



# TC NOTES

PRACTICAL **LEADERSHIP**  
AND **GUIDANCE** FROM  
**TORONTO CENTRE**

## HOW CAN CLIMATE- RELATED RISKS BE INTEGRATED INTO RISK-BASED SUPERVISION?

ESSAY WINNERS 2022

OCTOBER 2022

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# HOW CAN CLIMATE-RELATED RISKS BE INTEGRATED INTO RISK-BASED SUPERVISION?

## Preface

This summer, Toronto Centre accepted submissions for an essay contest in which participants were asked to describe how climate-related risks can be integrated into risk-based supervision.

The competition received a large number of high-quality entries from our international network. We are pleased to announce the winner of this contest to be Tshegofatso Nanjunga of the Bank of Botswana, and to publish her submission as a Toronto Centre Note.

Reflecting the high standards of the entries, we have also included in this Note two Annexes, based on submissions from Desmarie Brooks of the Jamaica Deposit Insurance Corporation and Esuru Ahaneku of the Nigeria Deposit Insurance Corporation.

Toronto Centre commends all those who submitted an essay and congratulates these three outstanding writers on their accomplished works.

## Introduction<sup>1</sup>

Climate change is becoming an increasingly important issue, necessitating a global transition to a less fossil fuel-based economy. The transition and the effects of global warming both create climate-related risks, which in turn are a source of financial risk and will have an impact on the resilience of financial institutions.<sup>2</sup>

Climate-related risks are financial risks caused by the exposures of financial institutions to physical or transition risks triggered by or connected to climate change.<sup>3</sup> If the effects of climate-related risks are not managed properly, they can pose risks to the financial system, resulting in financial instability. It is, therefore, part of the Bank of Botswana (“the Bank”)’s mandate to promote resilience to climate-related risks in the financial system.

Toronto Centre (2019) recommends that supervisory authorities should integrate climate-related risks into their risk-based supervision (RBS) framework. This Toronto Centre Note describes how the Bank will integrate climate-related risks into its RBS framework for licensed financial institutions (LFIs), highlighting key features of the management of climate-related risks and the supervisory approaches and principles of the Bank.

Botswana is keeping abreast of the accelerated global efforts, spearheaded by the Financial Stability Board, to address climate-related financial risks. It is hoped, therefore, that the Financial Stability Council, comprising the Bank, the non-bank financial institution regulatory authority, and the Ministry of Finance, will include climate-related risks in their action plan with a view to recommending adoption of the Basel Committee (2022) principles for the effective management and supervision of climate-related financial risks in Botswana. This will ensure that supervisory and regulatory approaches are strengthened, as well as enhance disclosures, data and the development of a climate-related risk taxonomy.<sup>4</sup>

## Wider context of climate change

Following the adoption of the 2015 Paris Agreement on climate change, three objectives were set globally to strengthen the global response to the threat of climate change. First, to limit global warming to well below 2 degrees Celsius and to pursue efforts to further limit the increase to 1.5 degrees Celsius. Second, to strengthen countries’ ability to deal with the impacts of climate change and to support them in developing low greenhouse gas emission technology. And third, to make financial flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development. Financial institutions have a key role in meeting the third objective, which relates to all public and private financial flows, both national and international, including financial instruments such as equity and bonds.<sup>5</sup>

In most developing market economies, the banking sector is one of the largest channels used for financial intermediation. It takes deposits and lends money, and in some cases it acts as a major holder of equity and bonds issued by non-financial institutions. As the banking sector plays its role in financing activities, some of these activities may increase climate change, while others may reduce harmful emissions.

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<sup>1</sup> This Note was written by Tshegofatso Nanjunga of the Bank of Botswana, with Annexes based on essays submitted by Desmarie Brooks of the Jamaica Deposit Insurance Corporation and Esuru Ahaneku of the Nigeria Deposit Insurance Corporation. Please address any questions about this Note to [publications@torontocentre.org](mailto:publications@torontocentre.org).

<sup>2</sup> Annex 1 discusses how these risks are materializing in Jamaica.

<sup>3</sup> For example, damage caused by extreme weather events or a decline in asset values in carbon-intensive sectors.

