Journal of Applied Finance & Banking, Vol. 14, No. 4, 2024, 17-32
ISSN: 1792-6580 (print version), 1792-6599(online)
https://doi.org/10.47260/jafb/1442
Scientific Press International Limited

Measuring Financial Stability in Curaçao and Sint Maarten

Gavin Ooft[1] and Monique Thijn-Baank[1]

Abstract

Assessing the solidity of the financial system may be cumbersome since there is no single comprehensive indicator to measure financial stability. This paper presents two aggregate measures that can be deployed as early warning measures of financial stability for the monetary union of Curaçao and Sint Maarten, mainly focusing on the banking sector. As this sector comprises most of the monetary union's assets, the constructed measures are mainly focused on this sector. Following financial stability literature, we apply empirical normalization and aggregation to construct an Aggregate Financial Stability Index (AFSI) and a Banking Stability Index (BSI). These indices have been gaining popularity among central banks to assess financial stability on top of conventional measures such as Financial Soundness Indicators (FSIs) and credit cycles. The AFSI comprises banking-sector indicators, macro-financial developments, and international trends, while the BSI captures dimensions of banks' financial soundness. We benchmark the AFSI and the BSI to the period of deteriorating macro-financial conditions induced by the coronavirus crisis, and the development in the indices was as expected. Based on the robustness analyses conducted, we deem the constructed indices plausible for measuring and tracking financial stability within the monetary union of Curaçao and Sint Maarten.

JEL classification numbers: C20, C45, E58, F15, G21.
Keywords: Early warning indicators, Financial stability, Financial soundness indicators.

[1] Centrale Bank van Curaçao en Sint Maarten.

Article Info: *Received:* April 2, 2024. *Revised:* April 30, 2024.
Published online: May 6, 2024.

1. Introduction

Particularly for monetary policymakers, measuring financial stability is crucial. The Centrale Bank van Curaçao en Sint Maarten (CBCS) defines financial stability as "a condition in which the financial system is well-functioning and supportive to the economy, while resilient enough to absorb and recover from financial shocks" (CBCS, 2022). In contrast to macroeconomic stability, often ascertained by low inflation and moderate economic growth, measuring financial stability is not as straightforward. Well-known conventional early warning indicators of banking crises are the credit-to-GDP gap, debt-service ratios, and gaps in equity and property prices. These indicators often focus on sustained upswings in the financial cycle, which are related to financial vulnerabilities and often precede financial crises (Aldasoro *et al*, 2018). Even though conventional early warning indicators are credible, they do not simultaneously capture multiple dimensions of financial stability. Central banks developed aggregate indicators such as the AFSI, the BSI, and the Financial Stress Index, which are single measures of financial stability that provide insights into the determinants of financial stress. These indices often use financial soundness indicators, macroeconomic indicators, and global indicators which impact the local financial system (see Albulescu, 2008; Geršl and Hermanek, 2008; Morris, 2010; Kočišová, 2014; Huotari, 2015; Oet *et al*, 2015; Akosah *et al*, 2018).

This paper presents two financial stability measures for the monetary union of Curaçao and Sint Maarten, which fit the Early Warning Monitoring System (EWMS) of the CBCS. More specifically, we construct an AFSI and a BSI for our jurisdiction. These indices can be used as early warning measurement, stress-testing, and forecasting tools for the monetary union's financial stability. The measures mainly encompass financial stability within the banking sector. This is particularly important for this jurisdiction, as banks are pivotal in the monetary union's financial system, with assets amounting to 156 percent of the monetary union's GDP in 2022 (CBCS, 2023). A lack of capital markets substantiates the importance of local commercial banks even further. Central banks resort to early warning tools to monitor financial stability and set appropriate macroprudential policies, reducing the probability and severity of financial crises. The current study contributes to the economic and financial stability literature for the monetary union of Curaçao and Sint Maarten, as it presents pioneering research on measuring financial stability in this jurisdiction. Also, it provides policymakers and practitioners with a method to assess the extent of financial stability in the monetary union.

