Crafting Banking Sector Stability Index for Sierra Leone

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ABSTRACT

Stability in the banking sector of Sierra Leone is crucial because it gives confidence and trust in the banking ecosystem. However, it is vital to assess the health conditions of the sector, by means of a composite Banking Sector Stability Index (BSSI) for Sierra Leone. This BSSI will supplement the suite of early warning indicators of the financial system and offers a platform to keep policymakers informed about the dynamics in the ecosystem of Sierra Leone. This study developed a banking sector stability index (BSSI) for Sierra Leone, using a nest of financial soundness indicators and gauges the health of the banking ecosystem with short term forecasting tendencies conditions in the banking ecosystem. It applied statistical and Conference Board Methodology normalization processes on Sierra Leone's banking data from 2019Q1 to 2022Q4. The resultant index traced fairly well the episodes of crisis in the system over the study period. It could, therefore, be employed as a complementary regulatory policy tool to gauge potential risks to enable monetary authorities take timely precautionary policy measures to assuage crisis in the banking ecosystem.

Introduction

Jacome et al. aver that diverse governments have redirected efforts to regulate and supervise financial institutions, specifically commercial banks to safeguard financial system stability. However, the deleterious effects of the 2007/2008 global financial and economic crisis have solidified interest on financial stability. Korze et al. 2017 as well as Bondzie et al. 2014 reflect in their work that financial stability should be given the same primacy as monetary policy conduct especially in low-income economies. The 2007/2008 global financial crisis that emanated from the United States of America have strengthened efforts of Central Banks and other financial institutions to explore more efficacious frameworks for gauging fragilities in the financial ecosystem. Therefore, considerable attention is embedded in policy discourse in this context. For instance, Serejembeet al. constructed banking sector stability index for Nigeria by using a mixture of financial soundness indicators and macro-fundamental variables spanning 2007Q1 to 2012Q2 [1]. Several of these ascribed that the crisis was largely driven by excessive risk-taking by financial institutions and the debilitation by the regulatory authorities to safeguard financial system stability.

Experts in the realm of financial stability alluded that this crisis was driven by the lapses in authorities' preferences for micro-prudential measures, only focusing on averting the pernicious failure of individual or entity-specific financial institutions [2,3]. This is entrenched in the common belief that financial crisis transpires randomly due to bad institutions failing and thus this contagion becomes systematic. However, experience has shown a different reality. Recent crisis commences with booms episodes, wherein financial institutions are flourishing, whilst during burst periods, financial institutions are anemic (weakened). Therefore, early warning indicators are needed to assess potential financial instabilities in the banking sector. In particular, Akosa et al. Developed financial stability metric in Ghana by employing a new index-based approach during the period June 2007-Decemebr 2016.

The conception that some financial institutions are stable whereas others are not is incongruous with boom-burst episodes. Therefore, a clarion call for a steady transition to macro-prudential approach in financial stability analysis emanated Lotte. Converse to the micro-prudential approach, the macro-prudential reinforces that an all-embracing positioning to monitoring financial systems by gauging macro-financial data buttressed by qualitative and structural evidence. Financial soundness indicators (FSIs) are crucial as they assess the health of the sector.

It is true that the International Monetary Fund (IMF) developed a raft of over forty FSIs including the core FSIs and encouraged set of FSIs which serve as bed rock to inform macro-prudential analysis and regulation. The IMF usually publish a nest of

harmonized Sierra Leone's FSIs as standardized across it partner countries acting as health metrics for the banking ecosystem and driven to inform policymaker's precautionary actions. However, the extant FSIs are not forward looking, which is a vital feature required for an early warning system. Consequently, this paper is directed at constructing BSSI for Sierra Leone by aggregating most of the core FSIs into a composite index and more so embedding a forecasting ability to gauge the potential health of the banking ecosystem in the short term. This BSSI serves as a- one –stop –shop in identifying vulnerabilities that have far reaching effects for financial system stability. Specialists have portended a raft of implements and early warning indicators. Different approaches have been put forward to gauge systemic vulnerabilities within the space of modeling accordingly.