<sup>4</sup> Annex 2 presents some similar supervisory developments in Nigeria.

<sup>5</sup> See Goritz et al (2021).

The risks that arise from climate change are likely to have an adverse impact on both individual financial institutions and on financial stability.<sup>6</sup> Therefore, the Bank needs to ensure that LFIs are aware of these risks and how they should act in ways that identify, control and mitigate climate-related risks.

Botswana is highly vulnerable to climate variability and change due to its high dependency on rain-fed agriculture and on natural resources, even if catastrophic events that have an impact on the health of the financial system have not yet been observed. The main physical risks in Botswana include drought, veld fires, heavy rains, and increase in temperatures. The potential impacts of climate change on infrastructure are likely to be high, especially on electricity connection and water reticulation systems, with operational risks for all sectors, including the financial sector.

## **Risk-based supervision framework of the Bank of Botswana**

The Bank adopted RBS in 2014, with the objective of providing an effective approach to assessing the safety and soundness of LFIs against current and emerging risks. The RBS framework places a strong emphasis on understanding and assessing the adequacy of each LFI's risk management. This framework also stresses the importance of risk identification, measurement, monitoring, control and reporting by LFIs on a continuous basis. It increases the effectiveness of supervision by identifying LFIs in which risks are greatest, identifying within LFIs those areas or activities in which risks are high, allocating supervisory resources to assessing and measuring these risks, and making supervisory interventions where necessary.

The RBS framework allocates resources to the areas of greatest risk. It enables supervisors to prioritize their efforts and to focus on significant risks by channeling available resources to LFIs where the risk profile warrants greater attention.<sup>7</sup> RBS recognizes that risks can originate from a variety of sources, and it is necessary to take a broad perspective.<sup>8</sup> RBS is dynamic, forward-looking, and allows risks to be identified and addressed early. It seeks to identify emerging areas of risk and the adequacy of management and financial resources to address these. As the financial system develops, there is a need for consolidation and development of the regular review of existing supervisory practices to ensure that regulatory and supervisory frameworks remain effective.

In recognition of the increased globalization of the financial industry, the Bank proposes to integrate climate-related risks into RBS using practices developed by other jurisdictions, such as the European Central Bank's (2020) guide for supervisors on climate and environmental risks and the Basel Committee's (2022) principles for the effective management and supervision of climate-related financial risks. Although the responses of banking supervisors to climate change are in the early stages of development, the Bank intends to set expectations, provide guidance, and take supervisory actions at an early stage so that the climate-related risks to the financial system, banks and consumers are addressed effectively.

The Bank will incorporate climate-related risks within a banking supervisor's system of RBS. It is not necessary to create a new risk category for climate change, but it is important to incorporate climate change-related risks within a supervisor's assessment of inherent risks and to take account of the materiality of climate change risk within each existing risk category.<sup>9</sup>

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<sup>6</sup> See Toronto Centre (2022).

<sup>7</sup> See Bank of Botswana (2021) and Toronto Centre (2018).

<sup>8</sup> For instance, risks may arise in the wider economy (macroeconomic) or at an industry or sector-wide level (macroprudential) and they need to be considered alongside firm-specific risks.

<sup>9</sup> See Toronto Centre (2019).

In fulfilling the objectives of the safety and soundness of LFIs against current and emerging risks and financial stability by continuous assessment of risks and maintenance of mitigation measures, the Bank will consider two broad climate-related risks. These are physical and transition risks. Physical risks emanate from more frequent and severe climate events, such as heatwaves, droughts, wildfires, floods, and storms. The manifestation of these risks can be acute if they occur due to climate and weather-related events that cause severe destruction of the environment, or progressive shifts in climate and weather patterns that bring about gradual deterioration.<sup>10</sup> Transition risks are financial risks that arise as a result of the transition to a lower carbon economy, driven by changes in climate-related policy, a shift in market sentiment, and the emergence of disruptive technology or new business models.

Physical risks and transition risks are not mutually exclusive. In the short term, a slow transition to a less fossil fuel-based economy may lessen the negative repercussions of the shift (transition risk), but it may also enhance the physical risks. If the physical risks increase, this may lead to more significant and faster changes in climate policy in the future, thereby increasing transition risk. Financial institutions may be vulnerable to the financial risks related to the transition to a climate-neutral economy (transition risks) as well as the physical consequences of climate change (physical risks).

