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BOTSWANA

FINANCIAL SECTOR ASSESSMENT PROGRAM

March 2024

TECHNICAL NOTE ON SYSTEMIC RISKS AND VULNERABILITIES FOR BANKS

This paper on Botswana was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed on January 18, 2024.

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January 18, 2024

TECHNICAL NOTE

ASSESSMENT OF SYSTEMIC RISKS AND VULNERABILITIES FOR BANKS

Prepared By
Monetary and Capital Markets Department

This Technical Note was prepared by IMF staff in the context of the Financial Sector Assessment Program in Botswana. It contains technical analysis and detailed information underpinning the FSAP's findings and recommendations. Further information on the FSAP can be found at http://www.imf.org/external/np/fsap/fssa.aspx

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AfS	Available for Sale
BoB	Bank of Botswana
CAR	Capital Adequacy Ratio
CET1	Common Equity Tier 1
D-SIB	Domestic Systemically Important Bank
EAD	Exposure at Default
FSAP	Financial Sector Assessment Program
FSGM	Flexible System of Global Models
FSI	Financial Soundness Indicators
FX	Foreign Currency
GDP	Gross Domestic Product
HfT	Held for Trading
HQLA	High-Quality Liquid Assets
IMF	International Monetary Fund
IRRBB	Interest Rate Risk in the Banking Book
LAR	Liquid Assets Ratio
LCR	Liquidity Coverage Ratio
LGD	Loss Given Default
MCM	Monetary and Capital Markets
MoPR	Monetary Policy Rate
NBFI	Non-Bank Financial Institutions
NBFIRA	Non-Bank Financial Institutions Regulatory Authority
NII	Net Interest Income
NPL	Nonperforming Loans
NSFR	Net Stable Funding Ratio
OLS	Ordinary Least Squares
PD	Probability of Default
PRR	Primary Reserves Requirement
RAM	Risk Assessment Matrix
RWA	Risk-Weighted Assets
SREP	Supervisory Review and Evaluation Process
TA	Technical Assistance
US	United States
USD	U.S. Dollar
WB	World Bank
WEO	World Economic Outlook

EXECUTIVE SUMMARY[1]

Botswana is a small, open economy with a highly concentrated financial sector comprising banks and sizeable non-bank financial institutions (NBFIs). Financial institutions hold adequate capital and liquidity and show moderate profitability. The interconnectedness between banks and NBFIs, and banks' large exposures to unsecured household debt could increase financial sector vulnerability.

The systemic risk analysis was conducted in the aftermath of the COVID-19 pandemic. The financial sector withstood the pandemic well, given the sectors' strong financial position and owing, in part, to policy measures. Bank capital appears adequate, and although liquidity is ample, banks' balance sheets reflect a high concentration of lumpy short-term deposits from the non-bank sector, including NBFIs and corporates.

The financial sector is vulnerable to three main risks: geo-political developments may slow global growth and reduce diamond demand that adversely impacts economic performance in Botswana; sustained food and energy cost pressures could further push inflation; and the tightening of global financial conditions as major economies continue to increase policy rates could lead to tighter domestic financial conditions. The combination of shocks could delay economic recovery and prolong the period of high inflation leading to tighter domestic monetary policy—potentially impacting financial institutions. Financial stability could also be impacted by recent regulatory changes for retirement funds.

This Technical Note (TN) assesses systemic risks in the banking sector. The assessment is based on stress tests, which simulate the health of the banks under a severe yet plausible (counterfactual) adverse scenario. The scenario includes global and domestic inflationary pressures, monetary policy tightness, and a major slowdown of economic activity. The exercises covered eight commercial banks as of June 2022.[2] Three types of stress test exercises were performed: a top-down solvency stress test, a liquidity stress test, and a contagion and interconnectedness stress test. The latter focused on the domestic banking interconnectedness.

The financial system appears resilient to a wide range of shocks. Solvency stress tests identify small capital shortfalls in two banks under the adverse scenario. The elevated level of banking sector liquidity allows all banks to comply with the prescribed liquidity ratios with sufficient buffers in a baseline scenario. Under an adverse scenario, five banks would face a liquidity shortfall due to their susceptibility to short-term wholesale funding sources—however, expanding the class of eligible liquid assets to be consistent with the Basel III HQLA definition would reduce the number of banks facing liquidity shortfall to two. These funding sources reflect large deposits from NBFIs comprising insurance companies and retirement funds that are well integrated with the banking sector.

[1] Prepared by Dan Cheng, Yuan Gao Rollinson, and Ian Stuart. The FSAP team would like to express its deepest gratitude to the authorities for their close cooperation and support in facilitating this comprehensive exercise.

[2] Commercial banks refer to eight commercial banks in Botswana as of June 2022. The BBS Bank Limited, which was licensed as a commercial bank on October 6, 2022, is excluded from the analysis.

Although this vulnerability is highlighted, a stress test of the largest NBFIs to market risks under an adverse scenario indicates that the impact on NBFIs' capital is limited.[3]

The FSAP recommends that the Bank of Botswana (BoB) and Non-Bank Financial Institutions Regulatory Authority (NBFIRA) improve the granularity and quality of certain datasets to enhance vulnerability assessments. (1) For credit risk modelling, the BOB should collect nonperforming loan (NPL) inflows and outflows data. The data would reflect the transition of performing loans to nonperforming status, or the exit from nonperforming status to other categories, e.g., for write-offs and recoveries; and probability of default and loss given default data from commercial banks by economic sectors. (2) For market risk modelling, despite limited exposure in Botswana's banking system, the BOB should collect the specific duration of securities for risk monitoring and management purposes. (3) For interconnectedness analysis, NBFIRA should add reporting requirements for bilateral exposures between banks and all NBFIs on a regular basis.

The FSAP recommends that the BoB introduces macro and micro level stress test based on a multi-period scenario analysis and develops its framework to assess interest rate risk in the banking book (IRRBB). On the stress testing framework, BOB currently conducts single factor, single period stress tests, and should integrate outputs from ongoing IMF technical assistance within its macroprudential stress testing framework. These enhancements will allow the BoB to challenge the results of banks' micro prudential stress tests and validate their assessment of IRRBB. Developing the supervisory methodologies for assessment of banks' exposure to IRRBB and the potential impact on banks' capital can better inform supervision and strengthen the supervisory review and evaluation process (SREP).

The FSAP recommends prioritizing the planned transition to the Basel III liquidity monitoring and assessment framework. While the current statutory liquid assets ratio (LAR) regulation plays an *ex-ante* risk control to mitigate liquidity risks, it has limitations for identifying vulnerabilities to liquidity and funding risks. The transition to a Basel III Liquidity Coverage Ratio (LCR) complemented by a Net Stable Funding Ratio (NSFR) will allow the BoB to evaluate individual bank's resilience against these risks. To support this transition, the BoB should expand its qualifying liquid assets by including the required reserves in the near term and long-term government bonds with appropriate haircuts in the medium term.

To improve banks' resilience to adverse economic shocks, the FSAP recommends that the BoB implements additional capital buffers. Considering the spillover effects from the vulnerabilities identified through interbank market connections alongside the capital shortfalls from the solvency assessment, some banks appear vulnerable. In observing that some of these banks have historically paid high dividends, the BoB should help build the sectors' resilience by implementing additional capital buffers as a prudential requirement and as a precautionary measure. This will ultimately reduce the potential for systemic risks to the broader financial system. Additionally, such a measure

[3] See the Technical Note of Assessment of Systemic Risks and Vulnerabilities for Non-Bank Financial Institutions, Botswana FSAP 2023.

may help to alleviate any concerns about the potential for a "domino effect" of bank failures in case of an economic downturn.

In addition, the FSAP recommends that the BoB builds on the strong financial stability institutional framework, to enhance its use of macroprudential tools to limit risk build-up and enhance financial sector resilience. Stress tests reveal no imminent solvency risks and limited liquidity risk (when adopting the Basel III HQLA definition); however, the trend rise in household debt that could become more linked to the economic cycle could generate future financial instability. Accordingly, the BoB should extend its capacity with macro-level stress tests with multi-period scenarios and sensitivity assessments; and continue efforts to fill data gaps to support the appropriate calibration of macroprudential tools such as, debt-service to income ratios for households and corporate debt; possibly set higher capital as a prudential requirement, or a countercyclical buffer to offset credit risks.

Table 1. Botswana: Key Recommendations for Bank Systemic Risk Analysis

Recommendations	Authority	Priority[1]
1. Standardize the reporting framework for banks and improve the data management systems to support stress testing and interconnectedness analysis [¶29,¶51].	BOB, NBFIRA	ST
2. Conduct stress test at both the macro- and micro-prudential levels based on multi-period scenario analysis and sensitivity assessments to enhance supervisory oversight [¶30].	BOB	ST–MT
3. Develop supervisory methodologies for assessment of banks' exposure to IRRBB and the potential impact on capital to better inform supervision and strengthen SREP [¶31].	BOB	MT–LT
4. Expand the use of macroprudential tools such as, debt-service to income ratio limits for households, or countercyclical capital buffers, to address underlying credit risks from loan concentrations [¶32.	BoB	MT
5. Extend the coverage of statutory liquid assets to: • Include required reserves in the short-term [¶43] • Include domestic long-term government securities (maturity longer than one year) in the medium-term [¶44-46]	BoB	ST
6. Revise the statutory reporting framework to improve banks' reporting with the level of granularity and quality to calibrate Basel III liquidity indicators [¶46].	BoB	ST
7. Calibrate regulatory weights on the assets and funding structure and liquidity characteristic of Botswana's banking system [¶46].	BoB	MT
8. Establish minimum requirements for Basel III liquidity standards once validation of parameters is conducted and material experience with Basel III supervisory monitoring is obtained [46].	BoB	MT–LT
9. Impose tailored Pillar II capital buffer requirements for banks with low capital and high dividends payout ratios [¶52].	BOB	MT

[1] ST: short term= less than 1 year; MT: medium term = 1 to 5 years; LT: long term = over 5 years.

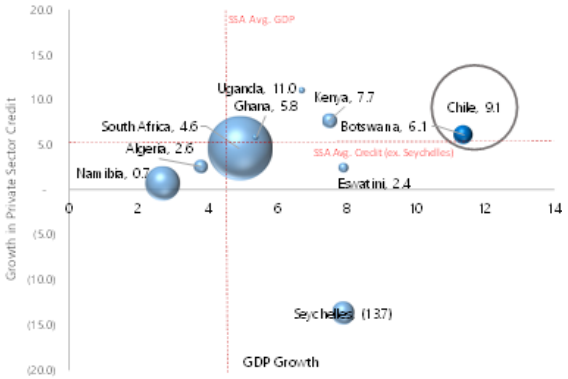
BACKGROUND

A. Financial Sector Landscape

1. Botswana's financial sector accounts for close to 130 percent of GDP and comprises commercial banks and non-bank financial institutions that are well integrated (Figure 1). The banking model is centered on intermediation of domestic deposits for credit provision and the non-bank financial sector includes retirement funds and insurance companies. The banking sector comprises nine commercial banks,[4] with the three largest banks accounting for 64 percent of banking sector assets, of which, two are D-SIBs[5] that account for 46 percent of banking sector assets. Banks are largely foreign-owned subsidiaries of pan-African banks that operate as conglomerates and hold subsidiaries in non-bank financial institutions (NBFIs). Domestic ownership of banks is mainly through the largest pension fund that holds 22 percent of bank shares.[6] The bulk of the NBFI sector consists of retirement funds (43 percent of financial system assets). The remainder of the financial system accounts for 15 percent of financial sector assets, comprising insurance companies, microlenders, and brokers.

2. The macroeconomic environment remains conducive to continued expansion in private sector credit. Credit increased by 5.4 percent (y-o-y, Q2 2022) and compares favorably with regional peers and other emerging markets for 2021 (text chart). Botswana's strong economic recovery is expected to be supported by robust growth in diamond exports which is a significant economic sector for employment and supporting small businesses. The comprehensive policy package that was implemented at the onset of the COVID-19 pandemic has buttressed economic recovery.

Output Recovery and Credit Performance, 2021



Bubbles represent the share of domestic credit in GDP as of 2020.
Sources: BIS, IMF, World Bank, central banks' websites, staff calculations

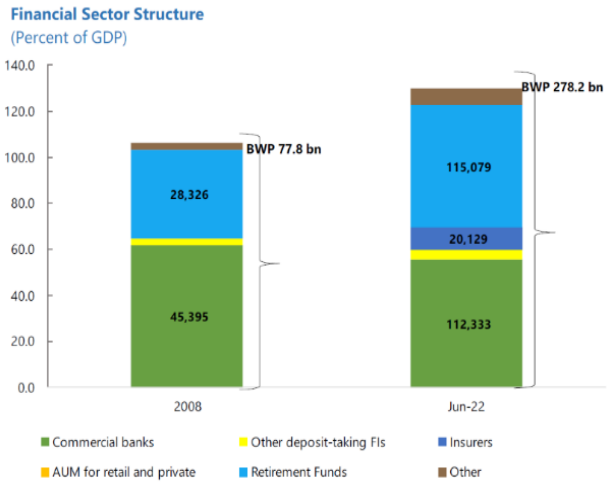
[4] The Botswana Building Society (BBS) was licensed as a commercial bank in October 2022.

[5] The BoB has developed a framework for identifying D-SIBs based on the Basel Committee for Banking Supervision methodology. Based on the weighted combination of factors—size, interconnectedness, substitutability, complexity, and domestic sentiment—two banks were assessed as being above the set threshold.

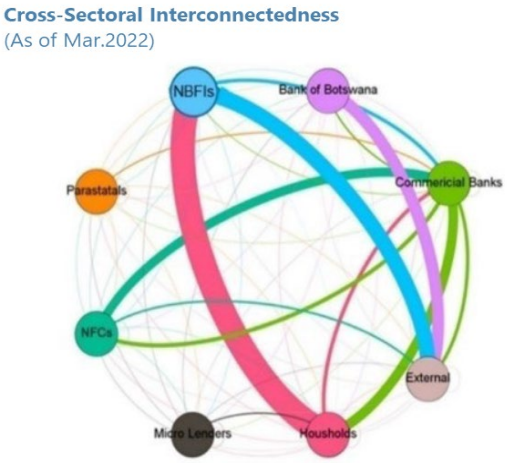
[6] Based on mission calculations from commercial banks' financial statements.

Figure 1. Botswana: Financial Sector Structure

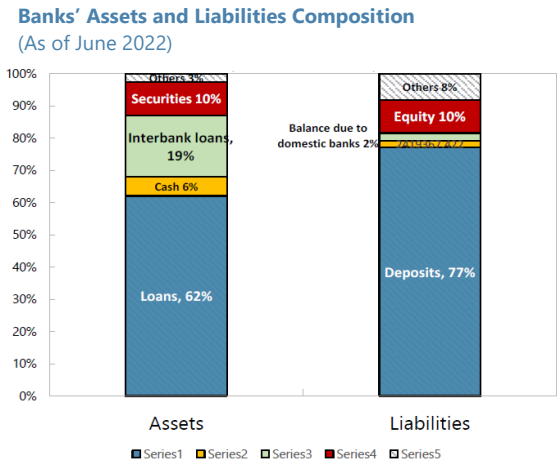
Banks and retirement funds dominate the financial sector…



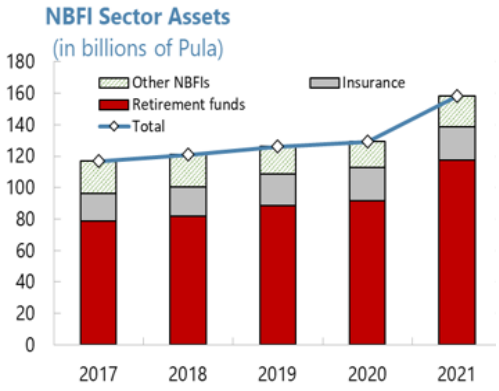
…with strong interlinkages across the economy.



Asset and liability distribution for banks remain broadly stable…



…while assets for non-bank financial institutions (NBFIs) grew strongly.



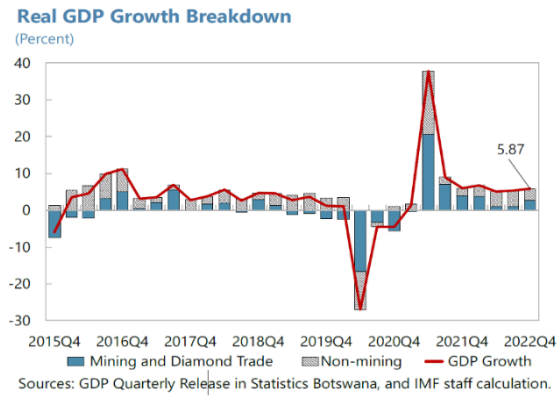
Sources: Bank of Botswana, Non-Bank Financial Institutions Regulatory Authority; IMF calculations.
Note: AuM = Assets under management; BWP = Botswana pula; FIs = Financial Institutions; NBFIs = non-bank financial institutions; NFCs = non-financial corporations.
Interbank loans include placements with foreign affiliated banks.
Intra-sectoral exposures are not included in Interconnectedness assessment. Edge thickness proportionally reflects financial linkages between sectors. Edges have the same color as the node to capture the exposure from that sector to the connecting sector. Retirement funds account for over 90 percent of NBFIs' total assets as of June 2022.

3. With economic recovery underway, inflation risks are tilted to the upside. Global conditions have contributed to rising domestic inflation, resulting in the BoB increasing its monetary policy rate (MoPR) by a combined 151 basis points since April 2022 (Figure 2). The BoB paused interest rate increases in August 2022, but second-round effects could dominate future inflation developments and could keep it above the medium-term inflation objective of 3–6 percent over the

next 12 months. Despite the increase in interest rates, conditions remain conducive to credit growth. Inflation risks over the medium term will be largely dependent on global developments.

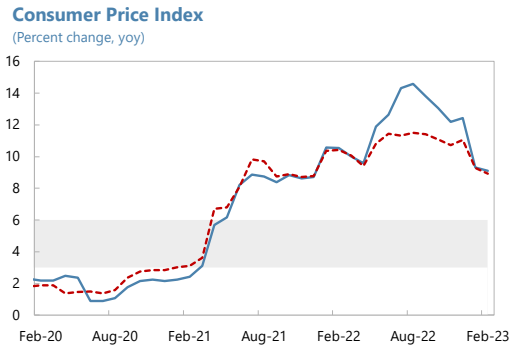
Figure 2. Botswana: Macrofinancial Context

Strong, broad-based economic recovery continued in 2022…



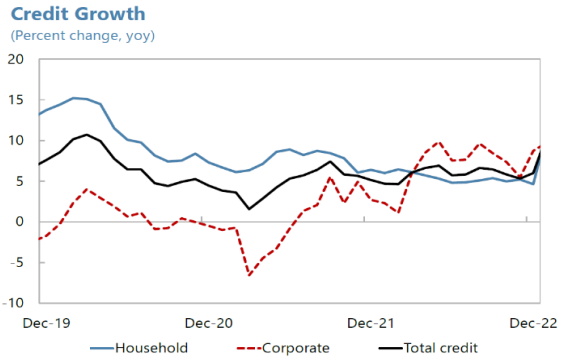
Sources: GDP Quarterly Release in Statistics Botswana, and IMF staff calculation.