It is hard to find a version of BSSI being replicated for Sierra Leone, despite increasing representation in some West African Countries such as Ghana and Nigeria in the Cross border financial integration and as well as accretion of stability over the years. To bridge this gap, the study leverages on the BSSI for Sierra Leone in the context of a small open economy. Since banks by their very nature are involved in risky business of on lending via financial intermediation and the challenges ascribed in accretion of reserves. Also, discussions of the forex volatility, central bank intervention amongst other sources have strengthened the papers drive is computing the BSSI for Sierra Leone.

This study's specific objective is to build a banking sector stability index (BSSI) for Sierra Leone with forecasting applicability by employing a nest of selected statistically normalized FSIs which mirror the healthiness of the sector during the period 2019Q1 to 2022Q4. The BSSI will act as a signal to mimic potential fragilities in the banking ecosystem. Furthermore, a robustness check is employed in the sense of validation of statistically normalized BSI to define the realism of the series derived. Hence, the paper offers an empirical exercise to further gauge the predictive value of the BSSI and its employability as an Early Warning Indicator to guide the Bank of Sierra Leone's Financial Policy Committee. The construction of the BSSI for Sierra Leone is conspicuously missing in the extant literature of banking sector stability within the context of Sierra Leone. Therefore, to the best of the author's knowledge this is the first time an attempt is made to mirror a banking sector stability index for Sierra Leone.

This paper therefore seeks to construct and use banking sector stability index to complement monitoring and supervision of the banking ecosystem by employing selected financial soundness indicator variables of Sierra Leone. The paper is further motivated by the need to crating BSSI that mimics health conditions of the sector which is immensely appealing. As entrenched in the Bank of Sierra Leone (BSL) Act Sec5(2a), which clearly mandates that Bank of Sierra Leone (BSL) promotes a safe and sound banking system and ensures system-wide financial stability [4]. Therefore, the crafting of the BSSI for Sierra Leone will enlighten policymakers and participants in the financial ecosystem to envision the drivers and bases of stress to the ecosystem; reinforce and monitor the dynamics of the banking sector and transmit the effect of such scenarios. Hence this paper supplements the body of evidence on banking sector stability indices within the broad West African context [1]. In the context of Sierra Leone, as far as the author is aware, this paper is the maiden endeavor to construct an index for banking sector stability in Sierra Leone and therefore offers potent policy implications for BSL's objective of ensuring financial system stability. The novelty of this paper lies in the fact that the BSSI for Sierra Leone has predictability capacities of banking conditions in the short term (3-months) in terms of magnitude and direction. Therefore, the paper seeks to close this lacuna in the engaged literature on BSSI for Sierra Leone. The proposed BSSI for Sierra Leone addresses this gap by providing a composite early warning metric that is not only forward – looking but also acts as a swap shot indicator of the strength of the banking ecosystem at a glance. Another vital selling point of the proposed index it is that a quarterly frequency in tandem with the Financial Policy Committee (FPC) meetings to aid different stakeholders in policy-making, review and future actions.

The rest of the paper is structured as follows, section two presents some stylized facts on the health of the banking ecosystem, section three reviews the relevant literature, section four delves into the methodology for crafting the BSSI, whilst section five analyses the results, section six tests the index with selected macroeconomic variables whilst section seven concludes the paper, puts forward some policy implications and future research directions.

Section Two
Stylized Facts
This section delves into dynamics in selected financial soundness indicators over the review period 2021Q1-2022Q2. The vintage 2021Q1-2022Q2 was chosen because it mirrors the recovery period of the Sierra Leone economy postcovid-19 pandemic. This is needed to elicit key behaviors of banking sector conditions in Sierra Leone.
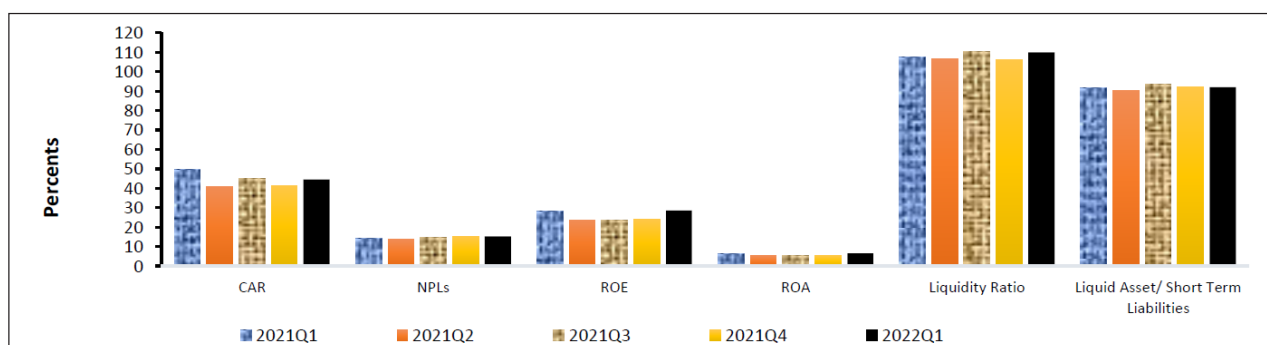

