vary the financial system structure which, in turn, influenced the lending pattern in the sector (Spratt, 2018). However, despite the reforms by way of interest rate spread and financial vulnerability index that have occurred in the financial system, evidence has shown that the financial system is still febrile and inefficient (Aryeetey & Senbet, 2016).

Furthermore, from the review of the literature, it would appear that while many studies on interest rate spread, financial vulnerability index and financial system stability have been conducted in the developed countries (Maudos, 2018; Laznia, 2013; Gersl & Hermanek 2019; Albulescu, 2010; Petrovska & Mihajlovska, 2018) only a few have been conducted in developing countries like Nigeria (Sere-Ejembi, Udom, Salihu, Atoi & Yaaba 2014; Jayaraman & Sharma, 2017). Also, no study in Nigeria, has examined the extent to which interest rate spread and financial vulnerability index impacts the financial system stability. This study attempts to contribute to the existing literature by examining the extent to which interest rate spread and financial vulnerability index impacts financial system stability using the period from 1989 to 2017.

Literature Review and Theoretical Framework

The empirical and theoretical work that helped to establish the nexus between interest rate spread and financial vulnerability index is that of King and Levine (1993) which, of course, added some other variables, that are financial ,to the standard financial stability regression thus extending and expanding the cross-country analytical framework developed by Barro (1991). From that time onward, many empirical evidences have confirmed that creating and providing the necessary conditions for a financial system that is efficient and developed can go a long way in contributing to the growth of the economy that is high and sustainable and invariably lower poverty (Honohan, 2004; Beck, Levine, & Loayza, 2010).

However, according to Rousseau and Wachtel (2011), the extent to which financial reforms impact the financial system stability is not very strong compared to the original panel studies of King and Levine (2013) when examined with more current and recent data. In general, the evidence indicates that financial reforms and financial system stability are significantly related.

Perron (2016) used three models of the method of Monte Carlo simulation to identify, detect and evaluate the impact of shocks. It was found that with a shift in structure that is significant

and utilizing the Augmented Dickey Fuller (ADF) test, the hypothesis of the existence of unit root should be rejected. Kim, Kim & Oh, (2017) used the coefficient of cointegration that is time varying to test the existence of shocks that are structural for purchasing power parity of currencies of selected Asian countries and monitored the level of shocks that they experience overtime. The conclusion was that a structural break that is major significantly impacts the purchasing power parity of currencies of selected Asian countries.

Marotta (2018) utilized the methodology of multiple breaks to test selected countries in the Economic and Monetary Union (EMU) and concluded that the variation in the pattern of date harmonizes with systems of national banking which adjust rapidly and slowly to a monetary regime that is new. The research also found that the introduction of euro could bring about some structural changes. In the same vein, it has been observed overtime that most volatilities and breaks are closely associated with shocks arising from terms of trade. Lee and Chien (2019) evaluated the question of whether policy changes in the different regime have caused a breakdown in the relationship that exists between the development of tourism and the growth process of Taiwan economy on a long term basis within the period 1959-2018. It was found that virtually all the variables used in the regression analysis have experienced one form of shock or another. These shocks must be accounted for establishing relationship of co-integration that exists between the development of tourism and the growth of the Taiwan economy. Analysis on a cross-country basis conducted to identify and predict the impact of development financially on the growth of the economy have suffered some demerits such as inability to account for the problem and challenge of the systems heterogeneity and the difficulty in establishing and accounting for the relationship that exists in the system on a long term basis.

Before the outbreak of the financial crisis of Asia, Doguwa (1996) proposed alternative early warning models for identifying and analyzing problematic banks in Nigeria using the technique of logit-analysis and accounting ratios. The two separate models developed for merchant and commercial banks were observed to be more efficient than earlier failure prediction models. The results revealed the identity of those deposit money banks that were already distressed and further revealed the identity of those banks that were at the verge of liquidation. However, during the period under consideration, the exposure of deposit money banks in Nigeria to the financial system that is external was largely limited.