The remainder of the paper is structured as follows. Section two briefly reviews the empirical literature on financial stability, early warning indicators, and aggregate indices. Section three elaborates on the construction of the AFSI, while section four sheds light on the construction of the BSI. Sections five and six, respectively, present the results and robustness checks. Section seven concludes.

2. Brief Review of Literature

Empirical research on financial stability has gained ground in the recent decade, triggered mainly by the 2007-2009 financial crisis. Though complicated to define, financial stability is often referred to as a condition in which the financial sector can facilitate the real economy and mitigate unexpected financial imbalances or exogenous shocks (Schinasi, 2004). Timely identification of potential vulnerabilities is crucial for eliminating threats to the financial system (Schinasi, 2004). Moreover, driven by the financial crisis, policymakers and global financial institutions proposed increased financial regulation to reduce systemic risks. Central banks have a central role in this process (Nier, 2009). Although there was a need for early warning systems already before the financial crisis, there was no consensus on how to measure and monitor financial stability due to the complex nature of financial systems. Nevertheless, there has been a growing consensus that measuring and ensuring financial stability is imperative.

The FSIs, indicators of the quality of the financial system, were proposed by the International Monetary Fund (IMF) in the late nineties to track financial stability, particularly in the banking sector. However, many countries were unable to track these indicators until after 2006, when the IMF published the FSI compilation guide after consultations with international and regional stakeholders (Navajas and Thegeya, 2013). Nowadays, FSIs are widely used by central banks, financial institutions, and research institutes for tracking the financial solidity of individual institutions and the financial system. Studies conducted by the Bank of International Settlements (BIS) proposed credit-related indicators to measure financial stability. The credit-to-GDP gap and the debt-service ratio are widely used early warning indicators for banking crises (Drehmann and Juselius, 2014; Drehmann and Tsatsaronis, 2014).

Before the global financial crisis, only a few published studies elaborated on the link between financial stability and the macroeconomic environment (Lindgren *et al*, 1996; Honohan, 1997; Lewis, 2006). The link has gained ground in the recent decade. After the financial crisis, financial stability has become a key pillar in central banks' mandate. Financial stability research proposed aggregate indicators such as the AFSI, the BSI, and the Financial Stress Index as overall measures for financial stability (see Navajas and Thegeya, 2013). These measures are becoming popular in assessing the robustness of the financial system. As this system is rather complex, there is no single target indicator for financial stability, in contrast to monetary stability (Schinasi, 2004). The aggregate-type indices may be cumbersome to benchmark, but at least provide a gauge for the stance of the macro-financial environment.

The AFSI is a single indicator of financial stability with dimensions of financial development, financial soundness, financial vulnerability, and the world economic climate. This index can be measured over time and allows for the comparability of financial stability between countries (Albulescu, 2008). Central banks seemed to embrace this framework and developed AFSIs for their jurisdictions, making some

country-specific modifications to the prototype. Alterations were made to the variables selected in the AFSI and the weighing method (see Albulescu, 2008; Morris, 2010; Cheang and Choy, 2011; Popovska, 2014; Akosah et al., 2018; Al-Rjoub, 2021).

Besides the AFSI, the BSI gauges the stability of the economy's banking sector. The BSI captures banking indicators from the CAMELS[2] framework, namely indicators of capital adequacy, asset quality, earnings & profitability, and liquidity. Hence, this indicator is a gauge for the buildup of financial risk in the banking system (Geršl and Hermanek, 2008; Kočišová, 2014). A Financial Stress Index[3], another measure of systemic risk, is often deployed by countries with developed financial markets. The Financial Stress Index captures the stress in financial markets such as the bond, foreign exchange, money, and stock markets (Hakkio and Keeton, 2009; Huotari, 2015; Oet *et al*, 2015). Huotari (2015) defines financial stress as "stress that is spread widely within the financial system and has potential adverse effects on the real economy." Financial stress is often associated with asset market volatility and investment behavior uncertainty (Hakkio and Keeton, 2009).

