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THE BAHAMAS

SELECTED ISSUES

January 2024

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THE BAHAMAS

SELECTED ISSUES

January 3, 2024

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Western Hemisphere Department

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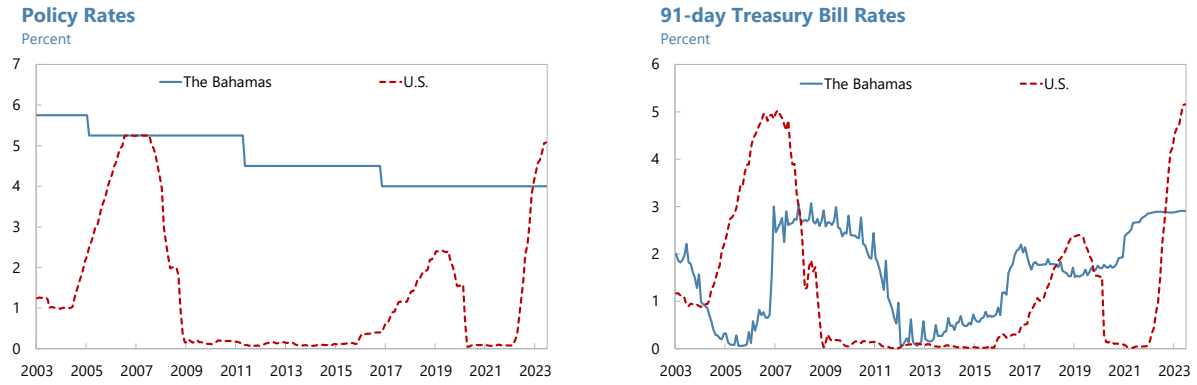
REVISITING THE SCOPE FOR INTEREST RATE POLICY IN THE BAHAMAS

This chapter investigates the scope for using interest rate policy in The Bahamas. The chapter first tests the effects of interest rate differentials on the central bank's net purchases of foreign exchange (FX) and the conditions under which this relationship is positive and statistically significant. The Central Bank of the Bahamas (CBoB) interest rates have not responded to recent hikes in U.S. interest rates, as existing capital flow management measures give some room for maneuver in setting interest rates. Using linear and nonlinear regressions, staff finds that notwithstanding the presence of capital flow management measures, net FX purchases by the central bank are sensitive to interest rate differentials in specific circumstances. These effects are economically significant during periods of elevated global risk aversion or when the foreign currency sovereign credit rating falls below investment grade. Secondly, impulse response functions generated via local projections suggest that cuts in the central bank's policy rate feed through to domestic interest rates, but the speed and magnitude depend on the degree of excess liquidity in the banking system. However, subsequent changes in lending rates have little effect on private sector credit, and by extension, economic activity.

A. Introduction

1. Short-term interest rates in The Bahamas have not kept pace with those in the U.S. The CBoB rates (the bank or discount rate) have remained unchanged since 2016, despite recent monetary tightening by the U.S. Federal Reserve (Figure 1). T-bill rates have increased only marginally, creating a negative spread between those in The Bahamas and the U.S.

Figure 1. The Bahamas: Bahamian and U.S. Interest Rates

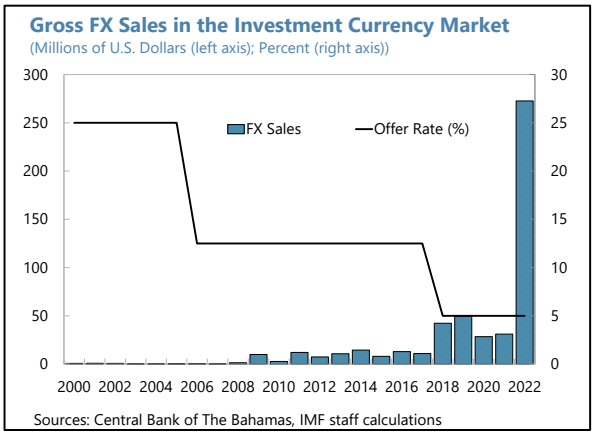


Sources: Central Bank of The Bahamas, Haver Analytics, and IMF staff calculations.

2. In the past, The Bahamian authorities cited the presence of capital flow management measures and the potential negative impact that higher interest rates could have on already-weak domestic lending as reasons for keeping the policy rate unchanged. In May 2022, IMF

staff recommended that the Bahamian authorities allow domestic interest rates to increase in line with rising U.S. interest rates, as the Fed continued to tighten monetary policy (IMF, 2022). However, the authorities "…opined that the relatively low degree of integration between domestic and international capital markets render interest tools less effective in regulating short-term flows…" (IMF, 2022).

3. Resident investors can buy and sell foreign currency to trade foreign securities via the investment currency market (ICM). [1] However, foreign exchange (FX) purchases and sales in this market attract a premium above the 1:1 exchange rate with the US dollar. For example, as of December 2023, residents purchasing foreign currency via the ICM for the purchase of foreign securities pay a 5 percent premium. At the same time, investors who wish to repatriate foreign investments to The Bahamas can sell their investment proceeds at a 2.5 percent premium in the ICM. These respective premiums represent an additional cost for investors who wish to increase (or maintain) their foreign asset portfolios.



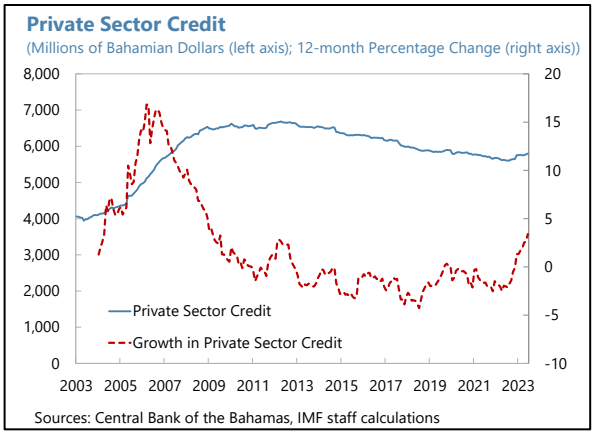
4. International reserves remain adequate, but recent portfolio outflows suggest that domestic investors may be sensitive to interest rate differentials with the U.S. Discrete changes in the premiums charged in the ICM have led to sharp changes in FX sales in that market. The reduction in the offer premium for purchasing U.S. dollars from 25.0 percent to 12.5 percent in 2006 coincided with a sharp increase in gross FX outflows from the ICM to facilitate foreign investments purchases in the years that followed, despite the advent of the global financial crisis (GFC). Similarly, the reduction in the offer premium from 12.5 percent to 5.0 percent in 2018 coincided with an almost tripling in gross outflows in the same year. Outflows have remained significantly above pre-2018 levels since then, despite the ICM's temporary suspension during May 2020 – September 2021. Most recently, the temporary suspension of bid and offer premiums for FX purchased via the ICM to acquire Bahamian U.S. dollar denominated sovereign bonds between October 6th and December 31st, 2022 coincided with an unprecedented increase in portfolio outflows as resident investors took advantage of a difference in yields.[2]

5. The CBOB has cut its policy rate multiple times to ease credit conditions, but private sector credit growth has trended downward since 2012. In response to cuts in the bank rate, commercial banks are asked to adjust their prime rate and the rates on their various lending

[1] https://www.centralbankbahamas.com/investment-currency-market

[2] https://www.centralbankbahamas.com/viewPDF/documents/2023-05-09-12-27-39-2022-CB0B-Annual-Report-and-FS.pdf

products by a similar magnitude. However, despite cuts in the policy rate and falling interest rates on loans, annual growth in private sector credit has remained negative throughout most of the past decade, contributing to large excess liquidity.