There are lots of literatures, both empirical and theoretical, that harp on the determinants of interest rate spreads in the advanced and emerging economies. The economic and specific variables of banks considered depicted the same behavior across all emerging and developing countries. It is also very interesting to know that the set of dependent and independent variables used, and the statistical methodology adopted emanated from previous research. Maudos and Solis (2017) evaluated those factors that determined net interest income in the banking sector of Mexico within the period of 1993 through 2016. The sample was made up of 43 banks operating on a commercial basis using a panel data that is unbalanced with 289 annual observations. It was observed that the banks in Mexico have high interest margins of approximately 5% in relation to the standard set internationally. Different explanatory factors were considered to explain and evaluate the behavioral patterns of interest rate spreads. These included the degree of risk aversion, market risk, cost to gross income, transaction size, GDP growth and inflation rate, liquidity, non-interest income, costs of operations, interest rate volatility, payments of interest that are implicit, management quality and credit risk.

Norris and Floerke Meir (2018) used panel dataset for banks in Armenia to evaluate the factors affecting interest rate spreads within the period of 2002 through 2016 using the pooled ordinary

least square regression and fixed effect analysis. Variety of bank macro and specific variables were employed. These variables included money market rate, change in the nominal exchange rate, foreign bank participation, inflation, real GDP growth, return on assets, capital adequacy, costs of overhead, size of banks, non-interest income, liquidity and deposit market share. They concluded that specific factors inherent in the banks including liquidity, size, market concentration, return on asset and market power explain a larger portion of interest rate spread. Khawaja and Din (2019) examined those factors that determine the interest rate spreads using panel data of 29 commercial banks in Pakistan within the period of 1998 through 2018. They utilized variables of industry which included concentration and deposit inelasticity and firm variables of quality of assets, costs of administration, liquidity, market share and macroeconomic variables of output that is real, inflation and interest rate that is real. It was concluded that the inelasticity of the supply of deposit was the major factor that determines interest rate spread.

Financial Stability Index

Over the years, researchers, academics and professionals have been trying to identify the avenues and conditions that will ensure that the financial system is stable. For this reason, many researchers have used varieties of indicators that explain, define, characterize and describe financial system vulnerability. It has been observed that many central banks in their reports on financial systems stability tried to evaluate the risk associated with financial system stability while they focus on a few indicators. The approach to these measures has continued to change as emphasis has moved from micro prudential guidelines to macroprudential dimensions of financial system stability. Therefore, there has been a renewed interest in the area of financial system stability making central banks to analyze and monitor threats and risks relating to the financial system thus resulting in the publication of reports on financial system stability.

According to Oosterloo, De Haan and Jong-A-Pin (2007), three main reasons have been adduced for publishing financial stability report. They include the following; to increase the transparency and accountability of policy makers who are responsible for financial stability, enhancing their contribution to financial systems stability and strengthening and consolidating the co-operation among all stakeholders who are involved in monitoring and maintaining financial systems stability. Among all pertinent information necessary to compare or contrast the extent to which banking sectors are stable is the report on global competitiveness which is prepared and distributed by the world economic forum. This report has datasets that are unique on a broad scale of competitiveness for over 144 economies of the world economies. The report ranked the competitiveness index of the globe which was hinged on 12 pillars (World Economic Forum, 2015).

Albulescu (2010) attempted to develop an index of aggregate stability for the financial systems in Romania. In developing this index, indicators relating to financial systems development, soundness, vulnerability and other indicators characterizing the climate of the foreign communities were put into consideration. He concluded by saying that other researchers should focus on constructing and formulating a composite indicator of financial stability for the banking segment which is also a vital part of the entire financial and economic system. However, it should be noted that in analyzing financial systems stability, the four major areas of concern are asset quality, profitability, capital adequacy and liquidity.