3. The Aggregate Financial Stability Index

The AFSI is comprised of subindices for financial development, financial soundness, financial vulnerability, and the world economic climate. The AFSI indicators are selected based on literature (see Albulescu, 2008; Morris, 2010; Cheang and Choy, 2011; Popovska, 2014; Akosah et al., 2018), data availability, and the characteristics of our economies. The subindices, indicators, descriptions, and signs are presented in Table 1. An increase in the AFSI indicates improved financial stability and vice versa. The indicator's sign reveals whether an increase in that indicator leads to an improvement or a deterioration of the subindex and, hence, the aggregate index.

[2] CAMELS refers to C-Capital Adequacy, A-Asset Quality, M-Management Capability, E-Earnings, L-Liquidity and S-Sensitivity to market risk.

[3] This index is not constructed in this study as it is not applicable to Curaçao and Sint Maarten.

Table 1: AFSI: subindices, indicators, descriptions, and signs

Subindex	Indicator	Description	Sign
Financial Development Index (FDI)	Credit growth	Growth of total banking sector credit stock.	+
	Herfindahl-Hirschmann Index	A measure of concentration, calculated as the sum of squares of the shares of individual banks' deposits	+
Financial Soundness Index (FSI)	Regulatory capital to risk-weighted assets (CAR)	Measures the sector's capacity to withstand shocks and absorb losses	+
	Gross non-performing loans to total loans	Measures the level of credit risk by assessing the quality of the loan portfolio	-
	Return on assets (ROA)	Measures the efficiency of the sector's earning assets	+
	Net-interest margin	Measures banks' interest earnings on loans relative to interest paid on deposits	+
	Liquid assets to total assets	Measures the liquid assets to cover unforeseen fund withdrawals	+
	Total loans to total deposits	Measures the ability to meet expected and unexpected cash outflows[4]	+
	Z-score	The z-score measures the probability of default of the banking system. It is measured as $\frac{ROA+CAR}{sd(ROA)}$	+
Financial Vulnerability Index (FVI)	Current account balance to GDP	The current account balance of the balance of payments relative to nominal GDP	+
	Deposits-to-M2	Total banking sector deposits to broad money	+
	GDP growth	Volume growth of the GDP	+
	General budget balance-to-GDP	The realized fiscal budget balance relative to nominal GDP	+
	Inflation rate	The year-on-year change in the consumer price index	-
	Import coverage in months	The gross international reserves to total imports of goods and services, expressed in months	+
	Reserves-to-deposits as a ratio of notes & coins to M2	Banks' reserves to deposits as a ratio to notes and coins to M2. This ratio measures banks' ability to serve society's liquidity needs	+
World Economic Climate Index (WECI)	Economic growth of G20 countries	Aggregate year-on-year GDP growth of G20 countries	+
	S&P500 index	Closing value of the Standard and Poor 500 index	+
	VIX	Chicago Board Options Exchange Volatility Index	-

Source: authors' research.

[4] While an increasing loan to deposit ratio is generally associated with financial stability, ratios above certain thresholds can be associated with increased vulnerabilities (Disalvo & Johnston, 2017).

The AFSI indicators are rescaled for comparability and statistical purposes, such as adding and subtracting, to construct the total index (i.e., aggregating). Furthermore, normalization allows to compare the indicators on the same scale, for instance, between minus one and one, or zero and one. We use empirical normalization[5] or min-max normalization as suggested by most earlier studies (see Albulescu, 2008; Morris, 2010; Cheang and Choy, 2011; Popovska, 2014; Akosah et al., 2018):

$$X'_{it} = \frac{X_{it} - \min(X_i)}{\max(X_i) - \min(X_i)} \tag{1}$$

where X_{it} represents an indicator at time *t* and $\max(X_i)$ and $\min(X_i)$ are the maximum and minimum values of the indicator, respectively. Hence, the normalized indicators X'_{it} range between 0 and 1, where 0 corresponds to the minimum, and 1 corresponds to the maximum of that indicator in the given sample. The AFSI can be represented as:

$$AFSI_t = \omega_{FDI} * FDI_t + \omega_{FSI} * FSI_t + \omega_{FVI} * FVI_t + \omega_{weci} * WECI_t \tag{2}$$

where the $AFSI_t$ is the aggregate financial stability index at time t, consisting of the weighted average of the FDI, the FSI, the FVI, and the WECI subindices.

