Glossary

CAR	Capital Adequacy Ratio
CBOB	Central Bank of The Bahamas
DSGE	Dynamic Stochastic General Equilibrium
FSAP	Financial Sector Assessment Program
FX	Foreign Exchange
GDP	Gross Domestic Product
GFC	Global Financial Crisis
IMF	International Monetary Fund
NPL	Nonperforming Loan
SMEs	Small and Medium-Sized Enterprises
WEO	World Economic Outlook

EXECUTIVE SUMMARY[1]

Macrofinancial risks stem from the economy's vulnerability to external shocks to tourism and real estate investment, exposure to frequent and severe hurricanes, and a small and illiquid real estate market. Stress tests reveal the overall banking system is resilient to a range of adverse scenarios given large aggregate capital and liquidity buffers. Some domestic banks and the two largest credit unions are more vulnerable to asset quality shocks and tail risk conditions. Asset quality and profitability are key determinants of financial institutions' resilience to adverse shocks. Liquidity, market, sovereign and financial contagion risks are low. The offshore banking sector is not a source of traditional banking risks.

A comprehensive stress testing exercise was performed under the 2019 FSAP for The Bahamas. The exercise covered all seven commercial banks and the two largest credit unions (97 percent of the assets of domestic credit institutions). It also examined 10 large offshore banks[2] (61 percent of international banking assets) and included stress tests for offshore banks with more traditional banking models. Overall, the stress test results reveal no significant current threats to financial stability given banks' capital and liquidity buffers. However, some individual banks' high NPLs warrant caution.

Economic linkages with the United States create scope for contagion through tourism and real estate channels, amplified by domestic factors and natural disasters. A deep and prolonged U.S. recession would reduce demand for tourism and real estate investment in The Bahamas, with knock-on effects on unemployment and housing prices. Risks to the banking sector are amplified by the large share of mortgages and consumer loans in bank portfolios, a small and illiquid real estate market, and a lengthy legal foreclosure process. Hurricanes could negatively impact employment and bank credit quality through degradation and closure of large resorts and key infrastructure.

Three adverse scenarios assessed the domestic banking system's resilience to a major hurricane, a U.S. recession, and a combined "perfect storm" scenario.[3] The impact of hurricane shocks and shocks to US growth and housing prices on domestic tourist arrivals, growth and bank performance is estimated in a small dynamic stochastic general equilibrium model and satellite models for bank credit quality, profitability and credit growth. Banks' NPL levels and income-generating capacity are key determinants of their resilience under macroeconomic shocks. These scenario-based solvency stress tests only cover credit risk.

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[1] This Technical Note has been prepared by Kalin Tintchev and Ljubica Dordevic (all IMF).

[2] Offshore banks deal primarily with nonresidents. In The Bahamas they are referred to as "international banks." The ten large offshore institutions include the top-five by balance sheet assets and the top-five by fiduciary assets.

[3] Offshore banks were not covered by the scenarios given the lack of long time series and limited exposure to traditional banking risks.

The overall banking system is resilient to a range of adverse scenarios. In the baseline, the system-wide CAR increases to 32.7 percent by 2021, supported by projected stronger economic activity in 2018–19 but growth subsequently moderates. Under the hurricane scenario, a short period of stress caused by a major hurricane weakens banks' performance but leaves all the banks above the minimum capital requirement. Nevertheless, system-wide indicators deteriorate, with the NPL ratio rising by 3 percentage points and the CAR declining by 2.5 percentage points.

Weaknesses widen under adverse and tail risk conditions. The steep and protracted slowdown projected in the U.S. recession scenario causes one domestic bank with a large portfolio of legacy loans and low profitability to become undercapitalized. Under the "perfect storm" scenario, the combined shock of a U.S. recession and a major hurricane leave two domestic banks (15 percent of the system's assets) below the 14 percent CAR threshold. The single factor sensitivity analysis confirmed the importance of credit risk for financial stability.

Liquidity, market and sovereign risks is low. Despite excess liquidity accumulated during the credit slowdown, one bank (7 percent of the system's assets) with lower than average liquid assets runs out of liquidity after a sustained six-month deposit run. Banks' direct sensitivity to interest rate risk is low but indirect interest-rate induced credit risk is significant. Small net open FX positions imply limited currency risk. Modest government bond holdings by most banks limit sovereign risk, except under extreme sovereign default scenarios, where some banks with more substantial sovereign exposure could be affected.

Solvency tests conducted for the two largest credit unions reveal significant vulnerability to credit risk. The two largest credit unions are undercapitalized under the 10 percent unweighted capital-to-asset threshold. Under the 14 percent risk-weighted threshold, which currently does not apply to credit unions, they are slightly above the requirement but become undercapitalized under moderate credit shocks. The prevalence of small retail loans in credit unions' portfolios limits credit concentration risk. Their sensitivity to interest rate risk is also low given that assets and liabilities are mainly short-term.

Traditional banking risks in the offshore banking sector are small. Among the ten large offshore banks assessed, only two are engaged in more traditional banking, with stress test results pointing to small risk exposures.

Financial contagion risk is limited. The financial contagion analysis focused on banking and insurance sectors and assessed resilience to financial spillovers triggered by a default of a major counterparty. Among all the institutions assessed, one credit union is vulnerable to defaults of major counterparties but will not generate spillovers to other institutions. Offshore banks and insurers seem to be neither an important source nor a recipient of spillover risk within the financial sector.

Recommendations	Time [1]	Responsibility
Stress Testing Framework		
Enhance analytical capacity for assessing solvency and liquidity risks; strengthen the focus of stress tests on key systemic and macroeconomic risks.	ST	CBOB
Adopt solvency tests based on macroeconomic scenarios with multi-factor shocks building on FSAP methodologies.	ST	CBOB
Implement financial contagion stress tests.	MT	CBOB
Run periodic bottom-up stress tests with individual banks under consistent scenarios.	MT	CBOB
Request corrective action from credit unions to strengthen capital adequacy.	ST	CBOB
Addressing Data Gaps		
Develop a real estate price index to enhance market monitoring and collateral valuation.	ST	CBOB/Department of Statistics (DOS)
Initiate collection of loan-level data on loan-to-value and debt-to-income ratios and household leverage.	ST/MT	CBOB/ Department of Statistics (DOS)
Improve data collection on loan classifications and provisioning, restructured loans, yields and duration of bonds in banks' portfolios, offshore banking sector and credit unions.	ST	CBOB
Operationalize the proposed Consumer Credit Bureau.	MT	CBOB/MOF
Staffing and capacity		
Establish a CBOB interdepartmental financial stability group focused on quantitative analysis.	MT	CBOB
Conduct training and build capacity to perform stress tests based on cutting-edge methodologies.	ST/MT	CBOB
Note: [1] "ST-short term is 1–3 years," "MT-medium term" is 3–5 years.		

INTRODUCTION

1.   The FSAP financial stability assessment took place in a macroeconomic environment characterized by a moderate pickup in growth after a period of stagnation. The economy was hard hit by the global financial crisis (GFC) and after a brief recovery slid back into a recession during the period 2013–16. Real GDP growth is forecast to accelerate to 2.3 percent in 2018 and 2.1 percent in 2019 from 1.4 percent in 2017 on the back of the opening of a large new resort and a projected cyclical upturn in the U.S. Nevertheless, structural bottlenecks constrain medium-term growth, with real GDP growth projected to slow to 1.5 percent.

2.   The economy's structural characteristics reveal vulnerability to external shocks. GDP growth is dependent on cyclical tourism and real estate industries. Tourism is estimated to account for 45 percent of GDP and real estate and construction activities contribute 22 percent of GDP. Tourism and real estate investment are to a significant extent driven by U.S. demand and affected by U.S. cyclical downturns.[4] Tourism inflows declined precipitously during the GFC and other recent U.S. recessions. The tourism industry is also prone to hurricanes, which have increased in frequency and severity over the last decade.

3.   The Bahamas policy framework provides limited flexibility to respond to external shocks. The exchange rate is fixed to the U.S. dollar. Capital controls provide some scope for independent monetary policy, but the transmission mechanism appears weak. Large developmental needs to address structural bottlenecks reduce fiscal flexibility.

4.   Main macrofinancial risks arise from the interplay of external and domestic factors. A deep and prolonged U.S. recession would reduce demand for tourism and real estate investment in The Bahamas, with knock-on effects on unemployment and housing prices. Risks to the banking sector are amplified by the large share of mortgages and consumer loans in bank portfolios, a small and illiquid real estate market, and a lengthy legal foreclosure process. Hurricanes could negatively impact employment and bank credit quality through degradation and closure of large resorts and key infrastructure.

5.   Asset quality problems render some individual banks susceptible to shocks. Despite a reduction in the system-wide NPL ratio to 8.9 percent at end-June 2018 from 15.4 percent in 2014, there is significant variation between banks, with some individual banks suffering from poor asset quality in the sluggish growth environment following the GFC. A prolonged recession could compound their vulnerabilities despite their high capital ratios.

6.   The stress tests focused on the domestic banking system, large credit unions and selected offshore banks. The stress tests covered all seven commercial banks and the

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[4] Preliminary data from the Ministry of Tourism of The Bahamas for January-September 2018 indicate that 80 percent of total stopover visitors were from the U.S.

two largest credit unions, representing about 97 percent of the assets of domestic credit institutions, and ten large offshore banks. The tests comprised macroeconomic scenarios and sensitivity tests for credit risk, large exposures, sectoral shocks, market risk (interest rate and exchange rate risks), sovereign risk, liquidity and interbank contagion risks (text figure).

Summary of Banking System Stress Tests[5]
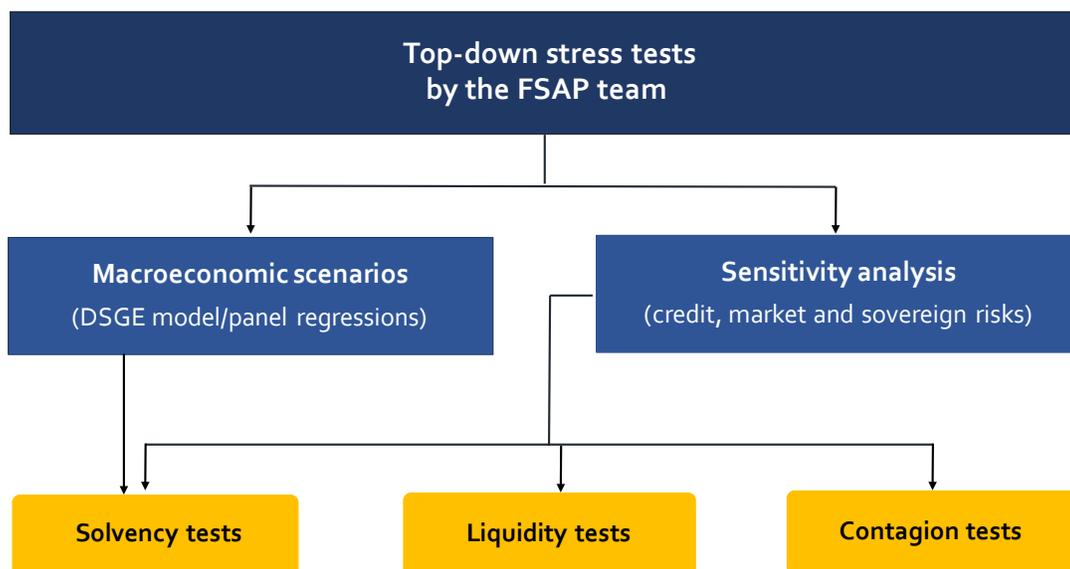
7.   The macroeconomic scenarios focused on key risks and vulnerabilities identified in the vulnerability analysis (text table):

Scenario Analysis: Risks and Vulnerabilities

Risks	Vulnerabilities
External shocks could drive up NPLs, impacting profitability and capitalization	Weak asset quality at some banks would exacerbate the impact
Contagion from a severe U.S. recession could lead to a domestic slowdown and large credit losses	The U.S. is a major source market for both tourism and FDI
A real estate price correction could result in large losses to mortgage portfolios	Bank loan portfolios are concentrated in mortgages
More frequent and severe hurricanes could damage infrastructure and cause a slowdown and credit losses.	High dependence on tourism for growth and employment

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[5] The scenario-based solvency stress test only covers credit risk. See also footnote 22.