6. The chapter seeks to determine whether the Central Bank of The Bahamas possesses some degree of monetary independence and what tools it has at its disposal to adjust domestic interest rates. First, it leverages both linear and nonlinear regressions to determine whether interest rate differentials affect the CBOB's net purchases of FX from commercial banks and other nongovernment market participants and whether this relationship changes under various conditions. Next, the chapter applies Jordà's (2005) local projections method to estimate the response of domestic interest rates, including the T-Bill rate, to changes in the central bank's policy rate, should the CBOB need to adjust domestic rates to protect international reserves or wanted to influence credit growth. Finally, should the transmission of interest rates be effective, the chapter assesses whether domestic interest rates affect credit growth and by extension, some measures of economic activity.

7. There is scope to raise interest rates without major harm to credit growth or the economic recovery, should global volatility or the negative interest rate differential put pressure on international reserves. During periods of elevated global risk aversion or when assessments of sovereign risk are high, interest rate differentials have materially positive effects on the central bank's net FX purchases. Local projections suggest that the transmission of changes in the bank rate to domestic interest rates is high but depends on the degree of excess liquidity in the domestic banking system. Still, interest rate tightening will likely have little impact on domestic credit, with almost no noticeable effect on economic activity.

B. The Effects of Interest Rate Spreads on Net FX Purchases

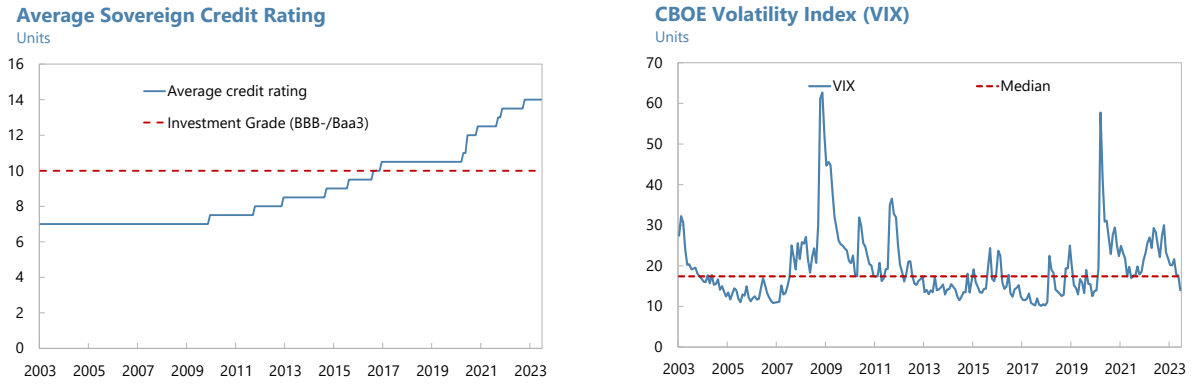
8. The test for monetary independence leverages earlier work by Worrell et al. (2008) and Jackman et al. (2013). Both studies tested for the presence of uncovered interest rate parity (UIP) for Barbados. Worrell et al. (2008) tested the relationship between the Central Bank of Barbados' daily net purchases of foreign exchange and the differential between Treasury Bill rates in Barbados and the U.S. within a GARCH-M framework. Jackman et al. (2013) built on this using an EGARCH-M model and assessed to what extent the relationship between net FX purchases and interest rate differentials were nonlinearly related. The approach used in this chapter differs in the following ways:

- It uses monthly net FX purchases by the CBOB rather than daily data. This allows us to specifically control for the effects of tourism and international fuel prices on net FX purchases rather than using dummy variables as in Worrell et al. (2008) and Jackman et al. (2013),

- It excludes the central bank's net FX purchases from the central government. These are more likely to capture the proceeds and servicing of the sovereign's foreign borrowing, which is less likely to be related to interest rate differentials and more likely related to the sovereign's gross financing needs. To control for the effects of large transactions, Worrell et al. (2008) and Jackman et al. (2013) include an 'exceptional FX trade' dummy variable to capture net purchases or sales exceeding US$5 million,

- Given the use of monthly data, each model was estimated first with a linear regression (instead of GARCH-M) and secondly, with a threshold model (instead of an EGARCH-M) to determine whether a nonlinear relationship between net FX purchases and interest rate differentials exists, particularly during periods of heightened investor risk aversion or where the perception of sovereign risk is elevated. Both conditions coincided in 2022, when global risk aversion (measured by the Chicago Board Options Exchange (CBOE) Volatility Index (VIX)) spiked and The Bahamas' average sovereign foreign currency bond spread peaked at 1,720 basis points, coinciding with rating downgrades by both Standard & Poor's and Moody's within a 12-month period (Figure 2).

Figure 2. The Bahamas: Sovereign Foreign Currency Credit Rating[1] and CBOE VIX

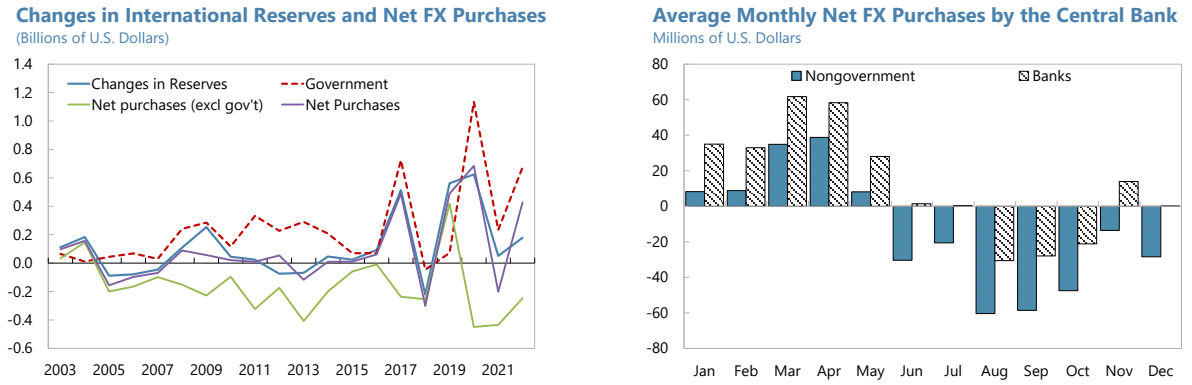


Sources: Central Bank of The Bahamas, and IMF staff calculations.

[1] The average sovereign rating is calculated as the mean of equivalent ratings assigned by Moody's and S&P, where Aaa/AAA+ take a value of 1, Baa3/BBB- take a value of 10, and Ca/CC and worse take a value of 20. Therefore, higher values correspond to higher sovereign risk.

9. The central bank's net FX purchases explain most of the fluctuations in its international reserves. Net FX purchases are also highly seasonal, driven largely by net purchases from commercial banks (Figure 3). The latter largely reflects the net supply of foreign exchange from the tourism sector, with large positive net FX purchases from January through May, before net purchases eventually turn to net sales for the rest of the year.