These two risk channels are drivers of conventional risks such as market, credit, operational, litigation, and reputational risks. Figure 1 demonstrates how climate-related risks can transmit and translate into financial risks through the key components of climate risk drivers, transmission channels and sources of variability. Column 1 represents climate risk drivers that are classified into either physical or transition risks.

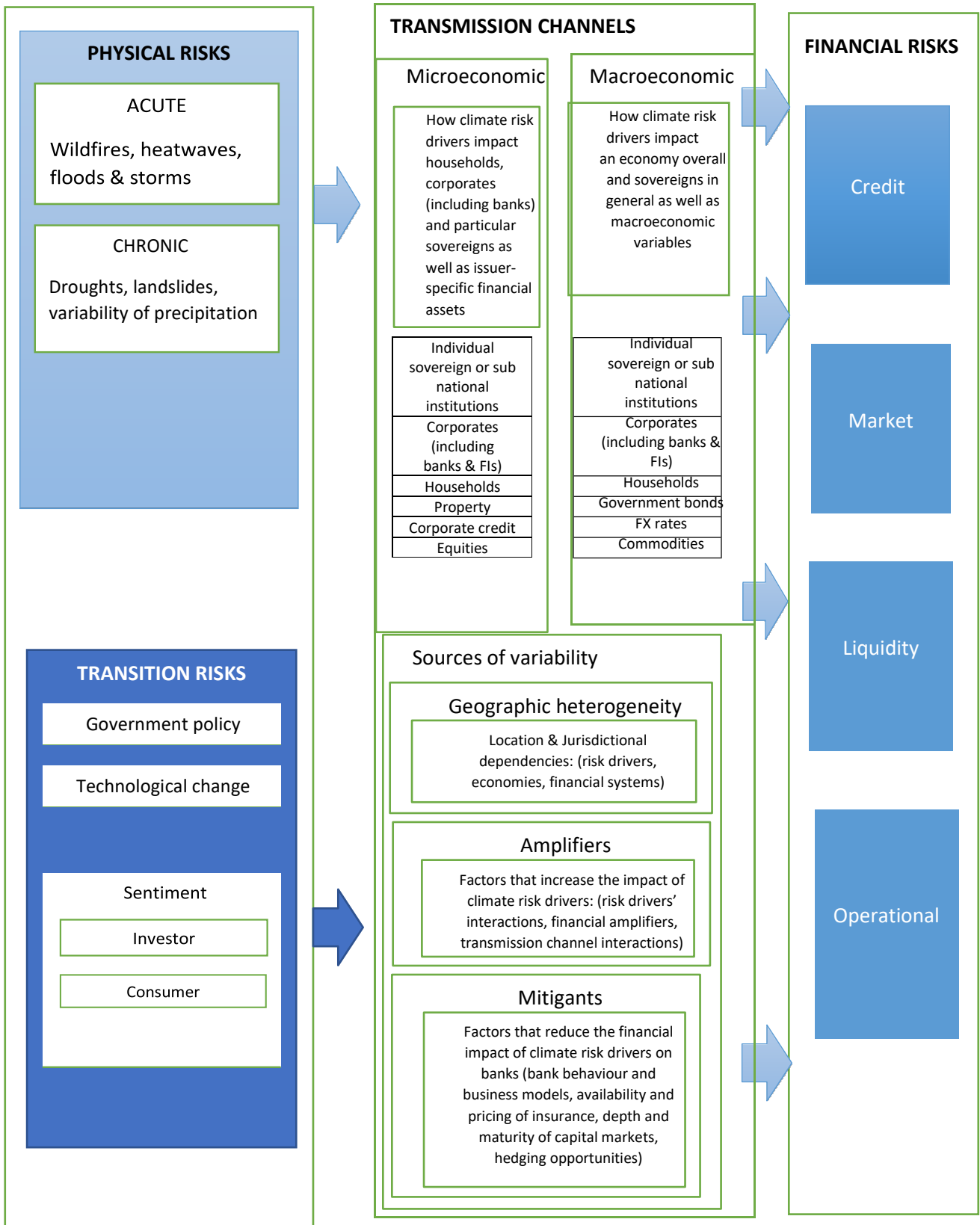
Transmission channels (column 2) are the causal chains that describe how climate risk drivers impact banks directly and indirectly through their assets, counterparties, and the economy in which they operate. Sources of variability (column 2) show that climate risk drivers can be affected by a variety of variables such as the geographic location of the bank, interactions and interdependencies between transmission channels, and climate risk drivers that can amplify or offset the impacts of climate change. Column 3 represents the financial risks arising from traditional risk categories of credit, market, liquidity, and operational risk. In addition, other risk drivers arising from climate change include legal risk, reputational risk, and litigation risk.<sup>11</sup>