Illing and Liu (2017) developed and constructed an Index of financial stress to examine the condition of the financial system of Canada. A single measure of financial stress on a macroeconomic level was provided by the index which was allowed by them to vary and change over a period and within a range of values where crises were reflected in extreme values. A survey

was further conducted on economists and policymakers in Canada where responses were fed into the constructed financial stress model in a bid to ascertain those events that made the Canadian economy stressful. Van den End (2006) constructed and advanced an index of stability condition for the financial system of Netherlands. Rates of interest, effective rate of exchange, prices of stocks and real estate, financial institutions solvency as well as stock index volatility were incorporated in this index.

In the same vein, the Central Bank of Turkey (2019) developed an index of financial strength. Six sub-indices covering asset quality, foreign exchange, liquidity, capital adequacy, interest rate risks and profitability were used for the process. Wong, Wong & Leung (2019) identified and validated the major indicators of banking sector stress for eleven economies of Asia-Pacific continent using data that spans the second quarter of 1990 to the first quarter of 2017. It was found that among leading indicators that were significant was growth of credit moving to the private sector, asset-price misalignment, default risk of deposit money banks and other corporate sector that is non-financial. During the global economic and financial meltdown, growth of the economy, ratio of external debt in the short-term to foreign reserves and inflation were observed to be significant determinants.

Theoretical Framework

Keynes (1936) harped on the need to engage in a careful and thorough financial management practices in order to ensure that economic activities run smoothly and perfectly. One viable concept introduced by Keynes was the liquidity trap that sets a minimum ceiling to the rate of nominal interest. When a trap becomes necessary and binding, the rate of real interest moves above the level of equilibrium which is consistent with employment at optimal level wherein savings that is planned exceeds investments that is planned. A drop in income level will, therefore, reflect a decrease in savings such that it becomes equal to investments. The position of Keynes was that the three main reasons why individuals and institutions save money are to close the gap that exists between expenditures and receipts as a preventive measure against billings that are unexpected and for the purpose of speculation in case there is a fall in the market value of any assets. Saving money for speculative reasons goes a long way in determining whether people save money directly or save in alternative assets such as annuities of the government. This may involve paying a fixed rate of dividend with respect to the rate of market interest which is a reflection of both the desire for the maximization of wealth and the opportunity cost of holding money as the profits expected from the annuities. The liquidity trap of Keynes emphasizes the fact that some certain individuals consider a particular level of interest rates to be normal. When the rate of interest is higher than this, individuals will reasonably expect it to come down to the level that is deemed to be normal. Yet, rates of interest that appear lower than what is considered normal reflect capital losses that are high. In this case, the holding of money tends to be more attractive than alternative assets such as annuities and coupons. The Keynesian liquidity trap theory is, therefore, the framework on which this research is based.

Methodology

In the study, the impact of interest rate spread and financial vulnerability index on financial systems stability in Nigeria is examined. Hence, a longitudinal research design which is appropriate for a study of this nature is employed. The choice of this design was based on the variables under consideration are historical in nature and, therefore, the researcher lacks the ability to manipulate the dependent and independent variables because they have already

occurred. Thus, time series analysis was done to assess the impact of interest rate spread and financial vulnerability index on financial systems stability in Nigeria. All firms that make up the formal financial sector (financial intermediaries) that operate in Nigeria including those that are quoted on the Nigerian Stock Exchange as of December 31st ,2017 constitute the population of the study. Since the sample is co-terminus with the entire formal financial sector, the aggregate or pooled data of the financial firms is used. Relevant secondary data covering a period of 1989 to 2017 were collected from the Banking Supervision Annual Reports, Reports on Financial Stability of the Central Bank of Nigeria (CBN) for various years, the National Bureau of Statistics, the Annual Statistical Bulletin and Fact books of the Nigerian Stock Exchange. The study made use of descriptive statistics, correlation analysis, unit root test and the ordinary least square (OLS) regression technique. The use of descriptive statistics and correlation analysis is needed to give a general appropriate characterization and the relationship among the variables in the model. Unit root test is used to evaluate the stationarity of different variables used for the construction of the model. The reason adduced for the use of unit root tests is to ascertain the underlying behavioral patterns and properties of the data that will be used for the study. The reason for the test of stationarity is to ensure the data are reliable for the Ordinary Least Square application.