Van den End (2006) asserts that equal weighting of indicators in constructing (sub)indices produces similar results to weighting by more sophisticated methods such as principal component analysis. Moreover, most other composite indices employ equal weighting. The AFSI subindices are calculated as the arithmetic averages of normalized indicators of respective subindex at time t:

$$\frac{1}{n} * \sum_{i=1}^{n} X'_{it} \tag{3}$$

The weights of the subindices are calculated as the number of indicators in a subindex as a ratio to the total number of indicators, N. Hence, the weights are as follows:

$$\omega_{FDI} = \frac{n_{FDI}}{N}; \omega_{FSI} = \frac{n_{FSI}}{N}; \omega_{FVI} = \frac{n_{FVI}}{N} \; and \; \omega_{WECI} = \frac{n_{WECI}}{N} \tag{4}$$

[5] Another normalization method employed in other studies is statistical normalization: $Z_{it} = \frac{X_{it} - \mu_{Xi}}{\sigma_{xi}}$, where X_{it} is the value of an indicator "i" at time t, μ_{Xi} is the mean of an indicator X_i, and σ_{xi} is the standard deviation of X_i. Here, the normalized indicators Z_{it} range between -1 and 1, where -1 corresponds to the minimum, and 1 corresponds to the maximum of that indicator in the given sample. Each subindex is simply calculated as the arithmetic average of the scaled indicators. However, this is beyond the scope of this study.

4. The Banking Stability Index

The BSI, consisting of banking-sector indicators, shares similarities with the financial soundness subindex of the AFSI. The BSI indicators are based on the characteristics of the banking sector of Curaçao and Sint Maarten. These indicators are dimensions of capital adequacy, asset quality, earnings & profitability, and liquidity, also used in the AFSI. Some studies also use indicators of exchange-rate risk. However, banks' foreign currency exposures are limited[6]. Most foreign exposures are to the U.S. dollar to which the Netherlands Antilles guilder (NAf) is pegged. Therefore, we do not include exchange-rate risk indicators in our BSI. Table 2 presents the indicators, measurements, and signs of selected indicators.

Capital adequacy shows a bank's capacity to withstand shocks and ability to absorb unexpected losses. The CAR and the Tier 1 capital to risk-weighted assets (RWA) are the most common capital adequacy indicators. However, due to the characteristics of our jurisdiction in terms of relatively high non-performing loans, we opted to use the NPLs net of specific provisions to total regulatory capital ratio instead of the Tier 1 capital to RWA.

Asset quality measures the level of credit risk through the quality of the loan portfolio and the levels of NPLs and SPLs. A weak loan portfolio triggers high NPLs and may require high levels of specific provisions. The two indicators that we used are the non-performing loans to total gross loans ratio and the specific provisions to total loans. For both indicators, a higher ratio implies greater credit risk. To measure the earnings and profitability, we used the return on assets (ROA) ratio and the non-interest expenses to gross income.

The liquidity dimension assesses the ability of a banking sector to meet expected and unexpected cash outflows. An indicator of liquidity is the liquid assets to total assets. The higher this ratio, the more able the banking sector withstands withdrawals of funds. Another indicator to measure liquidity is the liquid assets to short-term liabilities. Due to the high correlation between the two liquidity ratios, we employed the loans-to-deposits ratio.

Similar to equation (1), the BSI indicators are rescaled using empirical normalization:

$$X'_{it} = \frac{X_{it} - \min(X_i)}{\max(X_i) - \min(X_i)} \tag{5}$$

where X_{it} represents an indicator at time t and $\max(X_i)$ and $\min(X_i)$ are the maximum and minimum values of the indicator, respectively. Hence, the normalized indicators range between 0 and 1.