…although inflation remains above the 3–6 percent objective range



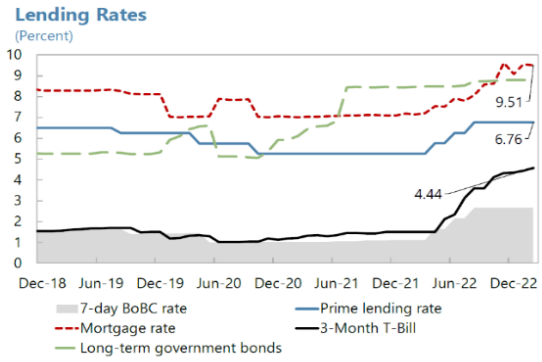
Sources: Haver Analytics, and IMF staff calculation.

Credit growth recovered since the pandemic…



Sources: Haver Analytics.

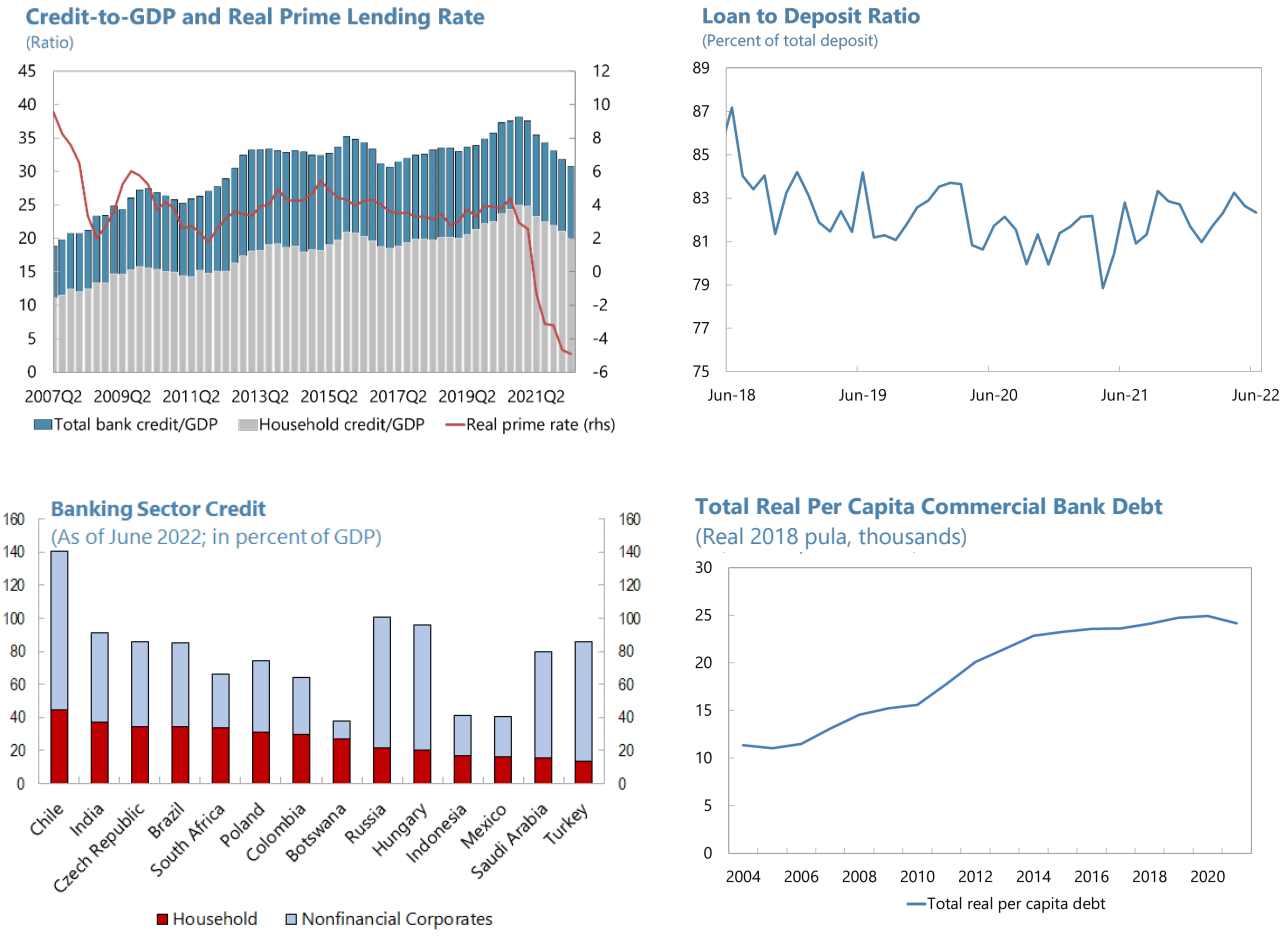
…and loan rates have risen with the monetary policy rate.



Sources: Haver Analytics/Bank of Botswana.

4. The accommodative monetary stance continues to be conducive to credit growth (Figure 3). The banking business model is centered on intermediation of domestic deposits to provide private sector credit. Assets are largely denominated in Pula with the largest exposures to unsecured household loans and to small- and medium-size corporates in services and other non-mining sectors. Bank loans to households account for 27 percent of GDP and corporate loans account for 10 percent of GDP. As the largest asset on most bank balance sheets, household debt has grown over time as a share of output and in per capita terms, with the sector remaining conservatively at an average 85 percent loan-to-deposit ratio (Figure 3). At end-June 2022, household loans accounted for around 41 percent of total commercial bank assets, and in recent months the share of credit to corporates has grown more rapidly than to households.

Figure 3. Botswana: Broad Credit Conditions



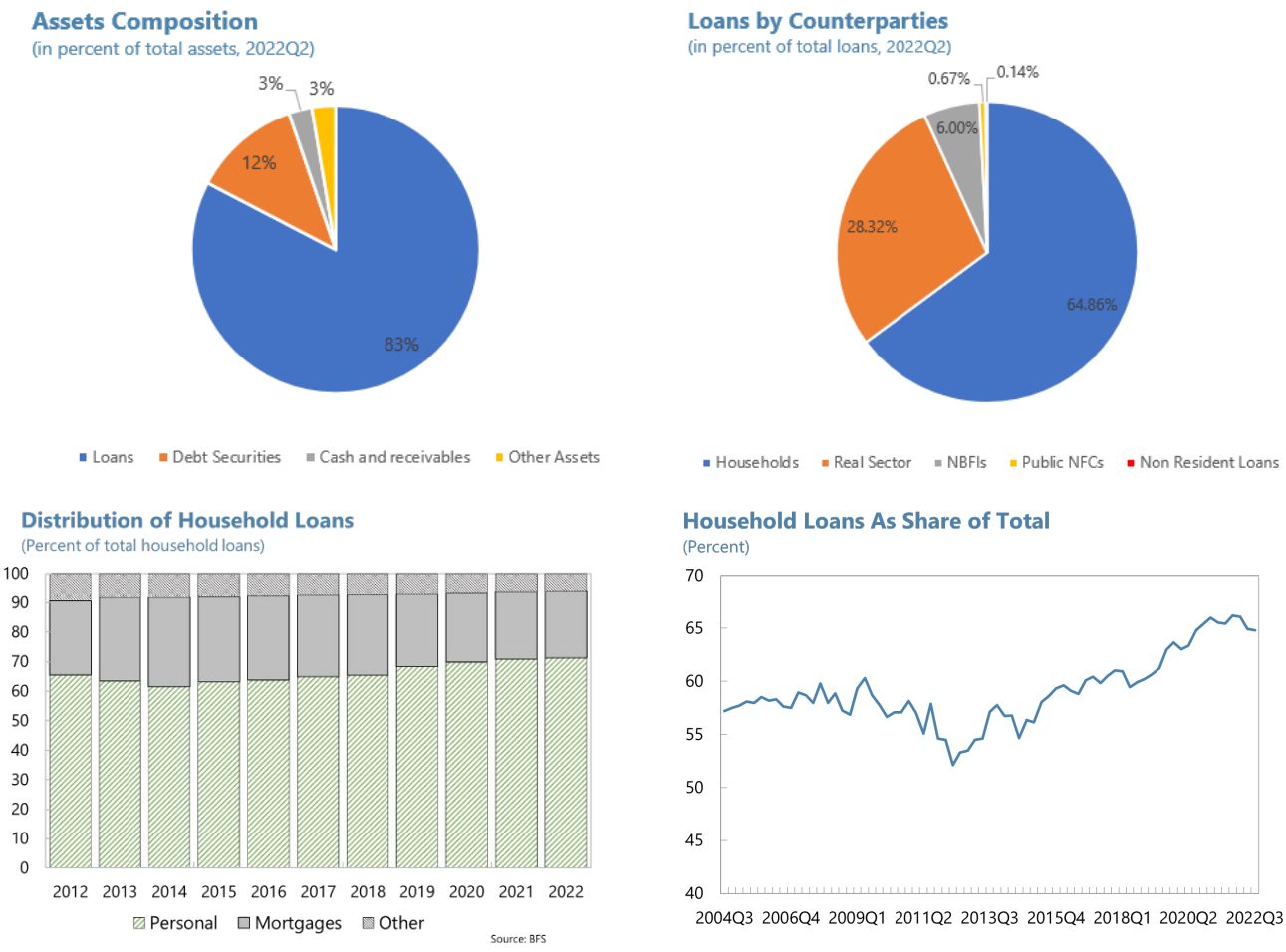
Sources: Bank of Botswana; Haver Analytics, and IMF staff calculations.

B. Banking Sector Risk and Vulnerabilities

5. Credit risk forms the largest risk in Botswana's banking system. Risk-weighted assets (RWAs) of credit risk account for 89 percent of total RWAs as of June 2022. The largest part of total assets comprises loans (83 percent).[7] By sector, loans are mostly concentrated in households, followed by real sector and public non-financial sector (Figure 4). The household loans take the form of personal loans (70 percent) followed by mortgages (23 percent) and others (Figure 4). Bank loans to households are mainly in the form of unsecured consumer credit, which a large share of lenders collect repayment through direct salary deduction (Box 1).

[7] "loans" here include gross loans and advances, as well as balance due from domestic banks (both on demand or less than 184 days and more than 184 days) and foreign banks.

Figure 4. Botswana: Banking System Asset Decomposition and Credit Risk Profile

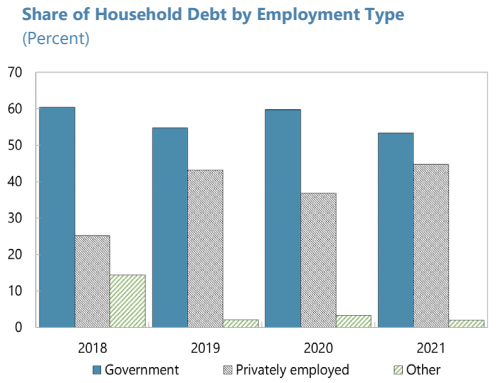


Sources: Bank of Botswana, and IMF staff calculations

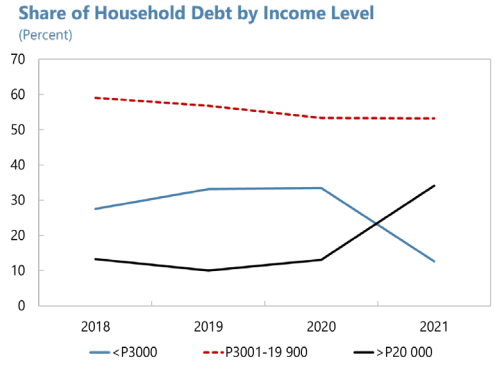
Box 1. Botswana: Trends in Household Indebtedness

Household debt plays a key role in the Botswana's financial system. In 2021, commercial banks, which account for 40 percent of the total financial sector assets, lent primarily to households (accounting for 66 percent of bank lending). The loans take the form of personal loans (70 percent) followed by mortgages (23 percent) and others. Bank loans are mainly in the form of unsecured consumer credit. Banks mitigate some credit risks through negotiated scheme loans that can provide for the deduction of instalments directly from borrowers' salaries. Some household debt features credit guarantees from employers.

Over the past two decades, household loans and advances have grown as share of output and in per capita terms. According to the Household Indebtedness Survey 2021/22, at end-2021, total household debt amounted to P58.5 billion (30 percent of GDP), comprising bank loans (88.5 percent), micro-lender loans (11 percent) and hire purchase credit (0.5 percent). Government employees hold the majority of debt, although the share held by the privately employed has been increasing over time. For a large share of household loans (more than 70 percent in the case of some banks), lenders can deduct instalments directly from borrowers' salaries. The share of debt held by higher income earners (>P20 000 per month) has been increasing. With a growing share of lending to privately-employed individuals, NPLs could become more cyclical.



Sources: 2021/22 Household Indebtness Survey Report, and IMF staff calculation.



Sources: 2021/22 Household Indebtness Survey Report, and IMF staff calculation.

Household debt does not appear to represent an immediate risk to the financial system, as:

- Levels of indebtedness and NPL ratios are relatively low, by international standards.
- Bank credit growth has been fairly low and stable, and there is ample liquidity in the banking sector.
- A large share of loans (more than 70 per cent, in the case of some banks) is collected at source and most borrowers are employed in the public service.

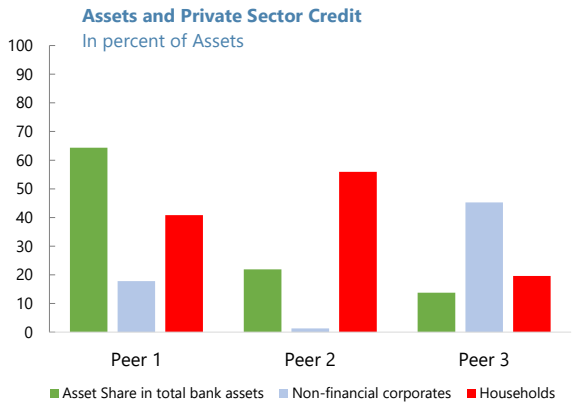
But pockets of risk potentially exists as banks have widely differing household NPL ratios and the distribution of household debt by income level of loanees is unequal – rising sharply for higher income groups. The largest share of household debt is medium-term (2 to 5 year), unsecured variable rate loans. In addition, a sizable and growing share of household debt (approximately 10 percent in 2021) is outside of the commercial banking system, with micro-lenders subject to lower capital and liquidity requirements. Micro-lending may also have shorter average maturities and higher interest rates.

Analysis of NPL ratios is hampered by gaps in economic data (including household income, real estate prices, unemployment, debt service costs), and changes in reporting standards of NPLs. As a result, statistical modelling typically shows a weak relationship between NPLs and economic conditions. The share of household lending to private sector employees is increasing, which could make NPLs more susceptible to the economic cycle.

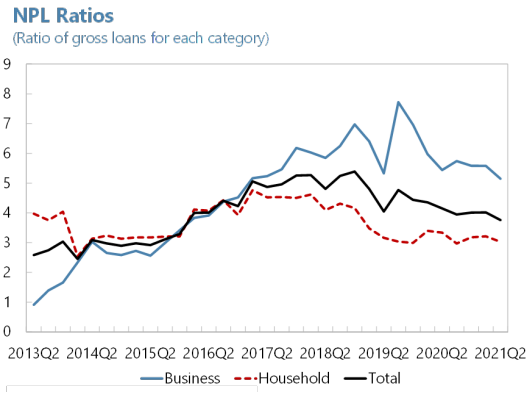
_____

Sources: Bank of Botswana, and IMF staff.

6. There is homogeneity in the credit exposures across the sector. Household loans dominate the asset portfolio for Peer 1 and Peer 2 banks,[8] with smaller banks having a niche to provide mainly corporate loans (Text Chart). Yet, the differences in asset quality and the provisioning coverage ratio may raise concerns about underlying risks in some loan books.



7. Non-performing loans (NPLs) stabilized following the pandemic, though related regulatory forbearance during the pandemic,[9] and weaknesses in the prudential treatment of loans, may suggest higher NPLs. NPLs to total loans represented 3.7 percent as of June 2022 compared with 4.3 percent in 2020, mainly attributed to good credit quality in household loans (text chart). Recently, total past-due loans declined from 6.3 percent of total loans and advances in 2020 to 5.4 percent of total loans as of June 2022, largely due to loan recoveries and write-offs.



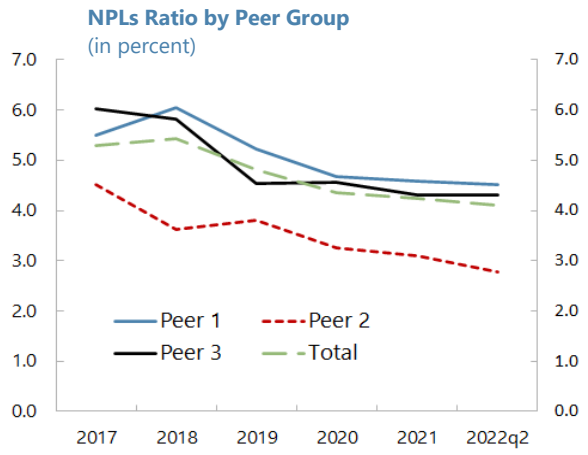
8. However, credit quality for non-financial corporate loans remains a concern, with these accounting for over 30 percent of past-due loans (Figure 5). Gross NPLs mirror the evolution of the loan quality for business loans, and though showing recent declines, NPLs for business loans have exceeded the overall NPL ratio by more than 2 percentage points. The credit risk exposure for loans to construction, transportation, and business service sectors dominate the NPLs, each sector showing NPLs over 20 percent as of June 2022. Data limitations on the financial exposures of corporate creditors restrict further assessment, as the supporting regulatory framework for credit registries is just being developed by the BoB, following the implementation of the Credit Information Act in October 2022.

[8] Peer groups are determined by the banks' share of total assets to banking system assets, Peer groups are determined by the banks' share of total assets to banking system assets, and Peer 1-2-3 represent 64-22-14 percent, respectively, as of end-June 2022.

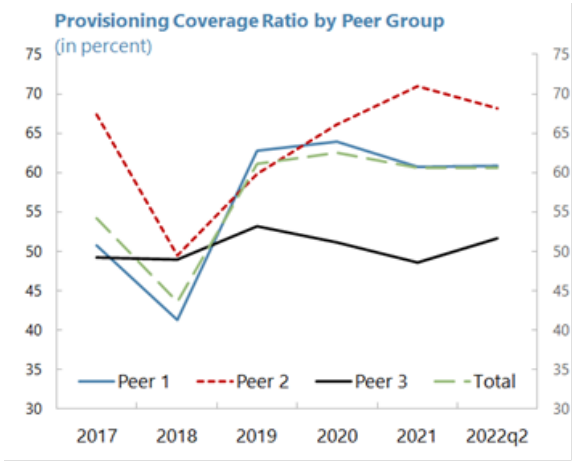
[9] Restructured loans were 8.5 percent of total loans and special mention accounts were 1.3 percent of total loans. Banks were allowed to treat COVID-19 related restructured loans as performing.