Figure 1: Selected FSIs in the banking ecosystem of Sierra Leone over the period 2021Q1-2022Q1
Source: IMF published FSIs for Sierra Leone

The banking sector remained relatively stable (well capitalized, profitable, and liquid) over the period 2021Q12022Q1 as reflected by the individual health indicators. The banking ecosystem in its well capitalized nature is advantageous as it absorbs losses and enables the banking sector to play its configured role of financial intermediation and being supportive to elicit confidence and trust in the banking ecosystem. In terms of liquidity, the sector appears liquid and enhanced in meeting any customer unexpected cash withdrawals or obligations as they become due. Profitability in the banking sector is also palpable as banks have operated in a profitable trajectory emanating largely from the investment in government securities and/or endeared forex dealings. This is reflected in the switching effects strategy that may be sustainable.
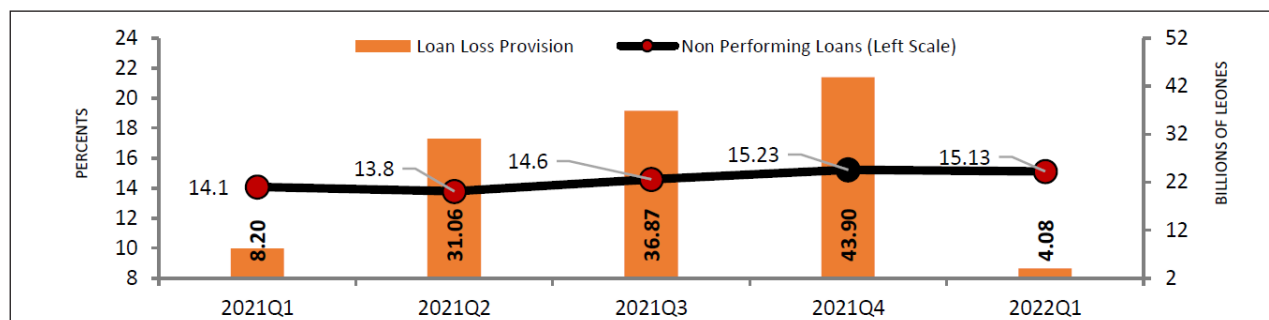

Figure 2: Dynamic provisioning and Non-Performing Loans in the Banking ecosystem
Source: IMF published FSIs for Sierra Leone

Asset quality issue have been prevalent in the ecosystem beyond the regulatory threshold of 10 percent. Despite this trajectory, banks have employed a risk-based supervision strategy where risks are identified and adequate provisions are made to address them going forward in a precautionary drive. However, the NPLs remained high at 15.13% in 2022Q1, although marginally declined relative to the level in of 15.23% 2021Q4.

Section Three
Review of Relevant Literature
This section reviews the relevant theoretical literature. The literature is replete with a myriad of studies from Central Banks that have produced indices on banking sector stability and financial stability. This section espouses the theoretical underpinnings wherein theoretical index for the construction of the BSSI are critically engaged.

Loloh constructed aggregate financial soundness index for Ghana, with laser-eye on soundness indicators. As a result, the paper develops an aggregate financial index for Ghana by employing meticulously selected macro financial economic variables. This paper thus contributes to debate on financial stability as pertains to frontier of a small open economy of Sierra Leone.

Kocisova assembled an aggregated banking system stability index for selected countries of ten that were European Union member countries in 2004 directed fully employing the financial soundness indicators which assess the health of the banking sector. These countries include Hungary, Romania, Poland, Slovak Republic, Slovenia, Czech Republic, Bulgaria, Cyprus, Estonia and Latvia.