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<sup>10</sup> See De Nederlandsche Bank (2020).

<sup>11</sup> See Toronto Centre (2019).

**Figure 1: Financial risks from climate risk drivers**



Source: Basel Committee (2021a).

## Management of climate-related risks by financial institutions<sup>12</sup>

As discussed in the previous section, climate-related risks typically have an impact on financial institutions by feeding through a range of traditional types of inherent risk. Similarly, the governance and controls of climate-related risks by financial institutions can be assessed as part of a supervisor's review of a financial institution's governance, senior management, and internal controls, and the adequacy of a financial institution's financial and other resources.

### Governance

Sound governance arrangements are critical to the functioning of financial institutions and the financial system. To facilitate effective oversight, an LFI's board and senior management should demonstrate an appropriate understanding of climate-related financial risk exposures and their impact on business plans, strategies, and risk appetite. When developing and implementing business strategies, the LFI should take into consideration material physical and transition risk drivers and evaluate how these risks could affect the resilience of the business over the short, medium, and long term. This also entails assessing the exposure of the LFI to structural changes in the financial system and the wider economy.

Sound governance arrangements are also critical for effective risk management, so an LFI's board and senior management ought to demonstrate an understanding of climate-related risks and their potential impact on the financial institution. Good practice here should include:

- gaining an understanding of how climate change may have an impact on the LFI's risk profile
- determining how its governance arrangements and strategy should be adapted and managed if the LFI is exposed to any climate-related risks
- integrating a general climate policy framework within the LFI's governance and risk management arrangements
- establishing an internal change program that is supervised by the board<sup>13</sup>
- assigning roles and responsibilities across all the relevant layers of the organization to address the implementation of the required changes, including specific requirements for the management of climate-related risks.

Board members should enhance their skill sets on climate-related risks, through appropriate training and through discussions of climate-related risks at the board and at the audit committee and risk committee. Board succession planning could also be used as an opportunity to add skills and understanding of climate risk to the board.

### Senior management

Senior management is responsible for incorporating and implementing policies and elements related to climate risk into relevant and existing operational and business policies. The board depends on senior management for guidance on the organization's climate-related risk objectives, plans, strategic options, and policies, as well as the establishment and use of applicable tools, models, and metrics to monitor exposures to climate-related risks. Senior management should set out potential trade-offs and recommendations to the board on any applicable information relating to climate risk to enable the board to focus on key issues and to make informed decisions in a timely manner.

Senior management should also assign climate-related responsibilities to relevant functions and

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<sup>12</sup> This section is primarily a statement of the standards set by the Basel Committee (2022) that are being proposed for the Bank of Botswana to follow.

<sup>13</sup> See De Nederlandsche Bank (2020).



business units to exercise effective oversight of climate-related financial risks. To effectively fulfill responsibility regarding climate-related risk management, senior management should ensure that the relevant functions and business units have adequate expertise and resources. Where necessary, senior management should raise awareness on climate-related topics through internal workshops and training, or external collaborations with expert organizations.

### Internal controls

To ensure sound comprehensive and effective identification, measurement, and mitigation of climate-related risks, LFIs should incorporate climate-related financial risks into their internal control frameworks. They should collect relevant quantitative and qualitative data for monitoring and assessing the interaction of potential climate-related risks with existing risks. The quality and availability of data should allow LFIs to perform aggregated analyses of various elements of climate-related risks. The potential impact on business continuity and operational resilience due to climate change should also be considered in the risk management system.