8.   **Three adverse scenarios assess the banking system's resilience to above risk factors.** *The natural disaster scenario* models the risk of a major hurricane (losses of 22 percent of GDP at the 99th percentile of the historical distribution) negatively impacting tourism, employment, and bank asset quality. *The U.S. recession scenario* assumes a steep drop in U.S. demand for tourism and investment services, leading to a deep and protracted domestic slowdown, a rise in unemployment, a sharp correction in real estate prices, and significant bank losses. *The "perfect storm" scenario* simulates the combined effects of a U.S. recession and a major hurricane making a landfall on The Bahamas. The U.S. growth path is the same as in the second scenario, but the hurricane shock is less severe than in the first (losses of 10 percent of GDP at the 95th percentile of the historical distribution).[6]

9.   **The shocks in the macroeconomic scenarios are calibrated in a macrofinancial modeling framework.** A small dynamic stochastic general equilibrium (DSGE) model is estimated to measure the impact of external shocks to U.S. growth, U.S. property prices and hurricane losses on domestic tourist arrivals, real GDP growth, inflation, and the short-term interest rate. The macroeconomic projections feed into panel regressions forecasting key bank-level drivers of bank solvency under each scenario.[7]

DOMESTIC BANKING SECTOR VULNERABILITIES AND RISKS

A. Domestic Banks

10.   **The domestic banking system is concentrated, with large foreign bank presence.** There are seven commercial banks, of which four foreign-owned banks account for roughly three-quarters of the system's assets (text figure and Appendix III Figure 1).[8] The banks were grouped, based on their business models, in two peer groups. Three foreign banks

Domestic and Foreign Banks

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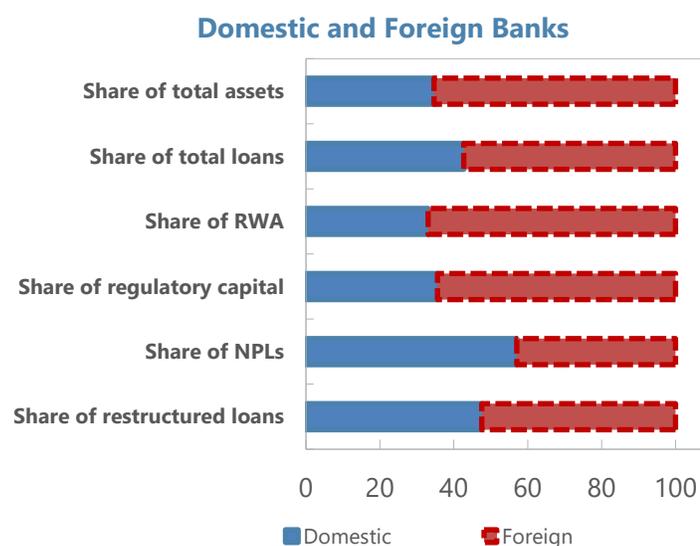
[6] The decline in real GDP growth in the scenario was calibrated not to exceed two standard deviations, which is consistent with The Bahamas' historical experience and standard stress testing assumptions.
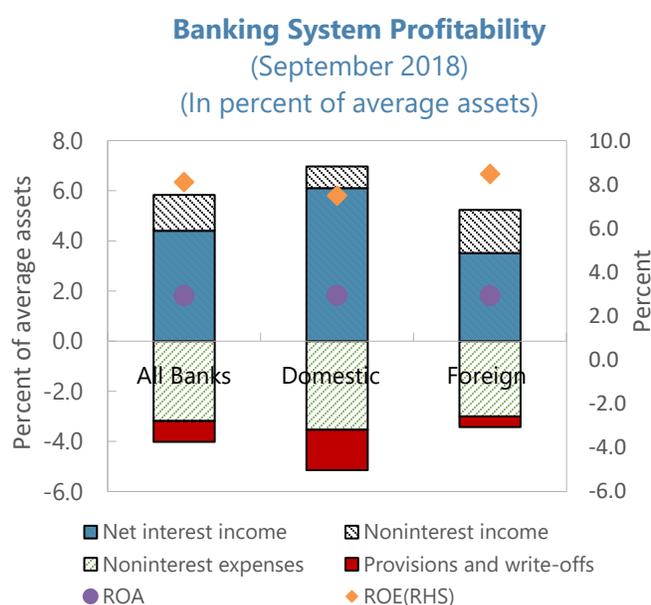
[7] Feedback effects from the banking sector to real activity are modeled through credit growth.

[8] This excludes one foreign bank with a significant branch presence and mainly nonresident operations.

operating both with residents and nonresidents under a consolidated balance sheet form the "foreign bank" group. Four banks operating only with residents form the "domestic banks" group.[9]

11.   The domestic banking system is primarily engaged in conventional banking services. Banks are funded mainly with household and commercial deposits and lend to the private sector and the government. Foreign banks rely more for funding on wholesale bank deposits than domestic banks and invest more in claims on other banks, mainly related entities. Approximately one fourth of foreign banks' balance sheets represent operations with nonresidents.[10] Commercial credit declined significantly following the GFC.[11] Mortgages comprised 60 percent of total credit to the private sector (residential mortgages represented 43 percent of total credit) at end-September 2018. Government securities accounted for less than 20 percent of banking assets at end-September 2018. Despite large exposure to mortgages, banks' maturity mismatches are moderate due to the prevalence of variable-rate loans.

12.   The system as a whole is well capitalized and profitable but there is dispersion across banks. As of September 2018, the capital adequacy ratio (CAR) of the seven commercial banks stood at 31.2 percent, with all the banks well above the 17 percent target ratio.[12] Foreign banks saw some reduction in CARs due to growth in risk-weighted assets, albeit from high initial levels. Domestic banks' CARs received a boost from a decline in risk-weighted assets and a capital injection at one bank. System-wide profitability remained stable, with a stronger reliance on net interest income among domestic banks and on noninterest income among foreign banks (text figure, Appendix III Figure 2, and

Banking System Profitability
(September 2018)
(In percent of average assets)

Legend: Net interest income | Noninterest income | Noninterest expenses | Provisions and write-offs | ROA | ROE(RHS)

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[9] This group includes one foreign-owned bank operating only with residents.

[10] They conduct both domestic (that is transactions with residents) and offshore banking activities (that is transactions with non-residents) under a consolidated balance sheet. Offshore banking activities are recorded on-balance sheet and recognized through fee income on the profit-and-loss statements.

[11] Partly because the large commercial portfolio of one bank that was hard hit by the GFC was wound down and because of the lack of creditworthy borrowers during the period of weak growth.

[12] In 2009, the authorities introduced two CAR requirements – a 17 percent target ratio and a 14 percent trigger ratio. Breaching the 14 percent threshold prompts supervisory actions including restrictions on dividends and production of a recovery plan.

Appendix III Table 3). Profitability is more uneven among domestic banks.

13.   Lingering asset quality problems warrant caution. Bank credit quality has been negatively impacted by the weak growth environment since the GFC. The system-wide NPL ratio remained elevated at 8.9 percent as of end-June 2018 after reaching 15.4 percent in 2014 (Appendix III Figure 4). While weaknesses persist in banks' mortgage portfolios, asset quality problems are more pronounced among domestic banks. Two banks had NPL ratios above 15 percent at end-September 2018. Given a soft medium-term outlook, asset quality problems are likely to continue to weigh on some banks' performance.

Nonperforming Loans
September 2018
(Percent of total loans)
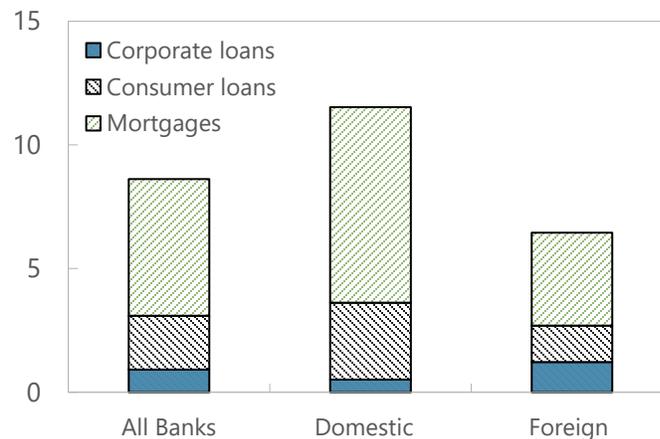
14.   Risks in the credit market are compounded by uncertainty regarding loan recovery values. Collateral values affect the loan amounts subject to provisioning. However, collateral valuations are not updated by periodic appraisals. In addition, the real estate market is small and prone to illiquidity, hence properties can be challenging to value even under stable economic conditions, given a lack of comparable sales, limited transaction disclosure requirements, and no published index of local housing prices. A 2017 law increased the protection of home owners, leading to a prolonged foreclosure process, and the chance of significant write-downs.[13]

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[13] The Home Owners Protection Act, 2017.

15.   Sluggish credit provision reflects heightened risk aversion and informational asymmetries in the credit market. Banks' large intermediation spreads partly reflect increased risk aversion in the face of borrowers' strained debt-servicing capacity during the prolonged slowdown. As a result, despite excess liquidity, banks refrain from making new loans. From 2012 to June 2018 bank credit to the private sector dropped by 11 percentage points. Informational asymmetries due to the absence of a credit bureau for households and the lack of financial statements for SMEs prevent a proper assessment of borrowers' creditworthiness.

Credit Growth and Credit Risk Indicators
(In percent)

- - - Lending-deposit spread (RHS)
—— Banking system NPL ratio
—— Credit growth
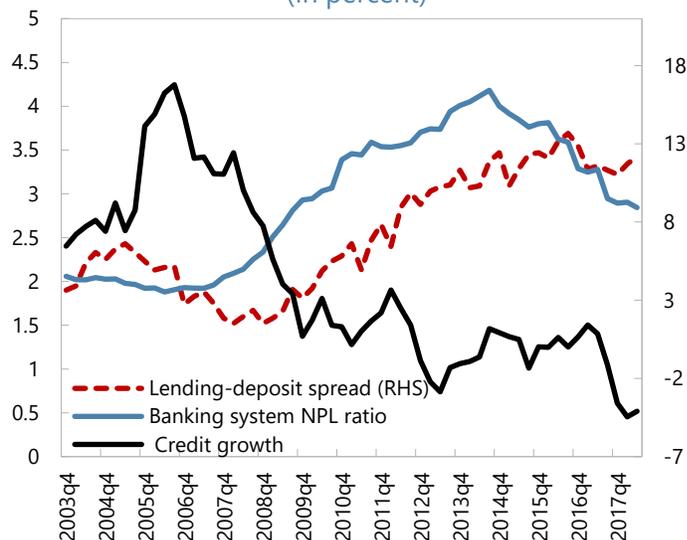
16.   Banks' direct sensitivity to interest rate risk is low but interest rate-induced credit risk is significant. Banks have small maturity mismatches due to the prevalence of variable rate loans and deposits in their portfolios. The system-wide cumulative maturity gap is positive, implying that a rise in interest rates would boost on average net interest margins (Appendix III Figure 5). However, higher interest rates would also increase borrowers' debt-servicing burden and banks' credit losses. Given small maturity mismatches and strong NPL sensitivity to interest rate shocks, the latter effect is likely to dominate.

17.   Banks' exposure to government bonds is moderate at present but further increases would warrant caution. In the December 2013–June 2018 period, the share of credit to the public sector in domestic banking assets increased from 20 percent to 23.5 percent. Government securities represent about 15 percent of total assets, of which two thirds are with maturities greater than one year (Appendix III Figure 5).[14] Rollover risk is mitigated by the relatively long duration of banks' bond portfolios.

18.   The banking system has accumulated excess liquidity during the period of weak economic activity. With ample liquidity buffers, subdued credit growth, and a growing deposit base, banks shifted toward cash reserves, increasing the ratio of net eligible liquid assets to 270 percent of required net liquid assets by end-June 2018 (Appendix III Figure 6). The ratio of liquid assets to total assets stood at 30 percent at end-June 2018. Strict exchange controls limit the risk of cross-border liquidity flight.