Sere-Ejembi et al. constructed banking sector stability index for Nigeria by employing a mixture of macro financial indicators [1]. Their study leveraged on statistical and Conference Board Methodology normalization processes on Nigeria's banking and macroeconomic data from 2007Q1 to 2012Q2. The ensuing index mirrored fairly well the crisis periods in the ecosystem during the review period. Hence, the BSSI is potent to be used as an early warning mechanism of signaling fragility.

Creel et al. averred the nexus between economic performance and financial instability, the measurement criteria were a statistical index, institutional index and a raft of microeconomic indicators. These were used to gauge financial instability and take-home income, investment and consumption for economic performance. The authors found an inverse relationship between economic performances.

Tng et al. explored the nexus between financial stress and economic activities via access to financing and revealed that high financial stress triggers ambiguity and discomfort in economic outlook and financial markets. Nasreen and Anwar examined the nexus between financial stability and economic development in South Asian countries by leveraging on human development indicator index (HDI) and an aggregate financial stability index (AFSI). The results revealed that economic development Granger causes financial stability in South Asian countries.

Mirna Dumičić employed a two-composite-indicators index mirroring the ramifications of systemic risk manifestation and a systemic risk accretion index by leveraging on principal component analysis. The results reflected that systematic risk supports the monitoring and comprehension the magnitude of financial stability, and this is signaled to the market participants and general public via macroprudential policy.

Within this space, the Fund rolled out the 2019 IMF-FSIs Compilation Guide. The Guide embeds the concepts, definitions, sources and techniques for populating and disseminating internally reliable, cross-country standardized nest of indicators that gauge the existing status of the financial ecosystem in aggregate space. The IMF 2019 Financial Soundness Indicators Compilation Guide also informs financial policy by embracing first-hand metrics to augment the coverage of the financial sector, including insurance corporations, nonfinancial corporations, money market funds, other financial intermediaries, pension funds, and households [5]. This 2019 FSI Guide ultimately focuses on creating a transparent and robust platform for to elicit discipline on financial institutions across member countries.

Ankosa gauged financial stability in Ghana in the context of an index approach [6]. Their study computed aggregate financial stability index (AFSI) for Ghana to measure the health of the financial ecosystem from 2017 since the inception of inflation targeting. The trend in AFSI detects three separate episodes in the financial ecosystem of Ghana. These include the first episode of financial pressures subsequent to the worldwide financial crisis (June 2007– September 2010); the second episode mirrored sustained enhancement in financial stability (December 2010 – June 2015); and the third episode mimicked reversion to financial pressures (September 2015 – December 2016). Their study discern that financial stability risks continued as sub-indices especially financial development index (FDI), financial soundness index (FSI), financial vulnerability index (FVI) in 2016 was below their respective thresholds in since 2012. The study revealed that the risk factors to financial stability primarily stems from the debilitating domestic factors which could be connected to the uncertainties that surrounded the Ghanaian election in 2016. Their study's metric thus offered a more influential indicator of financial stability in Ghana and quite pertinent for policymaking decisions by the monetary authorities.

Udom et al. constructed a composite index to support Monetary and Financial Stability Analysis in Nigeria by prolonging the work of Sere-Ejembe et al who developed a banking stability index for Nigeria by employing on measures in the insurance and capital markets segments as well to produce a composite financial system stability index for the Nigerian Financial System [1,7]. Their paper lengthens the research work by employing metrics of banking stability, insurance and capital market segments, to propose a composite financial stability index for Nigeria. These indices encapsulate the periods of stability and weaknesses (from Q2, 2008 and became pronounced in Q3, 2009 and further exacerbated in Q3, 2010 with restored stability afterwards) in the financial system of Nigeria during the vintage period of the study.