[6] Net open FX exposure to capital was 3.3% in June 2023

Table 2: BSI: subindices, indicators, measurements, and signs[7]

Subindex	Indicator	Description	Sign
Asset Quality	Gross non-performing loans to total gross loans	Measures the level of credit risk by assessing the quality of the loan portfolio	-
	Specific provisions to total gross loans	Measures the level of specific provisions to gross total loans	-
Capital Adequacy	Regulatory capital to risk-weighted assets	Measures the capital capacity to withstand shocks and absorb losses	+
	Non-performing loans net of specific provisions to total capital	Measures the potential impact on capital of the portion of non-performing loans not covered by specific provisions	-
Earnings and Profitability	Return on assets	Measures the efficiency of the earning assets	+
	Non-interest expenses to gross income	Measures the level of income to cover non-interest expenses	-
Liquidity	Liquid assets to total assets	Measures the liquid assets to cover unforeseen fund withdrawals	+
	Total loans to total deposits	Measures the ability to meet expected and unexpected cash outflows	+

Source: authors' research.

Similar to the AFSI, each respective subindex – in this case for capital adequacy, asset quality, earnings and profitability, and liquidity – is calculated as the arithmetic average of the scaled indicators (see equation 2), with the exact weighting method as the AFSI (see equation 4). Hence, the BSI reads:

$$BSI_t = \omega_{AQ} * AQ_t + \omega_{CA} * CA_t + \omega_{EP} * EP_t + \omega_L * L_t \quad (6)$$

5. Data and Results

This study uses data from 2018 to the second quarter of 2023 to calculate the AFSI and the BSI for the monetary union of Curaçao and Sint Maarten. Even though we have a few observations only, we can construct the aggregate indices since we do not apply statistical inference models. We retrieved our data from the quarterly Chart of Accounts of local commercial banks, the OECD Statistics, and Bloomberg. Table 3 presents descriptive statistics of the used variables.

[7] We have opted to exclude indicators that might be relevant but were highly correlated with the indicators in the model, for instance Regulatory Tier 1 capital which is highly correlated with Regulatory Capital.

Table 3: Descriptive Statistics of AFSI and BSI

	AFSI	BSI
Mean	0.39	0.01
Standard Error	0.09	0.16
Median	0.39	-0.01
Kurtosis	-0.75	-0.53
Skewness	0.08	0.53
Minimum	0.23	-0.21
Maximum	0.56	0.32
Observations	22	22

Source: authors' calculations

5.1 Weights

The AFSI is constructed with 19 indicators divided over four subindices, while the BSI is constructed with 8 indicators equally distributed over its four subindices. As we use equal weighting, the number of indicators of a given subindex is decisive for the weighting. The AFSI's financial soundness and vulnerability subindices account for 73.6 percent of the total index. The local component of the AFSI is around 84.2 percent. Since all subcategories in the BSI have an equal number of indicators, the weight of each subindex is 25 percent (Table 4 and Table 5).

Table 4: AFSI subindices

Subindex	Indicators	Weight
Financial Development	2	10.5%
Financial Soundness	7	36.8%
Financial Vulnerability	7	36.8%
World Economic Climate	3	15.8%

Source: authors' calculations

Table 5: BSI subindices

Subindex	Indicators	Weight
Asset Quality	2	25.0%
Capital Adequacy	2	25.0%
Earnings & Profitability	2	25.0%
Liquidity	2	25.0%

Source: authors' calculations

5.2 Benchmarking the AFSI and the BSI

Some studies benchmark the AFSI to periods when banking crises have occurred (Morris, 2010). We benchmark the AFSI and the BSI to the period of the coronavirus crisis – defined as 2020 and 2021 – since no banking crisis occurred during our sample period[8]. This period was characterized by the disruption of essential sectors, a high degree of uncertainty, lockdowns, and travel restrictions (CBCS, 2022). A sharp contraction in economic activity occurred between the first quarter of 2020 and the second quarter of 2021. Both the AFSI and the BSI contracted sharply during this period of economic crisis. As the AFSI and BSI use indicators relevant to our jurisdiction, the nominal values of these aggregate indices should not be compared across countries.