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[14] The Bahamas maintains a sub-investment grade BB+/B S&P sovereign credit rating with a stable long-term outlook.

B. Offshore Banks

19.   The analysis of the offshore banking sector is focused on the business models and balance sheets of the ten largest institutions. The analysis of the balance sheets and large exposures of these institutions confirms that their business models conform to those of the broader sector. Out of ten large offshore banks, two are primarily engaged in wholesale banking (mainly intra-group Treasury operations) and six are active in private banking. Therefore, although all 10 institutions were stress tested, results were reported for two banks engaged in more traditional banking activities.[15]

DOMESTIC BANKING SECTOR: SOLVENCY TESTS BASED ON MACROECONOMIC SCENARIOS

A. Description of Macroeconomic Scenarios

20.   A baseline and three adverse scenarios gauge individual banks' resilience to key global and country-specific risks identified in the Risk Assessment Matrix (RAM) (Appendix I). The analysis is conducted on data as of September 2018 over a 3-year horizon (2019–21).

21.   The "baseline" macroeconomic scenario is based on IMF World Economic Outlook (WEO) staff projections as of October 2018. The scenario assumes that global factors support near-term domestic growth. Improved U.S. consumer and business confidence support travel to The Bahamas and investment in the real estate sector. Domestic growth accelerates to 2.3 percent in 2018 and 2.1 percent in 2019, on the back of increased tourism receipts from a new, large resort.[16] Growth moderates to 1.5 percent by 2020, in line with the projected deceleration in U.S. economic activity. Monetary policy contains near-term inflationary pressures from international oil prices. Real interest rates remain steady.

22.   Three adverse scenarios assess the impact of global and country-specific shocks on tourist arrivals, GDP growth, inflation and interest rates.

- The *natural disaster scenario* gauges the effects of major hurricanes on tourist arrivals, GDP growth and bank performance.[17] A major hurricane that leads to a prolonged or

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[15] Three of the foreign-owned domestic banks that also operate in the offshore banking sector under consolidated balance sheets are stress tested with the domestic banking sector.

[16] The large Baha Mar resort was opened recently and is projected to boost near-term tourist arrivals and growth.

[17] The scenario replicates the effects of two major hurricanes, Francis and Jeanne, which hit The Bahamas in September 2004, inflicting combined damage estimated at 22 percent of GDP (Azevedo, 2016). In the

permanent degradation and closure of hotels and key infrastructure would negatively impact tourism and employment. The scenario explores the scope for increased bank credit losses from the knock-on effects of slower growth and higher unemployment.[18] The shock replicates two major hurricanes, Francis and Jeanne, which struck The Bahamas in September 2004, inflicting a combined damage of 22 percent of GDP (99th percentile of the historical loss distribution) (Box 1).[19] The scenario results in a cumulative 3-year decline of real GDP relative to the baseline equivalent to one standard deviation (text figure).

- The *U.S. recession scenario* models contagion from a severe U.S. recession through tourism and real estate investment channels. This would see reduced demand for tourism and investment services in The Bahamas, triggering a local slowdown. The resulting increase in unemployment, coupled with a sharp correction in real estate prices, would lead to significant bank losses in mortgages and consumer loans. The shocks to U.S. real GDP growth and U.S. property prices are calibrated based on historical data for the GFC. The scenario results in a cumulative 3-year decline of real GDP relative to the baseline equivalent to 1.5 standard deviations (text figure).[20]

- The *"perfect storm" scenario* simulates the simultaneous effects of a U.S. recession and a major hurricane. U.S. recessions and major slowdowns have coincided with hurricane events on seven out of the 15 hurricane shocks to The Bahamas observed over the last several decades (Box 1).[21] The U.S. recession shock is assumed to have the same severity as in the second scenario but the hurricane shock is less severe than in the first scenario (the shock is defined as losses of 10 percent of GDP, corresponding to the 95th percentile of the historical loss distribution). The shocks were calibrated to lead to a 2-standard deviation 3-year cumulative GDP decline relative to the baseline, an extreme but plausible GDP drop consistent with The Bahamas' historical experience (text figure).

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scenario, the hurricane losses are split over two consecutive years. The shock corresponds to the 99th percentile of the historical loss distribution.

[18] The association between hurricanes and growth is not always clear-cut in annual data given the impact of other factors, the short hurricane season, and expeditious rebuilding efforts based on reinsurance proceeds.

[19] Losses are spread over two years because given the fall hurricane season reconstruction activities are likely to continue the following year.

[20] GDP growth in The Bahamas exhibits significant volatility; its two-year cumulative standard deviation is seven percent over the 1962–2017 period.

[21] Major slowdowns are defined as drops in U.S. real GDP growth of at least one percentage point relative to the previous year.

Box 1. Hurricanes and Financial Stability in The Bahamas

The impact from hurricanes on the financial system is uneven but has on occasion proven significant. Given that banks typically require catastrophic risk insurance, and domestic insurance companies reinsure abroad, growth and employment are the main channels through which hurricanes affect the banking system. Banks' direct credit exposure to tourism companies appears small, mitigating the risk of large business loans losses, though hotel and infrastructure damage can lead to unemployment and bank losses on mortgages and consumer loans. The overall impact depends on the damage magnitude and could be long-lasting, especially if those affected choose not to rebuild—in 2016 Hurricane Matthew led to closure of several resorts that were already facing a severe demand slump. A regression analysis of 2002–15 NPLs revealed that the effect of hurricanes on bank NPLs is nonlinear and varies with the state of the economy. When growth is weak, the interaction of recessions and hurricanes further amplifies the increase in NPLs.

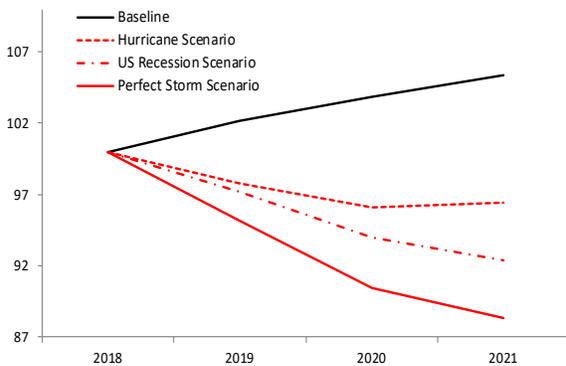**Hurricane Losses in The Bahamas 1/**
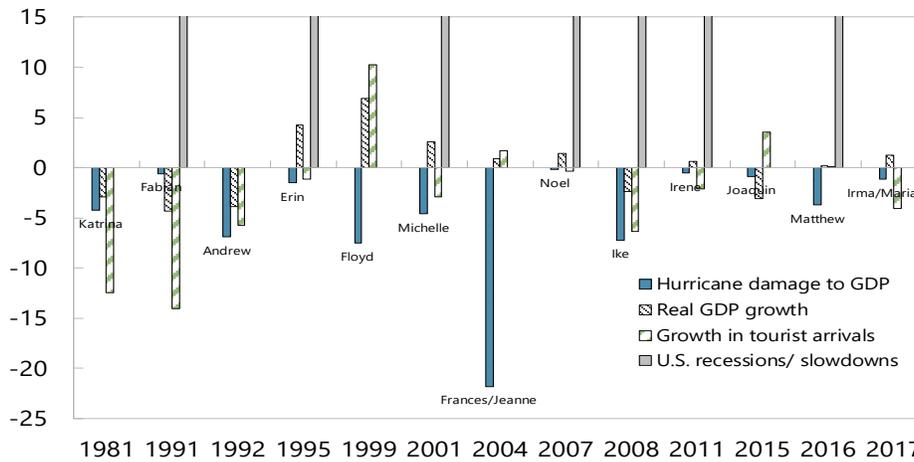
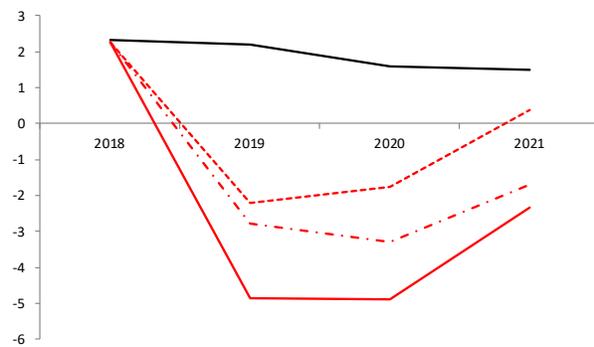Sources: Azevedo (2016), EM-DAT, and U.S. Hurricane Center.

1/ U.S. slowdowns are defined as declines in real GDP growth of at least one percentage point relative to the previous year.

Macroeconomic Scenarios: Shocks to GDP Growth

Real GDP Level (2018 = 100)

Real GDP Growth Rates (in percent)

23. **The scenarios are based on a DSGE model estimated for The Bahamas and satellite models for bank-level variables.** A small DSGE model is estimated to calibrate the impact of exogenous shocks to U.S. growth, U.S. property prices and hurricane losses on domestic tourist arrivals, real GDP growth, consumer price inflation, and the short-term interest rate. The projections enter as explanatory variables in panel regressions that project key bank-level drivers of solvency and ultimately bank CARs.[22] The scenarios consider second-round contagion and potential feedback effects from credit growth to real activity. The credit growth projections draw upon standard stress testing assumptions.[23]

24. **A novel modeling framework examines the effects of hurricanes on macroeconomic and bank-level variables.** The novelty in the approach is the use of a variable that measures the severity of hurricane losses to GDP to calibrate the impact of hurricanes on tourist arrivals, real GDP growth, bank NPLs and real credit growth in a DSGE model and satellite panel data regressions. The variable allows to vary the strength of the hurricane shock with the severity of the scenario. The panel regression analysis explores potential reinforcing effects of hurricanes and recessions on bank NPLs.[24]

B. Macroeconomic Model

25. **Staff estimated a small DSGE model to examine key macroeconomic relationships in The Bahamian economy.** The model consists of four behavioral equations for real GDP growth, growth in tourist arrivals, inflation and the short-term interest rate. The model specification was guided by New Keynesian theory, key features of The Bahamian economy, and stress test objectives. As a small, open Caribbean economy, growth in The Bahamas is mainly driven by tourism and real estate investment flows from the U.S. and prone to frequent hurricanes. The initial theoretical model was adapted to the empirical relationships observed in actual data.[25] The four equations are defined as follows:

$$Y_t = \alpha_1 Y_{t-1} + \alpha_2 TU_t + \alpha_3 USP_t + \alpha_4 HU_t + \alpha_5 CR_t + z_t \tag{1}$$

$$TU_t = \alpha_6 USY_t + \alpha_7 USP_t + \alpha_8 HU_t + v_t \tag{2}$$

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[22] The impact of interest rate risk on bank NPLs, income and credit growth is captured by including the interest rate as an explanatory variable in the panel regressions. Interest rate effects on the market value of banks' bond portfolios were not considered given that such bonds are held to maturity and not stress tested under standard stress testing practices. There is also limited data on bond yields and duration.

[23] A standard practice in stress testing is to assume that the credit to GDP ratio remains relatively steady over the stress test horizon.

[24] Recent historical experience seems to suggest that hurricanes have a more permanent effect on unemployment and bank NPLs when the economy is already in a recession because some firms/resorts confronted with a slump in demand may choose to cash in on insurance proceeds and exit the business.

[25] The macroeconomic series are available at annual frequency, which limits the number of observations and significantly reduces the modeling flexibility, requiring an extremely parsimonious specification.

$$Inf_t = \alpha_9 Inf_{t-1} + \alpha_{10} Y_{t-1} + e_t \tag{3}$$

$$IR_t = \alpha_{11} Inf_t + u_t \tag{4}$$

where Y_t is real GDP growth, TU_t is the percent change in stopover visitor arrivals, USP_t is the percent change in the U.S. housing price index for Florida[26], HU_t is the ratio of hurricane losses in The Bahamas to GDP, CR_t is real credit growth, USY_t is U.S. real GDP growth, Inf_t is consumer price inflation (e.o.p.), IR_t is the nominal T-bill rate, and z_t, e_t, u_t and v_t are independent and identically distributed (iid) random shocks. The shock z_t could be interpreted as a shock to domestic demand, v_t as a shock to U.S. (foreign) demand, and u_t as a monetary policy shock.