Figure 3. The Bahamas: Net FX Purchases and International Reserves



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

10. Linear and nonlinear regressions are estimated to determine the impact of interest rate differentials on net FX purchases. Specifically, the following equations are estimated:

$$NFXP_t^i = \beta_0 + \beta_1 NFXP_{t-1}^i + \beta_2 Spread_t + \beta_3 \ln Fuel_t + \beta_4 Arrivals_t + \beta_5 VIX_t + u_t \quad (1a)$$

$$NFXP_t^i = \beta_0 + \beta_1 NFXP_{t-1}^i + \beta_{2a}\, Spread_t\, I(x \le \emptyset) + \beta_{2b}\, Spread_t\, I(x > \emptyset) + \beta_3 \ln Fuel_t + \beta_4 Arrivals_t + \beta_{5a}\, VIX_t\, I(x \le \emptyset) + \beta_{5b}\, VIX_t\, I(x > \emptyset) + u_t \quad (1b)$$

where:

- $NFXP_t^i$ captures the Central Bank of The Bahamas' seasonally adjusted net purchases of foreign exchange from commercial banks and other agents excluding the government, measured in millions of Bahamian dollars. Specifically, $NFXP_t^i = Gross\ FX\ Purchases_t^i - Gross\ FX\ Sales_t^i$, where $i = \{Total\ nongovernment\}$ reflects the source or recipient of the central bank's purchases or sales of foreign exchange,

- $Spread_t$ is the differential between the annualized interest rates on 3-month Treasury Bills in The Bahamas and U.S. $Spread_t = Tbill_t^{BHS} - Tbill_t^{US}$, where $Tbill_t^{BHS}$ and $Tbill_t^{US}$ represent the interest rates on 3-month Bahamian and U.S. treasury bill rates, respectively,

- $\ln Fuel_t$ is the natural log of the average global fuel price index and captures the price of one of The Bahamas' key imports. Because The Bahamas is a net importer of fuel, an increase in global fuel prices is expected to increase the demand for FX from the central bank and reduce net FX purchases,

- $Arrivals_t$ are monthly, seasonally adjusted air arrivals to The Bahamas (measured in thousands of arrivals) to capture a key source of foreign exchange revenues. An increase in air arrivals increases the FX earnings by hotels and other tourism-related businesses and increases the central bank's net FX purchases,

- VIX_t is the CBOE Volatility Index used as proxy for investors' global risk aversion,
- u_t is the standard white noise error term.
- Finally, x in equation 1b represents the threshold variable (in this case VIX_t or the foreign currency sovereign credit rating $Credit_t$) and $\emptyset$ captures its value.[3] If a nonlinear relationship between net purchases of FX and interest rate differentials exists, then beyond $\emptyset$, the nature of the relationship between $NFXP_t^i$ and $Spread_t$ is expected to change.

11. The data for this analysis covers 246 months, spanning January 2003 to June 2023, and captures periods before and after both the global financial crisis and the COVID-19 pandemic. Gross central bank FX purchases and sales were sourced from Table 1.3 of various editions of the Central Bank of The Bahamas' Quarterly Statistical Digest (QSD) [4] and annualized interest rates on 3-month Bahamian and U.S. treasury bill rates were sourced from Haver. The fuel price index is the IMF WEO Fuel (Energy) price index and captures prices of crude oil (petroleum), natural gas, coal, and propane. Finally, monthly air arrivals and the VIX are from the Ministry of Tourism of The Bahamas and the St. Louis FRED, respectively.

12. On average, monthly net FX purchases from non-government sources and interest rate differentials with the U.S. have both been historically close to zero but are widely dispersed. The central bank's median and mean net FX purchases from non-government sources were $-9.7 million and $-12.8 million respectively, but net purchases or sales can vary widely, depending on the time of the year. Similarly, the median and mean interest rate differentials between The Bahamas and the U.S. were slightly positive at 0.54 percent and 0.27 percent, not unexpected for an economy with a 1:1 peg to the US dollar. However, spreads have historically swung from a minimum of -4.30 percent in August 2006 when U.S. T-Bill rates were approaching recent historical highs leading up to the GFC and Bahamian T-Bill rates were only slowly recovering from almost zero percent following elevated excess liquidity in the previous year, to a maximum of 2.89 percent in December 2008 after the U.S. Federal Reserve cut rates quickly in response to the GFC, with Bahamian rates slow to respond.

13. The central bank's net purchases of foreign currency are found to be sensitive to interest rate differentials, particularly during periods of elevated uncertainty and sovereign risk. Increasing the spread between Bahamian and U.S. T-Bill rates by 100 basis points leads to an additional $3.87 million ($46.43 million) in monthly (annual) net FX purchases from non-government sources. However, this relationship strengthens beyond certain levels of volatility and sovereign risk. Specifically, above a VIX of 21.7, an additional 100 basis point rise in the spread increases monthly (annual) net FX purchases by $16.16 million ($193.93 million annually), but at lower levels of volatility, the effect becomes much smaller. The scenario where the sovereign credit rating falls below investment grade (or exceeds 10.5) yields marginally smaller magnitudes. Below these

[3] The optimal $\emptyset$ is chosen as the value which minimizes the sum of squared residuals from a series of regressions that test a range of $\emptyset$ between the 10th and 90th percentiles of the VIX_t and $Credit_t$, respectively.

[4] https://www.centralbankbahamas.com/publications/qsd

thresholds, net FX purchases are less sensitive to interest rate differentials. These results suggest that, despite the presence of capital flow management measures, interest rate differentials may still matter for FX flows and reserve accumulation in The Bahamas.

Table 1. The Bahamas: Regression Estimates of Equations 1a and 1b – CBOB Net FX Purchases from Non-Government Sources[1]

Variable	No Threshold	x = VIX	x = Credit Rating
$NFXP_{t-1}^{Nongovt}$	0.145*	0.135*	0.122*
	(0.078)	(0.070)	(0.069)
$Spread_t$	3.869***		
	(1.331)		
$Spread_t\, I(x \leq \emptyset)$		2.169*	2.279*
		(1.288)	(1.221)
$Spread_t\, I(x > \emptyset)$		16.161***	12.978***
		(4.406)	(4.339)
VIX_t	-0.674**		
	(0.285)		
$VIX_t\, I(x \leq \emptyset)$		-0.023	-0.397
		(0.586)	(0.248)
$VIX_t I(x > \emptyset)$		-0.933***	-1.091**
		(0.353)	(0.431)
$\ln Fuel_t$	-0.089**	-0.077**	-0.082**
	(0.038)	(0.036)	(0.036)
$Arrivals_t$	0.484***	0.549***	0.560***
	(0.124)	(0.119)	(0.132)
Constant	24.101***	12.083	18.707**
	(9.013)	(11.342)	(8.320)
Threshold (∅)		21.7	10.5
Observations	245	245	245
R-squared	0.376	0.408	0.401

*N.B. *, **, *** indicate statistical significance at the 10%, 5% and 1% levels respectively; standard errors (se) are robust standard errors to correct for potential heteroskedasticity and autocorrelation.*

[1] Where necessary, regressions also include dummy variables which capture the effects of large, exceptional FX purchases or sales.

C. The Speed and Magnitude of Transmission to Domestic Interest Rates

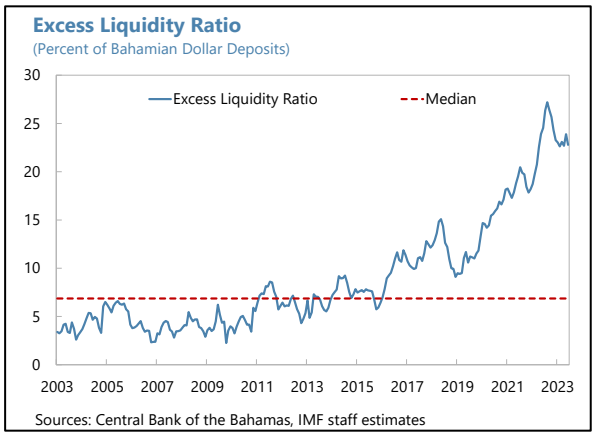
14. The magnitude and speed of interest rate transmission are assessed using local projections a la Jordà (2005). The initial analysis estimates the impact of changes in the CBOB's policy rate on domestic interest rates, using monthly data for the period January 2003 to June 2023.

Specifically, cumulative impulse response functions are estimated from successive regressions which take the form:

$$r^i_{t+h} - r^i_t = \beta_0 + \beta_h \Delta Bank\ rate_t + \sum_{j=1}^{k} \gamma_h\, \Delta Bank\ rate_{t-j} + \sum_{j=1}^{z} \delta_h\, \Delta r^i_{t-j} + u_t\ \forall h = 1, \dots, 18 \qquad (2a)$$

where r^i_t represents the interest rate on the relevant domestic instrument i (i.e., T-Bill rate, commercial bank lending and deposit rates) and $Bank\ rate_t$ is the central bank's policy rate. β_h captures the impact of the policy rate on the domestic interest rate at horizon h for the entire sample, a plot of which produces the cumulative impulse response functions.