6. Aggregate Financial Stability Index

The AFSI averaged 0.39 between 2018 and mid 2023 (figure 1). We set the AFSI benchmark at 0.4 as early warning level for the AFSI. This benchmark was set based on historical movements of this index, as is done in other studies. Hence, AFSI values above 0.4 are associated with relative financial solidity, while values below 0.4 signal increased vulnerabilities. Mid 2023, the AFSI stood at 0.56. The improvement in the AFSI as of 2021 was driven by the solidity of the local banking sector reflected in the financial soundness subindex.

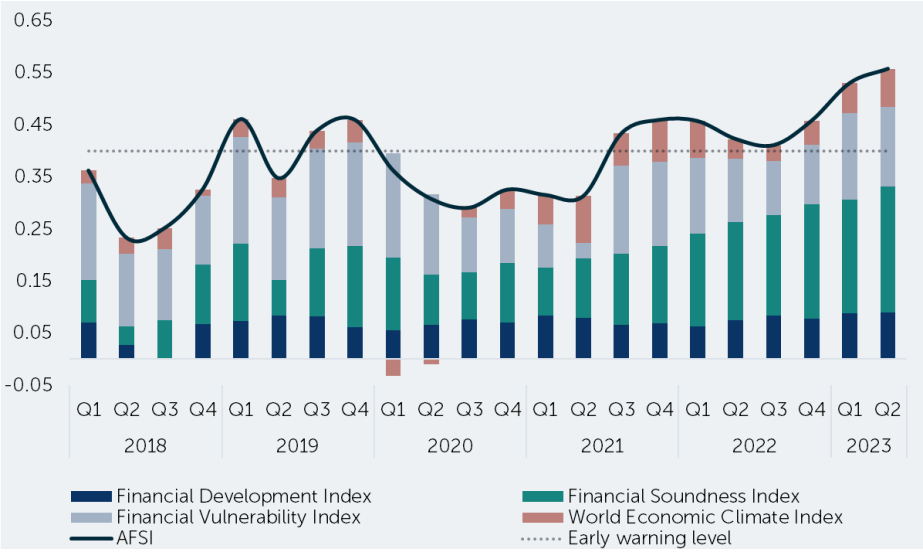

Figure 1: AFSI and contributions of subindices

Source: authors' calculations

[8] Girobank data are not included in this analysis.

The AFSI bottomed in 2018 due to the prolonged adverse effects of hurricane Irma, affecting Sint Maarten in September 2017. In 2018, the financial soundness subindex worsened due to increased specific provisions and non-performing loans, which were inevitable in the aftermath of the hurricanes Irma and Maria. Also, bank losses occurred during this period, while the financial development subindex contracted on the back of a temporary slowdown in credit extension.

From the fourth quarter of 2018 to the third quarter of 2019, the AFSI trended upward, mainly triggered by GDP growth and declining inflation rates. The international macro-financial climate was also fairly stable, reflected in the bottoming of the VIX in the last quarter of 2019. However, the circumstances in 2020 deteriorated considerably due to the devastating coronavirus crisis.

As of 2020 up to the second quarter of 2021, the AFSI signaled enhanced vulnerabilities. Dreadful international conditions, reflected in extreme market volatility, sharp contractions, and equity market corrections, dragged the AFSI down in the first and second quarters of 2020. Due to the lockdowns and sharp drop in tourist arrivals, local macroeconomic conditions started worsening. Also, the financial soundness index worsened substantially as banks set additional specific provisions for loan losses.

Macro-financial conditions improved as of the third quarter of 2021 after a period of increased risks, primarily due to a rebound in tourism activity. Global macro-financial conditions started improving likewise. The performance of banks recovered in 2022, although the state of the world's financial system deteriorated. Nonetheless, improved banks' performance must be interpreted cautiously since dividend payments were suspended during the coronavirus crisis.

The AFSI remained solid, above 0.4, since the third quarter of 2021. The financial soundness subindex drove the solidity of the AFSI, as local banks have been performing well in recent quarters. This is also reflected in the Banking Stability Index, which is elaborated on in the next section of this paper. Moreover, credit extension picked up in 2022, contributing to the financial development subindex. On the other hand, local and global macroeconomic conditions deteriorated in 2022 in contrast to a strong recovery in the previous year. The volatility in international equity markets contributed to the worsening of the world economic conditions subindex in 2022. In 2023, the AFSI climbed further, primarily due to improvements in the financial soundness subindex and the improvements in global market conditions.