Figure 5. Botswana: NPLs in the Banking System

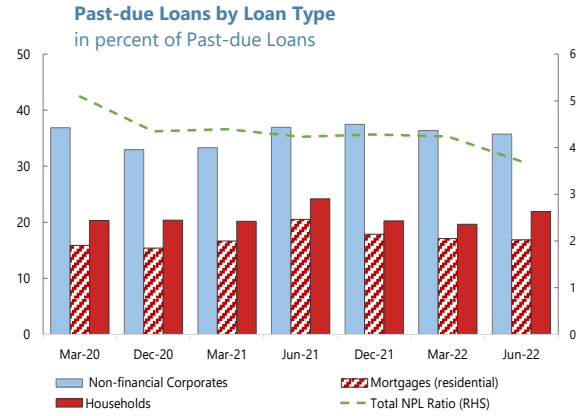
General reduction in NPLs…



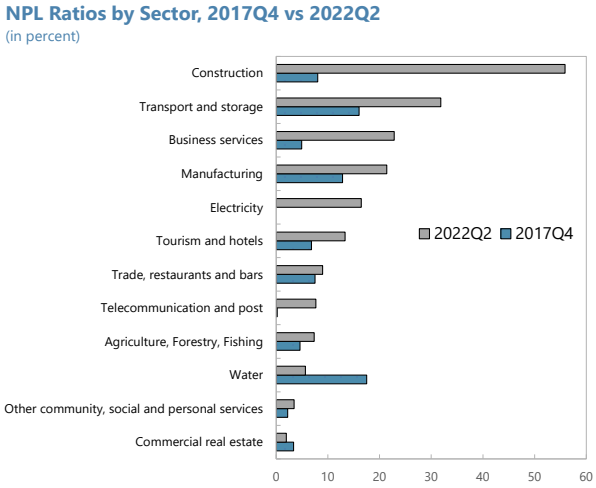
…but gaps in prudential provisioning standards evident.



Non-financial corporate credit quality remains a concern, dominating past-due loan…



…contributing to increasing NPLs for most economic sectors.



Sources: Bank of Botswana, and IMF staff.
Note: Peer groups are determined by the banks' share of total assets to banking system assets, Peer groups are determined by the banks' share of total assets to banking system assets, and Peer 1-2-3 represent 64-22-14 percent, respectively, as of end-June 2022.

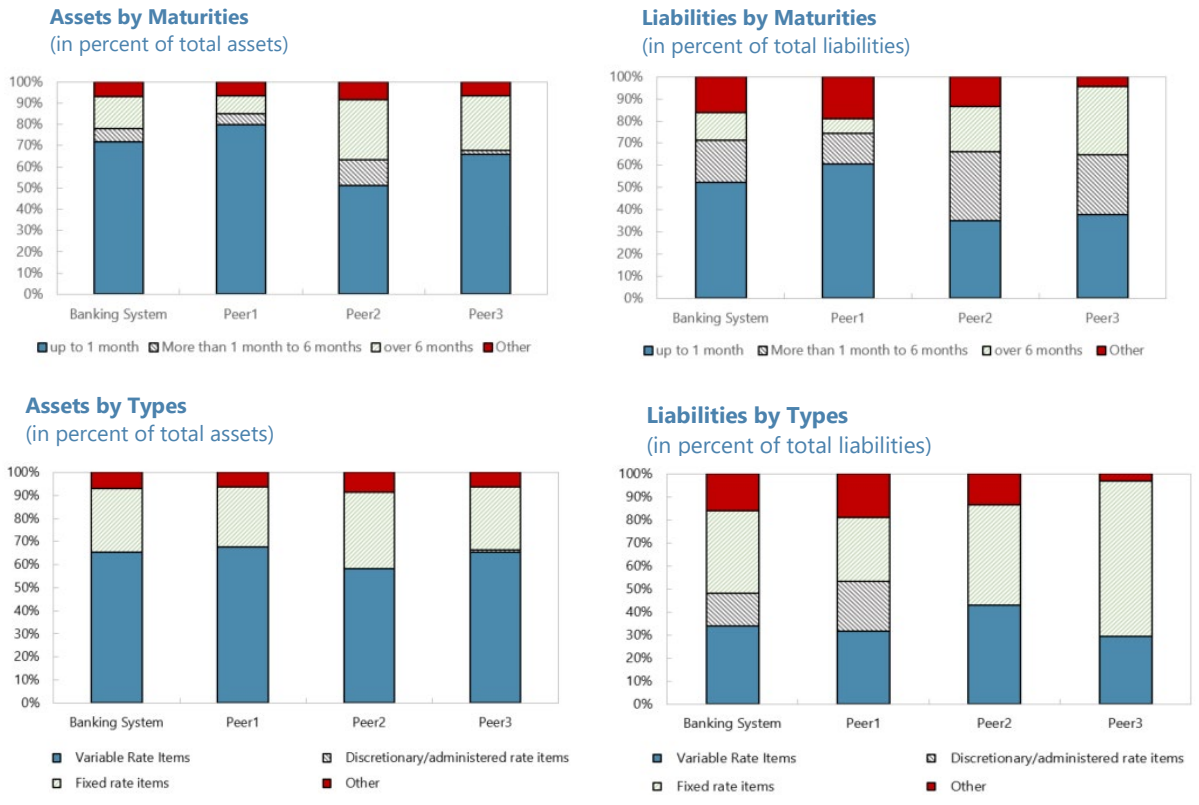
9. The impact from further monetary policy tightening requires monitoring for its potential impact on asset quality as changes in the MoPR have one-to-one changes in prime lending rates.[10] The unsecured household credit consists of mainly variable rate loans. In addition, after the BoB-imposed household loan interest rate reset moratorium expires in April 2023, increases in the MoPR may increase loan rates and possibly push up NPLs. For 2021, the household

[10] The BoB set the spread of 411 basis points between the MoPR and the prime lending rate for a period of one year starting in April 2022. However, commercial banks can set the final lending rate (prime rate adjusted for the customers' risk profile). As of June 2022, approximately 66 percent of loans were priced at margins ranging from 2–10 percentage points above the prime rate.

debt-service to income ratio ranged between 40 and 70 percent for banks (average of 57 percent), and between 30 and 67 percent for microlenders (average of 44.5 percent).[11] These ratios tend to be higher for lower income households. Household loans are susceptible to financial distress given the high debt-service burden, possible income loss due to adverse economic conditions and rising interest rates.

10. Banks may face financial exposures to interest rate risks in the banking book (IRRBB) due to interest rate and maturity mismatches (Figure 6). Over 65 percent of bank assets are floating rate, while approximately 35 percent of liabilities are fixed rate and are subject to administered rates that typically lag policy rate changes. Bank assets also have significantly shorter maturities than liabilities. In an environment of rising interest rates banks may experience a spike in net interest income (NII) and positive IRRBB exposures.

Figure 6. Botswana: Maturity Structure of Assets and Liabilities in the Banking Book
(As of June 2022)



Sources: Bank of Botswana, IMF staff calculation.
Peer groups are determined by the banks' share of total assets to banking system assets, Peer groups are determined by the banks' share of total assets to banking system assets, and Peer 1-2-3 represent 64-22-14 percent, respectively, as of end-June 2022.

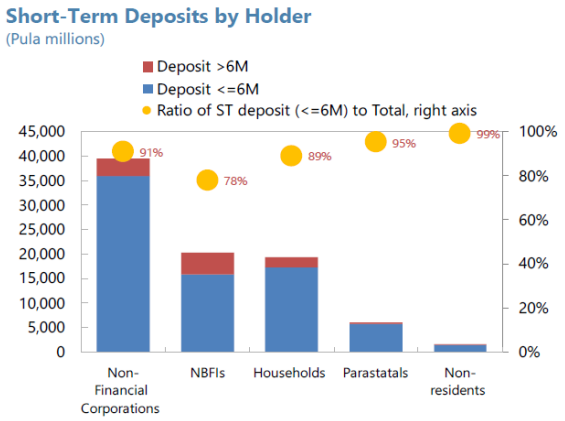
11. Banks are vulnerable to liquidity and funding risks due to concentrated funding profiles—short-term deposits of corporations and NBFIs (Figure 7). Total deposits of NBFIs in

[11] BoB, Household Indebtedness Survey 2021/22

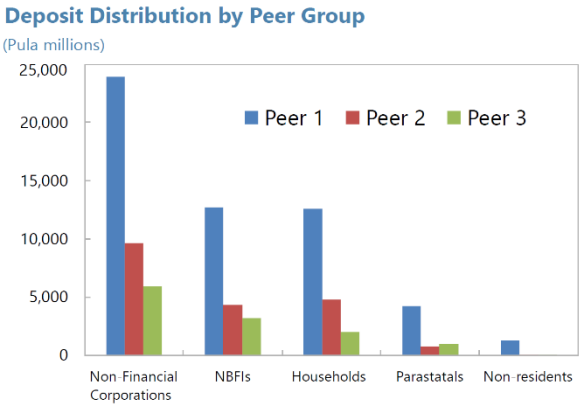
the banking sector account for 23 percent of deposits and comprise sizeable deposits from a few large depositors. The largest banks hold close to 68 percent of total household and corporate call and savings deposits,[12] leaving smaller banks to rely largely on price-sensitive fixed-deposits or access interbank funding from larger banks.

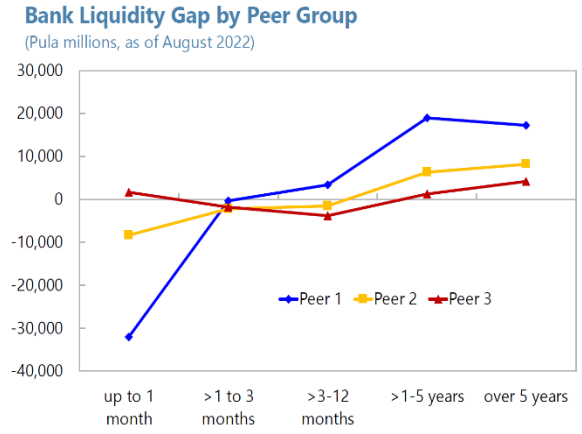
Figure 7. Botswana: Bank Deposits by Maturity and Holder, June 2022

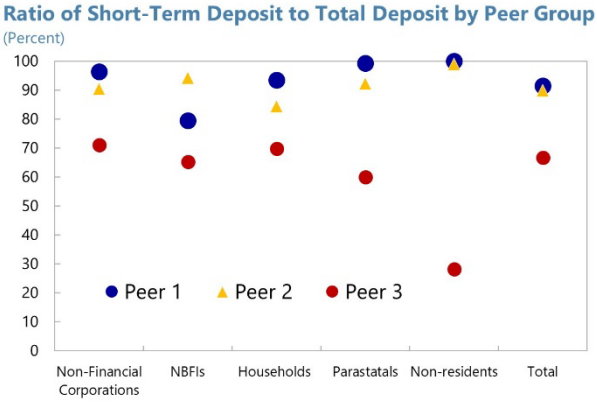
Deposits are dominated by short-term tenors.



The banking system's deposits are concentrated in Peer 1 banks.







Sources: Bank of Botswana; IMF staff calculation.
Notes: NBFIs = non-bank financial institutions. Peer groups are determined by the banks' share of total assets to banking system assets, Peer groups are determined by the banks' share of total assets to banking system assets, and Peer 1-2-3 represent 64-22-14 percent, respectively, as of end-June 2022.

C. Scope of Stress Tests and Risk Analysis

12. The systemic risk assessment for the banks covers eight commercial banks, including two identified as D-SIBs by the BoB. The eight banks represent 93.2 percent of total banking sector assets as of June 2022. The analysis largely relies on the supervisory data from the BoB, which

[12] Deposits of the top seven insurance companies account for approximately one third of their capital and deposits from retirement funds account for close to 46 percent of the banking sector total capital (NBFIRA 2022 Annual Report and Banking Sector Financial Statistics, 2021 data).

is augmented with responses on a commercial bank survey prepared and conducted by the FSAP mission.[13] The resilience of the Botswana banking system was assessed under the following stress test exercises[14]:

- **Solvency stress test**: Assesses bank capital adequacy under baseline and adverse macrofinancial scenarios over 2023 to 2025 using a balance sheet approach to identify recapitalization needs. Sensitivity analysis complemented the scenario stress tests, targeting two main areas: (i) the concentration of credit risks in the household sector; and (ii) changes in the pass-through of policy rates to loan rates.

- **Liquidity stress test:** Assesses banks' capacity to withstand a liquidity stress over a 30-day period based on their observance of a proxy liquidity coverage ratio (LCR) for pula positions. The assessment assumes different categories of unencumbered high-quality liquid assets (HQLA) and banks' response under different liquidity stress scenarios.

- **Interconnectedness and contagion:** Seek to map the domestic interconnections, characterize the networks among banks and NBFIs, and identify common exposures among financial institutions. The FSAP also conducted contagion analysis, which is based on Espinoza and Sole (2010) to simulate credit and funding shocks across the banking system.

TOP-DOWN BANK SOLVENCY STRESS TEST

A. Overview

13. The FSAP banking solvency stress tests assesses banks' resilience to (i) credit risk; (ii) interest rate risks in the banking book (IRRBB) and (iii) market risks under a baseline and an adverse scenario developed by the FSAP team and discussed with the authorities.

B. Scenarios

14. The Botswana banking sector is assessed against the October 2022 WEO baseline and the RAM-based adverse scenario (Appendix IV). The projection of the shocks relied on the Flexible Systemic of Global Model (FSGM), which is the semi-structural dynamic stochastic general equilibrium (DSGE) model developed by the IMF Research Department.[15] Characteristics of the baseline and adverse scenarios are presented below and the trajectory for key macroeconomic variables presented in Figure 8.

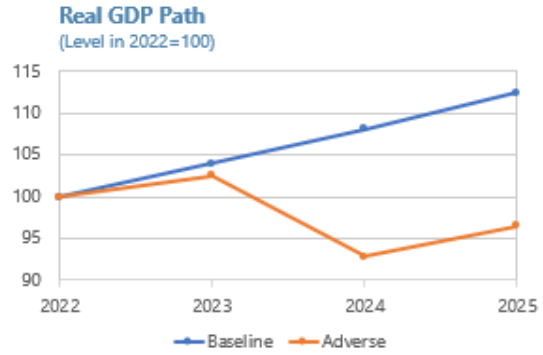
[13] As of June 2022, deposits of the top seven insurance companies account for approximately one third of their capital and deposits from retirement funds account for close to 46 percent of the banking sector total capital. (Ratio computed based on data from NBFIRA Annual Report 2022 and Banking Sector Financial Statistics, 2021).

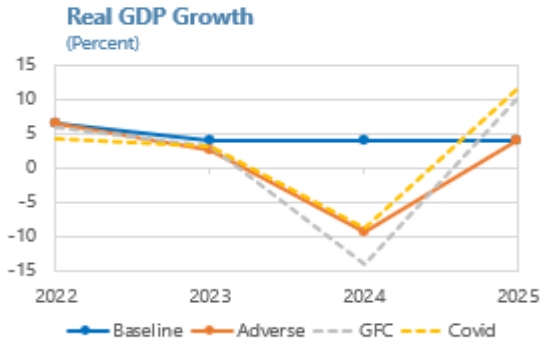
[14] Further details on methodologies and coverage are presented in the Stress Testing Matrix (STeM) in Appendix I.

[15] Andrle, M., Blagrave, P., Espaillat, P., Honjo, K., Hunt, B., Kortelainen, M., Lalonde, R., Laxton, D., Mavroeidi, E., Muir, D., Mursula, S., & Snudden, S. (March 2015). The Flexible System of Global Models-FSGM. IMF Working Paper.

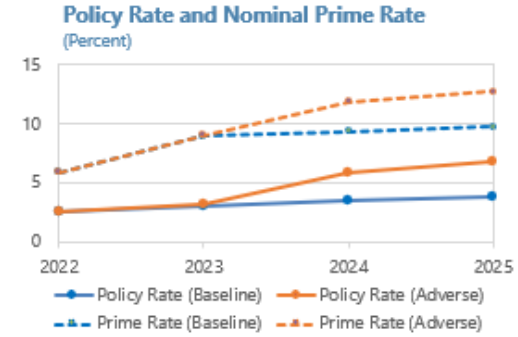
Figure 8. Botswana: Macro Scenarios

The realization of global and local adverse shocks entails a sharp decline in real GDP growth in 2024 and recovery by 2025. The GDP path in the adverse scenario is in line with previous recessions. It is more severe than outcomes from the COVID-19 pandemic, but less severe than the Global Financial Crisis.

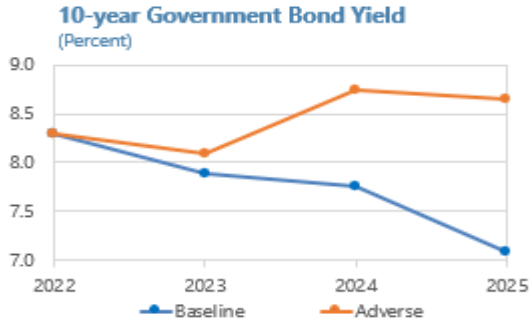




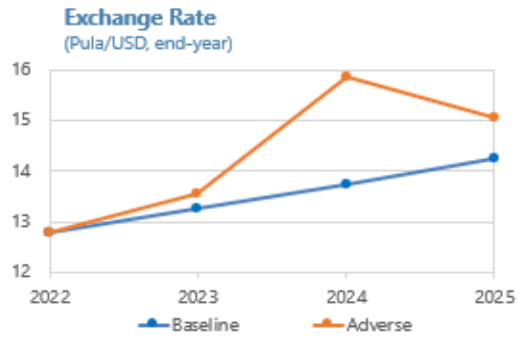
Policy rates will keep increasing and factor into higher prime rates on credit given a 1:1adjustment ratio…



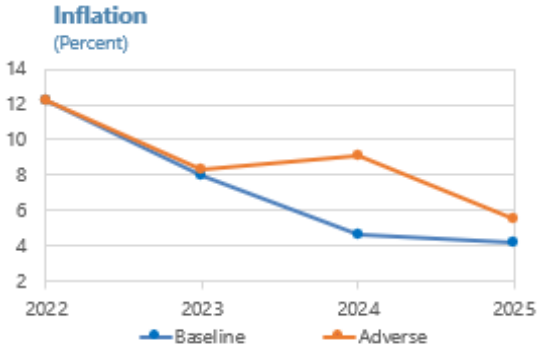
…and long-term bond yields initially spike as the economy goes into recession and government borrowing rises, and gradually decline as the economy recovers.



The BWP will depreciate against the USD due to higher domestic inflation to trading partners…



…inflation spikes in 2024 before returning to the downward baseline trend.



Notes:
1. The real GDP path was designed based on the "two standard deviations" rule and adjusted using historical recessions as references. Other variables' shock relied on scenario narrative and FSGM output, which has considered shocks of all Botswana's major trading partners.
2. The details for the macro scenario and assumptions are presented in Appendix IV.
Sources: World Economic Outlook and IMF estimates.