Model Specification

For the study, a model was developed adopted from the work of Abulesco (2010), Sere- Ejembi et al (2016) and Mbu (2016) with slight modification of adding a control variable.

The functional form of the model is stated explicitly below.

$$\text{AFSI} = f(\text{RS}, \text{FVI}, \text{TL})$$

The econometric form of the model is stated explicitly below,

$$\text{AFSI}_{it} = (\beta_0 + \beta_1 \text{RS}_{it} + \beta_2 \text{FVI}_{it} + \beta_3 \text{TL}_{it} + U_t)$$

Where:

AFSI = Aggregate Financial Stability index

β_0 = Constant

β_1 to β_3 = Coefficients of the independent variables and parameters to be estimated

RS = Interest Rate Spread

FVI = Financial Vulnerability Index

TL = Trade Liberalization as a control variable

i represent companies in the sample and t represents the scope or period of study

U_t = Error term

Moreover, the lag values of the return's variable are included to the equation to eliminate the possibility of auto correlated errors and heteroscedasticity problem. This was deduced from the works of Hakan and Halil (2001) and Nik and Nik (2010).

Analysis of Results and Discussion of Findings

Result of Aggregate Financial Stability Index Construction

Table 1 shows the composite normalization and the weighting of the Aggregate Financial stability Index (AFSI). Specifically, the Table 1 shows the normalized values of the Index of Financial Development (FDI), Index of Financial Vulnerability (FVI), Index of Trade Liberalization (TLI), Index of World Economic Climate (WECI) and Index of Financial Soundness (FSI) respectively. These are sub-indexes of the AFSI.

In order to aggregate the variable into a single index, each variable was normalized so that different variables can be compared. The study adopted the method of empirical normalization, where indicators' values ranged between 0 - 1, where a value of 0 represents the weakest value of an indicator and a value of 1 represents the best recorded value of an indicator.

Next, in the study, equal weighting was applied to all the variables included in the composite index (AFSI). The weights assigned to each of the variables used for all the sub-indexes are shown in Table 1. These weights were used to arrive at the values in Table 2. Finally, to construct the AFSI, the values of the sub-indexes are aggregated.

Table 1: Normalized Data for AFSI

WEIGHTS	3	7	2	2	2
Year/sub-index	FDI	FVI	TLI	WECI	FSI
1989	0.002736	0.003379	0.420515	0.339242	-2.54
1990	0.003649	0.003865	0.316413	0.313414	-13
1991	0.004649	0.005456	0.561379	0.266409	-9.46
1992	0.009099	0.007064	0.743637	0.268463	-5.4
1993	0.014369	0.010244	0.958617	0.290345	-5.64
1994	0.020129	0.013611	0.954782	0.319232	-5.5
1995	0.024015	0.017781	0.449042	0.375367	-6.11
1996	0.026488	0.020328	0.467968	0.369323	-2.54
1997	0.030061	0.025155	0.570007	0.659766	4.8
1998	0.035427	0.029149	0.839389	0.392873	6.3
1999	0.45595	0.044644	0.26099	0.301644	7.6
2000	0.066501	0.062331	0.215411	0.323999	10.3
2001	0.079996	0.084289	0.447177	0.354317	9.75
2002	0.082801	0.089994	0.486329	0.34502	9.3
2003	0.097281	0.092346	0.618501	0.397011	6.19
2004	0.09968	0.104091	0.306667	0.404778	5.38
2005	0.118301	0.117646	0.268769	0.437798	10.09
2006	0.154987	0.176223	0.386789	0.35192	6.88
2007	0.205737	0.253117	0.599824	0.438319	5.35
2008	0.302766	0.343686	0.538443	0.489926	5.72
2009	0.315687	0.350161	0.636818	0.508601	6.31
2010	0.313058	0.317357	0.679681	0.444647	14.86
2011	0.349065	0.337268	0.721671	0.37701	15.71
2012	0.382193	0.355217	0.645112	0.382844	13