Johnson examines the impact of financial frictions and monetary policy in Sierra Leone in the context of Bayesian Dynamic Stochastic General Equilibrium (DSGE) methodology [8]. The study employed quarterly data spanning 2007Q1 to 2021Q4. The study found out that shocks of financial frictions have transitory converging impact on inflation and a negating impact on output gap in Sierra Leone. Also, monetary policy shock has a negating effect on output gap, demand shock as an ephemeral negative shock on output growth in Sierra Leone. The economics of the monetary policy shocks is that it alleviates the contractionary impact on the economy although monetary policy alone cannot steer the economy to stimulate growth output. Regarding financial shocks, the point is that it is deleterious to confidence in the banking sector. The study's revelations are proof that monetary authorities should bolster financial system stability, thus enhancing confidence in the banking sector and strengthen their efforts in stabilizing prices with monetary policy focused on productivity at levels that are growth inducing and germane to stabilizing inflation.

Additionally, Johnson also assessed the stability of the banking sector in Sierra Leone in the context of Johansen cointegration technique [9]. The study investigated banking sector stability in Sierra Leone using an econometric analysis based on quarterly data (2009-2019) and to assess the concentration in the banking sector (using the Herfindahl Hirshman Index). To investigate banking sector stability the Johansen cointegration modeling approach was employed since all variables were integrated of order one to establish whether cointegration (long run relationship) exists between banking sector stability and its regressors over the coverage period. Hence, the approach used by study was regression analysis using time series data. The Johansen Approach showed that there were existing long run relationships between banking sector stability and its regressors [10]. Consequently, the parsimonious short run model of banking sector stability was estimated during the study period. The results revealed that total bank assets, and gross loans have positive impact on banking sector stability in the long run and the same is true of the short run. This is intuitive that as banks buildup assets (liquid), then banks are also more likely to cautiously on lend to their customers.

Jackson et al. explored the credit risk management and the financial performance of domiciled banks in Sierra Leone employing unbalanced panel data methodology with quarterly data over the period 2008-2018 with only eight banks [11]. Their findings showed weaknesses of the banking sector elicits from asset quality (Non-Performing Loans (NPLs) ratio). They also provide evidence that a low productive base in the domestic economy influences the state of high NPLs in the banking ecosystem.

This study elicits remarkable efforts in building and employing BSSI of early warning signals of health condition in the banking ecosystem of Sierra Leone [12]. It offers insights for complementing the BSSI with other early warning indicators to safeguard not only the banking sector stability but also financial system stability in Sierra Leone. Its relevance to scholars and policy-makers is vital as it provides insights into how successful financial policies have impacted in promoting financial stability in Sierra Leone.

Section Four
Methodology
The theoretical framework and the data selections are the most important elements for constructing any index [13]. This means that they provide the basis for the selection and combination of variables into a meaningful composite indicator.

The paper leverages on the methodology of Cheang and Choy to develop a quarterly Banking Sector Stability Indicator (BSSI) for Sierra Leone using the selected core Financial Soundness Indicators as espoused by the IMFFSIs Compilation Guide 2019 and attendant mirroring of Nicholas and Isabel approach [14,15].

Subsequently, the nest of selected of FSIs are consolidated into the Banking Sector Stability Index. All the variables employed are normalized by leveraging on the z-score to reinforce that no single variable dominates the aggregate BSSI [16]. Statistical normalization transforms measures to standardized scale having mean of zero and standard deviation of unity. The zero average evades introducing aggregation distortions emanating from variances in the means of the metrics. The scaling factor is the standard deviation. Ideally the Z-score has zero mean and unit standard deviation usually represented as ($Z \sim n$ [0,1]) and expressed as:

$$Z_t = \frac{X_t - \mu_x}{\sigma_x} \qquad (1)$$

where:

Z_t denotes the normalized value of the variable of interest;
X_t represents the value of the variable of interest at time t;
μ_x and σ_x symbolize the arithmetic mean and standard deviation of X respectively.

$$BSSI_{k,j} = \rho \sum_{i=1}^{n} \lambda_{r,s} \bullet Z_{ts} \qquad (2)$$

$$\psi = \sum_{s} \rho \psi \qquad (3)$$

$Z_{t\psi}$ are the statistically normalized values of the gauges of banking sector stability. By employing the Conference Board Methodology normalization process, the BSSI is expressed as:

$$BSSI_{t,cbm} = \psi_s * L_{ts} \qquad (4)$$

The weights ωr are as defined under statistical normalization. Where: r = s

As a result, the ensuing metrics are selected for the creation of the BSSI for Sierra Leone (Table 1).