Baseline Scenario

15. Under the baseline scenario, Botswana continues to recover from the COVID-19 pandemic, growing by approximately 4 percent on average over the medium term. Inflation will remain outside of the inflation objective band in 2022, mainly because of higher commodity prices globally (particularly fuel and food). To address the high inflation, the scenario assumes that the BoB will continue to increase the MoPR, leading to tighter domestic financial conditions. As the economy recovers, however, portfolio outflows are expected to decline, and strong demand for diamonds buoy foreign exchange reserves. Both the balance of payments and fiscal balance are projected to strengthen. Bank lending, which is concentrated in the household sector, should also be supported by the recently agreed wage settlement for government employees. The relatively strong monetary policy response should help to fight inflation and anchor inflation expectations, allowing inflation to decline towards to the objective band over the course of 2023.

Adverse Scenario

16. The adverse scenario simulates an extreme but plausible recession. It assumes lower growth in 2022 (1.58 percent below the baseline) and a 10 percent drop in GDP in 2023. This is equivalent to a 2-year cumulative shock of 2.3 standard deviations from the historical mean (estimated from 1990 to 2021). The GDP path in the adverse scenario is more severe than during the pandemic. GDP growth returns to its potential in the medium term. The adverse scenario includes an inflation spike driven by volatility in food and energy prices globally as a result of spillovers from Russian's war on Ukraine, tighter monetary policy to fight inflation domestically, a decrease in diamond price due to global slow down, and moderate nominal exchange rate depreciation against euro and USD due to higher inflation domestically relative to trading partners.

C. Models and Methodologies to Balance Sheet and Income Projections

17. The solvency stress test is based on a static balance sheet assumption and the projected future capital ratio over the period 2023 to 2025. Assets and liabilities are assumed to remain constant over the three-year stress test horizon. Capital ratios are projected based on scenario conditional paths for capital and RWAs (equation (2)). Satellite models for credit risk, and profit and loss (P&L) components link the macroeconomic scenario to key bank variables that are used to project banks financial statements.

$$Capital_{t+1} = Capital_t + Net\ Income_{t+1} + Other\ Comprehensive\ Income_{t+1} \quad (1)$$

$$Capital\ Ratio_{t+1} = Capital_{t+1}/RWA_{t+1} \quad (2)$$

18. The probability of default (PD) is proxied using projected NPL ratio obtained from satellite models and loss given default (LGD) paths were assumed based on bank-specific historical coverage ratios.[16] Using a Bayesian Model Averaging (BMA) ordinary least squares (OLS)

[16] Estimated over the period from 2012Q1 to 2022Q2 for each bank.

panel approach,[17] bank-level NPL ratios (NPLs to total gross loans) were modelled as a logit function of lagged NPL ratios, nominal GDP growth, the real prime rate[18] and exchange rates per USD based on quarterly historical data from 2000Q4 to 2022Q2. Further, the PD was proxied using the scenario conditional NPL ratios and the information on historical write-off and recoveries for each bank. For banks that do not have historical write-off and NPL recoveries data, the system average write-off and recovery rates of 1.4 percent was applied), and the minimum of PD was assumed to be 0.1 percent. In credit risk models for Botswana, economic activity was found to have low explanatory impact on the evolution of non-performing loans for banks. In the case of exchange rate, the direct impact on NPLs is not obvious given that Botswana banking system has limited foreign loan exposures. The depreciation of the pula against the USD is linked to a higher level of domestic inflation compared to peer countries, as well as other broader macro-financial conditions, which could adversely impact the real income on loans.

19. The market risk module evaluated the risks related to valuation adjustments from changes in asset prices, interest rates, and exchange rates. The adjustment is applied to banks' securities portfolios and open positions in foreign currency. For available-for-sale (AfS) securities and held-for-trading (HfT) securities, market losses/gains are estimated following a mark-to-market approach. A modified duration formula is employed to reevaluate exposures as a function of their reported residual duration and the relevant bond yield assumption under the scenarios. Trading losses from HfT securities are treated as realized losses, affect net income, and are subject to taxes and dividend payout. Unrealized gains/losses from AfS securities affect other comprehensive income (OCI) and are not subject to taxes. Therefore, valuation changes in AfS securities affect capital one to one. For held-to-maturity (HtM) securities, the framework uses a credit risk approach. Provisions are made to cover expected loss as asset quality deteriorates. Finally, valuation changes in open foreign positions are estimated based on fluctuations of the exchange rate under the scenarios.

20. Interest rate risk in the banking book (IRRBB) is assessed on interest-earning assets and interest-bearing liabilities. Given the unavailability of an effective interest rate for new business, the projected effective interest rates for both the baseline and adverse scenarios are derived using the respective effective rates of the total stock of interest-earning assets/ interest-bearing liabilities (Appendix II). The main stress test results are derived by incorporating a pass-through assumption on the funding rate, which is determined based on the effective interest rate on interest-bearing liabilities, along with the application of a full pass-through assumption on the lending rate. Additionally, to complement the main stress test result, the FSAP team performed a range of sensitivity analyses using different assumptions for lending rate pass-through: 0 and model-projected effective rates on interest-earning assets.

21. The assumptions about dividend payout ratios relied on bank-specific data for on a 10-year average. It is assumed that these ratios remained consistent across both baseline and

[17] Gross, M., & Poblacion, J. (2019). Implications of model uncertainty for bank stress testing. Journal of Financial Services Research, 55 (1), 31–58

[18] Prime rate is used as a reference rate for private sector loans in Botswana.

adverse scenarios throughout the stress test horizon. Dividends are assumed to be paid only when net profit is positive. By contrast, when net profit is negative, banks were assumed not to pay dividends and capital was used to cover the losses.

22. The Basel II standardized approach (SA) mandates adjustments to the risk-weighted assets (RWAs) in line with the evolution in credit risk. The change in RWAs for credit risk are primarily determined by three key components: (i) RWA grow in line with balance sheet growth, which is set as 0 under static balance sheet assumption; (ii) a decline in risk weights (to zero) is generated by the flow of provisions related to new NPLs; (iii) an increase in risk weights stemming from the non-provisioned segment of new NPLs.

23. The outcome of this exercise is measuring whether the capital ratios for individual banks meet the minimum regulatory requirement. All eight commercial banks have the same capital requirements for the total capital and Tier 1 capital. Only one bank has the Common Equity Tier 1 (CET1) requirement (Box 2).

Box 2. Botswana: Hurdle Rates

(In percent)

	Minimum Requirement
Total Capital	12.5
Tier 1	7.5
CET1	4.5

Source: Bank of Botswana.

D. Stress Test Results

Static Balance Sheet Assumption

24. The banking system remains broadly profitable and appears resilient to severe macro-financial shocks (Figure 9). The solvency stress test shows the aggregate capital depletion in the adverse scenario is relatively small (less than 0.02 percent of GDP). Under both baseline and adverse scenarios, the net interest income contributes positively to capital due to the combination of shorter maturities, a higher share of variable-rate assets, and a greater pass-through from the policy rate on assets compared to liabilities, in a high-interest environment. Credit risk increases significantly under the adverse scenario in 2024 but the increase in net interest income outweighs the impact on the capital ratio from rising NPLs. Banks present low market risk given the limited exposure to securities.

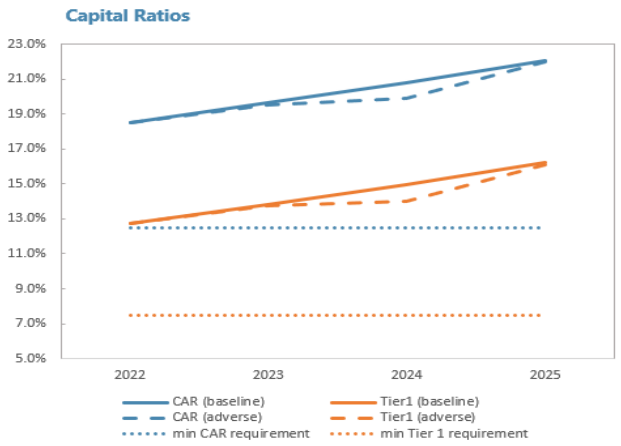
25. Two D-SIBs, representing 44 percent of the system assets, appear to be resilient under both scenarios. Although both banks have relatively high dividends payout[19] under both scenarios and high credit risk under adverse scenario, their capital adequacy ratios (CAR and Tier1) remain

[19] The average dividends payout ratios for two D-SIBs are significantly higher at 65.5 percent, as compared to the system average of 31.2 percent.

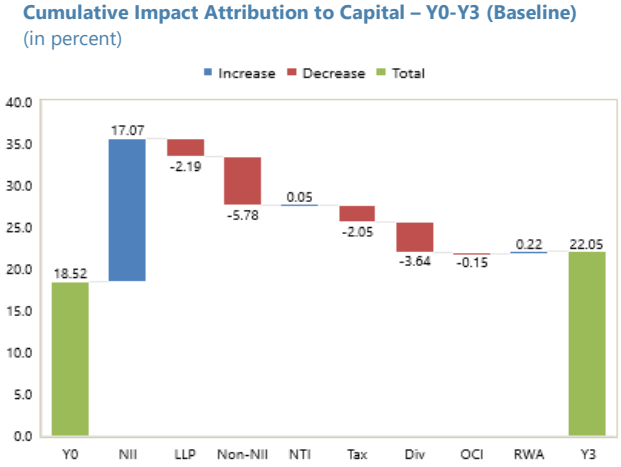
above minimum regulatory requirements due to high initial capital ratios (20 percent for CAR and 13.6 percent for Tier 1 capital ratio).

Figure 9. Botswana: Solvency Stress Test Results

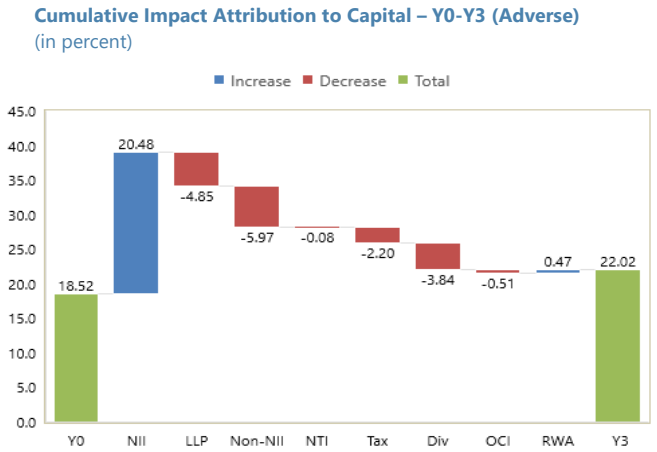
The banking sector has sufficient buffers under both scenarios, despite capital depletion in 2024 under adverse scenario.



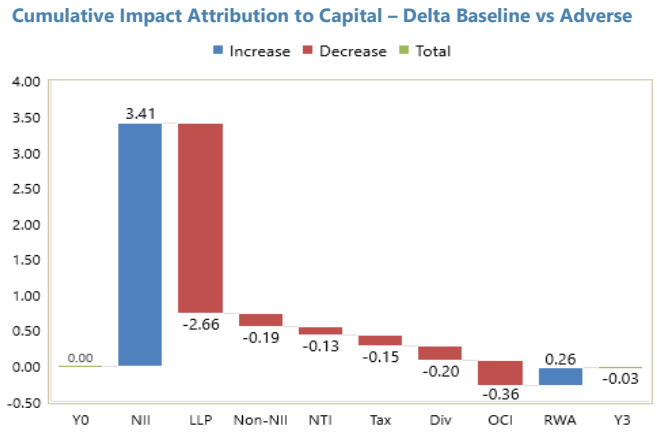
Dividends, credit risk and non-NII are the largest contributors to capital depletion under the baseline scenario.



The strong positive impact on NII outweighs credit losses in the adverse scenario.



Accordingly, the two scenarios result in largely similar outcomes.



Source: IMF staff estimates.
Note: NII= net interest income, LLP= loan loss provision, Non-NII= non-interest income, NTI= net trading income, Div= dividends, OCI= other comprehensive income.

26. Banks do not face material impacts from market risks given the limited exposures to securities. Market risk exposures are assessed through their exposure to foreign currency risk and interest rate risk in the trading book (IRR-TB). It was observed that only one bank was found to have significant market risk exposure in both scenarios. However, this was likely due to discrepancies in reporting securities between the trading book and banking book. Banks maintain capital for market exposures as per the Basel II norms. The risk weighted assets (RWA) for market risk for the banking system was 1.04 percent of total RWA as at end December 2021, which reduced to 1.02 percent as at end June 2022. Banks did not have any commodity or equity exposures as of December 2021.

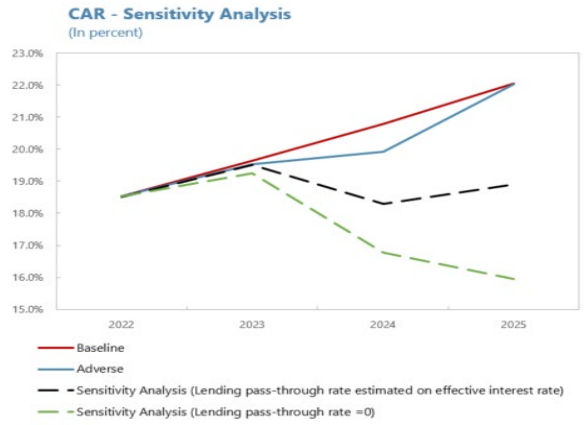
E. Single Factor Sensitivity Analysis

Different Pass-through Assumptions on the Lending Rate

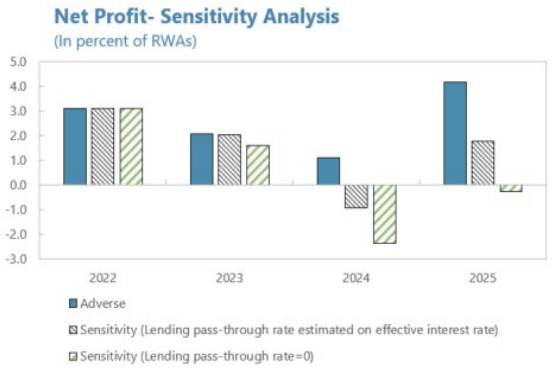
27. The significant net interest income in banks result from full pass-through assumptions applied to the lending rate.[20] A lower pass-through rate to lending rate would imply lower profitability and capital buffers (Figure 10). The sensitivity analyses are tested on top of the adverse scenario through: (1) model projected effective rates on asset-earning assets; (2) lending pass-through rates equal to 0. The analyses reveal that CAR could drop up to 6 percentage point to 16 percent in 2025. Even under the worst assumption, where pass-through equals to 0, the aggregate CAR would still remain above the regulatory thresholds. However, three banks would face challenges in meeting their minimum capital requirements by 2025 (aggregate recapitalization needs reach to 0.4 percent of GDP).

Figure 10. Botswana: Sensitivity Analysis

Different pass-through assumptions on lending rate could further reduce capital buffers…



…and contract net profit for banks due to lower NII over the medium term.



Source: IMF staff estimates.

[20] The assumption reflects the prevailing trend as practiced by commercial banks and corroborated from BoB's feedback.

Concentration Risk in the Loan Portfolio

28. Risks could arise due to a homogenous structure of concentrated risk to household loans (Table 2). The assumptions are for 10 and 20 percent of household loans becoming non-performing exclude the provisioning amount. Under the circumstance of 10 percent of household performing loans becoming non-performing, the banking system still shows resilience and capital sufficient, despite one bank that experiences total capital shortfall. If 20 percent of household performing loans were to become non-performing, some banks would encounter a significant capital shortfall, resulting in the aggregated CAR falling below minimum capital requirements. Nevertheless, most of banks possess strong total capital buffers and could withstand a severe shock from a rise in credit risks attributed to household loans.

Table 2. Botswana: Sensitivity Analysis Results for Concentration of Credit Risk
(in percent)

	Total	Peer 1	Peer 2	Peer 3
NPL ratios in household sector	3.2	3.6	2.0	4.8
Current Capital Ratios				
Total Capital	18.5	18.9	18.2	17.1
Tier 1	12.7	13.1	13.3	10.4
Core Tier 1	12.2	13.1	10.7	10.4
Single Factor Shocks				
10 percent Household Performing Loans become non-performing				
Total Capital	15.1	15.9	11.7*	15.8
Tier 1	9.3	10.1	6.7*	9.1
Core Tier 1	8.9	10.1	5.0*	9.1
20 percent Household Performing Loans become non-performing				
Total Capital	11.6*	12.9	5.1*	14.5
Tier 1	6.3*	7.1*	2.7*	7.8
Core Tier 1	6.3*	7.1*	2.7*	7.8

Sources: IMF staff calculations.
Notes: the asterisks indicate numbers below the minimum requirements.

Box 3. Botswana: Macroprudential Policy Tools

By international standards, Botswana's macroprudential toolkit is broadly on par with other EMDEs, but smaller than advanced economies. Botswana has a range of macroprudential tools in place to manage risks, with most targeting systemic liquidity risks (see Appendix VI).

A broader set of macroprudential tools could be useful to safeguard financial stability. Banks' high exposure to household debt, lumpy financing, as well as the concentration of their balance sheets, could pose systemic risks. Higher diamond prices could contribute to excess liquidity in the banking system, which could in turn fuel credit growth and inflate asset prices. This would likely be exacerbated by the recent decision to reduce overseas exposure limits for retirement funds, which may possibly contribute to a greater concentration risk in bank deposits.

To reduce solvency risks, additional capital buffers may be required. These could be structured as positive-cycle neutral counter-cyclical capital buffers, or systemic risk buffers, which could be released in periods of stress. To address liquidity risks, Basel Ⅲ tools—the LCR and net stable funding ratio (NSFR), could be useful to manage vulnerabilities. Additional measures, including a cap on debt-service to income ratios, could limit risks stemming from household debt.

Botswana and Selected Countries: Existing Macroprudential Instruments

Country	Algeria	Botswana	Chile	Ghana	Mexico	Namibia	South Africa
Broad-Based Tools							
Countercyclical capital buffer framework	no	**no**	yes	no	yes	no	yes
Positive countercyclical capital buffer rate	no	**no**	no	no	no	no	no
Capital conservation buffer	yes	**no**	yes	yes	yes	yes	yes
Limit on leverage ratio	no	**no**	yes	yes	yes	yes	yes
Forward-looking loan loss provisioning requirement	no	**yes**	yes	no	yes	no	yes
Cap on credit growth	no	**no**	no	no	no	no	no
Household Sector Tools							
Household sector capital requirements	no	**yes**	yes	no	yes	yes	no
Cap on loan-to-value ratio	no	**no**	yes	yes	no	yes	no
Cap on debt-service-to-income ratio	yes	**no**	yes	no	no	no	no
Restrictions on unsecured loans	no	**no**	no	no	no	no	no
Corporate Sector Tools							
Corporate sector capital requirements	no	**no**	yes	no	yes	no	no
Cap on loan-to-value ratio for commercial real	no	**no**	no	no	no	no	no
Liquidity Tools							
Liquidity Coverage Ratio	yes	**no**	yes	no	yes	no	yes
Differentiated by currency	no	**no**	no	no	no	no	no
Liquid asset ratio	no	**yes**	yes	no	no	yes	yes
Differentiated by currency	no	**no**	yes	no	yes	no	no
Net Stable Funding Ratio	no	**no**	no	no	no	no	yes
Loan-to-deposit ratio	no	**yes**	no	no	no	no	no
Net foreign exchange positions	yes	**yes**	yes	yes	yes	no	yes
Systemic tools							
Pension funds	no	**yes**	yes	no	yes	no	no
Capital surcharges for SIFIs	no	**no**	yes	no	yes	no	yes
Liquidity surcharges for SIFIs	no	**no**	yes	no	yes	no	no
Limits on exposures between financial institutions	no	**no**	yes	yes	yes	yes	no
Measures to mitigate risk exposures to sovereigns	no	**no**	yes	no	yes	no	no

Source: IMF Macroprudential Survey, 2020

F. Policy Recommendations

29. The authorities should collect more granular data on the performance of banks' credit portfolios and securities portfolio to close data gaps. First, the BoB should collect PDs or LGDs data from the banks who use this data for internal risk management, which the BoB could feed into credit risk assessments. Second, it is also necessary to obtain NPL flow data by economic sectors. The existing data only has the NPL beginning and closing balances but does not capture the new NPL flow data—inflow NPLs capture loans transitioning from performing status to non-performing status; outflow NPLs indicate loans that exits from non-performing status for various reasons. Only having NPL beginning and closing balance can be misleading, as there is no indication of how much of NPLs may have been written-off. Third, it would be useful to collect specific duration for existing loan and security portfolios to better measure the duration risks across different maturities, as the current statutory reports collect information only on the securities duration below 1 year and over one year.