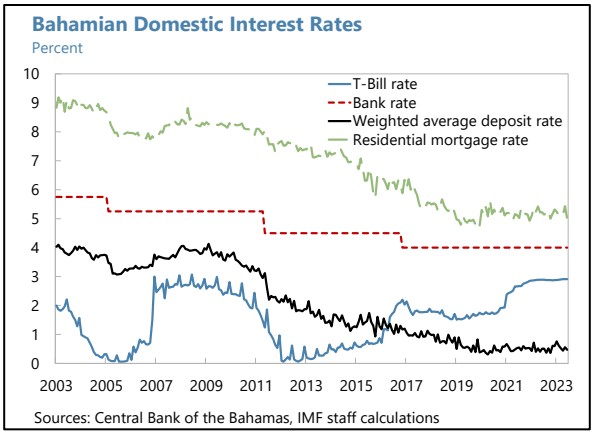
15. The stock of excess liquidity in the domestic banking sector may affect the speed and magnitude of the transmission of changes in the bank rate to deposit and lending rates. Previous work on monetary policy transmission has highlighted the role of excess liquidity in muting the impact of central bank policy rates (see Primus (2018) and IMF (2021)). In practice, high excess liquidity reduces the need for banks to buy and sell domestic currency in the interbank market or use the central bank's discount window. Bahamian banks' excess liquidity has risen sharply since 2016, and as of June 2023, banks held 23 percent of Bahamian dollar deposits in excess of the 5 percent minimum reserve requirement. Consequently, we then test whether β_h varies by the degree of excess liquidity via equation 2b:



$$r^i_{t+h} - r^i_t = \beta_0 + \beta_{h,l} \Delta Bank\ rate_t I(k \le \emptyset) + \beta_{h,h} \Delta Bank\ rate_t I(k > \emptyset) + \sum_{j=1}^{k} \gamma_h\, \Delta Bank\ rate_{t-j} + \sum_{j=1}^{z} \delta_h\, \Delta r^i_{t-j} + u_t \quad \forall h = 1, \dots, 18 \qquad (2b)$$

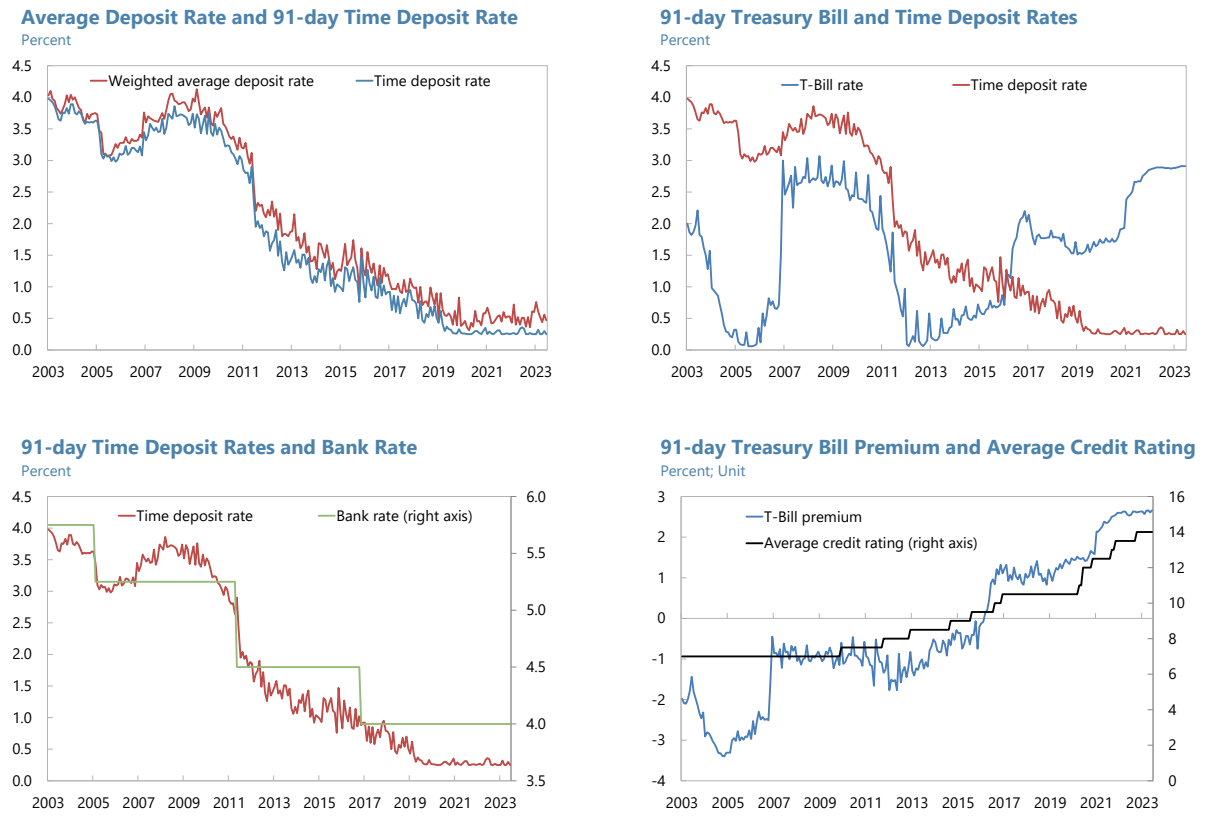
where $\beta_{h,l}$ and $\beta_{h,h}$ capture the impacts of the policy rate on the domestic interest rate at horizon h for periods of low (l) and high (h) excess liquidity respectively. k here represents banks' excess liquidity and $\emptyset$ is its median value (6.9 percent of Bahamian dollar deposits).

16. Historically, commercial bank deposit and lending interest rates in The Bahamas have comoved with the bank rate. Initial graphical evidence supports Boamah et al.'s (2011) finding that full transmission of the policy rate to lending rates in The Bahamas takes less than a quarter. Since 2003, the CBOB has reduced its policy rate only three times, citing the presence of persistent excess liquidity or the desire to accelerate economic growth. On each occasion, deposit and lending rates had declined accordingly.



17. A growing risk premium may explain the divergence between the 3-month T-Bill rate and other interest rates since 2016. After moving in line with other interest rates for most of the sample, the 3-month T-Bill rate increased sharply from 2016, despite the general downward trend in other interest rates over the same period. Decomposing the T-Bill rate into the rate on a comparable product (the rate on 3-month time deposits in commercial banks) and the interest rate differential between these two offers some insight into this divergence. Specifically, the chapter decomposes the T-Bill rate as follows: $Tbill_t^{BHS} = 3month\ Time\ Deposit_t^{BHS} + Tbill\ Premium_t^{BHS}$ where: $Tbill\ Premium_t^{BHS} = Tbill_t^{BHS} - 3month\ Time\ Deposit_t^{BHS}$. Figure 4 below shows that the time deposit component comoves with the central bank's policy rate, while the T-Bill premium moves with The Bahamas' average foreign currency sovereign credit rating. Since 2016, the T-Bill premium has been positive, corresponding to the period during which the Government of The Bahamas lost its investment grade status. Therefore, to the extent that the CBOB can influence deposit rates in The Bahamas, it may be able to influence the T-Bill rate.

Figure 4. The Bahamas: 3-Month Treasury Bill Interest Rate Decomposition



Sources: Central Bank of The Bahamas, Haver Analytics, and IMF staff calculations.