Integrating climate-related risks into a financial institution's risk management framework requires an overview of all climate-related risk factors as well as amending all risk management methods and processes. Therefore, to embed climate-related risks across the whole organization, it is necessary to enhance the roles and responsibilities relating to climate risk and reporting lines across the three lines of defence. The first line of defence (business units) is expected to be aware of potential climate-related risks and assess these risks during the client on-boarding stage, credit application and review processes.

The second line of defence is the risk management function, which should be responsible for identifying, monitoring, and undertaking a comprehensive climate-related risk assessment that recognizes all material risks within an integrated firm-wide perspective on risk, and for ensuring that the first line responsibilities and other climate-related roles are conducted following the applicable rules and regulations. The third line of defence is the internal audit function, which carries out periodic reviews of the entire internal control framework and systems in light of developments in businesses, risk profiles and the quality of underlying data.

LFIs are expected to ensure that business units and internal control functions have adequate financial and human resources to effectively fulfill their responsibilities relating to the management of climate-related risks. LFIs should, to the extent required, increase the capability and resources at their disposal as well as promote suitable training for all relevant roles.

### Supervisory approach and principles<sup>14</sup>

The objective of supervision for the Bank is to ensure safety and soundness of the LFIs and to maintain stability and confidence in the financial system, thereby reducing the risk of loss to depositors and creditors. In dealing with LFIs where the risks are assessed to be high and the governance controls are assessed to be weak, this objective translates into supervisory actions aimed at preserving the value of the LFI's assets with minimal disruption to its operations.

The Bank's approach to RBS is based on the following concepts and principles, which are considered essential for the effective functioning of the financial system:

**Identification of areas of risk focus:** RBS focuses its supervisory resources based on the risk profile of an LFI. It explicitly recognizes that not all activities are equally risky, and not all risks within each LFI are the same. RBS allocates resources to systems or areas that pose the greatest and most significant risks to supervisory objectives. An LFI's supervisory ratings are captured in a risk matrix (see Figure 2), which facilitates the assessment of an LFI's risk

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<sup>14</sup> Again, some of the approaches described here remain aspirational for the Bank of Botswana at this stage.

assessments, including for the inherent risk of each significant activity and the quality and effectiveness of governance and controls. Physical and transition climate risks have been incorporated into the “External risks” columns of the Bank's existing risk matrix, with the intention that this in turn feeds into the assessment of relevant inherent risks, governance and controls, the adequacy of financial resources, and the overall risk rating of an LFI.

**Figure 2: Risk matrix**

Licensed Financial Institution Risk Matrix as at .....																	
Significant activities	External Risks				Inherent Risks						Risk Management and Governance				Net Risk	Direction of rating	Financial Resources
	Macroeconomic	Macroprudential	Physical	Transition	Credit	Market	Operational	Financial Crime/Money	Underwriting	Conduct	Board	Senior Management	Internal Audit	Risk Management			
Activity 1																	
Activity 2																	
Activity 3																	
Overall Score																	

The overall risk of an LFI (the composite risk rating) is rated as low, moderate, above average, or high. When an LFI is rated low composite risk by the Bank, this means the LFI is rated as being well-managed, strong, and very resilient to potential shocks. A moderate rating means the LFI is rated as being generally well-managed, sound, and resilient to adverse changes in economic, business, and climate-related conditions without a material impact on its risk profile. An above-average composite risk rating means an LFI is rated as being vulnerable to economic, business, and climate-related conditions and has signs that could lead to financial losses. A high rating means the LFI is not resilient to most adverse business, economic, and climate conditions, which would pose severe safety and stability concerns if corrective measures are not promptly implemented.