26.   The analysis is based on annual data for the period 1976–18. Real GDP, CPI, the T-bill rate, nominal credit to the private sector and U.S. real GDP are extracted from the IMF World Economic Outlook and International Financial Statistics. Annual visitor arrivals are downloaded from the online data of The Bahamian Ministry of Tourism. The Florida housing price index of the U.S. Federal Housing Agency is obtained via Haver Analytics.

27.   The impact of hurricanes on growth and tourist arrivals is calibrated using a novel variable. The variable measures actual damages to the capital stock as a percentage of nominal GDP. This approach allows to modulate the shock according to the severity of the scenario. The data are based on Azevedo (2016) and sourced from the International Disaster Database EM-DAT (Guha-Sapir, Hoyois and Below, 2015). The series was updated from news reports and information available from the U.S. National Hurricane Center for the period 2016–18.

28.   The structural parameters of the model are estimated by maximum likelihood. The method uses a Kalman filter to form the log-likelihood function. Given that the shocks are assumed to be independent and identically (but not normally) distributed, the estimation was conducted with robust standard errors to ensure consistency of the maximum likelihood estimator under this weaker distributional assumption.

29.   The estimates are consistent with theory and key features of The Bahamian economy (Table 2).

- As expected, GDP growth is driven by visitor arrivals and foreign real estate investment (proxied by the buoyancy of U.S. housing prices in the similar Florida market).

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[26] The Florida housing index appears more closely associated with real GDP growth in The Bahamas than the broader U.S. housing index, possibly because it reflects more fully prices of vacation properties and similar climatic conditions.

- Visitor arrivals show a strong relationship to U.S. GDP growth and the momentum in the U.S. housing market. The latter could have important wealth effects on travel.

- Hurricanes have a significant impact on visitor arrivals and GDP growth.

- The inflation process seems persistent and relatively backward looking, with expectations playing a limited role.[27]

- The estimates suggest a muted response of interest rates to inflation, consistent with anecdotal evidence of a relatively weak policy transmission.

30.   The novel hurricane variable helps focus the analysis on tail risk. The hurricane losses to GDP variable is better suited to model extreme shocks compared to dummy variables, which capture the average hurricane impact. The estimates suggest that an increase in hurricane damages by 1 percentage point of GDP would lead to a 0.47 percentage point drop in the growth rate of tourist arrivals relative to the baseline. The average hurricane damage in the sample is 4 percent of GDP, implying a 2-percentage point difference with the growth in tourist arrivals in the baseline. This estimate is consistent with the literature (Granvorka and Strobl, 2011). Under the tail risk shock of 22 percent of GDP (more than 4 standard deviations above the mean), the estimates imply that growth in tourist arrivals would be by 10 percentage points lower relative to the baseline.[28]

31.   The estimates of hurricanes' growth impact are consistent with the literature. An average hurricane would reduce real GDP growth by about 0.6 percentage points relative to the baseline. An extreme shock at the far end of the distribution would cause real GDP growth to deviate from the baseline path by 3.3 percentage points. Similar results are obtained in Strobl (2011) for a panel of U.S. coastal countries.[29]

32.   The model's impulse response functions reveal strong shock persistence. The effects of one-standard deviation shocks to exogenous variables on domestic GDP growth unwind over a 3-year period (Appendix IV Figure 1). More severe shocks would take longer to peter out. This analysis informed the choice of a stress test horizon. External shocks are carried over to next periods through lags of domestic growth and inflation. In in-sample forecasts, the model closely replicates the trajectory of key domestic variables conditional on actual U.S. data for the GFC (Appendix IV Figure 2).

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[27] The expected inflation variable proved insignificant in the inflation equation. The behavior of inflation and interest rates appears consistent with the fixed exchange rate and capital controls.

[28] This is a cumulative two-year decline in arrivals because hurricane losses are spread over two years.

[29] Strobl (2011) find that real GDP growth will decline after an average and an extreme hurricane by 0.45 percentage points and 3 percentage points, respectively. The estimates are on per capita basis.

Table 2. DSGE Model Estimates
(Sample period: 1976-2018)

	(1)	(2)	(3)	(4)
	Real GDP growth	Growth in tourist arrivals	inflation	Short-term interest rate
Real GDP growth (t-1)	0.343			
	(2.70)***			
Growth in tourist arrivals (t)	0.302			
	(7.73)***			
Change in U.S. housing prices (t)	0.061			
	(1.82)*			
Real credit growth (t)	0.073			
	(1.85)*			
Hurricane losses to GDP (t)	-0.153			
	(1.82)*			
U.S. real GDP growth (t)		1.643		
		(3.68)***		
Change in U.S. housing prices (t)		0.142		
		(1.81)*		
Hurricane losses to GDP (t)		-0.469		
		(2.00)**		
Inflation (t-1)			0.746	
			(9.91)***	
Real GDP growth (t-1)			0.229	
			(3.41)***	
Inflation (t)				0.582
				(5.65)***

Note: Maximum likelihood/Kalman filter methods, i.i.d shocks and robust standard errors. T-values reported in parenthesis (* p<0.1; ** p<0.05; *** p<0.01). All variables are expressess as percentages.

33.   The shocks in the model are calibrated to generate the October 2018 IMF WEO baseline. Deviations from the baseline in adverse scenarios are driven by exogenous shocks to hurricane losses, U.S. growth, and U.S. housing prices (Appendix IV Table 1). The model has three external, exogenous variables—the ratio of hurricane losses to GDP, U.S. GDP growth, and the percent change in U.S. housing prices. Hurricane losses in adverse

scenarios correspond to the tail of the historical distribution. The shocks to U.S. variables were calibrated on historical data for the GFC (Appendix IV Figure 2).[30, 31, 32]

34.   The adverse macroeconomic scenarios are driven by external risk factors. In the "perfect storm" scenario, two thirds of the decline in GDP is due to external factors and one third is due to domestic factors. These estimates are derived from the policy matrix of the model, in which all the control variables are expressed as a function of state variables. The elasticities show the effects of a one-unit shock to the state (exogenous) variable on the control (endogenous) variable. The impact of exogenous variables on GDP is a function of their estimated elasticities and cumulative changes over the stress test horizon. Among external factors, both hurricanes and U.S. housing prices explain about 25 percent of the decline in GDP, while U.S. real GDP growth explains 17.5 percent (Table 3).

35.   Domestic factors amplify external shocks. Among domestic factors, lagged GDP growth (which could be interpreted as a proxy for a domestic multiplier), amplifies the external shocks, explaining about 25 percent of the total cumulative GDP slowdown.

Table 3. "Perfect Storm" Scenario: Contributions to Real GDP Shock of External and Domestic Factors (2019–21)				
	Elasticity 1/	Cumulative shock (2019-21) (ppt)	Cumulative impact on real GDP growth	Share in total GDP impact (percent)
External risk factors				
US GDP growth	0.496	-4.0	-2.0	17.4
Change in US housing price	0.103	-27.3	-2.8	24.8
Hurricane losses to GDP	-0.295	10.0	-3.0	25.9
External factors (total)			-7.8	68.1
Domestic risk factors				
Lagged real GDP growth	0.326	-9.5	-3.1	27.3
Lagged inflation	-0.054	3.1	-0.2	1.5
Credit growth	0.073	-4.9	-0.4	3.1
Domestic factors (total)			-3.6	31.9

1/ The effect of a one-unit shock (ppt change) to the variable on real GDP growth.

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[30] The slightly more protracted U.S. recession in the scenario assumes a more limited room for stimulus during a new U.S. recession and is consistent with a shock calibration requirement of 2 standard deviations.

[31] Contemporaneous credit growth is determined exogenously conditional on lagged GDP growth in bank-by-bank panel regressions (see Section C below).

[32] The credit growth projections in adverse scenarios were adjusted to conform with standard assumptions that the aggregate credit to GDP ratio should remain relatively stable over the stress test horizon.

C. Satellite Models and Methodologies

36.   The panel data analysis models the relationship between individual banks' NPLs, ROA and credit growth, and key macroeconomic variables. The analysis is based on a dynamic panel data specification, which assumes that the dependent variable is a function of its lagged values and a set of macroeconomic controls:

$$y_{it} = \alpha_i + \sum_{j=1}^{k} \beta_j\, y_{it-j} + \sum_{F=1}^{m} \sum_{s=0}^{n} \gamma_{F,s} MACRO_{F,t-s} + \varepsilon_{it} \qquad (5)$$

where y_{it-j} is the lagged bank-level dependent variable of bank i at time t and $MACRO_{F,t-s}$ is a vector of macroeconomic control variables. The model includes a bank fixed effect a_i and a random disturbance term ε_{it}. The fixed effect controls for unobserved bank-level heterogeneity.

37.   The NPL analysis follows the established approach in the literature. The dependent variable represents a logit transformation of the NPL ratio (Virolainen, 2004). Under this approach, the NPL ratio, which is a limited dependent variable bound between zero and unity, is transformed into a "credit quality index," which is free to vary between minus and plus infinity. The credit quality index, $logitNPLr_{it}$, is defined as follows:

$$logitNPLr_{it} = \ln\left((1 - NPLr_{it}/100)/ (NPLr_{it}/100)\right) \qquad (6)$$

where $NPLr_{it}$ is the actual NPL ratio of bank i at time t. It is worth noting that the index moves in opposite directions to the NPL ratio—higher values imply better credit quality. The credit quality index is used as a dependent variable in the NPL regressions.

38.   The panel data analysis employed a variety of econometric techniques. Potential bias resulting from the dynamic specification was addressed using the Arellano-Bond GMM instrumental variable estimator. However, the final specifications were based on fixed effect estimation because the lagged dependent variables proved insignificant.

39.   The dataset represents a balanced panel with annual data for the period 2001-17. [33] Given that the credit quality index was nonstationary in levels, it was included in the regression in its first difference. The period 2016–17 was excluded from the NPL regression because it was characterized by direct NPL sales to asset management companies that were unrelated to macroeconomic fundamentals.

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[33] The sample period varies slightly between models based on data availability and due to the differencing of one dependent variable.

40. **The results reveal a strong relationship between bank performance and macroeconomic fundamentals.** The estimates suggest high sensitivity of NPLs to shocks to economic activity, with a one percentage point drop in GDP growth leading to a 0.75 percentage point increase in the NPL ratio (Table 4).[34] The estimates indicate that NPLs are sensitive to interest rate shocks, with a one percentage point increase in the real rate associated with a 1.2-percentage point increase in the NPL ratio.[35] GDP growth has significant and economically important effects on ROA and real credit growth (the latter with a one-year lag). NPLs are an important driver of bank ROA and real credit growth.[36]

Table 4. Panel Regression Estimates

	ΔlogitNPLr 1/	ROA	Real credit growth 2/
Real GDP growth (t)	0.0477***	0.0744**	
	(0.0146)	(0.0300)	
Real GDP growth (t-1)			0.723**
			(0.342)
Real interest rate (t)	-0.0766***		
	(0.0244)		
NPL ratio (t)		-0.136***	
		(0.0250)	
NPL ratio (t-1)			-0.686***
			(0.113)
Hurricane losses to GDP (t)	0.000758		
	(0.00658)		
Hurricane losses to GDP (t-1)			0.344*
			(0.176)
Real GDP growth (t) * Hurricane losses to GD	0.00732*		
	(0.00376)		
Constant	-0.144***	2.867***	8.089***
	(0.0301)	(0.232)	(1.410)
Observations	91	112	105
Number of groups	7	7	7
R-squared	0.375	0.405	0.385

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1/ First difference of the credit quality index (logit NPL transform). Higher values imply better quality.
2/ Deflated by consumer inflation (eop).

41. **Bank income and credit growth appear to have low sensitivity to interest rate shocks.** The interest rate is insignificant in the ROA and credit growth regressions after

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[34] Some previous specifications included also U.S. GDP growth in the NPL regression, but the variable is highly correlated with domestic GDP growth, leading to collinearity problems. The relatively small number of observations also limits the number of parameters that could be reliably estimated.

[35] However, in interpreting this result, it is useful to note that GDP's standard deviation is nearly twice as large as that of the real interest rate.