18. Cuts to the central bank's policy rate feed through to domestic interest rates, but the speed and degree of transmission depend on the stock of excess liquidity (Figure 5). Cuts to the bank rate generally fully pass through to deposit and T-Bill rates. Residential mortgages and consumer

loans account for ¾ of total private sector credit in The Bahamas, and the transmission of the bank rate to interest rates on these products will be important for the effectiveness of interest rate policy. Cuts to the bank rate feed through to residential mortgage rates, but the effects become statistically insignificant by the end of the horizon for the weighted average lending rate. However, high excess liquidity limits the transmission of cuts in the bank rate to residential mortgage rates but amplifies the transmission to deposit and T-Bills rates. Similarly, cuts in the bank rate feed through to residential mortgage rates more quickly and completely when excess liquidity is low, but the effects on deposit and T-Bill rates are less persistent.

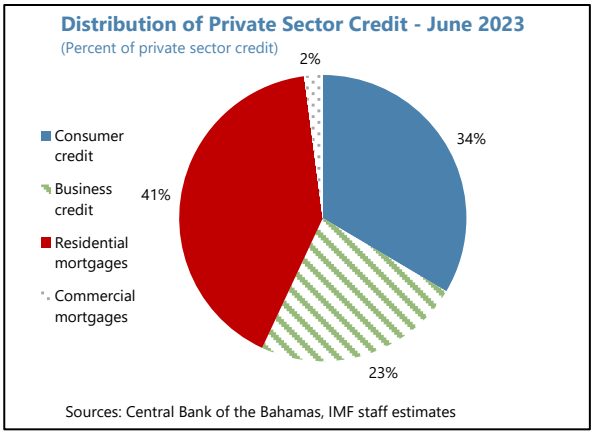
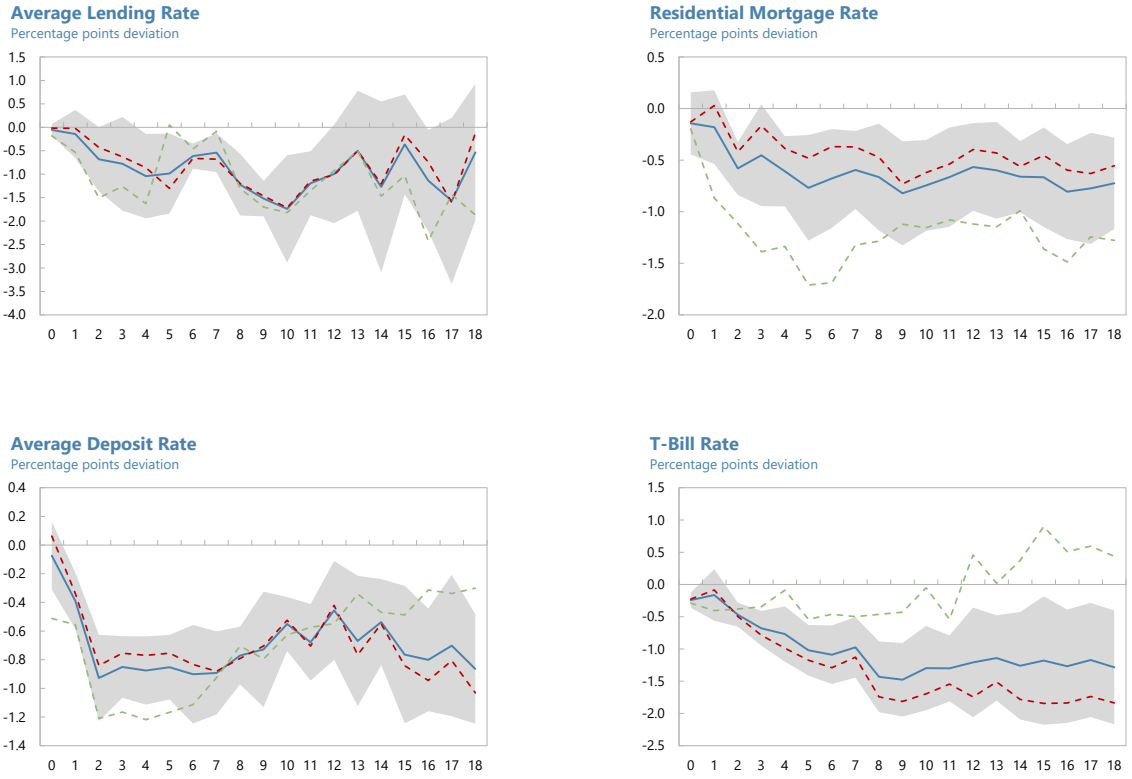


Figure 5. The Bahamas: Cumulative Impulse Responses to 1 pp Cuts in Bank Rate over 18 Month Horizon

Full sample (blue line), high excess liquidity (red line), and low excess liquidity (green line)



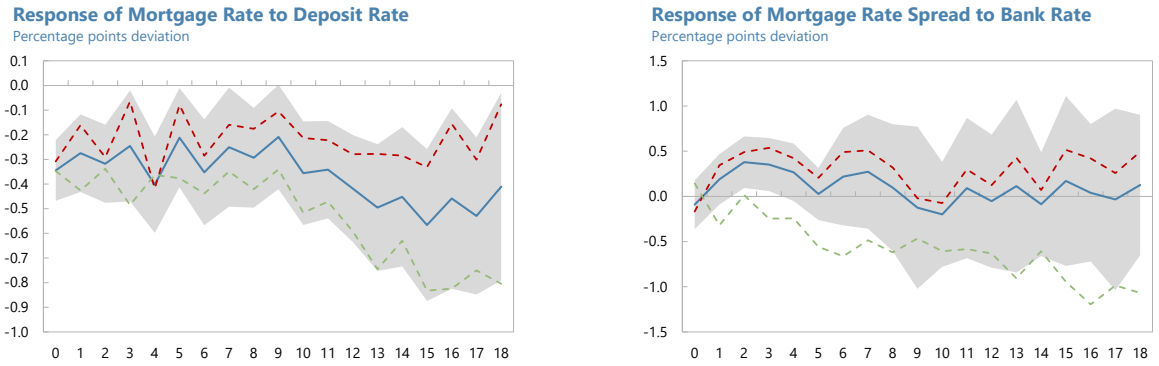
Note: Shaded grey areas represent 90 percent confidence bands for the full sample

Source: IMF staff calculations.

19. Banks consider the effects on their residential mortgage spreads when responding to changes in the CBOB's monetary policy stance. When liquidity is tight, temporary cuts in deposit rates (and by extension the rate that banks demand on T-bills) in response to historical cuts in the CBOB's policy rate may be reversed in the medium-term as banks compete for liquidity. At the same time, low excess liquidity implies lower carrying costs of liquidity and banks reduce lending rates more aggressively, reducing their average lending spread over time (Figure 6). Alternatively, when faced with high excess liquidity, banks are prone to reduce deposit rates quicker in response to a cut in the policy rate, possibly to discourage additional deposit accumulation or to reduce the carrying cost of the existing liquidity. In contrast, banks adjust lending rates less aggressively, pushing banking spreads higher, although not significantly so in the medium-term.

Figure 6. The Bahamas: Cumulative Impulse Responses of Lending Spreads over 18 Month Horizon

Full sample (blue line), high excess liquidity (red line), and low excess liquidity (green line)



Note: Shaded grey areas represent 90 percent confidence bands for the full sample

Source: IMF staff calculations.