30. The BoB should expand the stress testing framework to include multi-period scenario analysis at both the macro and micro levels. BoB currently conducts single factor, single period stress testing that covers credit, interest rate and liquidity risks. In terms of macroprudential stress tests, the BoB can take advantage of the ongoing IMF TAs to develop models for credit risk, market risk and interest rate risks. These would augment the review of the micro-level stress tests conducted and reported by banks that use macro-economic and financial vulnerabilities, and shocks that are most relevant to their portfolio. By comparing the outcomes from these two assessments, BoB can better monitor the potential risks to the system or specific bank more effectively.

31. While the stress tests do not reveal material impacts from IRRBB, the authorities should develop supervisory methodologies to assess banks' exposure to IRRBB and the possible sensitivity of their net interest margins. This will strengthen the SREP, particularly in the current cycle of tightening financial conditions and as the BoB-imposed cap on the transmission of MoPR changes to loan rates expires. Supervisors receive bank-wise data on distribution of rate sensitive assets (RSA) and rate sensitive liabilities (RSL) by their repricing maturity, but in the absence of the supervisory tools to analyze the reported data to determine the extent of individual bank's exposure to IRRBB, it hinders the BoB's ability to validate or challenge the banks' internal measurement of IRRBB, including for the purpose of Internal Capital Adequacy Assessment Process and the adequacy and appropriateness of the internal limits established by banks.

32. The concentration of credit risks in household loans may suggest a need for complementary macroprudential sectoral tools to limit vulnerabilities. Pockets of elevated sensitivity to rising NPLs from the household loans may exist and should be effectively managed using additional tools to complement the BoB's current macroprudential reporting requirement which increases the risk-weighting of mortgages with loan-to-value (LTV) ratios above 90 percent. Household sector tools such as the caps on debt-service to income (DSTI) ratios have not been

introduced, although they are included in the macroprudential policy framework.[21] In addition to credit growth considerations, macroprudential capital buffers could protect against a range of shocks. These could be structured as positive-cycle, neutral counter-cyclical capital buffers, or systemic risk buffers, which could be released in periods of stress.

TOP-DOWN BANK LIQUIDITY STRESS TEST

A. Overview

33. The BoB has implemented the statutory liquid assets ratio (LAR) as a prudential liquidity regulation imposed on commercial banks. The LAR is defined as the ratio of a bank's holding of statutory liquid assets to short-term deposits. The statutory LAR requirement of 10 percent is a daily requirement. The LAR plays a role in *ex-ante* risk control to mitigate liquidity risks. However, it is not as informative as the LCR—because the LCR assesses liquidity risk from a flow perspective. The BoB plans to introduce Basel III LCR and NSFR framework to enhance liquidity monitoring of the banking system.

B. Methodology

34. The bank liquidity stress test was based on a top-down LCR-proxy test to assess banks' resilience against liquidity shock. Using granular data from the banks' Basel II statutory reports, the LCR test was conducted in local currency over a 30-day period. The BoB has not yet implemented Basel III LCR and NSFR for liquidity monitoring or as a binding requirement, so necessary assumptions were made to ensure consistency with standard liquidity components of the Basel III LCR framework (Appendix V). The detailed data mapping from BoB's Basel II items to Basel III LCR are available in Appendix VII.

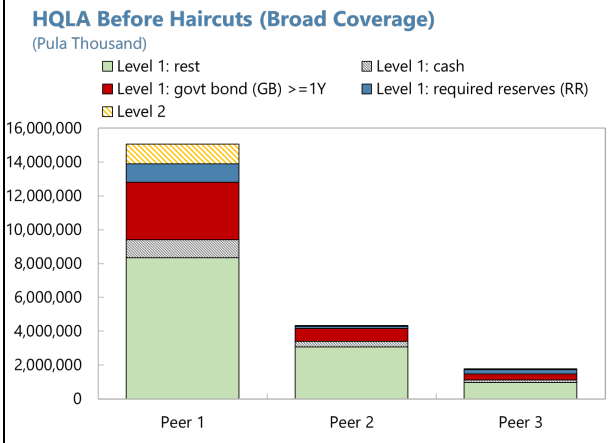
35. Banks' HQLA are concentrated in Peer 1 banks (71 percent of total) and are dominated by level 1 assets (94 percent of total), based on the broad definition (Figure 11). Peer 1 banks collectively hold 71 percent of total HQLA, while Peer 3 banks collectively hold only 8.5 percent.[22] Banks' level 1 assets consists mostly of government securities and balances due from the BoB (including current and repo accounts, standing deposit facility, and required reserves). Notably, Peer 3 banks hold a greater proportion of required reserves in their HQLA holdings than other groups. As for level 2 assets that are 6 percent of total HQLA, banks mostly hold marketable securities and corporate bonds—with four banks not holding any level 2 assets at all.

[21] The macroprudential framework includes limits on exposure concentration, which target corporate sector credit exposures (see Appendix VI). The share of corporate debt in total debt is low, and although the sensitivity assessment was not done for this sector, additional measures could be considered given the trends in NPLs and the need to limit credit risk exposures. The calibration of these tools, however, will require additional information, e.g. aggregate debt exposures and debt service costs in expenses.

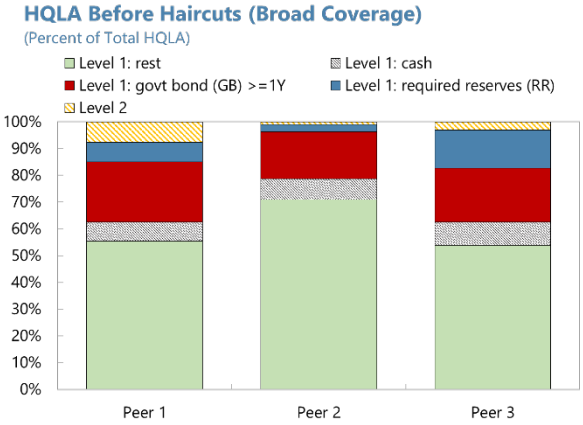
[22] Peer 1/2/3 banks' share of total assets in the banking system is 64/22/14 percent, respectively, as of end-August 2022.

Figure 11. Botswana: HQLA Decomposition

Banking system's HQLA is concentrated in Peer 1 banks

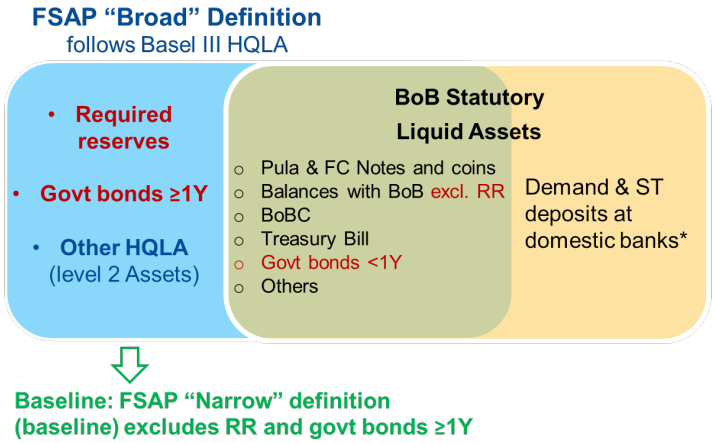


Banking system's HQLA is dominated by level 1 assets. Peer 3 banks hold relatively higher proportion of required reserves.



Source: Bank of Botswana (Commercial Bank Statutory Reports), and IMF staff calculation.
Note: "level 1: rest" assets comprise mostly of government securities (BoBCs, T-bills, and government bonds with maturity less than one year); they also include Pula and foreign cash, banks' balances with the BoB (current/repo/SDF).

36. The baseline scenario considered a coverage of HQLA that is close to the BoB's statutory liquid assets. The BoB's current regulatory framework excludes the primary reserve requirement (PRR) and government bonds with maturities beyond one year from its statutory liquid assets,[23] which make up 28 percent of the total HQLA in the banking system (Figure 10). The FSAP bank liquidity test adopted a "narrow" coverage of HQLA in the baseline, to be more consistent with the BoB's statutory liquid assets. The "broad" coverage of HQLA was included for comparison, which as expected, considerably increased the LCR ratios across banks.



Source: Bank of Botswana. Basel III LCR guideline.
Note: * refer to "due from domestic banks - demand and/or less than 184 days", which mainly consists of interbank unsecured loans.

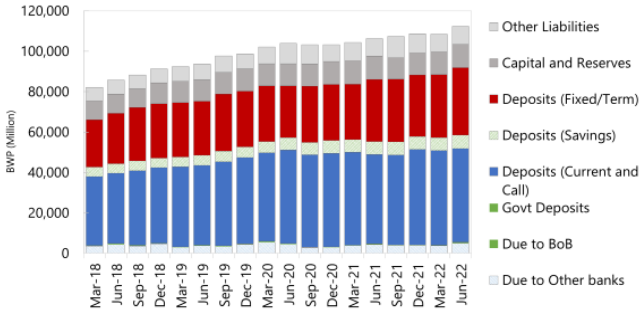
37. The parameters for the baseline scenario adopted the Basel III LCR factors, except for two adjustments in selected categories of deposits due to their relative stability in bank liabilities. The first exception is for the run-off rates of parastatals (government and development

[23] Under Basel III, required reserves can be excluded at the national discretion if they're not allowed to be drawn down in times of stress. In Botswana, government bond with maturities beyond 1-year are eligible for collaterals with the BoB, however, are not recognized as statutory liquid assets by the BoB.

banks), for which a 25 percent run-off rate was applied. The second exception for NBFIs' deposits applies a 40 percent of run-off rate. The total outflows in the baseline scenario represent 21 percent of total banking sector assets (BWP 24 billion). To be consistent with the BoB's current haircut schedule on the collateral assets, haricuts of 1.5 percent and 4 percent were applied to government bonds with maturities of less than one year and greater than one year, respectively.

38. To reflect the run-off risks of short-term wholesale and household deposits, the adverse scenario considered higher run-off rates on outflows (50 percent and 15 percent). Accordingly, outflows increased by BWP 6 billion from the baseline. The parameters for the adverse scenario were calibrated to anchor banks' outflows/total assets ratio to 26 percent, and inflows/total assets ratio to 9 percent. Haircuts on government bonds increased to 5 percent and 15 percent for those with maturities of less than one year and great than on yeear, respectively. Detailed LCR factors and scenarios are presented in Table 3.

Funding Sources in the Banking System



Source: Botswana Financial Statistics and IMF staff calculation

Table 3. Botswana: LCR Factors and Scenarios

	Category	Basel III Factor	Baseline Factor	Adverse Factor	*Adverse-0, all shocks*	*Adverse-1, HQLA shock*	*Adverse-2, HQLA +inflow shocks*	*Adverse-3, HQLA +outflow shocks*
HQLA	HQLA_l1: CB reserves (RR)	*100%*	100%	95%	✓	✓	✓	✓
	HQLA_l1: CB reserves (current/repo/SDF)	*100%*	100%	95%	✓	✓	✓	✓
	HQLA_l1: coins and banknotes	*100%*	100%	100%	✓	✓	✓	✓
	HQLA_l1: marketable securities (BoBCs, T-bill, other clai	*100%*	100%	95%	✓	✓	✓	✓
	HQLA_l1: marketable securities (GB<1Y)	*100%*	98.5%	95%	✓	✓	✓	✓
	HQLA_l1: marketable securities (GB>=1Y)	*100%*	96%	85%	✓	✓	✓	✓
	HQLA_l2A: corporate debt securities	*85%*	85%	70%	✓	✓	✓	✓
	HQLA_l2A: marketable securities	*85%*	85%	70%	✓	✓	✓	✓
Inflows	if_counterparty: households	*50%*	50%	25%	✓		✓	
	if_counterparty: domestic banks	*100%*	100%	50%	✓		✓	
	if_counterparty: domestic banks' subsidiaries	*100%*	100%	50%	✓		✓	
	if_counterparty: foreign banks	*100%*	100%	50%	✓		✓	
	if_counterparty: parastatals (govt & dev banks)	*100%*	100%	50%	✓		✓	
	if_counterparty: corporations	*50%*	50%	25%	✓		✓	
	if_counterparty: NBFIs	*50%*	100%	50%	✓		✓	
	if_derivative: net derivative inflows	*100%*	100%	50%	✓		✓	
Outflows	of_retail: household deposits	*10%*	10%	15%	✓			✓
	of_wholesale: domestic banks	*100%*	100%	100%	✓			✓
	of_wholesale: foreign banks	*100%*	100%	100%	✓			✓
	of_wholesale: parastatals (govt & dev banks)	*40%*	25%	40%	✓			✓
	of_wholesale: corporations	*40%*	40%	50%	✓			✓
	of_wholesale: NBFIs	*100%*	40%	50%	✓			✓
	of_secured: CB or backed by level1 (bal due to BoB)	*0%*	0%	0%	✓			✓
	of_secured: backed by 2A (Debt < 5Y)	*15%*	15%	20%	✓			✓
	of_secured: non-level1 or non-level 2A (repo with FI)	*25%*	25%	50%	✓			✓
	of_secured: other borrowings	*100%*	100%	100%	✓			✓
	of_additional: Net derivate cash outflows	*100%*	100%	100%	✓			✓

Sources: Basel III LCR, and IMF staff calculation.

Note: (1) Required reserves (CB reserves (RR)) and government bonds with maturity over one year (GB<1Y) are excluded from the baseline. (2) Baseline factors that differ from Basel III LCR factors are marked in red color. Government bonds' baseline haircuts are from the BoB's haircuts schedule for refinancing facilities.

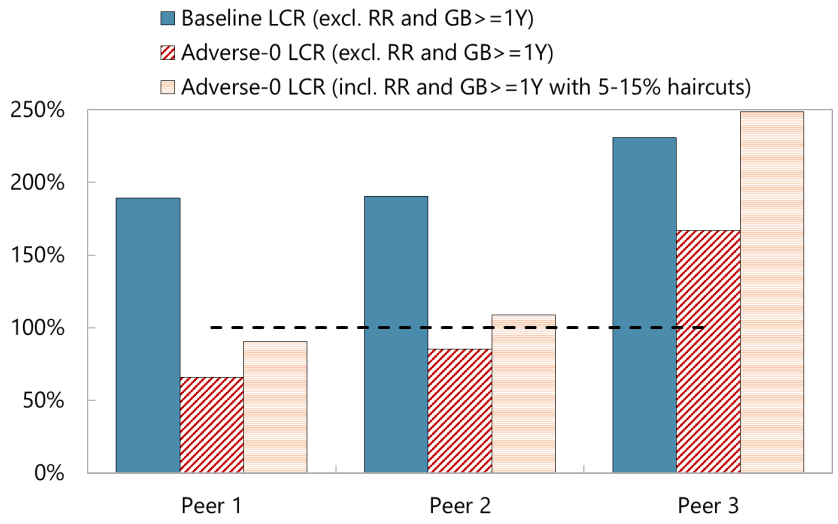
C. Stress Test Result

39. Banks showed a strong liquidity position in the baseline, even under the restricted definition of HQLA that excludes the PRR and long-term government bonds (Figure 11). The LCR ratios for all commercial banks were substantially above the 100 percent threshold. Peer 3 banks had the highest average LCR because they have sizeable short-term liabilities: Peer 3 banks' average 30-day inflows to total assets was 26 percent (after applied LCR factors), significantly higher than Peer 1 banks' average of 16 percent. The relative size of inflows to outflows for Peer 3 banks was also significantly greater than for other groups: their average 30-day inflows to 30-day outflows was 193 percent, compared to 72 percent for Peer 1 banks. In the LCR calculation, therefore, the cap on inflows, set at 75 percent of outflows, was binding for Peer 3 banks.

40. Banks' liquidity positions are vulnerable due to their reliance on short-term funding, as revealed in the adverse scenario (Figure 12). Using the baseline definition of HQLA (narrow coverage), the LCR ratios of four banks dropped by more than 50 percent, with five banks falling below the 100 percent threshold (Figure 12). However, expanding the class of eligible liquid assets to include required reserves and government bonds with maturity over one year (with 15 percent haircuts), the sector shows slightly improved resilience with LCRs closer to 100 percent for most banks—only two banks remained below but close to 100 percent. Notably, the LCRs of Peer 3 banks increased significantly more than those of other groups, as they held a significantly larger proportion of required reserves in their HQLA holdings.

Figure 12. Botswana: LCR-Proxy Stress Test Result

The banking system is vulnerable to wholesale deposits run off, but expanding the eligible liquid assets improves the LCR



Source: IMF staff calculation.
Note: RR refers to primary required reserves, and GB refers to government bonds.