7. Banking Stability Index

The BSI averaged 0.01 between 2018 and the second quarter of 2023. Historical movements suggest that a BSI below zero is associated with an elevated risk of a local banking crisis, while a positive BSI corresponds with relative stability in the banking sector. The BSI was negative for the most of 2018 due to the impact of hurricanes Irma and Maria in 2017 in Sint Maarten (figure 2).

In 2018, banks experienced an increase in non-performing loans and sharply

increased specific provisions on loan losses, reflecting low asset quality, and causing a decline in earnings & profitability, and capital adequacy. At the end of 2018, the BSI was positively influenced by enhanced asset quality and earnings & profitability. Asset quality improved due to a substantial reversal of specific provisions on loan losses - which continued in 2019 - and a decline in non-performing loans. The reversal of the provisions on loan losses also favorably impacted earnings & profitability.

The BSI deteriorated during the coronavirus crisis. In this period, the banking sector reacted by setting up additional specific provisions for loan losses, reflecting a decline in asset quality, resulting in lower earnings & profitability. Regulatory measures such as moratoria on loan payments and dividend payout restrictions prevented further asset quality deterioration and improved the capital position during 2020 and 2021. The upturn observed in the BSI continued in the second half of 2021, mainly because of the recoveries of specific provisions on loan losses. The BSI improved further in 2022, primarily driven by improved profitability, asset quality, and capital.

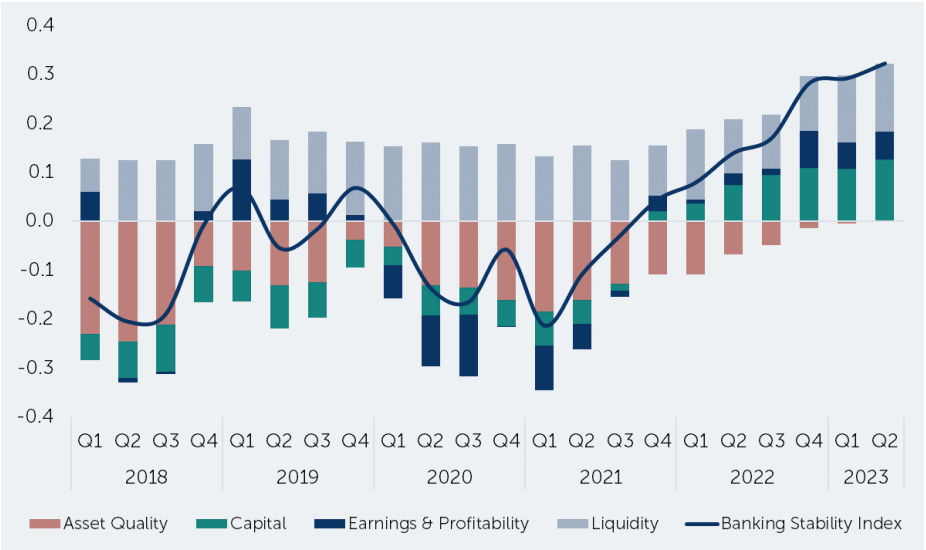

Figure 2: BSI and contributions of subindices

Source: authors' calculations

The monetary union's BSI improved further in 2023, driven by all of its subindices. Asset quality improved as credit extension grew, and non-performing loans diminished. Earnings & profitability picked up during 2023, due to an increase in gross income, specifically due to a rise in interest income and fees and commissions. As a result, net income increased, leading to an enhanced capital position. Liquidity expanded primarily due to the growth in liquid assets. Even though the BSI suggests that local banks performed well in recent quarters, asset quality remains a concern, specifically due to the high volume of NPLs, reflected in a high NPL-to-total-gross-

loan ratio. Another issue facing the local banking sector is the narrowing in the interest-rate spread in the recent decade. Low lending rates dampen interest income and affect the overall profitability of local banks.