D. Do Changes in Interest Rates Affect Commercial Bank Loans and Deposits?

20. Using quarterly data from 2003Q1 to 2023Q2, the chapter then estimates the cumulative impulse responses of private sector credit, residential mortgages, consumer loans, and deposits to changes in the weighted average lending rate, residential mortgage rate, consumer lending rate, and weighted average deposit rate. Even if changes in the CBOB's interest rate successfully feed through to domestic interest rates, the extent to which they affect the wider economy will depend on whether growth in credit and deposits respond to changes in banks' interest rates. For credit and deposits[5], the relevant regressions take the form:

$$credit^i_{t+h} - credit^i_t = \beta_0 + \beta_h \Delta r^i_t + \sum_{j=1}^{k} \gamma_h \, \Delta r^i_{t-j} + \sum_{j=1}^{l} \delta_h \, \Delta credit^i_{t-j} + u_t \qquad \forall h = 1, \ldots, 8 \qquad (3a)$$

[5] In these regressions, $credit$ and $deposit$ enter in logged form.

$$credit^{i}_{t+h} - credit^{i}_{t} = \beta_0 + \beta_{h,l}\Delta r^{i}_{t} I(k \leq \emptyset) + \beta_{h,h}\Delta r^{i}_{t} I(k > \emptyset) + \sum_{j=1}^{k} \gamma_h \Delta r^{i}_{t-j} + \sum_{j=1}^{3} \delta_h \Delta credit^{i}_{t-j} + u_t \quad \forall h = 1, \dots, 8 \quad (3b)$$

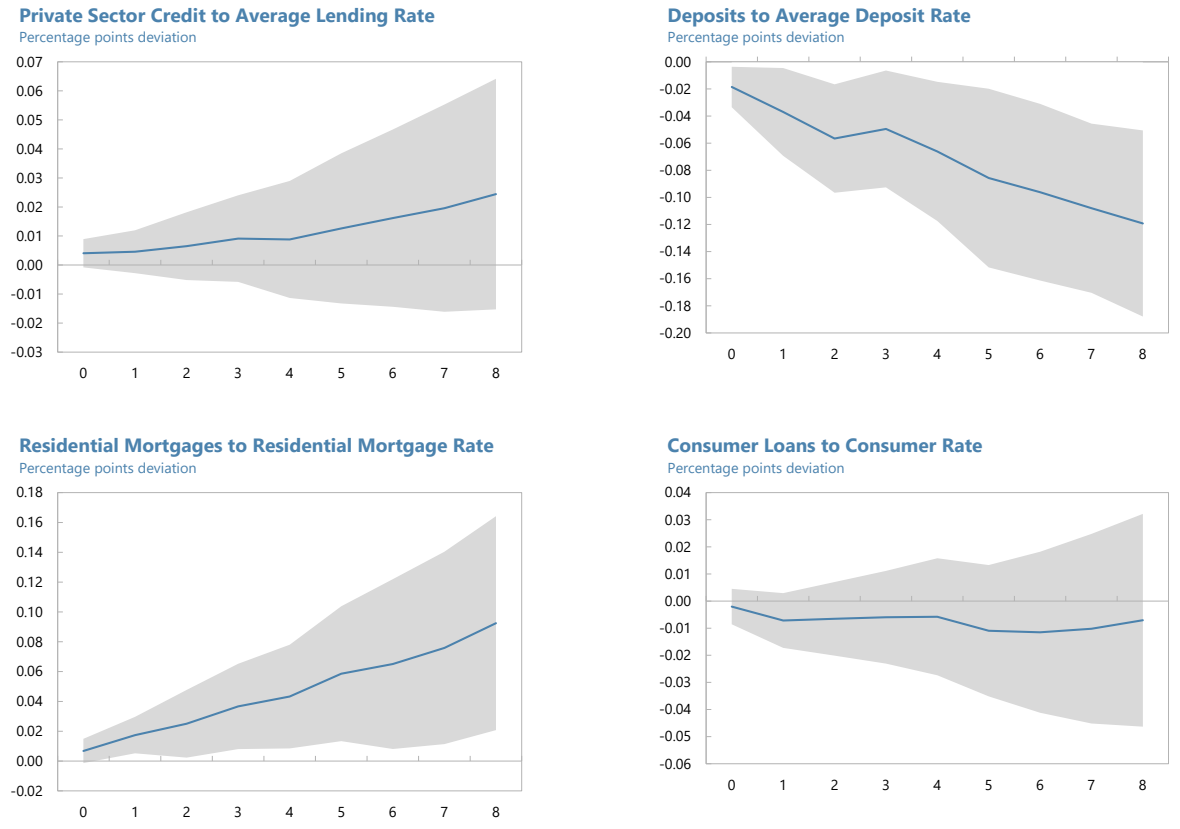
$$deposit_{t+h} - deposit_{t} = \beta_0 + \beta_h \Delta r_t + \sum_{j=1}^{k} \gamma_h \Delta r_{t-j} + \sum_{j=1}^{l} \delta_h \Delta deposit_{t-j} + u_t \quad \forall h = 1, \dots, 8 \quad (4a)$$

$$deposit_{t+h} - deposit_{t} = \beta_0 + \beta_{h,l}\Delta r_{t} I(k \leq \emptyset) + \beta_{h,h}\Delta r_{t} I(k > \emptyset) + \sum_{j=1}^{k} \gamma_h \Delta r_{t-j} + \sum_{j=1}^{3} \delta_h \Delta deposit_{t-j} + u_t \quad \forall h = 1, \dots, 8 \quad (4b)$$

where i represents private sector credit, residential mortgages, or consumer loans and r_t is the relevant interest rate on either loans or deposits.

21. Except for a small impact on residential mortgages, cuts to lending rates do not elicit statistically significant effects on private sector credit. 1 percentage point cuts to the residential mortgage rate increase the stock of residential mortgages by less than 0.1 percentage point over 8 quarters (Figure 7). In contrast, consumer credit appears almost immune to cuts to consumer lending rates. Consequently, the effect of cuts to the weighted average lending rate on overall private sector credit, while positive, is marginal and statistically insignificant. In contrast, cuts to the weighted average deposit rate reduce deposits, but the effects are modest at best.

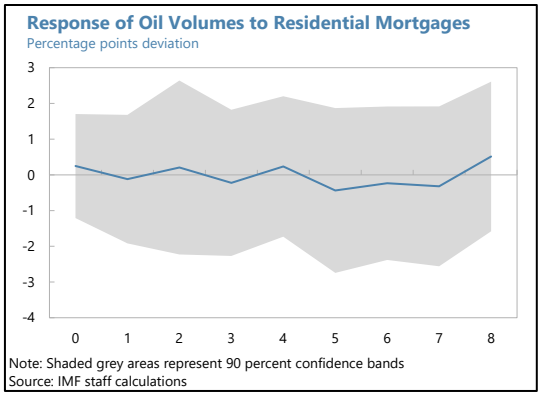
Figure 7. The Bahamas: Cumulative Impulse Responses to 1 pp Cut in Relevant Interest Rates



Note: Shaded grey areas represent 90 percent confidence bands

Source: IMF staff calculations.

22. Shocks to residential mortgages have no discernable effects on economic activity.[6] A 1 percentage point rise to the stock of residential mortgages has no statistically significant impact on oil import volumes, even 8 quarters later.[7]



E. Conclusion

23. This analysis shows that interest rate decisions can have an impact on FX reserve accumulation and some pass-through to domestic interest rates, but this depends on the perceptions of sovereign risk and global volatility and on the stock of excess liquidity. Interest rate differentials between The Bahamas and the U.S. affect the central bank's net FX purchases which are a significant determinant of changes in international reserves. The impact of interest rate differentials on net FX purchases is particularly economically and statistically significant at higher levels of global volatility and sovereign risk.

24. Liquidity management operations which reduce excess liquidity and lower banks' carrying cost of liquidity would improve the transmission of changes in the bank rate to lending rates. The transmission from the bank rate to domestic interest rates is strong but depends on the degree of excess liquidity. Changes in the bank rate generally feed through quickly and fully to many domestic interest rates and may be useful to discourage capital outflows and restore external balance. Interest rate tightening to raise the T-bill rate is likely to be most effective and persistent when excess liquidity is high and higher deposit rates increase the carrying cost of excess Bahamian dollars. However, banks will likely increase lending rates by less than the rise in deposit rates, with a modest fall in bank spreads.