Table 2: Weighted RSW, FVIW and TLW

Year	RSW	FVIW	TLW
1989	-2.54	0.011825	0.420515
1990	-13	0.013528	0.316413
1991	-9.46	0.019095	0.561379
1992	-5.4	0.024722	0.743637
1993	-5.64	0.035853	0.958617
1994	-5.5	0.047637	0.954782
1995	-6.11	0.062233	0.449042
1996	-2.54	0.071148	0.467968
1997	4.8	0.088042	0.570007
1998	6.3	0.102022	0.839389
1999	7.6	0.156256	0.26099
2000	10.3	0.218158	0.215411
2001	9.75	0.295013	0.447177
2002	9.3	0.314979	0.486329
2003	6.19	0.323211	0.618501
2004	5.38	0.364318	0.306667
2005	10.09	0.411762	0.268769
2006	6.88	0.616781	0.386789
2007	5.35	0.885909	0.599824
2008	5.72	1.202902	0.538443
2009	6.31	1.225262	0.636818
2010	14.86	1.110748	0.679681
2011	15.71	1.180438	0.721671
2012	13	1.243261	0.645112
2013	15.56	1.345397	0.618491
2014	12.31	1.434676	0.813147
2015	18.96	1.428583	1.252218
2016	16.47	1.632384	1.072902
2017	19.5	1.767641	0.772429

Descriptive Statistics

The descriptive statistics in Table 3 shows the combined Jarque-Bera values of the Dependent variable, AFSI, and the Independent variables, RSW, FVIW and TLW respectively.

Table 3: Descriptive Statistics

	AFSI	RSW	FVIW	TLW
Mean	363.9657	5.867241	0.608072	0.607696
Median	204.947	6.31	0.323211	0.599824
Maximum	971.5071	19.5	1.767641	1.252218
Minimum	123.4714	-13	0.011825	0.215411
Std. Dev.	332.8473	8.800556	0.59641	0.252102
Skewness	1.183538	-0.43665	0.541662	0.58998
Kurtosis	2.465486	2.278741	1.705056	2.997419
Jarque-Bera	7.115573	1.550135	3.44432	1.682378
Probability	0.028502	1.460673	0.17868	0.431197
Sum	10555.01	170.15	17.63408	17.62319
Sum Sq. ev.	3102045	2168.594	9.959744	1.779546
Observation	29	29	29	29

Table 3 shows that on the average, between the periods of 1989 and 2017, none of the variables assumed a maximum value of 100 per cent of AFSI. More especially, the highest and minimum values recorded for the Interest rate spread (RSW) are 19.5 and -13 per cent, the highest and minimum values of financial vulnerability (FVIW) are 1.767641 and 0.011825 per cent while the highest and minimum values of trade liberalization (TLW) are 1.252218 and 0.215411 respectively.

From the literature, zero skewness and kurtosis characterize a normal distribution. Comparing the reported values for the various series to the values of the default normal distribution, it is found that the various series employed have a normal distribution. This is confirmed by the probability of the Jarque-Bera statistics which did not exhibit any zero value for all the series. With the probability value higher than the conventional significant level of 5 per cent, the null hypothesis of normality is, therefore, accepted, and it is concluded that the various series follow a distribution that is normal. However, it should be noted that this may not have any effect on the validity and viability of the results obtained when used in econometric analysis because for a sample that is large, a violation of the assumption of normality is not important since with respect to the central limit theorem, the test statistic will asymptotically follow the appropriate distribution pattern even without the presence of normality.