8. Robustness checks

We conduct robustness analyses to support our findings. The purpose of this analysis is to justify the developments in the constructed indices, justifying their use as early warning tools. First, we assess the relationship between the constructed indices to ascertain to which extent they tend to co-evolve. We find a strong correlation of 0.876 between the AFSI and the BSI (figure 3). Second, we calculate the correlation between the BSI and the Z-score[9], an indicator of insolvency risk in the banking sector (see for instance Lepetit and Strobel, 2015). We come across a correlation of 0.877 between the BSI and the Z-score. We considered constructing separate indices for Curaçao and Sint Maarten. However, banks in Sint Maarten are mostly branches and are not required to maintain capital. It would therefore not be possible to construct the AFSI and BSI for Sint Maarten separately.

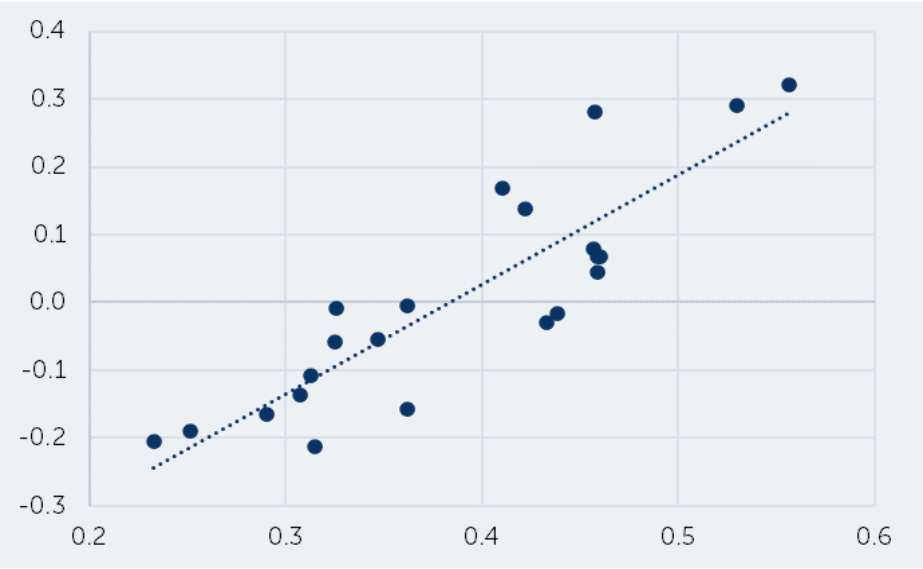

Figure 3: Correlation between AFSI and BSI. Source: authors' calculations

[9] We do not calculate the correlation between the AFSI and the Z-score, as the Z-score is in an indicator in the AFSI.

9. Conclusion

This paper presents two measures of financial stability for the monetary union of Curaçao and Sint Maarten. Both the AFSI and the BSI are assets to the EWMS and the financial stability framework of the CBCS for examining the state of the financial system, in particular the banking sector. This is crucial given the banking sector's systemic importance. Moreover, the developed indices enable the CBCS to track and forecast financial stability and conduct analyses on interrelations between variables using statistical and econometric techniques. We selected variables based on literature with data available on a timely basis. The variables are transformed using empirical normalization, after which indices are constructed using equal weights.

The results show that the AFSI and the BSI can track financial stability when benchmarked to the period of relative instability during the coronavirus crisis. The developed measures will be reviewed, improved, and expanded continuously. For instance, the framework could be broadened with indicators from other financial sectors, such as the insurance and pension funds sector, when data becomes timely available.

10. Discussion

Even though the AFSI is considered an early warning tool, it becomes available with a time lag due to the availability of macroeconomic data lag. Hence, this can be considered a drawback of this indicator. Also, this framework encompasses only the banking-sector financial soundness indicators as data from other financial sector segments is not timely available. Moreover, this framework does not account for interconnectedness risks. A drawback of the BSI is that it only contains quantitative indicators of banking soundness and does not consider other factors such as management and foreign currency risk. Nonetheless, these indicators are widely used by other central banks to track financial stability.

Acknowledgements. We thank our colleagues for their valuable comments

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