25. There is limited scope for using interest rate decisions to influence private sector credit, but raising interest rates is equally unlikely to do significant damage to credit growth. Commercial bank lending exhibits only modest sensitivity to changes in domestic lending rates, with the greatest impact being on residential mortgages. Even then, economic activity appears largely immune to shocks to residential mortgages.

[6] Because quarterly GDP exists only from 2015 onward, economic activity here is measured as quarterly imports of oil volumes, excluding imports of aviation gasoline, bunker "C", and gas oil.

[7] The cumulative impulse response function is estimated from the following equation: $output_{t+h} - output_t = \beta_0 + \beta_h \Delta credit_t + \sum_{j=1}^{k} \gamma_h \Delta credit_{t-j}^{i} + \sum_{j=1}^{l} \delta_h \Delta output_{t-j}^{i} + u_t \qquad \forall h = 1, \ldots, 8$

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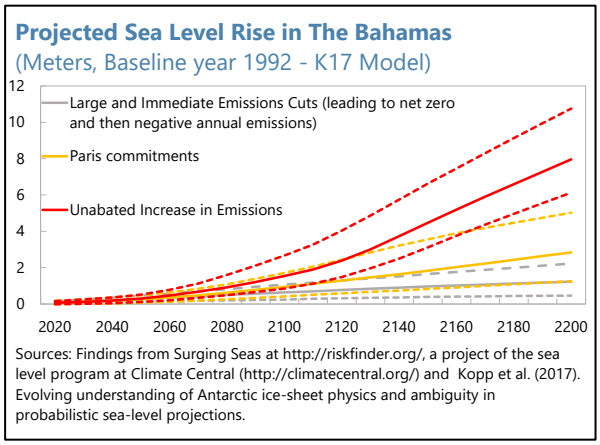
NAVIGATING THE PERFECT STORM: CONFRONTING CLIMATE CHANGE RISKS AND INSURANCE CHALLENGES IN THE BAHAMAS

A. Introduction

1. The Bahamas faces an Extreme Risk from Natural Disasters and Climate Change. Rising global temperatures are predicted to raise sea levels and increase sea temperature, which could fuel more and stronger storms. The Caribbean region's flat and low-lying terrain and hurricane inclination make it particularly vulnerable to climate change. A 2018 IDB report[1] found that in the Caribbean more than 600,000 people occupy land less than 0.5 m above sea-level. The Bahamas faces the greatest proportional threat within the region, with 1/3 of land and ¼ of population occupying points below 0.5 m. Furthermore, compared to other Caribbean countries, The Bahamas has historically suffered the highest number of tropical storms, which includes major hurricanes – the country was hit by 160 hurricanes since 1944, with 35 considered major hurricanes, according to the Saffir-Simpson scale.



2. Natural Disasters generates Direct and Indirect Consequences. Besides the loss of human life and the negative effect on the population's physical and mental health, natural disasters can directly impact infrastructure, crops, and supply chains. Indirect effects are associated with business interruption, and repercussions on the social network. Natural disasters also require rapid mobilization of emergency resources, which can jeopardize the fiscal stance if the government must access the market in unfavorable conditions. Therefore, the ultimate impact depends on the existence of fiscal buffers, financial safety nets, and insurance coverage.

B. Direct Impacts of Hurricanes

We use data on the maximum wind speed observed during each registered storm in the western hemisphere and monetary losses per capita-we use states and provinces' populations for larger countries- to construct a damage function. This produces an exogenous measure of hurricane intensity and its potential destructive power at a fine-grained geographical level. We also include in our regressions the number of days the event lasted for each geographic location-as hurricanes usually tend to slow-down after reaching large masses of land. The results are shown in Table 1.

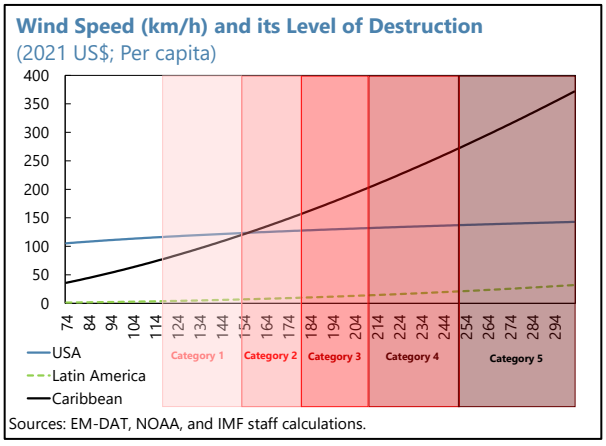
[1] Sea-Level Rise Threats in the Caribbean (IDB 2018).

Table 1. The Bahamas: Wind Speed and Its Level of Destruction

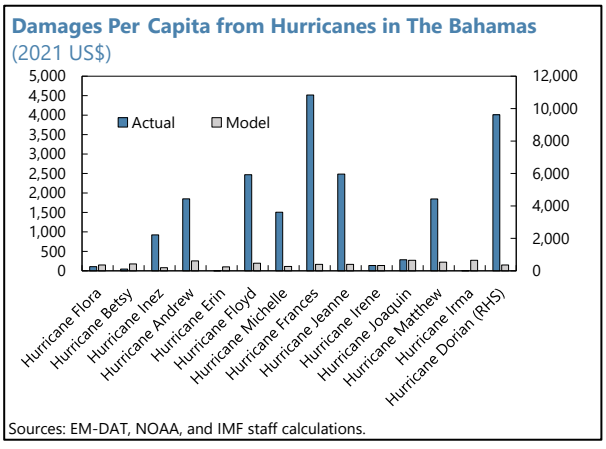
VARIABLES	(1) Log_Damages_per_cap	(2) Log_Damages_per_cap
Log_Wind_Speed	2.114***	2.263***
	(0.495)	(0.519)
1.d_Caribbean #c. Log_wind_speed	-0.529**	-0.608**
	(0.293)	(0.301)
1.d_USA#c. Log_wind_speed	-1.915***	-2.047***
	(0.548)	(0.573)
Total_Days		-0.0486
		(0.0333)
d_ Caribbean	5.674*	5.924*
	(3.142)	(3.272)
d_USA	12.59***	13.19***
	(2.772)	(2.890)
Constant	-15.82***	-16.37***
	(2.467)	(2.586)
Observations	387	367
R-squared	0.283	0.285

Source: IMF staff calculations.
Notes: the baseline are Latin American countries; standard errors in parentheses; *** p<0.01, **

3. Hurricanes have a greater impact on the Caribbean region. Considering the same level of maximum wind, countries in the Caribbean suffer larger damages from hurricanes than countries in Latin America and states in the US. Although the impact of a less destructive storm is larger in the US than in the Caribbean for category 2 hurricanes, the damages increase disproportionately in the Caribbean. According to our estimates, a 10 percent increase on wind speeds generates 17.1 percent increase of economic losses per person in the region. The result is significant and larger than the impact of such increase in the US (2.1 percent).



4. Results in the Caribbean vary, and the model underestimates the damages in The Bahamas. The divergent impacts of storms on Caribbean countries stem from a combination of geographical, and environmental factors, as the islands' topography, proximity to storm paths, and ecosystem resilience determine the impact of a storm. Socio-economic factors such as economic development, population density,



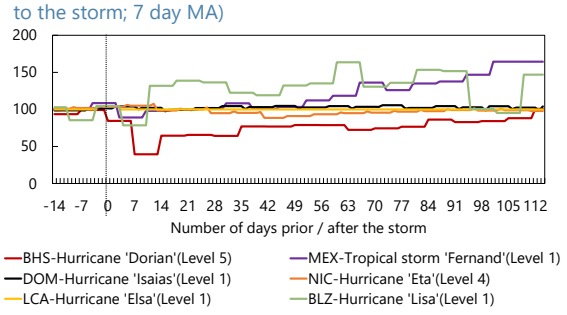
and disaster preparedness also contribute to divergent impacts. Countries with stronger infrastructure, comprehensive land-planning, effective response systems, and resilient costal ecosystems (such as mangroves and coral reefs) tend to suffer less severe consequences.