The standard deviation, like variance, gives an idea of the extent to which data points of each series are spread, scattered or dispersed from the mean. Except for interest rate spread (RSW) which shows the highest value of 8.800556 in comparison with other series under consideration, the other series are reasonably close to the mean or are not too far away from the mean. This indicates a high degree or level of interest rate spread during the period under consideration. The mean statistic gives the average values of the different variables over the same period. The average value of interest rate spread is 5.867241 per cent of financial systems stability in Nigeria. This is the highest average value of the mean in all the series. The average value of financial vulnerability index (FVIW) is 0.608072 per cent of the financial stability of the Nigeria's system from 1989 to 2017. The average value of TLW as percentage of the financial system stability in Nigeria is 0.607696.

Kurtosis is a shape parameter which gives a measure of the weight of tails of a distribution of data. For a given distribution to be normal, the value of its kurtosis assumes the value of 3 or has an excess kurtosis value of 0. All the variables namely, interest rate spread (RSW) financial vulnerability index (FVIW) and trade liberalization (TLW) have kurtosis lower than 3 thus implying that the tails of the distributions are not heavy and therefore not leptokurtic.

Correlation Result

To assess the nature and strength of the relationship that exists between pair wise observations of the variable of interest, the correlation matrix is generated as shown in Table 4, which shows the correlation coefficient after each analysis of a given pair. This provides a general ideal of the pair wise relationship that exists between the dependent and the independent variable. As a stylized fact, correlation does not in any way imply causation between variables. A value above 0.5 shows a reasonably strong relationship between a pair of variables while a value below 0.5 shows a weak relationship between the selected pair.

From Table 4 it can be observed that the aggregate financial stability index (AFSI) is correlated to financial vulnerability (FVIW) with the value of 0.809015. That means that financial stability is associated with financial vulnerability (as measured in this study). Table 4 further revealed that AFSI cannot easily be separated from the two variables used in the study. In the same vain there is a high correlation between financial vulnerability (FVIW) and interest rate spread, RSW, with

a value of 0.784253. More specifically, the result shows that as the Nigerian economy ratchets up foreign loans and foreign portfolio investment, interest rate spread widens.

Table 4: Correlation of AFSI, RSW, FVIW and TLW

	AFSI	RSW	FVIW	FLW
AFSI	1	0.645524	0.809015	0.520592
RSW	0.645524	1	0.784253	0.252799
FVIW	0.809015	0.784253	1	0.452681
TLW	0.520592	0.252729	0.452681	1

Source: Author's computation 2019

Regression Results

Table 5 shows the regression result of the dependent variable (AFSI) with the independent variables (RSW, FVIW and TLW).

Table 5: Regression Results of AFSI and other Variables

Variables	Coefficient	Std. Error	t-Statistics	Prob.
RSW	-1.72066	6.464446	-0.26617	0.7925
FVIW	-1098.84	522.181	-2.10433	0.0465 **
TLW	83.06035	160.1297	0.518707	0.6089
C	196.3334	179.2003	1.095609	0.2816
R-squared	0.783647		Mean dependent Var.	363.9657
Adjusted R-squared	0.736614		S.D. Dependent Var.	33.8473
S.E. of regression	170.821		Akaike info criterion	13.3011
Sum square resid	671135.6		Schwarz criterion	13.58399
Log likelihood	-186.866		Hannan-Quinn criter.	13.3897
F-statistic	16.66158		Durbin-Watson stat.	1.03356
Prob. (F-statistic)	0.000001			

** shows 5 percent level of significance.

Source: Author's computation 2019

From Table 5, one can see the coefficient of the two independent variables used for the study namely; interest rate spread, (RSW- which is measured using lending rate minus deposit rate) and financial vulnerability (FVIW - measured using the ratio of financial asset and liability to real GDP) are negatively related to aggregate financial stability (AFSI), the dependent variable in Nigeria from 1989 to 2017. The sign the coefficient of any variable takes shows the relationship of the particular variable to the independent variable.