Table 1: Selected Indicators of Banking Sector Stability Index for Sierra Leone

Category	Indicator	Notation
Capital Adequacy	Capital Adequacy Ratio	CAR
	Ratio of Non-Performing Loans net of Provisions to Capital	NPLP/C
Asset quality	Ratio of Non-Performing Loans to Total Loans	NPL/TL
Profitability	Return on Assets	ROA
	Return on Equity	ROE
Liquidity	Liquid Assets to Total Liabilities	LA/TL
	Liquid Assets to Short Term Liabilities	LA/STL
Interest rate risk	Average Lending Rate to Average Deposit Spread (%)	AVLR/ADR
Foreign exchange risk	Net Foreign Assets to Tier 1 Capital (%)	NFA/T1K

Source: Author

Hence the BSSI employing statistical normalizations has 0 as threshold, whilst the CBM has unity. Data has been sourced from IMF FSIs database which was retrieved from the IMF website.
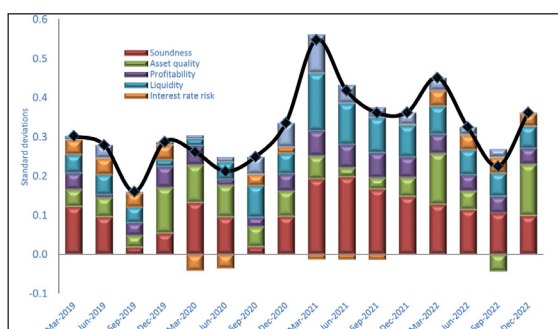

Figure 3: BSSI and its sub-components (Conference Board Methodology Normalization)
Source: Author

Section Five
Interpretation of Results and Applicability of the BSSI
This section elicits the results from the BSSI and it usage to gauge the banking conditions in the ecosystem [17]. It is pertinent to maintain that peaks and troughs reflected during the vintage were portraying episodes of banking sector robustness and attenuation.

Interpretation of the BSSI
The banking sector stability index is mirrored in figures 3 and 4 with the corresponding sub-components used to elicit the BSSI based on both statistical and Conference Board Methodology normalization procedures [18]. The key point from the BSSI is that increases mirror improvement in banking sector stability whilst declines mimics deteriorations in the conditions of the banking ecosystem over the review period.

Figure 3 superimposes the sub-components or nest of indicators of the Banking Sector Stability Index whereas Figure 4 mirrors the core BSSI on its own and signals that over the review period banking sector conditions have been improved [19]. This is driven by a nest of policies that were implemented including the increase in minimum paid-up capital and as well as regulations and guidelines rolled out to safeguard financial system stability by the Bank [20]. In sum, the BSSI mirrors the metric as the deviations from the mean. Zero is its threshold [21]. Any level above zero displays that the stability of the ecosystem is above average and the farther away above zero the index is, the more stable the ecosystem [22]. By the same token, any magnitude below zero is a mirror image of vulnerability. Furthermore, increasing consecutive values of the index signify improvement, and vice versa [23]. From a general perspective, the BSSI displayed mixed results within the vintage, demonstrating that while the banking ecosystem in Sierra Leone was more stable at some time, it was less stable at others.
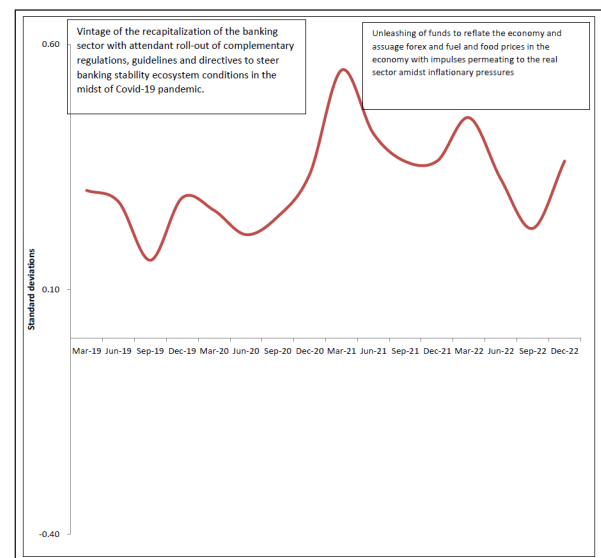
Figure 4: Core 'Banking Sector Stability Index' for Sierra Leone
Source: Author

Overall, the results indicate the importance of gauging the BSSI within a dynamic setting of Sierra Leone's Banking ecosystem [24]. Hence, the thrust of the BSSI is that it provides a useful tool not only for a panoramic view of the banking sector but also for both researchers and policy-makers to synthesize and monitor the stability of the banking sector [25].