C. Indirect Impacts of Hurricanes

5. The impact of natural disasters lingers in the Caribbean. Due to their reliance on tourism, several Caribbean nations may experience prolonged effects from a natural disaster, lasting for months after the disaster. After Hurricane Dorian, for example, it took approximately three months for international passengers' arrivals to return to pre-storm level in The Bahamas. At the same time, supply of hotel rooms was barely affected[2], while demand for rooms only fully returned after 17 weeks. The slow return of tourists, while most of the tourism inventory was unaffected, can be attributed to a wrong perception of tourists that the storm affected the entire country, and/or to supply-chain disruptions-with most of the resources having to be directed to the affected areas. For instance, Hurricane Dorian stopped tourists' arrivals to the country for a full trimester (which accounts for approximately 40 percent of the economy).

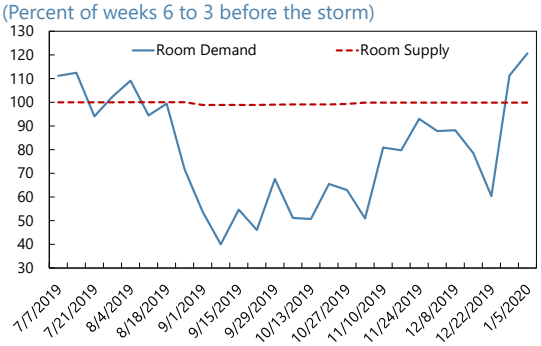
Impact of Hurricanes on the Tourism Sector in the Caribbean

International Passangers' Arrival
(Percent of the arrivals between 30-10 days prior to the storm; 7 day MA)



Sources: Flightradar24, and IMF staff calculations.

Demand and Supply of Rooms
(Percent of weeks 6 to 3 before the storm)



Sources: STR, and IMF staff calculations.

D. Insurance Payments

6. Insurance coverage is an essential part of resilience against Natural Disasters. Besides offering financial protection against the damage of physical assets, insurance provides liquidity that help cushion the impact of a disaster on the economy. As insurers (and reinsurers) rely on their ability to pool losses across their policyholders, the increase in the frequency and intensity of natural disasters challenges insurers' capacity to spread risks and could lead to a rise in collected premium for certain regions or even insurers withdrawing from offering coverage. Consequently, climate change is affecting the insurability of specific risks and the accessibility to cost-effective coverage.

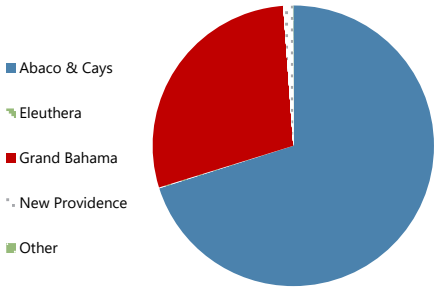
[2] Hurricane Dorian did not cause major impacts in New Providence, which contains most of the room inventory in the country.

7. A recent increase in insurance premiums brings to light a similar event in the 1990s. Property owners in The Bahamas have witnessed premiums rise by over 20 percent since 2022, attributed to the heightened reinsurance costs for local insurance firms. In the 1990s, the Caribbean experienced a substantial spike in insurance costs due to a shrinking global catastrophe reinsurance market following Hurricanes Gilbert (1988), Hugo (1989), and Andrew (1992) and the Northridge Earthquake in California (1994). These events caused premiums to increase by 200 percent as they had strained the capital base of reinsurance companies. Fortunately, the Caribbean experienced no major insured catastrophic losses after 1994 and, coupled with the establishment of public-private partnerships, reinsurance companies were able to restore their capital buffers.

8. Most of Hurricane Dorian Physical Damages in 2019 were covered by Insurance. 52 percent of the damages from Hurricane Dorian were covered by insurance (around US$1.8 billion was paid regarding the estimated US$3.4 billion pf physical damages), implying an insurance protection gap[3] of 48 percent, slightly lower than the world average at 55 percent[4]. Most of the insurance claims and payments after Dorian were related to residential properties, and international reinsurance companies paid for 98 percent of the claims (around US$1.8 billion).

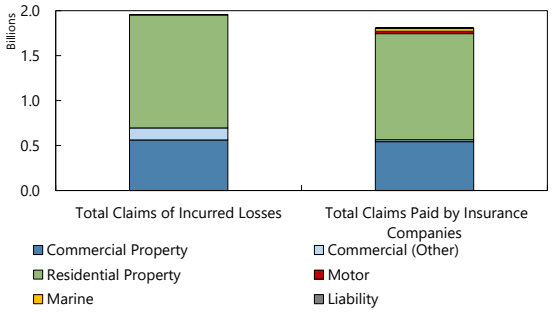
Insurance Claims and Payments in The Bahamas after Hurricane Dorian

Total Claims of Incurred Losses by Island



Sources: Insurance Comission of The Bahamas, and IMF staff calculations.

Insurance Claims
(US$ billion)



Sources: Insurance Comission of The Bahamas, and IMF staff calculations.

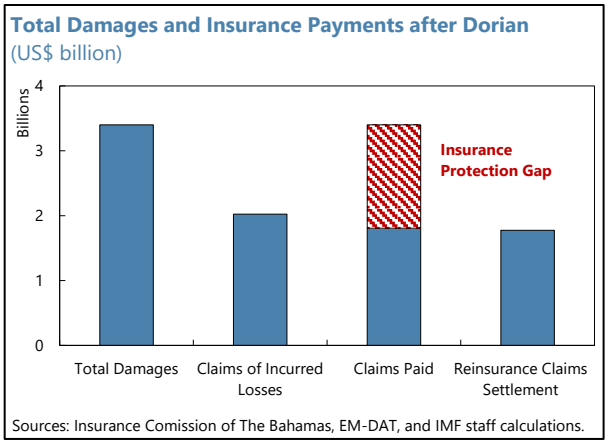
9. Under the current Insurance Protection Gap, the public and private sector would need to mobilize at least 1.4 percent of GDP per year to self-insure against hurricanes. Considering the current insurance protection gap and level of estimated damages and economic losses, assuming a level 4 hurricane every three years in The Bahamas would require the government and local private sector to save around 1.4 percent of GDP per year to cover for future losses.[5] The

[3] The insurance protection gaps are defined here as the uninsured portion of economic losses caused by natural disaster.

[4] According to a report from the Swiss Re Institute, in 2022, 45 percent (US$ 125 billion) of economic losses related to natural disasters (US$ 275 billion) were insured in the world.

[5] Without considering an expansion of the protection gap, the occurrence of adverse selection issues, changes in the elasticity of demand for insurance relative to income and risk, or an escalation in the intensity of tropical storms.

current rise in insurance premiums and the potential expansion of the insurance protection gap emphasize the urgent need to enhance self-insurance measures. If the protection gap increases to 55 percent, for example, efforts to self-insure would increase to 1.7 percent of GDP per year.



E. Conclusion

10. The Bahamas faces an extreme risk from natural disasters and climate change, with anticipated rising global temperatures contributing to higher sea levels and intensified storms. Divergent impacts in the Western Hemisphere, shaped by geographical, environmental, and socio-economic factors, highlight the need for a comprehensive approach to resilience. The recent surge in insurance premiums raises concerns, reminiscent of the challenges faced in the 1990s, with potential implications for property owners, development projects, and the overall insurance landscape. As the rise in prices could potentially widen the protection gap, the mobilization of public and private resources for self-insurance becomes more critical.

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