[36] The latter may be interpreted to suggest potential supply-side driven restraint on real credit growth.

controlling for the effects of GDP growth and NPLs. Sensitivity test results (see next section) also suggest that the impact of interest rate shocks on bank net interest income is small. This is mainly due to the close matching of assets and liabilities of similar maturities, which insulates bank net interest income from interest rate fluctuations. Given a positive overall asset-liability gap, higher interest rates would slightly increase net interest income. However, there will be an offsetting negative effect on net interest income from the resulting increase in NPLs. Domestic demand, proxied by GDP growth and credit risk, proxied by NPLs, also seem to dominate the interest rate as a driver of credit growth.

42.   The estimates point to reinforcing effects between GDP, real credit and NPLs. In the DSGE model, real credit growth has a small, contemporaneous effect on real GDP growth. In the panel regression, GDP growth (used as a proxy of aggregate demand) impacts real credit growth with a one-year lag. These estimates suggest potential scope for reinforcing feedback effects between real credit growth, real GDP growth and bank credit quality. The feedback appears stronger from real GDP to credit than in the other direction.

43.   The panel regressions explore the effects of hurricanes on bank performance. In the NPL regression, hurricanes appear to have a negative impact on NPLs during recessions. This result is intuitive as short-term interruptions in tourism activity that fail to lead to a recession and higher unemployment are less likely to trigger increased losses to mortgage and consumer portfolios. The interaction of hurricane losses with GDP growth is statistically significant at the 10 percent level.[37] This suggests potential mutually reinforcing effects of hurricanes and recessions on bank credit quality. In the credit growth regression, hurricanes appear to have some positive effect on credit growth, possibly due to increased demand for bank loans to finance reconstruction activities.

44.   The results are robust to Granger tests for reverse causality. Panel Granger causality tests with one and two lags were conducted on contemporaneous explanatory variables to test for reverse causality (see Dumitrescu and Hurlin, 2012 and Lopez and Weber, 2017). The tests did not detect problems with reverse causality running from dependent variables to regressors at conventional significance levels.

D.   Risk Transmission to Bank Solvency

45.   The trajectory of individual banks' CARs is generated using the above satellite models and the following main assumptions:

- **Loss given default (LGD).** The average LGD is derived empirically from the distribution of banks' outstanding business, consumer and mortgage loans as of September 2018, which is assumed to stay constant and assuming sectoral LGDs on business, consumer and mortgage loans of 80, 100, and 50 percent, respectively. The average LGD varies

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[37] The estimates are based on a small number of observations and should be interpreted with caution.

from the low 60 percent for banks with large mortgage portfolios to 90–95 percent for banks specialized in consumer lending.

- **Credit losses.** Banks' credit losses in a given year are calculated as the incremental increase in projected NPL levels (based on regression forecasts) multiplied by the assumed loss given default (LGD). NPLs equal the projected NPL ratio multiplied by the credit projection and are adjusted for credit losses from restructured loans.

- **Restructured loans.** Actual restructured loans as of September 2018 are added to banks' initial positions. It is assumed that 10 percent of these loans would fall back into NPLs by end-2018. Banks' 2018 capital is adjusted for the resulting additional provisions. This rate of reversal is consistent with banks' experience and internal stress testing models. Subsequently, new NPLs arising from restructured loans are modeled as a fixed fraction of projected NPLs each period and vary from 5 to 20 percent, depending on the scenario. They are converted into credit losses using the same LGD assumptions.

- **Profits.** Profits are backed out of the regression projections for ROA and projected average assets. Total assets are assumed to stay constant, in line with the standard constant balance sheet assumption in stress tests.

- **Dividends.** Banks pay dividends if they are profitable for the year, in the amount of 50 percent of bottom-line profits. This dividend payout ratio was determined based on discussions with individual banks.

- **Risk-weighted assets.** The change in risk-weighted assets each period is calculated as the incremental increase in credit multiplied by its average weight in risk-weighted assets, which, based on actual data, is about 70 percent.[38]

E.   Macroeconomic Scenario Results

46.   The analysis of banks' initial capital adequacy positions was constrained by some data limitations but points to high share of common equity capital. An initial assessment of banks' capital positions prior to the stress tests would examine the adequacy of their loan classifications and provisions and adjust capital for any identified provisioning shortfalls. Provisioning coverage proved difficult to analyze due to some data gaps in loan

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[38] The average weight of credit in risk-weighted assets is less than one because the weights of consumer and mortgage loans are less than one.

classifications, provisioning and collateral valuations and coverage.[39] Nevertheless, the composition of regulatory capital points to high share of common equity for most banks.[40]

47.   Prior to the scenario analysis, banks' initial CARs were adjusted for potential reversals of restructured loans into NPLs. Most banks have restructured loans, some of which are likely to fall back into NPLs, especially if growth falters in an adverse scenario. Therefore, the preliminary analysis adjusted banks' initial CARs for a possible reversal of a fraction of restructured loans to NPLs.[41]

48.   The scenario results reveal that the overall banking system is resilient to a range of adverse shocks, but pockets of vulnerabilities remain and widen under severe stress. Banks' initial NPL levels and income-generating capacity emerged as key drivers of their resilience to the solvency shocks simulated in the macroeconomic scenarios. Despite high current capital ratios, banks with high NPLs experience a degradation of capital under adverse scenarios, resulting in some cases in capital breaches.

49.   The estimates indicate that U.S. recessions impact growth and bank credit quality through tourism and real estate channels. The analysis points to nonlinearities in the effects of hurricanes on NPLs, which appear to amplify bank losses during downturns.

Baseline

50.   In the baseline, the system-wide CAR increases on the back of stronger economic activity and slow accumulation of risk-weighted assets (Table 5). Banks' NPL ratios initially decline but then increase modestly in the outer years of the scenario when economic activity slows down. Nevertheless, the capital ratio of one bank with poor asset quality and low profitability declines over time but remains well above capital requirements.

Major Hurricane

51.   A short period of stress caused by a major hurricane would weaken bank performance but would not leave any banks below the 17 percent CAR target. The hurricane scenario affects key infrastructure and tourism inflows, incurring losses equivalent to 22 percent of GDP. The fall in economic activity drives up the system-wide NPL ratio by 3 percentage points relative to the baseline.[42] The system-wide CAR declines by about

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[39] Collateral valuations matter for provisions, which are assessed on NPLs after netting out collateral. Future compliance with IFRS 9 is likely to increase banks' provisioning requirements.

[40] Two domestic banks have issued preferred stock.

[41] Assuming that 10 percent of restructured loans regress to NPLs by end-2018 leads to a decline in the system-wide CAR by 0.6 percentage points.

[42] This shock implies an increase in aggregate NPLs of about 70 percent.

3 percentage points, dragged down by deteriorating profitability of weaker banks, which see their capital ratios decline but remain above the 17 percent target.

U.S. Recession

52.   The steeper growth slowdown projected in the U.S. recession scenario drives one bank with a large portfolio of legacy loans and low profitability below the 14 percent CAR trigger. Spillovers from a deep and protracted U.S. recession pushed up the system's NPL ratio by 10 percentage points relative to the baseline.[43] Banks' capital buffers are reduced by increased provisions, write-offs and falling profitability. Domestic banks with higher initial NPL ratios are more vulnerable to the shock. Their solvency position deteriorates by 10 percentage points relative to the baseline while the solvency position of foreign banks weakens by about 5 percentage points.

Perfect Storm Scenario

53.   Under tail risk conditions, the system-wide CAR declines to 23 percent and two banks (15 percent of banking assets) need additional capital. In the "perfect storm" scenario, the combined effects of a deep and protracted recession, higher real interest rates and large hurricane losses significantly weaken bank performance. The system-wide NPL ratio rises by 13 percentage points relative to the baseline.[44] Bank interest income declines as sharply rising NPLs squeeze profit margins while increased provisions and write-offs weigh on bottom-line profits. The hurricane shock further amplifies the fall in tourist arrivals, growth, employment and the rise in NPLs.[45] Given high initial capital buffers, the banking system's total capital shortfall is estimated at 0.4 percent of 2018 GDP.

Second-round Interbank Contagion

54.   The tail risk scenario generates limited interbank contagion, but one credit union is vulnerable to deposit losses. One bank is exposed to a vulnerable institution in the scenario but is in a position to absorb a potential loss without becoming undercapitalized.[46] One credit union is potentially at risk of facing large deposit losses in a vulnerable bank, which could erode its capital.

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[43] This shock implies an increase in aggregate NPLs of about 120 percent.

[44] This shock leads to an increase in aggregate NPLs of about 150 percent.

[45] Panel regression analysis suggests that hurricanes' impact on NPLs could increase in severe recessions.

[46] The tests assume LGD of 100 percent given the unsecured nature of interbank lending.

Table 5. Macroeconomic Scenarios: Summary Results
(In percent unless indicated otherwise)

	Regulatory capital ratio (CAR)			Number of banks with CAR below 14 percent[1]			Bank assets with CAR below 14 percent (percent of the system's assets)[1]			Potential recapitalization needs (percent of GDP)[2]		
	System	Domestic	Foreign	System	Domestic	Foreign	System	Domestic	Foreign	System	Domestic	Foreign
Initial position (Sept. 2018)	31.2	33.6	30.1	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Adj. position [3]	30.6	32.7	29.6	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Baseline												
2019	31.9	33.8	30.9	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
2020	32.5	33.9	31.8	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
2021	32.8	33.6	32.4	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Major Hurricane												
2019	30.4	31.3	30.0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
2020	29.0	28.2	29.5	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
2021	28.0	25.9	29.1	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
U.S. Recession												
2019	29.9	30.1	29.8	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
2020	28.4	26.9	29.2	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
2021	26.3	23.0	27.9	1	1	0	7.3	7.3	0.0	0.1	0.1	0.0
Perfect Storm												
2019	29.3	29.3	29.3	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
2020	26.5	24.1	27.6	0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
2021	22.9	18.4	25.1	2	2	0	15.1	15.1	0.0	0.4	0.4	0.0

Sources: Central Bank of The Bahamas and IMF staff estimates.

Note: "Domestic" banks are defined as banks with resident operations only, "foreign" banks are banks with resident and nonresident operations. Under this classification, there are 4 domestic and 3 foreign banks, representing 35 and 65 percent of banking assets, respectively.

[1] Based on a domestic regulatory threshold (trigger CAR ratio) of 14 percent.

[2] The recapitalization amount is estimated as the capital injection needed to restore CAR to 14 percent. Projected nominal GDP based on the October 2018 IMF World Economic Outlook.

[3] The initial adjustment to CAR assumes that 10 percent of restructured loans in 2018 become nonperforming by the end of the year.

SOLVENCY SENSITIVITY STRESS TESTS

A. Methodology

55.   The solvency sensitivity tests conducted by the FSAP team assess bank resilience to credit and market risks. Unlike macroeconomic scenarios, sensitivity tests gauge resilience to the instantaneous impact of a single risk factor. The tests are based on static projections, holding all other relevant factors constant. They assume no profit buffer and hold risk-weighted assets constant. Credit risk tests assess bank resilience to single factor shocks to the quality of the entire credit portfolio, individual economic sectors and large borrowers. Market risk tests examine the impact of interest rate shocks on banks' net interest income and estimate the FX gains or losses for banks with net open FX positions.

56.   The sensitivity tests cover domestic banks, large credit unions and offshore banks with more traditional banking business. For consistency with the macroeconomic scenarios, solvency shocks are calibrated on risk-weighted CARs whenever feasible. The tests for credit unions are based on a pro-forma CAR and use the same hurdle rate of 14 percent.[47] Additional tests for credit unions are performed on the unweighted capital-to-asset ratio using a hurdle rate of 10 percent (consistent with the PEARLS international standards for credit unions). The tests for offshore banks are based on the unweighted capital-to-asset ratio using a hurdle rate of 5 percent as agreed with CBOB.

57.   CBOB periodically conducts top-down stress tests for credit, interest rate and liquidity risks. The results are published in CBOB's annual Financial Stability Reports. The stress tests assess banks' resilience to single factor shocks to credit risk, interest rate risk and liquidity. There are differences in underlying assumptions, methodology, scope, and stress test horizon with the FSAP stress tests, which affect the comparability of results.