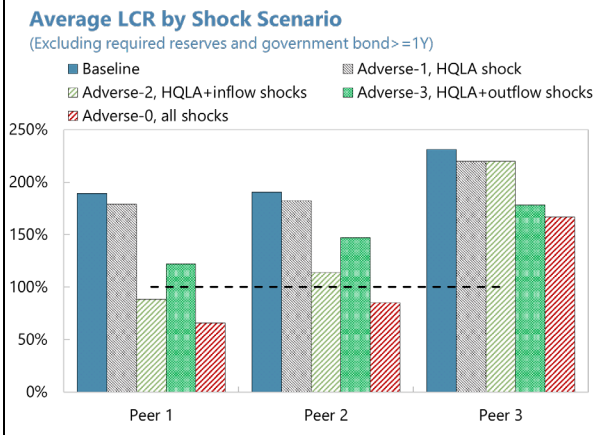
D. LCR Sensitivity Analysis

41. Peer 1 banks were more vulnerable to short-term inflow shocks due to the sizeable long-term maturities of assets; and banks with heavy reliance on short-term household and wholesale funding were more vulnerable to outflow shocks (Figure 13). The impact of different shocks under the adverse scenario showed that Peer 1 banks are more vulnerable to inflow shocks, as a result of their investment focus on the long-term maturities (securities holdings and loan lending). Peer 3 banks are resilient to inflow shocks due to substantial investment in short-term liquidity (inflows were still capped at 75 percent of outflows in all adverse scenarios 0–3).[24]

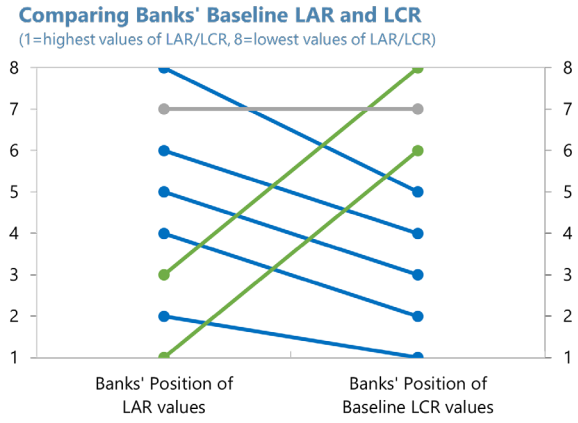
42. The LCR is a more informative indicator to assesses liquidity risks from a flow perspective. As shown in Figure 13, banks with higher LAR ratios did not necessarily have higher LCR ratios, due to discrepancy between the two measures. LCR focuses on the short-term stress (typically 30 days) while LAR covers all maturities. In addition, the LCR applies haircuts on liquid assets and bank inflow, run-off rates on bank liability by counterparty, as well as considers the off-balance sheet commitments, thus, LCR is more informative for monitoring liquidity risk.[25]

Figure 13. Botswana: LCR Sensitivity Analysis

Peer 1 banks are more vulnerable to inflow shocks, while Peer 3 banks are more resilient to inflow shocks.



Banks with the highest LAR values do not necessarily associate with the highest LCR values.



Sources: Bank of Botswana, and IMF staff calculation.

[24] While it is noted in the interconnectedness that small banks are particularly vulnerable to liquidity risks, these outflows may be understated as reporting of deposits across all maturities—whereas the LCR outflows only capture those during the 30-day LCR stressed period.

[25] This assessment of liquidity risks under different assumptions does not account for the availability of central bank emergency liquidity assistance or lines of credit (either from foreign parent banks or other domestic sources).

E. Policy Recommendations

43. The BoB should include the PRR as statutory liquid assets, particularly for the future LCR implementation. Basel III guidance includes the reserve requirement among liquid assets "to the extent the central bank policies allow their use in time of stress."[26] Commercial banks' balances held in the PRR account have met three pre-conditions for Basel III LCR compliance.[27] On the other hand, it would be problematic for LCR compliance if the PRR is excluded from statutory liquid assets when averaging is allowed. Commercial banks are required to retain 2.5 percent of Pula-denominated customer deposits in the PRR account in addition to the 10 percent LAR requirement.[28] Inclusion of the required reserves would facilitate commercial banks' liquidity management and relax balance sheet constraints on lending.

44. The FSAP recommends that the BoB, in the medium term, includes long-term government bonds as statutory liquid assets with appropriate haircuts.[29] The government bonds with maturities over one year are eligible collateral assets for the BoB's refinancing facilities, but not eligible as a statutory liquid asset—this is inconsistent with the Basel III guidance for LCR. In addition, this exclusion disincentivizes commercial banks from holding such securities for liquidity management.

45. In extending the coverage of liquid assets to include long-term government bonds, BoB should calibrate appropriate haircuts. Using the BoB's existing haircut schedule (up to 4 percent on government bonds with maturity over 10 years) may not appropriately reflect current market risks for government bonds in Botswana, given the limited secondary trading in the current market. While this is acknowledged as a limitation in calibrating appropriate haircuts for the long-term government bonds, it is an important issue that BoB should continue to monitor and improve over the medium term.

46. The BoB will need to develop a clear plan for introducing the Basel III LCR and NSFR liquidity framework, and this should consider the following:

- Improvements in banks' statutory reports to include detailed information, such as net loan and advances to different counterparties in different maturity buckets, balances due to domestic and foreign banks over a 30-day horizon, for the calibration of parameters;

[26] Basel Committee on Banking Supervision, Basel III: the liquidity coverage ratio and liquidity monitoring tools, paragraph 50 (b).

[27] PRR takes the form of averaging provision during the reserve maintenance period, which covers the LCR 30-day stress period; it is fully accessible to banks on daily basis; it contains only cash balances which have no conversion issue during liquidity stress period. See section III.D of MCM TA handbook on "Reserves Requirements".

[28] LAR and PRR have different deposit base: the deposit base of PRR is the total average Pula customer deposits from the previous month, while LAR is based on the total customer and banking deposits at the end of current month.

[29] See discussion in section III.C "Government Securities Market Development" of the FSAP technical note of Systemic Liquidity Management.

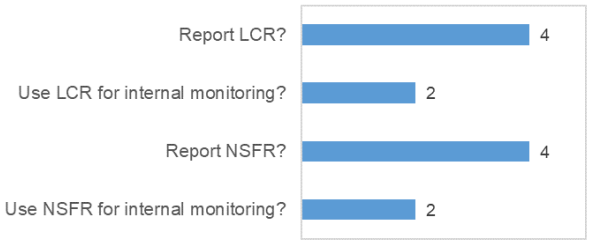
- Developing the regulatory guidance for banks on the application of the LCR and NSFR in Botswana's context, and how to use them for internal liquidity management (see Box 3);
- Appropriate calibration and applications of the regulatory weights on the assets, funding structure, and liquidity characteristics of Botswana's banking;
- A path for supervisors to gain material experience with LCR and NSFR reporting and validating by introducing a sufficiently long period where banks only report ratio calculations for monitoring purposes, before imposing prudential limits.[30]

Box 4. Botswana: Status of LCR and NSFR for Commercial Banks

Banks request more technical guidance from the BoB for the implementation of Basel III liquidity standards, especially small banks. As part of liquidity risk regulation reform since 2019, the BoB has investigated the feasibility of introducing LCR and NSFR to strengthen banking sectors' resilience to short-term liquidity shocks. In the commercial bank survey conducted by the FSAP team, all banks expressed supportive attitudes for this implementation, meanwhile, concerns about understanding and accurately calculating the indicators have been a challenge for most banks, with smaller banks in particular, indicating a need for more technical guidance from the BoB. Four banks report LCR on a monthly or quarterly basis, but only two banks use LCR together with either LAR or internal liquidity model for monitoring market liquidity. The NSFR status is similar, however, only one of the two banks report NSFR also report LCR. Most banks lack sophisticated tool for funding liquidity risk management, instead depending on liquidity gap analysis (Excel-based table in bank statutory report to calculate liquidity gap across different maturity buckets).

Number of Commercial Banks Responded "Yes"

(total = 8)



Source: IMF staff.

INTERCONNECTEDNESS AND CONTAGION ANALYSIS

A. Interconnectedness

47. The financial system intersectoral linkages are significant in Botswana. The banking sector has the largest exposure (48.67 percent) to households through unsecured loans, who also have majority of claims against NBFIs. NBFIs cross-border exposures mainly reflect pension funds offshore investment, which account over 60 percent of pension funds' total exposure portfolio.

[30] Ferreira, C., Jenkinson, N., & Wilson, C. (2019). From Basel I to Basel III: Sequencing implementation in developing economies. International Monetary Fund.

Commercial banks' exposure to micro-lenders is limited, and mainly concentrated in the two largest micro-lenders in the country. The major funding source in banking sector is from non-financial corporations, considering 49.76 percent of total banking deposit by May 2022[31]. In the interbank market, Peer 1 banks are the predominant lending source domestically, followed by medium banks.

B. Contagion Risks

48. The contagion analysis is based on Espinoza and Sole (2010)[32] to simulate credit and funding shocks across domestic banking system.[33] The data composed of eight commercial banks and analysed by group level. Credit shocks are analysed through failure of institution A that will cause credit losses to other institutions who have claims against institution A. These creditor institutions must use their capital to absorb these credit losses, if insufficient, they would default on their creditor. The simulation stops when no institutions default. Funding shocks, on the other hand, are simulated through failure of institution A and its impact on debtor institutions, who are forced to find other funding sources. Debtor institutions have to use their capital to absorb funding shortfall-induced losses, and once insufficient, they would default.

49. Key Assumptions: For credit shock the loss given default (LGD) was set to 85 percent, given the nature that interbank lending is concentrated in unsecured loans. When a funding shock and a credit shock occurred simultaneously, the assumption was that a bank could only replace 50 percent of the funds that were previously borrowed from the default creditor, causing the borrower bank's assets to be traded at a 35 percent discount fire-sale.

50. The simulations show that no single failure of a bank would trigger the failure of another bank given credit and funding shocks, but undercapitalization remains a potential concern (Figure 14). Interbank positions are small compared to banks' capital in the Botswana banking sector. Dispersions of contagion index[34] in Peer 1 and vulnerability index[35] among Peer 3 are comparably large due to the different degrees of bilateral interbank connections. Peer 1 banks appear to be the most contagious group, followed by Peer 2 group. The failure of any bank in the Peer 1 group would result in a potential capital reduction of up to 12.7 percent for the counterparty bank. This could increase the risk of affected banks falling below the required minimum capital levels. In case of simultaneous credit and funding shocks and the failure of all banks in Peer 1, the remaining banking system would experience a total capital loss of 12 percent. In contrast, the vulnerability index indicates Peer 3 banks are among the most vulnerable, as evidenced by their capital loss of 11 percent resulting from other banks' defaults. The vulnerability index at the group

[31] Source: Bank of Botswana.

[32] Espinosa-Vega, M., & Sole, J. (2010). Cross-Border Financial Surveillance: A Network Perspective. IMF Working Paper.

[33] Given the data constraints, only inter-bank contagion analysis has been conducted.

[34] Contagion index is the weighted average percentage losses of other banks due to the failure of a given bank.

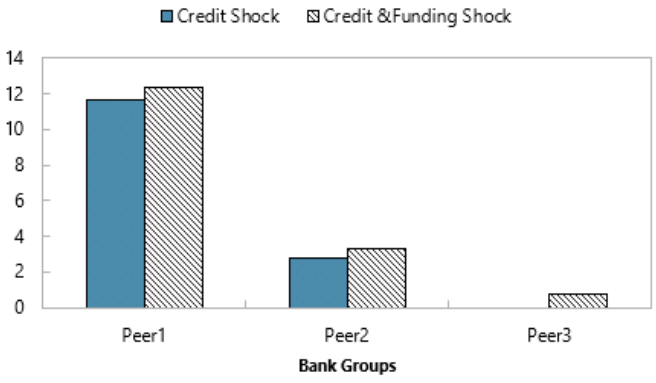
[35] Vulnerability index is the percentage losses of a bank due to the default of other banks.

level of Peer 2 is driven up by the bank that is particularly vulnerable to the other two banks in the system.

Figure 14. Botswana: Contagion Analysis

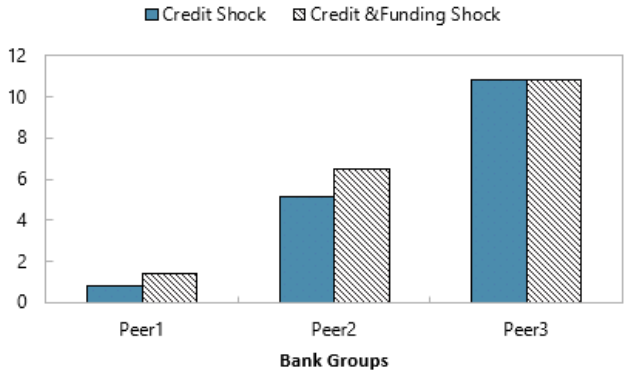
Peer 1 banks are the most contagious entities…

Index of Contagion



…while Peer 3 banks appears to be the most vulnerable group…

Index of Vulnerability



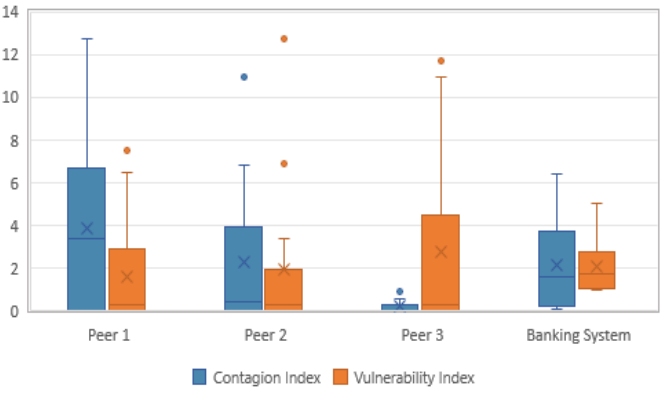
…Peer 3 group is particularly susceptible to Peer 1 group.

…the bank in Peer 2 is especially vulnerable to other two banks in the system.

Bilateral Exposures

		Vulnerability Index		
		Peer 1	Peer 2	Peer 3
Contagion Index	Peer 1	--	11.58	13.34
	Peer 2	2.20	--	8.39
	Peer 3	0.58	1.33	--

Contagion and Vulnerability Indices Distribution
(Credit & Funding Shock)



Sources: Bank of Botswana, and IMF staff calculations.
Notes: 1/ Index of contagion (of index of outward spillover risks): the average loss of other banks due to the failure of a bank i (or a bank group). Index of contagion = total capital impairments/ total pre-shock capitals (both numerator and denomenator exclude the trigering bank's (or bank group's) capitals- the one assumed to be failed).
Index of vulnerability (or index of inward spillover risks): the average loss of a bank i (or a bank group) due to the failure of all other banks. Index of vulnerability =1/(n-1)* total capital impairment for a bank (or bank group)/ total pre-shock capitals of the same bank (or bank group) (n >=2)
2/ Top two and bottom left panels use group level simulation, excluding exposures within bank groups; Bottom right panel uses bank level simulation, including all banks and intra-group exposure.

C. Policy Recommendations

51. The interconnectedness analysis highlights the needs for NBFIRA to enhance the data quality and streamline the data sharing with BoB. Given the large connection between banks and NBFIs in the financial system, the FSAP recommends an upgrade of the supervisory reporting templates to collect standardized information on bilateral exposures between banks and NBFIs (including inshore and offshore exposures). This added data could be used for contagion analysis among financial institutions and identify the most vulnerable institutions across the financial sector to enhance supervision.

52. To strengthen the sector resilience, it is recommended for the BoB to consider imposing tailored Pillar II capital buffer requirements for specific banks.[36] Banks with a high index of vulnerability concurrently fail to meet the capital requirement under adverse scenario in solvency stress test. These banks typically exhibit low capital ratios and paid high dividends based on historical patterns. Implementing this measure would enable banks with high index of vulnerability to enhance their ability to withstand adverse economic shocks. Additionally, it would address concerns regarding the possibility of a "domino effect".

[36] The assessment and definition of D-SIBs by the BoB have made the use of capital buffers an important part of the macroprudential toolkit.

Appendix I. NPL Ratios Satellite Model and Proxy PD

To estimate proxy probability of default (PDs), the scenario conditional non-performing loan (NPL) ratios, as well as data on loan recoveries and write-offs provided by banks, were used. Banks' NPL ratios were gathered quarterly from 2000Q4 to 2022Q2, while the data on recoveries and write-offs were available for a shorter period, depending on the bank.

Methodology for NPL Ratios Satellite Model

To ensure the models only produce NPL predictions between 0 and 1 and to capture nonlinearities in the relationship between the dependent and explanatory variables, the following logit transformation was applied to the original NPL:

$$Y_{it} = ln\left(\frac{NPL\ Ratios_{it}}{1-NPL\ Ratios_{it}}\right)$$

To assess the effects of macro-financial shocks on non-performing loan (NPL) ratios, a linear model was applied. The model utilized the logit-transformed NPL ratios as the dependent variable, and various exogenous macroeconomic and financial factors (regressors) as the independent variables. Thus, the resulting model for NPL ratios can be represented as:

$$Y_{it} = \alpha + \beta Y_{i,t-k} + \delta_{i,t-s} + \varepsilon_{i,t}$$

where $Y_{i,t}$ is the logit transform of the NPL ratios for bank i at time t, X_t is a vector of macroeconomic and financial variables, $Y_{i,t-k}$ is vector of the lagged dependent variable (k=1 to N), $\varepsilon_{i,t}$ is an independent and identically distributed error-term, and α, and vectors β, and δ are parameters were presented in Table A1.

Bayesian Model Averaging (BMA) OLS panel approach was used to estimate the satellite models for NPL ratios, with the aim of eliminating model uncertainty. BMA addresses the problem of overconfident inferences that may arise from relying on a single model estimation by taking an average over the best models in the model class, based on their approximate posterior model probability. The framework also allows for sign restrictions to be imposed during the estimation process, ensuring that there is a reasonable relationship among input variables.

Table I.1. Botswana: Bank NPL Ratios Satellite Model

	Long run multiplier with sign restriction
VARIABLES	
L.Logit_NPL	0.54*
nGDP growth	0.001
Real Prime Rate	0.015
Exchange Rate	0.17*
R-squared	0.58

Sources: Bank of Botswana, IMF WEO database, and IMF staff calculations.

Notes:

1. *denotes a higher posterior inclusion probability than the prior, which indicates variable statistical significance.

2. A long run multiplier is defined as the sum of all coefficients of a given right hand-side variable on its contemporaneous and lagged terms.

Methodology to Calculate Proxy PDs

The BoB does not currently collect PDs and LGDs as all banks are regulated following the Basel standardized approach. While information on the stock of non-performing loans is available, NPL flow data is not. Therefore, the PDs were approximated through the following equation:

$$Proxy\ PD_t = \frac{[NPl_t - (1 - \bar{\alpha})NPl_{t-1}]}{Performing\ Loans_{t-1}}$$

Where $\bar{\alpha}$ represent the proportion of NPLs that are either written-off or recovered to performing.

The value of $\bar{\alpha}$ is derived using limited historical information. In particular, the change of NPLs between two consecutive periods can be rewritten as:

$$New\ NPL_t = NPl_t - NPl_{t-1} + Recoveries_t + Writeoffs_t$$

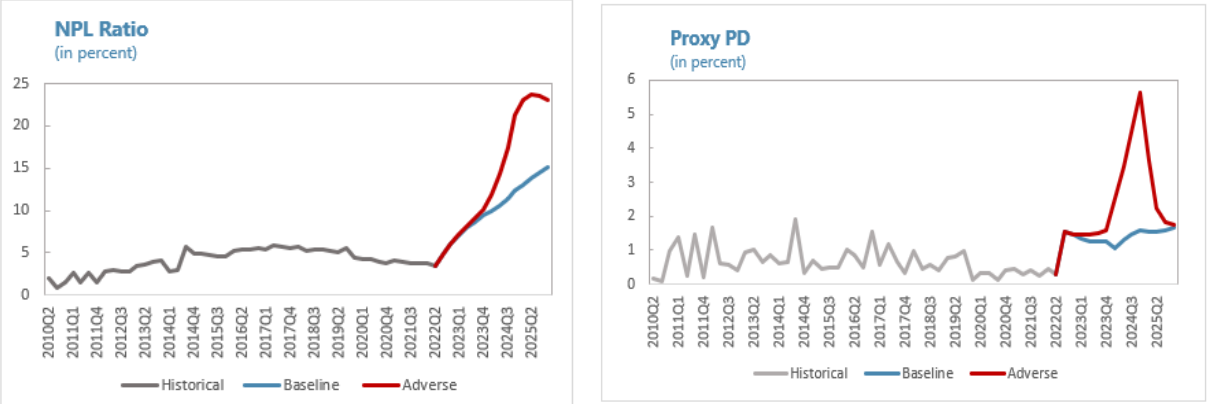
$$\Delta NPL_t = NPl_t - NPl_{t-1} = New\ NPL_t - Recoveries_t - Writeoffs_t$$

$$\Delta NPL_t = NPl_t - NPl_{t-1} = New\ NPL_t - \alpha_t * NPL_{t-1}$$

Assuming a constant alpha over time, taken as the average over the sample period:

$$\bar{\alpha} = \text{(recoveries+ write-offs)/ } NPL_{t-1}$$

Figure I.1. Botswana: NPL Ratio and PD Projections



Sources: Bank of Botswana, and IMF staff estimates.