Section Six
Testing the BSSI for Sierra Leone with Selected Macroeconomic Variables
Synopsis
To evaluate the BSSI's practical use, the study tests its applicability for some macro-financial variables in Sierra Leone namely, exchange rate, inflation, the effective rate in the market (which is the 1-year day treasury bills) and money supply growth [26].

BSSI Forecast and Correlation with other macroeconomic variables.
The proposed BSSI and the short-term forecast are represented in Figure 5. The forecast is consistent with the dynamics of customers during the review period [27]. For instance, quarter 4 is usually a festive period season where there is a call of deposits to meet the various motives of holding money [28].

Subsequently, it is in quarter 1 that appetite reduces and there is a reflow of resources into the banking ecosystem boosting its stability and capability to stimulate intermediation activities.
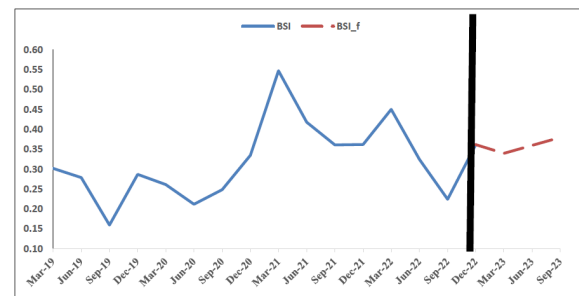

Figure 5: BSSI And Short-Term Forecast
Source: Author

Table 2: Selected Macro-financial Variables and forecasts

QUARTER	S BSI	BSI_f	QUARTER	SINF	INF_f	QUARTERS	1yr-tbills rate	1yr-tbills rate_f	M2g	M2g_f
Mar-19	0.30		Mar-19	14.77		Mar-19	23.26		-0.40	
Jun-19	0.28		Jun-19	14.65		Jun-19	24.77		1.12	
Sep-19	0.16		Sep-19	15.16		Sep-19	25.04		-0.46	
Dec-19	0.29		Dec-19	13.89		Dec-19	25.05		2.34	
Mar-20	0.26		Mar-20	15.56		Mar-20	25.07		2.11	
Jun-20	0.21		Jun-20	14.36		Jun-20	24.39		5.76	
Sep-20	0.25		Sep-20	13.71		Sep-20	11.44		2.47	
Dec-20	0.34		Dec-20	10.45		Dec-20	10.51		4.13	
Mar-21	0.55		Mar-21	8.95		Mar-21	21.25		4.80	
Jun-21	0.42		Jun-21	10.2		Jun-21	21.59		0.39	
Sep-21	0.36		Sep-21	11.63		Sep-21	18.40		0.94	
Dec-21	0.36		Dec-21	17.94		Dec-21	21.38		6.69	
Mar-22	0.45		Mar-22	22.06		Mar-22	24.95		1.97	
Jun-22	0.33		Jun-22	27.85		Jun-22	25.08		-1.53	
Sep-22	0.22		Sep-22	29.10		Sep-22	27.59		4.14	
Dec-22	0.36	0.36	Dec-22	37.09	37.09	Dec-22	28.23	28.23	11.76	11.76
Mar-23		0.34	Mar-23		40.59	Mar-23		30.12		18.09
Jun-23		0.36	Jun-23		45.21	Jun-23		31.69		24.73
Sep-23		0.38	Sep-23		49.83	Sep-23		33.27		31.38

Source: BSL & Author's Short-Term forecasts

The raft of variables and their short-term forecasts are presented in Table 2. The forecasting method employed is the moving average approach [29]. However, the key variable of interest is the BSSI for Sierra Leone and its complementary ability to inform directions for financial policy discourse going forward.

Within this context, the univariate forecasting technique agrees with the unique behavior of customers in the banking eco-system of Sierra Leone.

Correlation Amongst Variables
It is pertinent to assess the potency of the BSSI in relation to its correlation with other core macroeconomic variables of interest [30-33]. Contextually, the correlogram has been employed for gauging the correlations.