The inverse relationship established by the study between interest rate spread (RSW) and financial stability confirms the fact that the Nigerian financial system is vulnerable to shocks arising from wide interest rate spread. This finding agrees with the result of empirical studies by Demirguc-Kunt and Detragiache (1998b). Similarly, for FVIW, the result shows that as FVIW increases, the degree of financial stability reduces in Nigeria. This is in consonance with the submission of the IMF (2015) and Stiglitz (2017) that financial vulnerability greatly affects financial systems stability in Nigeria. This is especially with regards to developing and emerging market economies (inclusive of Nigeria) that often rely on borrowing from external sources and other inflows of capital for the growth of their economy. These sources make them especially vulnerable to changes in the behavior and sentiments of the investors.

The coefficient of the other variable, trade liberalization (TLW - measured using the ratio of import and export to real GDP) is positively related to financial stability. This implies that as more trade liberalization is achieved, the degree of financial stability also improves in Nigeria. The positive relationship between TLW and financial stability established by the studies validate the result obtained in earlier studies by Demetriades and Luintel (1997) who found that financial repression has a large effect that is negative on financial systems stability over and above the retarding influence of low real rate of interest.

From the results above, the R-squared value is 0.783647 indicating a strong relationship between the dimensions of financial reform used in the study when combined (RSW, FVIW, TLW) and the financial stability in Nigeria. The study reveals that 78 per cent of financial system stability is explained by the combination of the independent variables used in the study while other factors not included in the regression model accounted for 22 per cent change of the dependent variable. The model adopted in the study shows that it is a good model as it has the capacity and ability to explain financial system stability in Nigeria. The rule of thumb that is used to assess the appropriate value of efficacy of any model is 60 per cent. In addition, the R-square adjusted value which is a measure of the efficiency of R-square is 0.736614 or 73 per cent which is not too far from the R-square value of 78 per cent. The F statistic, which is a measure of fitness has a value of 16.66 with a probability of 0.000001 (which is less than 5 per cent) in the model, indicates that the dimensions of financial reforms (RSW, FVIW and TLW), when combined or grouped together, is significant at one per cent (1%) level of significance. That means that, on the whole, there exists a linear relationship that is statistically significant between the dimensions of financial reforms in the study and financial stability in Nigeria. This is a good model for explaining the variables that determine financial system stability in Nigeria. The acceptable level or the rule of thumb is that a good model should be able to explain up to 60 per cent of the dependent variable.

However, when the dimensions of financial reforms investigated in the study are disaggregated from group to individual (sub-index) levels, it is seen from the regression results that not all the reform dimensions have statistically significant relationship with financial stability. The t-statistic shows the main variables driving financial stability in Nigeria. Financial vulnerability (FVIW) is the main driver of financial stability in Nigeria within the period under consideration. The result showed that FVIW has a T-statistic of -2.10433 with the probability of 0.0465 which is less than 5 per cent.

Conclusion and Policy Recommendations

This paper empirically measured the extent to which interest rate spread (RS) and financial vulnerability index (FVI) impacted financial system stability in Nigeria between 1989 and 2017. The study revealed that interest rate spread, and financial vulnerability index drives financial stability negatively while financial vulnerability index showed a statistically significant relationship with financial stability. However, the other dimension of financial reform which is trade liberalization showed no statistically significant relationship to financial stability in Nigeria. Further, the aggregate financial Index developed in the study proved to be a potent tool for tracking periods of financial vulnerabilities as well as the periods of financial stability in Nigeria. Since the study showed that the extent of interest rate spread (RS), the Financial Vulnerability index (FVI) impact negatively on financial system stability in Nigeria and that interest rate spread has no significant impact on financial system stability, the study, therefore, recommends that the policy makers and authorities should be careful in relying on interest rate spread as a tool of financial system stability as it stands presently. Since it is also observed that financial

vulnerability has a negative but significant impact on financial stability, it is recommended that the policy makers should ensure that excessive financialization does not imperil financial stability by constant monitoring of the ratio of financial asset and liabilities to the nation's real GDP. Since it is one of the variables that drives financial system stability in Nigeria, it must be considered in the management of the Nigerian financial sector. Finally, it is recommended that the policy makers and regulators should continue to forecast future levels of stability and be proactive in designing and implementing policies that will always guarantee the stability of the Nigerian financial system at all times.

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