Credit Risk

58.   The FSAP credit risk stress tests assess bank resilience to the following single factor shocks:[48]

- *An increase in NPLs.* The tests assume increases in individual banks' NPLs of various magnitudes and assess their impact on capital through a corresponding increase in specific provisions (Appendix II STEM). The NPL increases are modeled under two approaches. The first approach assumes that the existing stock of NPLs increases by a

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[47] The authorities have proposed a 10.5 percent risk-based capital requirement for credit unions.

[48] The tests use a uniform LGD of 70 percent for all domestic and international banks and credit unions in stress tests based on the total credit portfolio and large exposures. A uniform LGD of 100 percent is used for comparability in the sectoral shocks (this test abstracts from differences in recoveries due to variations in collateral coverage which take time to materialize and focuses more on the gross economic impact). Risk-weighted assets do not change in the tests.

certain percentage (e.g., 25 percent). The second approach assumes that the increase in NPLs is proportional to total loans (e.g., an increase in the NPL ratio equivalent to 5 percentage points).[49]

- *Shocks to specific economic sectors.* Given that the economic sectors to which banks lend are likely to have different sensitivities to credit risk, these stress tests apply sector-specific NPL shocks to banks' sectoral loans. The shocks are specified in terms of an increase in sectoral NPLs. For credit unions and offshore banks, the sectoral NPL increase is assumed proportional to the sectoral exposure due to data limitations.

- *Defaults of banks' largest borrowers.* These tests assume simultaneous defaults of individual banks' first, three, and five-largest borrowers.

Interest Rate Risk

59.   The stress tests model the impact of interest rate shocks on banks' net interest income in a repricing gap framework. Interest rate risk stems from maturity mismatches between interest-bearing assets and liabilities. The effect of interest rate shocks on net interest income in each repricing bucket depends on the direction of the mismatch between assets and liabilities. A cumulative net asset position implies a net interest gain when interest rates increase. Conversely, a net liability position implies a net interest loss. The impact of interest rate shocks on earnings and solvency are estimated over a 1-year horizon. Shocks of various magnitudes are applied to total exposure in domestic and foreign currency. Variable rate loans are assumed to reprice in the 1–3 month bucket.

Exchange Rate Risk

60.   Exchange rate sensitivity tests gauge banks' resilience to a simultaneous, uniform devaluation against all major currencies. The tests estimate the direct repricing impact on banks' net open FX positions under various shocks (Appendix II STEM).

B.   Results: Commercial Banks

61.   The credit risk tests broadly confirm the findings of the scenario analysis. The tests reveal banks' overall resilience to small-to-medium-sized shocks and vulnerability in two banks to tail risk conditions. The results are similar to the macroeconomic scenarios, with two banks falling below the 14 percent CAR trigger if existing NPLs increase by 150 percent (Table 6). If shocks are applied instead in proportion to total loans, an increase in NPLs equivalent to 10 percent of total loans will drive two banks representing 32 percent of banking assets somewhat below the 17 percent CAR target but all banks will remain above the 14 percent trigger ratio. This test has a smaller effect on capital because the

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[49] Bank capital is reduced by the estimated credit losses, which are calculated as the product of the outstanding nonperforming exposures and the assumed LGD.

shock is driven by leverage, which is not particularly high given banks' large initial capital buffers.

62.   Risks stemming from banks' mortgage portfolios dominate other sectoral shocks. An increase in mortgage NPLs of 150 percent would cause one bank (7 percent of banking assets) to breach the 14 percent capital trigger. Exposure to credit concentration risk is less significant given the preponderance of consumer and residential mortgage loans in bank portfolios. Foreign banks are more exposed to large borrowers than domestic banks. Nevertheless, a simultaneous default of their five largest borrowers would not leave any banks undercapitalized.

63.   The banking system is overall resilient to direct interest rate risk. Assets and liabilities reprice quickly given the prevalence of floating rate loans on the asset side and short-term deposits on the liability side. Domestic banks have for most part negative one-year repricing gaps and their net interest income will decline if there is a rise in interest rates.[50] Conversely, foreign banks have on average positive one-year gaps and their net interest income will increase if interest rates rise.[51] Since the system's average is dominated by foreign banks, declines in interest rates reduce aggregate net interest income but overall the effect is small. Banks' CARs remain well above domestic trigger and target ratios after 500 basis point shocks to interest rates (Table 7).

64.   Nevertheless, banks' exposure to indirect interest-rate induced credit risk is significant. Interest-rate induced credit risk was assessed in the macroeconomic scenarios using econometric methods. Interest rates emerged as an important determinant of bank NPLs in the panel regression analysis and in macroeconomic scenarios, possibly because of the large share of floating rate loans in bank portfolios, which would reprice quickly in a rising interest rate environment.

65.   The stress tests reveal relatively modest bank exposure to sovereign risk. Notional face-value haircuts applied to banks' government securities portfolios reveal small-to-moderate sensitivity for most banks, except under extreme sovereign default scenarios that involve haircuts above 25-30 percent, where some banks with more substantial domestic sovereign bond exposure could be affected (Table 7).[52]

66.   Direct exchange rate risk is low given banks' small net open FX positions. Strict FX controls effectively segregate operations in domestic and foreign currencies, ensuring the stability of the peg to the U.S. dollar. Nevertheless, foreign banks' consolidated balance sheets include also nonresident positions, which are denominated in foreign currencies,

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[50] The impact of the interest rate shocks on banks' net interest income was measured over a one-year horizon, using data on the time to maturity structure of assets and liabilities up to one year.

[51] A rise in interest rates would also reduce net interest income through its negative impact on asset quality, which in the panel regression analysis is an important determinant of bank NPLs.

[52] The stress tests did not cover direct bank lending to public enterprises, etc.

mainly U.S. dollars. Regulatory requirements limit net open FX positions to the minimum of 5 percent of bank Tier 1 capital and B$5 million. Data for September 2018 indicate that banks are well below this limit (Table 7).

C.   Results: Credit Unions

67.   The sensitivity tests for credit unions reveal significant vulnerability to credit risk. The two largest credit unions have weak capital buffers and NPL ratios above 10 percent of total loans.[53] One of the two credit unions is currently under the 10 percent unweighted capital requirement while the other is broadly compliant. Therefore, the tests used a pro-forma risk-weighted CAR as an alternative hurdle rate. The FSAP team estimated the average CAR of the two credit unions to be 16.3 percent. The two credit unions become undercapitalized under a relatively moderate 50 percent increase in NPLs.[54] Larger shocks lead to significant undercapitalization. Credit unions are more resilient to credit concentration and interest rate risks than domestic banks given their predominant investment in short-term consumer loans.

D.   Results: Offshore Banks

68.   The stress test results for offshore banks point to low risks from traditional banking activities. The offshore banks covered by the analysis have low NPL ratios and low levels of credit to the private sector. An increase in NPLs equivalent to 10 percent of total loans would not have a large impact on their solvency. Offshore banks lend mainly to corporates and are in a position to withstand a 15 percent deterioration in the quality of corporate loans. One of the banks is more exposed to credit concentration risk and would see its capital-to-asset ratio approach the 5 percent hurdle rate if its five largest borrowers default.[55] Small maturity mismatches result in low sensitivity to interest rate risk.

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[53] The two largest credit unions represent 65 percent of total credit union sector's assets.

[54] This risk-weighted threshold is indicative given that credit unions currently do not have to comply with risk-weighted capital requirements. The smaller credit union's higher vulnerability to shocks is due to its lower capital buffers and higher initial NPL ratio.

[55] The tests were conducted on the unweighted capital to asset ratio and based on a hurdle rate of 5 percent given some data limitations.

Table 6. Credit Risk Sensitivity Tests for the Domestic Banking System
(In percent unless indicated otherwise)

	Regulatory capital ratio (CAR)			Number of banks with CAR below 14 percent[1]			Bank assets with CAR below 14 percent (percent of the system's assets)[1]		
	All Banks	Domestic	Foreign	All Banks	Domestic	Foreign	All Banks	Domestic	Foreign
Initial position (Sept. 2018)	31.2	33.6	30.1	0	0	0	0.0	0.0	0.0
Adj. position [2]	30.6	32.7	29.6	0	0	0	0.0	0.0	0.0
Increase in NPLs [3]									
(i) Proportional to existing NPLs									
50 percent	27.6	27.7	27.6	0	0	0	0.0	0.0	0.0
100 percent	24.7	22.6	25.7	0	0	0	0.0	0.0	0.0
150 percent	21.7	17.6	23.7	2	2	0	15.1	15.1	0.0
200 percent	18.7	12.6	21.8	3	2	1	41.4	15.1	26.4
(ii) Proportional to total loans									
3 percent	28.8	30.3	28.0	0	0	0	0.0	0.0	0.0
5 percent	27.5	28.7	26.9	0	0	0	0.0	0.0	0.0
10 percent	24.5	24.8	24.3	0	0	0	0.0	0.0	0.0
Large borrower defaults [3]									
1st largest borrower	28.8	32.3	27.0	0	0	0	0.0	0.0	0.0
3 largest borrowers	27.0	31.5	24.8	0	0	0	0.0	0.0	0.0
5 largest borrowers	25.9	30.9	23.5	0	0	0	0.0	0.0	0.0
Sectoral credit shocks [4]									
Shock to commercial loans	28.5	28.4	28.5	0	0	0	0.0	0.0	0.0
Shock to consumer loans	28.0	27.8	28.1	0	0	0	0.0	0.0	0.0
Shock to mortgage loans	23.1	18.9	25.2	1	1	0	7.3	7.3	0.0

Sources: Central Bank of The Bahamas and IMF staff estimates.

Note: Domestic banks are defined as banks with resident operations only, foreign banks are banks with both resident and nonresident operations.

[1] Based on a domestic regulatory threshold (trigger CAR ratio) of 14 percent.

[2] The initial adjustment to CAR assumes that 10 percent of restructured loans become nonperforming.

[3] Assuming LGD of 70 percent.

[4] This test assumes an increase in sectoral NPLs of 150 percent and LGD of 100 percent.

Table 7. Market Risk Sensitivity Stress Tests for the Domestic Banking System
(In percent unless indicated otherwise)

	Regulatory capital ratio (CAR)			Number of banks with CAR below 14 percent [1]			Banks with CAR below 14 percent (percent of the system's assets)[1]		
	All Banks	Domestic	Foreign	All Banks	Domestic	Foreign	All Banks	Domestic	Foreign
Initial position (Sept. 2018)	31.2	33.6	30.1	0	0	0	0.0	0.0	0.0
Adj. position [2]	30.6	32.7	29.6	0	0	0	0.0	0.0	0.0
Interest rate shock									
–300 basis points	29.8	32.6	28.5	0	0	0	0.0	0.0	0.0
–500 basis points	29.3	32.5	27.8	0	0	0	0.0	0.0	0.0
+300 basis points	31.3	32.8	30.6	0	0	0	0.0	0.0	0.0
+500 basis points	31.8	32.9	31.3	0	0	0	0.0	0.0	0.0
Exchange rate shock									
15 percent devaluation	30.6	32.7	29.6	0	0	0	0.0	0.0	0.0
25 percent devaluation	30.6	32.7	29.6	0	0	0	0.0	0.0	0.0
Sovereign risk shock [3]									
Nominal haircut									
10 percent	28.2	30.3	27.1	0	0	0	0.0	0.0	0.0
20 percent	25.8	27.9	24.7	0	0	0	0.0	0.0	0.0
30 percent	23.3	25.5	22.3	1	0	1	19.8	0.0	19.8

Sources: Central Bank of The Bahamas and IMF staff estimates.

Note: Domestic banks are defined as banks with resident operations only, foreign banks are banks with both resident and nonresident operations.

[1] Based on a domestic regulatory threshold (trigger CAR ratio) of 14 percent.

[2] The initial adjustment to CAR assumes that 10 percent of restructured loans become nonperforming.

[3] The "haircuts" are applied on the outstanding nominal value of banks' government securities.