Appendix II. Satellite Models—Interest Income and Interest Expense

Separate estimations were made for the funding rates and lending rates of the banks, which were based on historical interest rates for loans and deposits, respectively. And BMA OLS panel methodology was used. Results from satellite models reveals high explanatory power of nominal prime rates and the exchange rate (Table AII.1 and Table AII.2).

$$\underset{(Lending\ Rate,\ Funding\ Rate)}{Y} = \underset{(inflation,\ nominal\ prime\ rate,\ exchange\ rate)}{f\,(macroeconomic\ variables)}$$

Satellite Model on Interest Income

$$Lending\ Rate_{bt} = \frac{Interest\ Income_{bt}}{Total\ Earning\ Assets_{bt} - NPL_{bt}}$$

Table II.1. Botswana: Interest Income Satellite Model

Long run multiplier with sign restriction

VARIABLES	
L.Logit_Lending Rate	0.41*
inflation	-0.01
L.inflation	0.012
Nominal Prime Rate	0.035*
Exchange Rate	0.17*
R-squared	0.29

Sources: Bank of Botswana, IMF WEO database, IMF staff calculations.

Notes:

1. *denotes a higher posterior inclusion probability than the prior, which indicates variable statistical significance.

2. A long run multiplier is defined as the sum of all coefficients of a given right hand-side variable on its contemporaneous and lagged terms.

Satellite Model on Interest Expense

$$Funding\ Rate_{bt} = \frac{Interest\ Expense_{bt}}{Total\ Liabilities_{bt}}$$

Table II.2. Botswana: Interest Expense Satellite Model

Long run multiplier with sign restriction

VARIABLES	
L.Logit_Funding Rate	0.48*
inflation	0.002
L.inflation	-0.0002
Nominal Prime Rate	0.065*
Exchange Rate	0.03*
R-squared	0.31

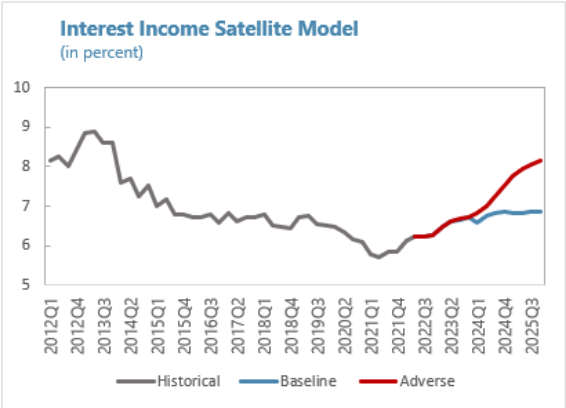
Sources: Bank of Botswana, IMF WEO database, and IMF staff calculations.

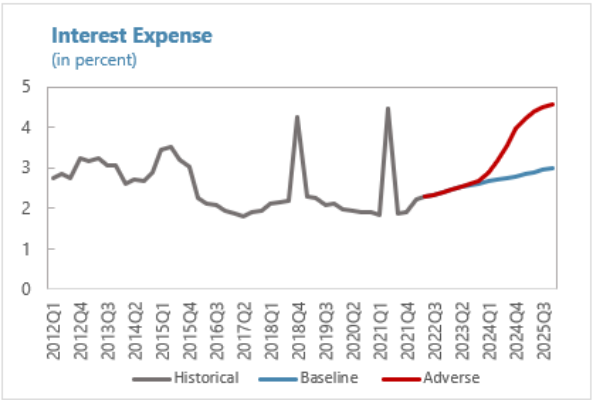
Notes:

1. *denotes a higher posterior inclusion probability than the prior, which indicates variable statistical significance.

2. A long run multiplier is defined as the sum of all coefficients of a given right hand-side variable on its contemporaneous and lagged terms.

Figure II.1. Botswana: Interest Income and Interest Expense Satellite Models





Sources: Bank of Botswana, and IMF staff estimates.

Appendix III. Detailed Results from Solvency Stress Test

Table III.1. Botswana: Baseline Scenario: Summary Results
(In Pula millions unless otherwise indicated)

	2022	2023	2024	2025
GDP	220,464,000	246,853,541	268,206,372	290,063,479
Nominal GDP change (percent)		12	8.7	8.1
Total capital adequacy ratio (percent)	18.5	19.6	20.8	22.1
Tier 1 capital ratio (percent)	12.7	13.8	15.0	16.2
Common/Core tier 1 ratio (percent)	12.2	13.3	14.4	15.7
Number of banks failing the tests total		0	0	0
CAR		0	0	0
T1R		0	0	0
Core T1R		0	0	0
Necessary Recapitalization (absolute)		0	0	0
CAR		0	0	0
T1R		0	0	0
Core T1R		0	0	0
Necessary Recapitalization (percent of GDP)				
CAR		0	0	0
T1R		0	0	0
Core T1R		0	0	0
Total Capital in the banking system	14,344	15,153	15,980	16,889
Tier 1 Capital in the banking system	9,867	10,675	11,503	12,412
Common/Core Capital in the banking system	9,467	10,275	11,102	12,012
Sum of Risk Weighted Assets	77,444	77,200	76,893	76,602
Change of Total capital in the banking system		808	828	909
Change of RWA		-243	-307	-291
Net Profit	2,406	1,728	1,781	1,949
Net Interest Income	4,483	4,482	4,904	4,663
Loss provisions (Credit Risk)	-33	-487	-614	-582
Net non-interest income	-1,415	-1,460	-1,486	-1,498
Losses/Gains on market portfolios	0	-13	-12	-11
Share of profits of associates	0	0	0	0
Others	0	0	0	0
Extraordinary items	0	0	0	0
Taxes	-628	-497	-515	-562

Source: IMF staff calculations.

Table III.2. Botswana: Adverse Scenario: Summary Results
(In Pula millions unless otherwise indicated)

	2022	2023	2024	2025
GDP	220,464,000	244,252,065	243,362,500	266,456,047
Nominal GDP change (percent)		10.8	-0.4	9.5
Total capital adequacy ratio (percent)	18.5	19.5	19.9	22.0
Tier 1 capital ratio (percent)	12.7	13.7	14.0	16.1
Common/Core tier 1 ratio (percent)	12.2	13.2	13.5	15.6
Number of banks failing the tests total		0	2	2
CAR		0	1	1
T1R		0	1	2
Core T1R		0	1	1
Necessary Recapitalization (absolute)		0	163.9	163.8
CAR		0	21	35
T1R		0	22	14
Core T1R		0	142	158
Necessary Recapitalization (percent of GDP)				
CAR		0	0.009	0.013
T1R		0	0.009	0.005
Core T1R		0	0.058	0.059
Total Capital in the banking system	14,344	15,067	15,107	16,649
Tier 1 Capital in the banking system	9,867	10,589	10,630	12,171
Common/Core Capital in the banking system	9,467	10,190	10,230	11,772
Sum of Risk Weighted Assets	77,444	77,123	75,878	75,599
Change of Total capital in the banking system		723	40	1,542
Change of RWA		-320	-1,245	-280
Net Profit	2,406	1,609	844	3,163
Net Interest Income	4,483	4,506	5,014	5,642
Loss provisions (Credit Risk)	-33	-640	-2,489	-560
Net non-interest income	-1,415	-1,440	-1,566	-1,510
Losses/Gains on market portfolios	0	28	-11	-78
Share of profits of associates	0	0	0	0
Others	0	0	0	0
Extraordinary items	0	0	0	0
Taxes	-628	-470	-309	-892

Source: IMF staff calculations.

Appendix IV. Risk Assessment Matrix

Botswana: Risk Assessment Matrix[1]		
Nature/Source of Main Threats	**Overall Level of Concern**	
	Relative Likelihood	**Expected Impact if Materialized**
Global Risks		
Abrupt global slowdown or recession. Global and idiosyncratic risk factors combine to cause a synchronized sharp growth slowdown, with outright recessions in some countries, spillovers through trade and financial channels, and downward pressures on some commodity prices.	**Medium**	**High** • Lower demand for diamond, and other commodity exports could slow the rebound in tourism. • A slowdown in neighboring countries could lower SACU revenue, affecting external and fiscal balances, foreign reserves and putting pressure on the pula.
Rising and volatile food and energy prices. Commodity prices are volatile and trend up amid supply constraints, war in Ukraine, export restrictions, and currency depreciations. This leads to short-run disruptions in the green transition, bouts of price and real sector volatility, food insecurity, social unrest, and acute food and energy crises (especially in EMDEs with lack of fiscal space).	**High**	**Medium** • Higher inflation caused by rising food and energy prices has a spillover effect, translating to higher interest rates across economy. • Retirement funds and insurance could suffer loss of premium payments—either through moratoria requests or policy surrenders—impact on institutions' liquidity.
De-anchoring of inflation expectations and stagflation. A fast recovery in demand (supported by stimulus policies, combined with COVID-19 related supply constraints, leads to sustained above-target inflation, and a de-anchoring of inflation expectations, and triggering a wage-price spiral in tight labor markets. Central banks tighten monetary policy more than envisaged leading to weaker global demand, currency depreciations in EMDEs, and sovereign defaults. Together, this	**High**	**High** • Increases in funding costs could impose additional stresses on banks, households and leveraged firms. • Tighter financial conditions could leave consumer and businesses with deteriorating balance sheets that could pose a credit risk to banks, and underperforming assets. • Loan re-pricing due to higher monetary policy rate could impact large share of unsecured household loans, posing credit risks to banks'/financial institutions' balance sheet.

could lead to the onset of stagflation.		• Falling asset prices and/or valuation losses on portfolios of retirement funds could erode financial institutions' capital buffers. • Non-bank sector that is heavily invested in offshore equites face sharp decline in income, face large valuation losses and weakened capital positions.
• **Natural disasters related to climate change.** Higher frequency of natural disasters cause severe economic damage to smaller vulnerable economies and accelerate emigration. Severe events in large economies hitting key infrastructure reduce global GDP, cause further supply chain disruptions and inflationary pressures, and prompt a recalculation of risk and growth prospects.	**Low**	**Medium** • Natural disasters would damage infrastructure and amplify supply chain disruptions causing water and crop productions disruptions, and slow the domestic economy growth. Weaker economy growth and increased unemployment rate would increase NPLs and lead to higher loan loss impairment, weighing on banks' profitability, which could weaken contribution to banks' capital buffers. • Growth remains anemic amid competitiveness problems, and financial development goals not realized.
• **Cyber attacks**	**Medium**	**High** • An incident could result in loss of confidential and critical data, financial losses, business disruption and reputational damage for financial institution/sector.
Domestic Risks		
Delays in implementing fiscal consolidation due to political economy constraints, capacity limitations or lack of effort on medium-term outcomes.	**Medium**	**Medium** • Effects amplified if coupled with a sovereign credit rating downgrade. • Increased demand for the financial sector to finance the government potentially crowding out credit to the private sector. Lower growth and higher NPLs.

[1] The Risk Assessment Matrix (RAM) shows events that could materially alter the baseline path.

Banking Sector: Solvency Test		
Domain		**Framework**
		Top-down by FSAP Team
1. Institutional Perimeter	Institutions Included	• Eight commercial banks (including two D-SIBs)
	Market Share	• 93.2 percent of assets in the Botswana banking system as of June 2022
	Data and baseline date	• Supervisory data (balance sheet and income statements) • Commercial Bank Survey (bank- level average duration of securities in banking book and trading book, dividend payout ratio by banks in the past 10 years). • Starting position: June 2022
2. Channels of Risk Propagation	Methodology	• IMF Solvency Stress Test Workbox (Balance-sheet model)
	Satellite Models for Macro- Financial Linkages	• **Credit Risk:** Satellite models that link credit risk variables with macroeconomic variables bank-by-bank to estimate loan losses. • **Market risk:** Mark to Market (MtM) approach is used to calculate valuation losses for Held for trading (HfT) and available for sales (AfS) securities when shocks to risk-free rates and credit spread. *Repricing risk:* $$Value\ Changes_t = -\frac{duration}{(1+rf_{t-1}+cs_{t-1})} * B_t * \Delta r_t$$ *Credit spread risk:* $$Value\ Changes_t = -\frac{duration}{(1+rf_{t-1}+cs_{t-1})} * B_t * \Delta cs_t$$

Banking Sector: Solvency Test		
Domain		**Framework**
		Top-down by FSAP Team
		Where *rf* is the risk-free rate (policy rates), *cs* is credit spread (sovereign spread, which is the difference government bond yield and policy rates), *B* is government bond and *duration* is the remaining duration of the portfolio of securities. Apply FX shocks on banks open foreign exchange positions • **Net Interest Income:** interest rate risk in the banking book (IRRBB) is assessed by using interest income rate/ interest expense rate satellite models and maturity gap analysis, which is based on supervisory data on interest sensitive assets and liabilities by repricing buckets. $Y = f(\text{macroeconomic variables})$ *(IIR, IER) (inflation, nominal prime rate, exchange rate)* $Interest\ Income\ Rate_{bt} = \frac{Interest\ Income_{bt}}{Total\ Earning\ Assets_{bt} - NPL_{bt}}$ $Interest\ Expense\ Rate_{bt} = \frac{Interest\ Expense_{bt}}{Total\ Liabilities_{bt}}$
	Stress Test Horizon	• 3 years (2023-2025)
3. Tail Shocks	Scenario Analysis	• Two macro scenarios: baseline scenario and adverse scenario • The **baseline** scenario follows October 2022 WEO. Botswana continues to recover from the COVID-19 pandemic, growing by approximately 4 percent on average over the medium term. Inflation will remain outside of the target band in 2022, mainly because of higher import prices (particularly fuel and food). The MPR is expected to continue increasing, leading to tighter financial conditions. As domestic and global economy recovers, however, portfolio outflows are expected to decline, while strong demand for diamonds will also support the replenishing of foreign exchange reserves. Inflation expectations are expected to remain anchored, with inflation falling back towards to the target band over the course of 2023. • The **adverse** scenario:

Banking Sector: Solvency Test		
Domain		**Framework**
		Top-down by FSAP Team
		○ Use IMF's Flexible System of Global Models[1] for the external context and calibrated based on previous crisis episodes with country team for the domestic impact. ○ Driven by a combination of external shocks amplified by domestic characteristics (see RAM). ○ The Botswana economy experiences a U-shaped growth path with a stagflation scenario. It assumes a lower growth in 2023 (1.52 percent below the baseline) and a drop in GDP of -9.47 percent in 2024. This is equivalent to a shock to 2-year cumulative growth of 2.3 standard deviation from historical mean (estimated from 1990 to 2021). GDP growth returns to its potential in year three. ○ The economy slowdown will be accompanied by unemployment rate rising to 25.77 percent, 30.58 percent, and 30.5 percent over the 3-year horizon. Pula depreciates against USD most significantly in year 2, with 13.25 percent depreciation below baseline. ○ Inflation will remain high in the first two years at 14.72 percent and 12.39 percent respectively due to high volatility in food and energy prices and will drop to 6.03 percent in year 3. Monetary policy rate will stay high to fight against inflation. ○ The economic slowdown in Botswana will also be associated with diamond price deterioration, with 9 percent, 24.1 percent, and 11.5 percent below baseline over the 3-year horizon.
4. Risks and Buffers	Risks/ factors assessed (How each element is derived, assumptions).	• Credit risk (provision costs): determined by changes in estimated new NPL flows. $Expected\ Loss = Proxy\ PD * LGD * EAD$ • Market risk: impact of financial variable's evolution on sovereign bonds and FX open positions. • Interest rate risk in the banking book • Net fee and commission income, other income and non-interest expense evolve with macroeconomic conditions.
	Behavioral adjustments	• Balance sheet growth assumption: Static balance sheet assumption (Balance sheet growth is zero)

[1] It is a multi-region, forward-looking, semi-structural dynamic stochastic general equilibrium (DSGE) model.

Banking Sector: Solvency Test		
Domain		**Framework**
		Top-down by FSAP Team
5. Regulatory and Market- Based Standards and Parameters	Calibration of risk parameters	• PDs: proxy based on estimated new NPL flows over performing loans. PD is derived in following steps: • $New\ NPL_t = NPl_t - NPl_{t-1} + Recoveries_t + Writeoffs_t$ • $\Delta NPL_t = NPl_t - NPl_{t-1} = New\ NPL_t - Recoveries_t - Writeoffs_t$ • $\Delta NPL_t = NPl_t - NPl_{t-1} = New\ NPL_t - \alpha_t * NPL_{t-1}$ • $New\ NPL_t = NPl_t - (1-\alpha_t)NPl_{t-1}$ • $New\ NPL_t = NPl_t - (1-\bar{\alpha})NPl_{t-1}$ • $Proxy\ PD_t = [NPl_t - (1-\bar{\alpha})NPl_{t-1}] / Performing\ Loans_{t-1}$ • Where $\bar{\alpha}$= (recoveries+ write-offs)/ 〖NPL〗_(t-1)), and it is bank specific parameter. As write-off and recoveries data is only available for shorter period, average alpha is calculated by using existing data and apply to historical NPLs to estimate PDs. • LGDs: proxy based on average historical provision coverage ratio by banks (provisions/ NPLs) • EADs: proxy as performing loans in t-1
	Regulatory/ Accounting and Market- Based Standards	• Basel II standardized approach • The hurdle rates are based on minimum capital requirements: 7.5 percent for Tier1 Capital, 4.5 percent for CET1, and 12.5 percent for total capital • RWAs evolve with credit growth, net of increase in provisions.
6. Reporting Form	Output presentation	• Capital ratios pre- and post-shock and capital shortfall for the aggregate banking system • Decomposition of the key drivers of changes in capital ratios system wide • Distribution of capital ratios system wide over the scenario horizon

Banking Sector: Liquidity Test		
Domain		**Framework** **TD by FSAP Team**
Institutional Perimeter	Number of banks:	Eight commercial banks (including two D-SIBs)
	Market share:	93.4 percent of assets in the Botswana banking system as of end-August 2022
Methodology		• LCR (Liquidity Coverage Ratio) – proxy test, using the bank-level Basel II statutory reports data at end of August 2022. • To be consistent with standard Basel III LCR framework, necessary assumptions are made particularly when breakdown data are unavailable from the regulatory Basel II reports (e.g., proportions of breakdown items). • Banks' 30-day "Net loans and Advances" (M-LIQGAP) doesn't have breakdown data by counterparties, therefore, ratios of "Gross Loans and Advances" of all maturities were applied to proxy the breakdown data.
Scenarios		• The baseline scenario considers a coverage of HQLA that is close to the BoB's statutory liquid assets, by excluding required reserves and government bonds with maturities beyond one year. • The severe scenario adopts the same coverage of HQLA as in the baseline but considers larger haircuts on HQLA, lower inflows from retail and non-financial corporations, and larger run-off on banks' wholesale and retail deposits funding (see Table below)

Appendix VI. Financial Stability and Macroprudential Policy Framework

1. A strong institutional framework is the cornerstone for ensuring the effective conduct of macroprudential policy. The institutional arrangements that create an enabling environment for the shared responsibility for financial stability in Botswana will be assessed in three aspects: (1) the *willingness to act*, which makes sure the sufficient timely actions by dedicated institutions through a clear mandate and an accountability framework, including communication tools; (2) *the ability to act*, which assures obtaining necessary information, activating regulatory constraints, and changing regulatory perimeters when necessary; (3) *effective cooperation* in risk assessments and mitigation across domestic agencies; and (4) *the toolkit and calibration of macroprudential tools* for the banking sector.