Table 3: Correlogram of BSSI and Selected macroeconomic Variables

Auto Correlation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |***. |	. |***. |	1	0.428	0.428	3.5129	0.061
. |* . |	. *| . |	2	0.083	-0.123	3.6533	0.161
. |* . |	. |* . |	3	0.103	0.144	3.8866	0.274
. |* . |	. | . |	4	0.127	0.038	4.2708	0.371
. *| . |	. **| . |	5	-0.162	-0.295	4.9588	0.421
****| . |	.***| . |	6	-0.515	-0.433	12.596	0.050
. **| . |	. |* . |	7	-0.252	0.166	14.630	0.041
. *| . |	. *| . |	8	-0.119	-0.102	15.138	0.057
. | . |	. |* . |	9	-0.051	0.211	15.244	0.084
. *| . |	. *| . |	10	-0.156	-0.159	16.419	0.088
. | . |	. | . |	11	-0.042	-0.055	16.523	0.123
. |* . |	. **| . |	12	0.081	-0.229	17.000	0.150

Source: Author's Computations

The key message from this correlation analysis is that the BSSI is correlated with other the nest of variables during the period of review and therefore its policy relevance cannot be overemphasized [34,35]. This BSSI can be employed with the other selected macroeconomic variables that act as a one -stop -shop in identifying vulnerabilities that have far reaching effects for financial system stability.

Section Seven
Conclusion and Policy Implications and Future Research Directions
The study is motivated to construct BSSI for Sierra Leone over the period 2019Q1-2022Q4 using selected FSIs that gauge the health conditions of the banking ecosystem. In the extant literature on banking sector stability in Sierra Leone, the development and usage of the BSSI to gauge impacts and elicit policy prescriptions is very hard to find. The paper's effort is therefore directed to fill this lacuna and potentially extend the BSSI to assess the relevant financial conditions in Sierra Leone in the nearest future.

The period 2019Q1-2022Q4 was chosen as it embedded the accretion of minimum paid-up capital by the banking system from Le30bn to Le85bn in order to shore up the banking sector against losses and endear banks to play their configured role of financial intermediation. Furthermore, the banking sector has also transitioned to the risk-based supervision approach wherein banks make dynamic provisions to address risks that may crystalize in the ecosystem and steer the banking sector to continue its operations fully not only in buoyant periods but also when the banking sector is challenged. Hence the Central bank uses indicators to preempt risks emanating in the ecosystem. This paper is an immense effort in that direction. The paper aimed to provide quantitative tool for both researchers and policymakers to synthesize and monitor the drive of banking sector stability in Sierra Leone.

Regarding the significance of the health of the banking sector, the study employed financial soundness indicators as portended by the IMF to develop the BSSI for Sierra Leone. The study leverages on the methodology of Cheang and Choy buttressed by Nicholas and Isabel elicited via statistical normalization complemented by the conference board methodology as a validating measure of the normalized BSSI. The trajectory of the BSSI revealed episodes of robust stability and also episodes of attenuated stability in the banking ecosystem of Sierra Leone. The BSSI mirrored resiliency of the ecosystem during the vintage under consideration hence it acts as an early waning indicator for mirroring the extant health situation of the banking ecosystem in the midst of multi-shocks that ultimately were managed within the system. Therefore, the BSSI offers a more potent and quicker indicator in mimicking the stability of the banking ecosystem in Sierra Leone.

Consequently, the following policy recommendations are put forward:
- The BSSI could be used as a complimentary regulatory policy implement to identify and mitigate potential risks to enable forward-looking policies to be rolled-out that could evade crisis. The proposed BSSI will provide the basis of informed investment and policy decisions.
- Recent gains in stability of the banking sector should be sustained going forward and complemented with stability in exchange rate.

Future Research Directions
The extant outcomes in this paper certainly offer avenues for future research especially on BSSI. A first avenue is the further construction of the Banking Vulnerability Index (BVI). Furthermore, another avenue that the index that is needed is in the arena of future research focused on Economic Climate Index (ECI) to elicit a more composite index for the strengthening of BSSI. Taken together, these Potential Further Research and Extensions will now serve as early warning indicators to gauge banking sector conditions in the ecosystem of Sierra Leone.

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