DOMESTIC BANKING SECTOR: LIQUIDITY TESTS

69.   The FSAP team conducted liquidity stress tests based on the maturity ladder of bank assets and liabilities. The liquidity tests are based on assumptions for run-off rates on funding sources and roll-off rates on assets (Appendix V Table 1). The run-off rates specify the percentage of the liability exposure maturing in a given period that is withdrawn (and not rolled over). The roll-off rates define the percentage of the asset exposure maturing that is converted into a cash inflow (and not rolled over) by the bank. Banks finance negative funding gaps by drawing down liquid assets and fail the test if they run out of liquidity and need emergency liquidity assistance from CBOB.[56]

70.   The dynamics of the simulated funding shocks are based on the following stress test assumptions:

- *Shock intensity.* Although the funding shock is assumed to be persistent, lasting for up to 1 year, the intensity of the run-off rates is higher in the shorter maturity buckets (up to 6 months) and declines afterwards. Actual outflows peak within 1 month given that a significant amount of deposits is concentrated in that maturity. The profile of individual bank outflows depends on the bank-specific structure of liabilities. Under the parameters of the test, banks with more short-term deposits would *ceteris paribus* see themselves confronted with larger outflows.

- *Run-off rates.* Second, deposit liabilities (which are to some extent protected by deposit insurance) have lower run-off rates than unsecured and wholesale funding. The absence of deposit breakdowns by maturity bucket prevented varying the run-off rates by types of deposits based on their degree of stability under shocks.

71.   Under the assumptions of the test, banks can convert a fraction of maturing loans into cash to meet the outflows and cover potential shortfalls with liquid assets. A standard stress test assumption is that banks convert (roll-off) a fraction of maturing performing loans into cash proceeds to meet outflows. The roll-off rates are 50 percent of loan amounts of shorter maturities (up to one month), 30 percent for maturities up to six months, and 10 percent for longer maturities. Banks' liquid assets comprise cash, excess reserves at the CBOB, deposits with financial institutions and government securities. Government securities are assumed to be rediscounted (repoed) through the CBOB facility at a minimum haircut of 15 percent as required by CBOB regulations (Appendix V Table 1).

72.   The results reveal that a sustained run would cause a shortfall in one bank representing 8 percent of banking assets but after a prolonged 6-month period. The tests are based on run-off rates differentiated by the maturity profile of bank liabilities. The

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[56] Data limitations precluded the analysis from distinguishing between different currencies and resident and nonresident deposits. The Bahamas has strict exchange controls, which mitigate the risk of cross-border (nonresident) withdrawals.

shocks imply that 21 percent of non-equity funding is withdrawn within the first 3-months, with total withdrawal reaching 25 percent by the end of the year (Table 8 and Figure 1). Banks offset withdrawals with cash inflows from their asset portfolios and cover shortfalls with cash, excess reserves and repos of government securities, subject to valuation haircuts. Most banks have large liquidity buffers. The affected bank in the test has lower liquidity buffers and a large portfolio of illiquid long-term loans. Also, one large bank that relies mostly on short-term deposit liabilities would have to repo a significant fraction of its government securities during the first 3 months to meet projected outflows.

Table 8. Liquidity Stress Test
(In percent unless indicated otherwise)

	Number of banks that fail the test			Share of illiquid banks in the system's assets		
	System	Domestic	Foreign	System	Domestic	Foreign
0-30 days	0	0	0	0.0	0.0	0.0
30-60 days	0	0	0	0.0	0.0	0.0
60-90 days	0	0	0	0.0	0.0	0.0
90-180 days	1	1	0	7.7	7.7	0.0

Sources: Central Bank of The Bahamas, and IMF staff estimates.

Note: The stress test is based on a maturity ladder contractual cash flow analysis. It assumes that 25 percent of total non-equity funding is withdrawn within a year, with 21 of it withdrawn in the first 90 days.

Figure 1. Liquidity Stress Test: Banking System
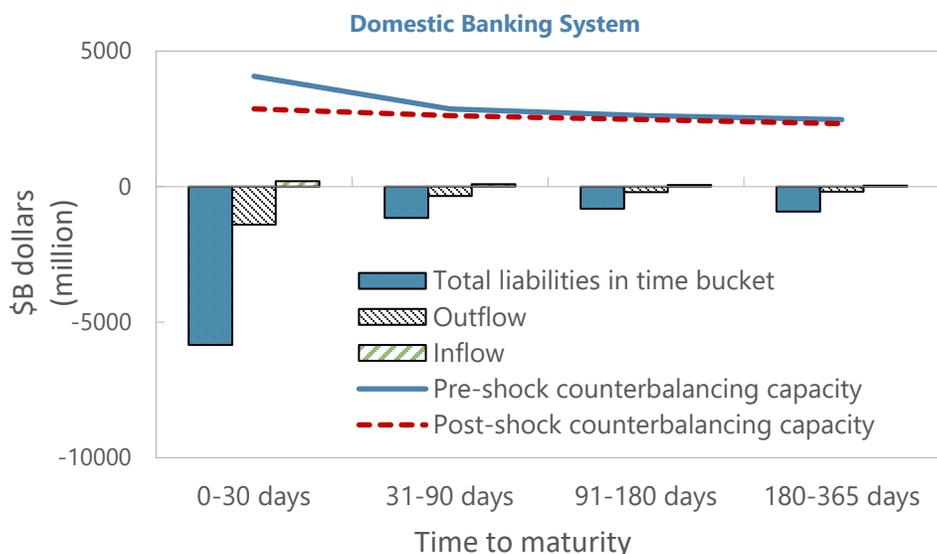
FINANCIAL INTERCONNECTEDNESS ANALYSIS

73.   Onshore and offshore financial sectors are effectively segregated by strict exchange controls. In September 2018, only around 5.8 percent of domestic banking sector assets were held in offshore counterparties (US$725 million), most of which as foreign banks' intragroup transactions with related offshore entities.

74.   In the onshore financial sector, banks' interconnectedness vis-à-vis banks, credit unions and other non-bank financial institutions is generally low. In September 2018, there were few interlinkages among the domestic banks, with aggregate exposures in the sector being B$115 million, equivalent to 5 percent of the aggregate capital. Total onshore banks' gross claims on NBFIs were B$62 million, roughly 0.5 percent of aggregate assets in the onshore sector, while banks' liabilities to insurers stood at B$83 million and mostly consisted of deposits.

75.   Potential financial stability risks and spillover effects were evaluated through a network analysis.[57] The contagion simulation gauges the scope for systemic spillovers from simultaneous solvency and liquidity shocks produced by the potential default of a counterparty. The simulations were carried out under the following assumptions:

- **Credit shock**
  The counterparties with significant claims on the failing financial institution may suffer material losses, potentially resulting in their inability to satisfy their own obligations with other institutions. Given the unsecured nature of inter-institution deposits that constitute majority of claims in the network, the model assumes that an institution exposed to a failing counterparty suffers a total loss (i.e., the loss given default rate is 100 percent). If the generated loss is greater than the capital base, the institution defaults, potentially transmitting the shock further down the credit chain through a domino effect.

- **Funding shock**
  A counterparty that relied on funding from the failed institution needs to find alternative sources or liquidate some assets, subject to the assumptions on market conditions as described in Table 9.

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[57] The network analysis was based on Espinosa-Vega, M. A. and J. Solé, 2010, "Cross-Border Financial Surveillance: A Network Perspective," IMF Working Paper WP/10/105.

| Table 9. The Bahamas: Network Analysis – Parameter Calibration	
Parameter/variable	Description
λ=1	100 percent loss given default on exposures
ρ=1	100 percent share of lost funding that is non-replaceable
δ=0.3	30 percent discount on asset sales
Capital	For banks, total regulatory capital
	For credit unions, book value of total capital
Default of a financial institution	Capital falls to zero

76.   **The network model examines the systemic risks arising from the direct, bilateral linkages between the financial institutions using the data from September 2018.** The model includes seven onshore banks, the two largest credit unions, eight large offshore banks, and the ten largest domestic insurance companies. As foreign branches are exempt of any local capital requirement, they are excluded from the analysis.[58]

77.   **Overall, the network model portrays limited interconnectedness between the financial institutions located in the Bahamas.** Gross exposures in the network amounted to B$146.5 million or 6.5 percent of aggregate capital. In the bank domain, most domestic banks are connected to only one other domestic bank with the volume of these interlinkages usually below 1 percent of bank's total regulatory capital. Given relatively small size of the credit unions, their interlinkages are small, albeit in some cases they can be significant with respect to the credit union's total capital.

78.   **In the domestic sector, the risk of contagion between banks and credit unions appears to be low, given the generally small exposures compared to capital levels.** Contagion simulation analysis shows that among all the institutions assessed, only one credit union is vulnerable to potential default of its counterparties, as the deposits it holds with two onshore commercial banks each exceeds its capital (Text Figure). Given that the credit union's total assets are small (0.6 percent of the total assets of the institutions included in the analysis) and that it does not have other significant financial interlinkages, financial stability risks arising from interconnectedness are low.

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[58] The analysis excludes one onshore foreign bank branch and two large offshore foreign branches. The onshore banks and credit unions included in the analysis constitute approximately 97 percent of domestic credit institutions' assets, whereas the eight large offshore banks constitute around 35 percent of offshore banking assets excluding foreign branches. The insurance companies under analysis account for around 93 percent of aggregate assets in the domestic insurance sector.
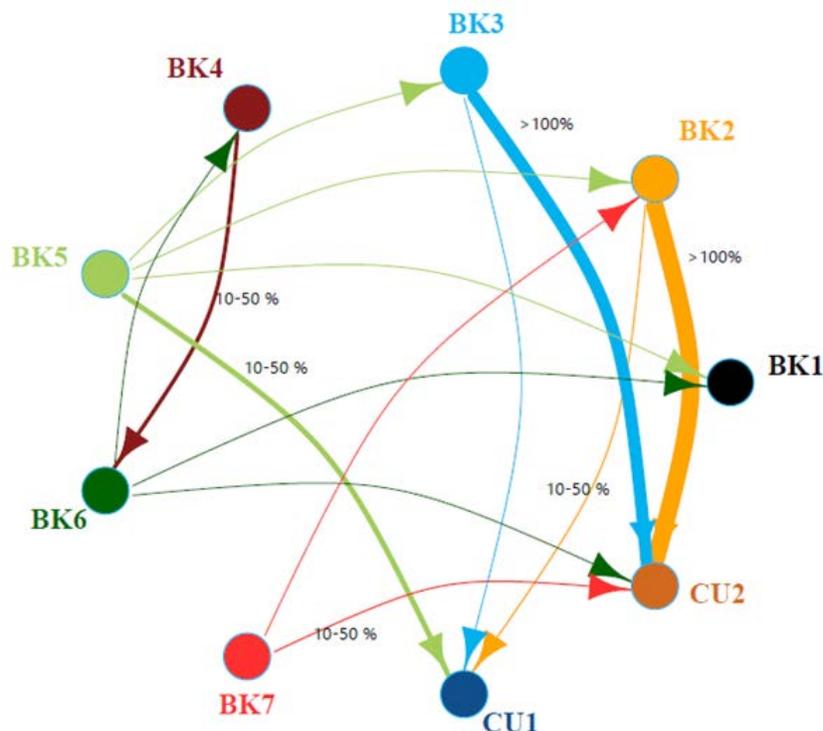
Data as of September 2018.
Arrows point from the institution source of the exposure (liability issuer) to the institution carrying the exposure (liability holder).
Arrow thickness is proportional to the size of the exposure relative to the lenders' capital.
Unmarked lines show exposures below 10 percent of lenders' capital.

Sources: Central Bank of The Bahamas, and IMF staff estimates.

79.   Offshore banks and insurers seem to be neither important sources, nor recipients, of spillover risk within the financial sector in The Bahamas. The network analysis shows that there are no interconnections between large offshore banks, whereas they have very low interlinkages to the onshore banks. Domestic interconnectedness of insurance companies is largely via deposits they hold with domestic banks while there is little bank lending to insurers. Insurers' deposits are generally spread out across multiple banks, limiting the concentration risk. The total exposure between domestic banks and insurers in the network analyzed is around B$340 million, equivalent to 12.7 percent of aggregate capital in the network.