Willingness to Act

2. The authorities have made considerable progress in strengthening the institutional framework since the 2007 FSAP. The NBFIRA Act, 2022, establishes the context and oversight for the safety, soundness, and stability of NBFIs. The Financial Intelligence Act (2022) strengthens oversight of anti-money laundering activities. In 2019, a Financial Stability Council (FSC) was established to analyze and monitor systemic risks. The recent Bank of Botswana Amendment Act (BoBAA) elevates the status of FSC to a statutory committee with a specific mandate and expanded remit—strengthening its willingness to act. This augurs well for its autonomy to identify and respond to financial sector vulnerabilities.

3. The Bank of Botswana (BoB) assumes the primary macroprudential policy function for banks in Botswana. The BoB supervises banks in its financial system, with the broad objectives, is assigned powers to issue regulations and guidance that are necessary to conduct monetary policy and credit policy, as well as to ensure sound progress of the banking system.[1] The BoB has implemented a wide range of prudential tools for banks, contributing to maintaining financial stability.

Ability to Act

4. The BoB and the NBFIRA have broad powers to collect information to monitor systemic risks. The BoB Act provides authorization to collect supervisory information from banks. Similarly, the NBFIRA Act provides authorization to undertake inspections or investigations of licensed non-bank financial institutions. The (Financial Intelligence Agency (FIA) helps to shape the policy direction for financial stability by disclosing financial information on suspicious financial activity. The FSC has a broadened set of responsibilities including, inter alia, developing coordinated

[1] See BoB Act, 1999

policy responses to risks including crisis management, making recommendations, and issuing warnings or opinions addressed to the regulatory bodies of financial institutions.

5. Under the revised BoBAA the FSC has "semi-hard" powers enabling it to make formal recommendations, coupled with a "comply or explain" mechanism for regulators. The FSC can make formal recommendations to other supervisory agencies—a useful mechanism to foster collective policy actions among the multiple agencies. The BoB also has soft powers to express an opinion on risks to the system. Expansion of the FSC's membership should enhance the authorities' ability to act.

Cooperation in Risk Assessment and Mitigation

6. The authorities have made efforts to foster inter-agency cooperation. A Memorandum of Understanding (MoU) is in place to underpin arrangements for information sharing, cooperation, and communication. Over time, the membership of the FSC has broadened to now include the BoB, Ministry of Finance (MoF), FIA and representation from the impending DIS. As of 2021, the Botswana Stock Exchange has observer status on the council. The work of the FSC is supported by a technical working group comprising representatives from the financial stability departments of each of the primary regulators address financial stability risks through appropriate policies.

7. The BoB's role and its shared responsibility for financial stability through the FSC can be emphasized. The role of the statutory FSC for financial stability should also be underscored by publishing the MoU that sets up collaboration across regulators. The BoBAA should allow the FSC to set standards for transparency and accountability.[2] Moreover, clear communication can improve transmission of macroprudential action, both when measures are taken and when they are relaxed (Giese et al, 2013).[3] Communication can also promote public understanding of the need for macroprudential measures, counter biases in favor of inaction and enhance legitimacy and accountability of the BoB for macroprudential policy.

Macroprudential Toolkit and Calibration

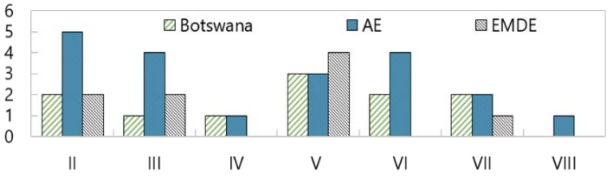
8. The IMF's integrated Macroprudential Policy (iMaPP) database is a valuable resource for considering Botswana's global position in terms of macroprudential tools. The database covers 182 countries and provides timelines for macroprudential reforms, including the dates when tools were introduced, and whether limits have been loosened or tightened over time.

[2] The IMF Central Bank Transparency Code provides a useful framework for developing the transparency practices for the BoB's mandate for financial stability, its shared responsibility for financial stability with other official agencies, and the macroprudential policy framework.

[3] "Key Aspects of Macroprudential Policy," IMF Policy Paper, June 2013. International Monetary Fund

9. In comparison to international macroprudential frameworks, Botswana has fewer macroprudential tools than advanced economies, but is broadly on par with other EMDEs (text chart).[4] Under Category V (liquidity tools for the banking sector), banks are required to hold liquidity for prudential reasons through the PRR (currently at 2.5 percent) and a LAR (at 10 percent). However, more sophisticated liquidity tools such as the liquidity coverage ratio (LCR) and the NSFR have not been implemented, although they have been under consideration.

Macroprudential Measures in Botswana, AEs and EMDEs
(Median number of measures)



Category	Description
II	Broad-Based Tools Applied to the Banking Sector
III	Household Sector Tools
IV	Corporate Sector Tools
V	Liquidity Tools Applied to the Banking Sector
VI	Tools to Address Systemic Liquidity Risk and Fire Sale Risk in the Nonbank Sector
VII	Tools to Address Risks from Systemically Important Institutions and Interconnectedness within the Financial System
VIII	Tools to Address Other Sources of Systemic Risks

Source: IMF Macroprudential Survey, 2020

10. For the banking sector as a whole (Category II), Botswana has two measures (loan-loss provision and the Capital Adequacy Ratio. Forward looking provisioning was introduced in 2018 under IFRS9, but it has not been comprehensively reviewed or tested by the BoB.[5] Other tools, e.g., countercyclical buffers, limits on leverage ratio, are being considered but have not been activated. Most advanced economies have these measures in place. By comparison, roughly half of EMDEs have forward-looking loan loss provisioning requirements, capital conservation buffers, countercyclical capital buffers, and limits on leverage ratios.

Category II: Broad-Based Banking Sector Tools

Advanced Economies	Percentage	Botswana	Typical limit
Capital conservation buffer	97		1.5-2.5%
Countercyclical capital buffer framework	95		1.5%
Limit on leverage ratio	92		3%
Forward-looking loan loss provisioning requirement	86		
Other measures for credit booms	78		
Cap on credit growth	0		

Category III: Household Sector Tools

Advanced Economies	Percentage	Botswana	Typical limits
Cap on loan-to-value ratio	62		80-100%
Household sector capital requirements	46		
Cap on debt-service-to-income ratio	46		40-60%
Limit on amortization periods	41		
Fiscal measures to contain systemic risks			
Restrictions on unsecured loans			
Other			
Loans with high loan-to-value ratios			
Other			
Cap on loan-to-income ratio			

11. The BoB has designated D-SIBs. Two banks out of eight have been identified as D-SIBs since 2021 based on the methodology in line with the Basel Committee of Banking Supervision (BCBS) framework. The D-SIBs cover about 90 percent of the banking system by assets.

[4] Botswana is compared to two country groups: advanced economies and emerging market and developing economies. The database can be found at https://www.elibrary-areaer.imf.org/Macroprudential/Pages/Home.aspx

[5] Botswana FSAP 2023 Detailed Assessment of Observance under the Basel Core Principles for Effective Banking Supervision, [February 2023].

12. For the corporate sector (Category IV), Botswana has one measure that limits exposure concentration.[6] Relative to the household sector, advanced economies have relatively fewer macroprudential tools targeting corporate debt. In theory, targeted sectoral tools, such as sectoral capital requirements (risk weights) and exposure caps, can be recommended to address risks from the corporate sector. In practice, advanced economies typically use tools related to capital requirements, usually in the form of higher risk weights and stricter criteria for higher LTV ratios. Some advanced economies apply LTV and DSTV caps on corporate lending. Approximately 45 percent of EMDEs have a cap on LTV ratios, while a third have a cap on debt-service-to-income ratios. A quarter of EMDEs have some capital requirement tool for the corporate sector.

Category IV: Corporate Sector Tools

Advanced Economies	Percentage	Botswana	Typical limits
Corporate sector capital requirements	27		
Fiscal measures to contain systemic risks	8		
Other measures to mitigate systemic risks from loans to the corporate sector	8		
Cap on loan-to-value ratio for commercial real estate credit	5		
Other	5		
Lending to particular industries or sectors	5		
Other			
Cap on credit growth to the corporate sector			
Cap on debt-service coverage ratio for commercial real estate credit			
Cap based on borrower leverage			
Foreign-currency-denominated loans			

[6] The 'Directive on Large Exposures', announced and effective May 8, 2001, states that banks' total/aggregate large-exposure loans (that is, loans in excess of 10 percent of unimpaired capital) may not exceed 800 percent of their unimpaired capital.

Table VI.1. Botswana: Selected Macroprudential Tools for Banks		
Instruments	**Details**	**Implementation Date**
Broad Based Tools		
Limit on large exposures	Exposures shall not exceed 30 percent of a bank's unimpaired capital, and the total amount of large exposures shall not exceed 800 percent of its unimpaired capital	Nov-09
Capital Adequacy Ratio	Implementation of Basel III definition of capital Unimpaired Capital to Risk-Weighted Assets of minimum 15 percent (CET1 – 4.5%, AT1 – 3%, T2 – 7.5%)	Jan-16
Household Tools		
Liquidity Risk Monitoring (prudential)	Bank reporting requirements: risk-weighted reporting based on LTV	Jan-16
Liquidity Tools		
Liquidity Risk Monitoring (prudential)	Liquid asset ratio: current ratio is 10% (1995) Prudential Reserve Requirement: current ratio is 2.5% (2019) Liquidity gap profile (monitoring only) Top 20 depositors (monitoring only)	
Systemically Important Institutions and Interconnectedness		
D-SIB framework	Domestic Systemically Important Banks (D-SIBs) framework was partially implemented in 2021, with D-SIB designation, based on 5 indicators, but as yet no associated additional capital requirement.	Jan-21
Other Tools to Address Sources of Systemic Risk		
Financial Stability Council	Comprises Ministry of Finance (MoF), the BoB, NBFIRA, Financial Intelligence Agency (FIA), D primarily for monitoring and risk assessment, overseeing and guiding macro-prudential policy framework and implementation	Feb-19

Table VII.1. Botswana: LCR Data Mapping: HQLA

	Baseline Factor	Item of Statutory Report	Table of Statutory Report	Note
Banks total assets (on and off balance)				
Level 1 Assets				
Coins and bank notes	100%	1.a. Notes and Coin (pula & FC)	M-LIQ	
Qualifying marketable securities form sovereigns, central banks, PSEs, and multilat. Dev banks	100%	1.d. Treasury Bills equal to or less than 6 months	M-LIQ	cross check with bond column from M-SECA
	100%	1.f. Bank of Botswana Certificates (less those pledged as security)	M-LIQ	
	100%	1.g. Other government obligations (with maturity less than one year)	M-LIQ	
	98.5%	e. Government Bonds - (with maturity less than one year)	M-LIQ	broad HQLA definition includes govt bonds of all maturities
	100%	3. Claims on Sovereign or CBs - Exposure assigned credit quality grade of AAA to AA-	M- SRWA 12a (CRM1)	mostly zeros. Data covers all maturities (30-day breakdown unavailable)
	100%	24. Claims on Exposure to BIS and IMF	M- SRWA 12a (CRM1)	mostly zeros. Data covers all maturities (30-day breakdown unavailable)
	100%	26. Exposures to highly rated MDBs as per para 7.20 of the Capital Directive.	M- SRWA 12a (CRM1)	mostly zeros. Data covers all maturities (30-day breakdown unavailable)
Qualifying central bank reserves	100%	1.b. Due from Bank of Botswana	M-LIQ	include non-RR portion: current account/repo/SDF
	100%	3.b Reserve requirement account	M-SFinP1	Only included for broad HQLA definition
Domestic sovereign or central bank debt for nonzero risk-weighted entities				
Level 2A Assets	85%			
Qualifying marketable securities form sovereigns, central banks, PSEs, and multilat. development banks (with 20% risk weighting)		4. Claims on Sovereign or CBs - Exposures assigned credit quality grade of A+ to A-	M- SRWA 12a (CRM1)	
		13. Claims on Domestic Public Sector Entities	M- SRWA 12a (CRM1)	
		14. Claims on PSEs - Soverign credit risk assessement rating of AAA to AA-.	M- SRWA 12a (CRM1)	
		27. Claims on MDBs - Exposure assigned a credit assessment rating of AAA to AA-.	M- SRWA 12a (CRM1)	
Qualifying corporate debt securities rated AA- or higher		48. Claims on security firms assigned a credit assessment rating of AAA to AA-.	M- SRWA 12a (CRM1)	
		58. Claims to corporates assigned a credit assessment of AAA to AA-.	M- SRWA 12a (CRM1)	
Qualifying covered bonds rated AA- or better				
Level 2B Assets				
Qualifying Mortgage Backed Securities	75%			
Qualifying corporate debt securities rated between A+ and BBB-	50%			excluded due to high risk weights 50% and 100%
Qualifying common equity shares	50%			

Source: Bank for International Settlements Basel III Framework, Bank of Botswana Statutory Report, and IMF staff.

Table VII.2. Botswana: LCR Data Mapping: Inflows

Secured lending transactions backed by the following	Baseline Factor	Item of Statutory Report	Table of Statutory Report	Note
Inflows				
Level 1 assets	0%			
Level 2a assets	15%			
Level 2b assets				
Eligible Residential Mortgage Backed Se	25%			
Other	50%			
Margin lending backed by all other collateral	50%			
All other assets	100%			
Credit or liquidity facilities	0%			
Operational deposits held at other financial ir	0%			
Other inflows, by counterparty				
Retail counterparties	50%	Households	M-LIQGAP	Ratios of “Gross Loans and Advances” (M-LA1, balance outstanding) of all maturities were applied to "12. Net loans and Advances" (M-LIQGAP) to proxy the breakdown data
	100%	parastatals (govt & dev banks)	M-LIQGAP	
	50%	corporations	M-LIQGAP	
	50%	NBFIs	M-LIQGAP	
Nonfinancial wholesale counterparties, transactions not listed above	50%			
Financial institutions and central banks, transactions not listed above	100%	5. Balances due from domestic banks - on demand or less than 184 days	M-LIQGAP	up to 1 month
	100%	7. Balances due from foreign banks	M-LIQGAP	up to 1 month
	100%	10. Balances due from related parties	M-LIQGAP	up to 1 month
Net derivative cash inflows	100%	11. Asset_Derivative instruments	M-LIQGAP	up to 1 month
Other (contractual) cash inflows	100%			

Source: Bank for International Settlements Basel III Framework, Bank of Botswana Statutory Report, and IMF staff.

Table VII.3. Botswana: LCR Data Mapping: Outflows

	Baseline Factor	Item of Statutory Report	Table of Statutory Report	Note
Retail Deposits				
Demand deposits and term deposits (less than 30 days maturity)				
Stable deposits	5%			
Less stable retail deposits	10%	line 29 and 32 * col B-E for resident & NR HH current/call/savings/term(0-31) deposits	M-DEP1 (Deposit Excl. FCA)	less stable due to absence of deposit insurance
		line 29 and 32 * col B-E for resident & NR HH current/call/savings/term(0-31) deposits	M-DEP2 (FCA by Maturity)	less stable due to absence of deposit insurance
Term deposits, residual maturity > 30d	0%			
Unsecured Wholesale Funding				
Demand and term deposits, residual maturity < 30d, small business				
Stable deposits	*5%*			
Less stable deposits	*10%*			
Operational deposits generated by clearing, custody,	25%			
Portion covered by deposit insurance	5%			
Cooperative banks in an institutional network	25%			
Nonfinancial corporates, sovereigns, central banks, multilat dev banks, PSEs				
Fully covered by deposit insurance	*20%*			
Not fully covered by deposit insurance	*40%*	line 14/15/31 * col B-E for corporations current/call/savings/term(0-31) deposits	M-DEP1 (Deposit Excl. FCA)	unavailable data to separate small vs. large business
		line 14/15/31 * col B-E for corporations current/call/savings/term(0-31) deposits	M-DEP2 (FCA by Maturity)	unavailable data to separate small vs. large business
		line 12/13 * col B-E for govt current/call/savings/term(0-31) deposits	M-DEP1 (Deposit Excl. FCA)	
		line 12/13 * col B-E for govt current/call/savings/term(0-31) deposits	M-DEP2 (FCA by Maturity)	
		line 36 * col B-E for dev bank current/call/savings/term(0-31) deposits	M-DEP1 (Deposit Excl. FCA)	
		line 36 * col B-E for dev bank current/call/savings/term(0-31) deposits	M-DEP2 (FCA by Maturity)	
Other legal entity customers	100%	line 41 * col B-E for NBFI current/call/savings/term(0-31) deposits	M-DEP1 (Deposit Excl. FCA)	
		line 41 * col B-E for NBFI current/call/savings/term(0-31) deposits	M-DEP2 (FCA by Maturity)	
		30. Balances due to domestic banks (affiliated + non-affilicated)	M-SFinP2	demand+term (all maturity). 30-day breakdown
		31. Balances due to foreign banks (affiliated + non-affilicated)	M-SFinP2	unavailable
Secured Funding				
Secured funding with a central bank, or backed by Level 1 assets	0%	35. Balances due to Bank of Botswana	M-SFinP2	
Secured funding backed by Level 2A assets	15%	36(a). Debt securities in issue (< 5Y)	M-SFinP2	
Secured funding backed by non-Level1 or non-Level 2A asset, with domestic sovereign, multilat dev banks, or domestic PSEs as a counterparty	25%	34. Repurchase agreements (with Fin corporations)	M-SFinP2	
Funding backed by RMBS eligible for Level 2B	25%			
Funding backed by other Level 2B assets	50%			
Other secured funding transactions	100%	37. Other borrowings	M-SFinP2	
Additional Requirements				
Net derivate cash outflows	100%	33 Derivative instruments	M-SFinP2	
Any other contractual cash outflows (not listed abov	100%			

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