OFFSHORE FINANCIAL SECTOR

Structure and Business Model

80.   The Bahamian offshore financial sector remains large relative to the size of the economy but has shrunk significantly since the last FSAP in 2013. Total offshore assets have dropped from US$427 billion at the end of 2013 to an estimated US$256 billion in June 2018, approximately 21 times GDP (Appendix VI Figure 1). The Bahamas ranks fourth in banking assets among the 19 countries classified by the BIS as "offshore centers", but its assets total only US$119 billion or 2.5 percent of the aggregate US$4.6 trillion in this peer group.

81.   This decline in assets takes place in the context of ongoing global efforts to strengthen AML-CFT and tax transparency standards. There has been increased cooperation between the Bahamian authorities and OECD countries, as well as various tax amnesties offered in multiple jurisdictions. Similar asset declines have also been observed in Cayman Islands, Guernsey and Jersey, all jurisdictions that have traditionally competed with The Bahamas in offshore banking activities (Appendix VI Figure 1).

82.   The offshore financial sector comprises a diverse and large number of players, including banks, investment funds and insurance companies. Banks dominate the sector with offshore banks' total assets being US$168 billion. Investment funds account for around US$86 billion in total assets, whereas the insurance sector is relatively small with total assets of US$1 billion.[59]

83.   Both offshore banks and the Bahamian authorities point to a shift in the international banking business model towards wealth preservation and legacy planning for clients seeking geographic diversification. In recent years the client base has become increasingly concentrated in Latin America (particularly Brazil) due to the time zone, physical proximity and historical presence of group affiliates in the region. Strong legal and economic institutions, political stability, and flexible regulation are often cited as reasons to hold assets or structure lending operations in The Bahamas.

84.   Strict exchange controls keep the local economy insulated from the international sector, and historically offshore banks have been unable to offer their services to domestic residents.[60] Banks with an Authorized Dealer Exchange Control designation can deal in all currencies, including Bahamian dollars, while a Resident status allows banks to offer services in the BSD market. Offshore banks, on other hand, may

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[59] Non-financial International Business Corporations (IBCs) are excluded from this analysis.

[60] Under regulatory changes announced in December 2018 there may be opportunities for international banks to offer services to domestic residents, however this will likely only be for non-BSD accounts.

operate freely in foreign currencies but require an initial Exchange Control authorization to operate an External Bahamian dollar account. Foreign currency position regulations of onshore banks significantly limit the magnitude of foreign currency exposures they can undertake.[61] Around 5.8 percent of domestic banking sector assets are with the offshore counterparties (US$725 million), most of which are intragroup transactions with related offshore entities.

Offshore Banks

85.   **Offshore banks primarily offer either private banking and trust services, or conduct treasury operations on behalf of affiliated institutions.** Neither of these activities involve significant amounts of traditional banking activities such as term lending or liquidity transformation.

86.   **Private banking institutions hold substantial off-balance sheet fiduciary assets on behalf of international clients. They also hold relatively smaller amounts of mostly liquid on-balance sheet assets (Appendix VI Figure 2).** Banks focus on asset management services for high- and ultra-high net worth individuals, with fees representing 75 percent of income for the five largest banks. On-balance sheet assets are mainly held for cash management purposes in highly liquid securities or as balances with related financial institutions. As client assets are held in individual accounts there are no redemption risks such as might arise from collective investment vehicles.

87.   **Lending in private banking consists primarily of margin lending against investment portfolios.** With clients posting initial margin and variation margin based on daily mark-to-market adjustments, these activities do not entail the same credit risks associated with traditional bank lending. A few banks also offer mortgage loans to clients, in some cases for high-end Bahamian real estate, but these loans are small in number and total magnitude.[62]

88.   **The offshore entities conducting treasury operations do so mostly for affiliated banks, and they hold 91 percent of offshore banking on-balance assets.** They predominantly perform consolidated treasury functions for related entities, investing aggregated surplus cash in bulk. There are also branches focused on intra-group treasury management operations, with funding provided by wholesale clients booked in the Bahamian entity and passed on to clients in other jurisdictions. Some branches offer limited

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[61] The larger of the sum of net short or long positions in all foreign currencies, including all on and off-balance sheet assets and liabilities of an onshore bank cannot exceed the minimum of 5 percent of its Tier 1 capital and B$5 million. The onshore banks are also subject to regulatory capital requirements of 17 percent, which constrains expansion of banks' balance sheet using foreign funding.

[62] Any lending facility offered to nonresidents and secured by pledged B$ assets is subject to explicit authorization by CBOB.

global booking services for offshore financial operations, including a small amount of structured notes issuance.

89.   The BIS data on locational bank statistics testifies that banks' cross-border financial linkages are primarily with related banks. At end-June 2018, about two thirds of total claims and liabilities of banks to nonresidents were vis-à-vis banks, of which 70 percent were intragroup (Appendix VI Figure 3). Claims were mainly on advanced economies, offshore centers, and Latin America, whereas the advanced economies were predominantly net suppliers of funds (Text Figure).
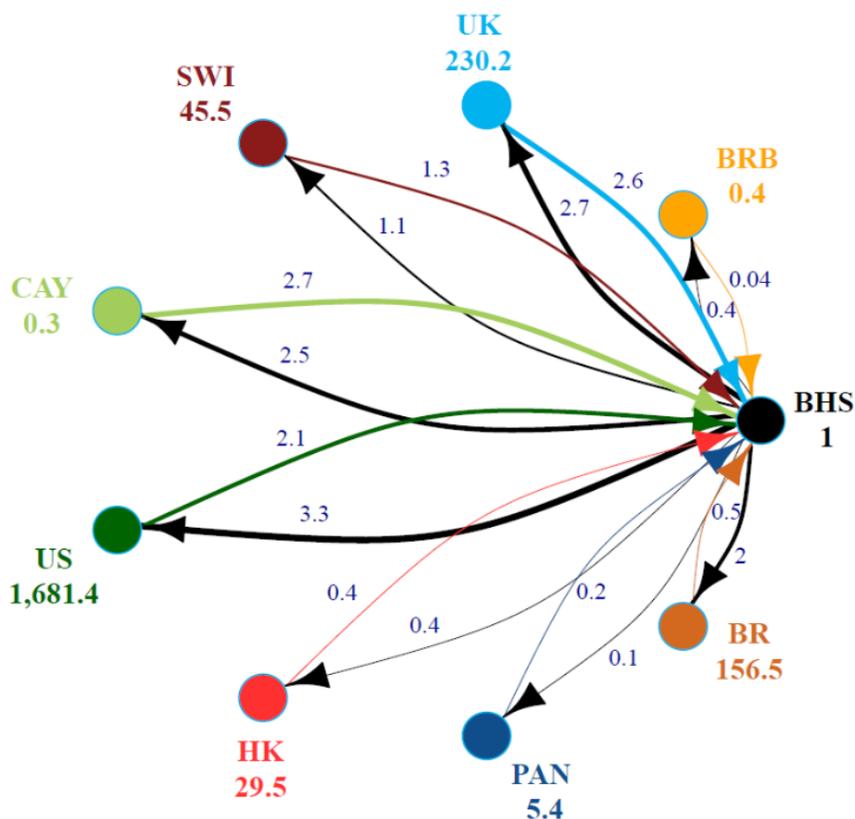
Note 1: Data as of June 2018.
Note 2: Node numbers show the absolute size of the country's GDP relative to the GDP of The Bahamas.
        Arrows point from the country source of the exposure (liability user) to the country carrying the exposure (liability holder)
   Arrow numbers show the absolute size of the exposure relative the GDP of The Bahamas.
        Arrow thickness is proportional to the size of the exposure relative to the GDP of The Bahamas.
Sources: Central Bank of the Bahamas, BIS, World Economic Outlook database, and IMF staff estimates.

Investment Funds

90.   The investment fund space seems to include few traditional collective investment vehicles. Most assets are held in non-standard funds such as Specific Mandate Alternative Regulatory Test (SMART) Funds and "Professional" Funds, which are aimed at qualified investors (Text Figure and Text Table). SMART Funds are primarily used as wealth management vehicles for single individuals or families. This class of funds has been increasing in popularity, with a 14 percent growth in the number of entities since the last FSAP and net asset value (NAV) around B$21 billion in 2017. The Professional Funds, which are typically restricted to qualified investors, have seen assets declining by over 60 percent since 2013 to around B$16 billion (NAV) in 2017. There are very few standard funds open to the general public, with NAV of around B$3.4 billion in 2017. Recognized Foreign Funds are not licensed in the Bahamas, but they are registered due to their Bahamas-based service providers.

Investment Funds Licensed or Registered: Net Asset Values, 2013–2017
(Billions of Bahamian dollars)
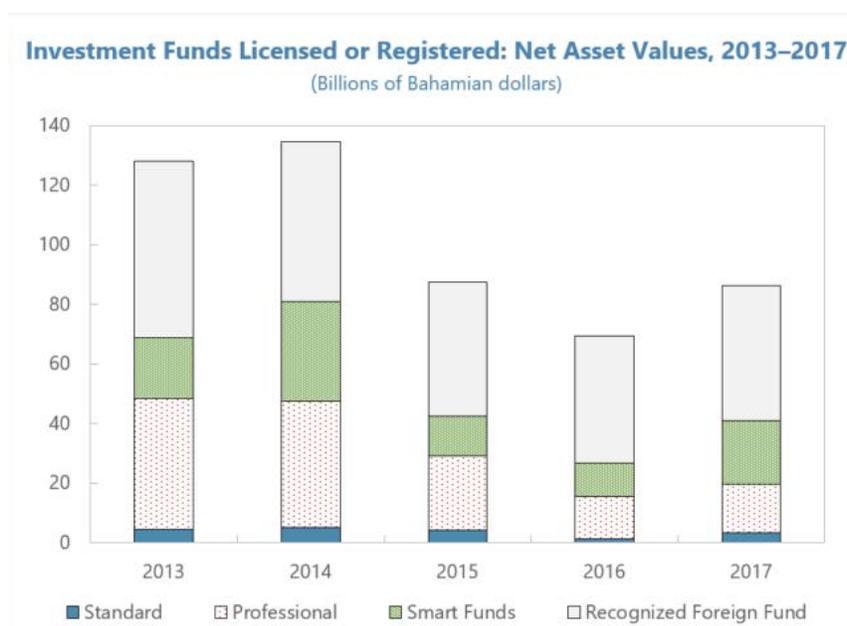
Investment Funds Licensed or Registered

Fund Type	Net Asset Value (B$ billion)		Number of Entities	
	2013	2017	2013	2017
SMART Funds	20.5	21.3	433	494
Professional Funds	43.8	16.2	226	219
Standard Funds	4.5	3.4	41	39
Recognized Foreign Funds	59.2	45.4	53	31

Source: Securities Commission of The Bahamas.

> **The Investment Funds Act (2003) recognizes four classes of Investment Funds:**
>
> **Professional Funds** are designed only for accredited investors – typically professional investors or high net worth individuals. They may be licensed by an Unrestricted Administrator or directly by the Securities Commission of The Bahamas.[63]
>
> **Specific Mandate Alternative Regulatory Test (SMART) Funds** have operational structures ("SMART Fund Templates") designed by industry participants and approved by the Securities Commission of The Bahamas. They are typically available to a small number of qualified investors. Each template is designed for a specific business purpose ("Specific Mandate") with the regulatory profile adjusted to the risk profile of the fund ("Alternative Regulatory"), while the promoters can create a new template and seek approval from the SCB for its wide use ("Test Fund").
>
> **Standard Funds** are usually retail-type funds that anticipate offering to the general public.
>
> **Recognized Foreign Funds** are licensed or registered in a prescribed jurisdiction. These funds are not licensed in The Bahamas, but are required to register there because of their Bahamas-based administrators.

External Insurers

91.   The offshore insurance sector in The Bahamas is small and populated by captive and non-captive insurers. The total assets in the sector grew by around 37 percent between 2013 and 2016 to a figure of roughly B$1 billion, one third of which is composed of captive insurers (Text Table).

External Insurers, End-2016

	Total Assets	Number of Entities
	(B$ million)	
Captive Insurers	358	17
Non-captive Insurers	689	4

Source: Insurance Commission of The Bahamas.

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[63] Unrestricted Administrators have been given delegated authority to issue licenses to funds they administer with a time period within which to file those documents with the Securities Commission of The Bahamas.