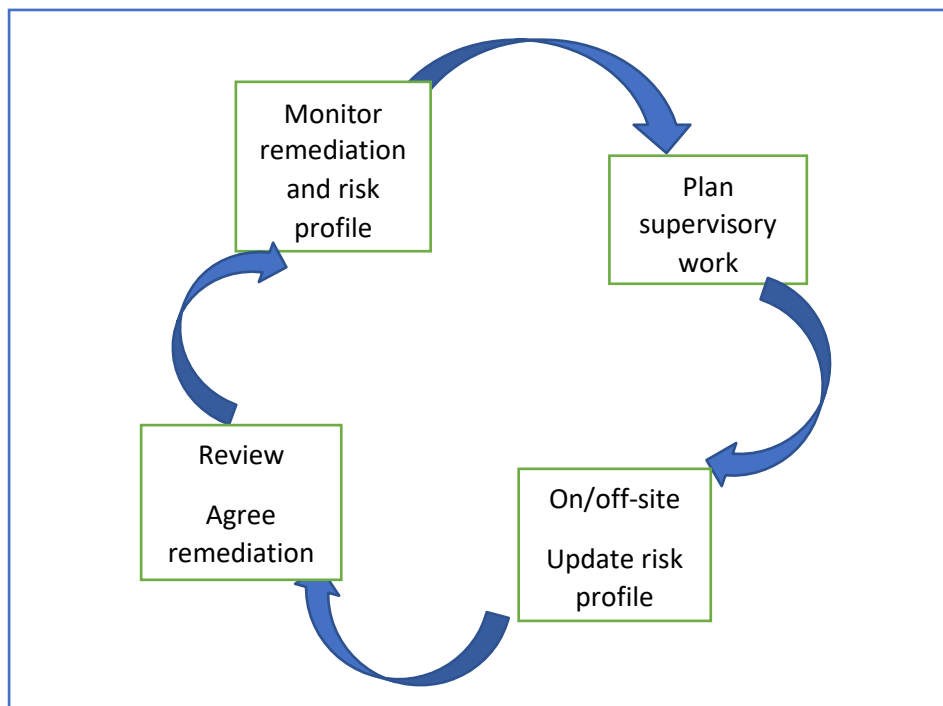
The composite risk rating is a significant factor in determining the supervisory response and supervisory plan for the LFI (see Figure 3).

**Figure 3: Relationship between Composite Risk rating and Intervention rating**

Intervention Rating	Composite Risk Rating			
	Low	Moderate	Above Average	High
0-Normal				
1-Early warning				
2-Potential risk to safety/stability				
3-High risk to safety/stability				
4-Severe safety and stability concerns				

**Continuous assessment of the risk profile:** The RBS framework requires a continuous assessment of an LFI's risk profile. A dedicated team of Examiners (both on-site and off-site) is assigned to the largest and riskier LFIs to empower continuous and consistent supervision. This team works closely with the Compliance Managers, who in turn lead the teams as well as being the Bank's primary contact with the LFIs. Assigning the same team to LFIs follows an international practice of adopting a portfolio approach to supervision. It is also necessary to develop a common understanding of the LFIs risk profile. In practice, supervisory activities (supervisory planning and resource allocation), on-site examinations, and off-site monitoring are integrated into the process such that one feeds into the other. See Figure 4 below.

**Figure 4: Continuous/dynamic nature of RBS**



Source: Toronto Centre (2018)

**Early risk identification and measurement:** Supervisors should incorporate forward-looking tools, review the governance and management structure, and use stress testing and scenario analysis to identify the risk processes at an early stage and understand the short-, medium-, and long-term risks of the business model of an LFI from a climate change perspective.

**Stress testing and scenario analysis of climate-related risks:** To assess the potential impact of a range of climate change outcomes, LFIs are expected to develop climate change scenarios that form the basis of stress tests. LFIs are expected to conduct stress tests relating to physical or transition climate-related risks that are relevant to their business strategy, exposure profile and business models. The objectives of climate scenario analysis and stress testing are to reflect the LFI's overall climate risk management objectives as set out by its board and senior management.<sup>15</sup>

The range of outcomes should be used by an LFI to inform strategic planning and to determine the impact of climate-related risks on the LFI's overall risk profile and on the resilience and vulnerabilities of the LFI's business model. This should also feed into the LFI's internal capital adequacy assessment process (ICAAP) and the determination by the supervisors of LFI-specific capital adequacy requirements (Pillar 2 capital).<sup>16</sup>

The analyses are expected to consider physical and transition climate-related risks as drivers of conventional risk types such as operational, credit, liquidity, and market risks over a range of relevant time horizons. The scenario analysis should include a short-term and long-term assessment of the LFI's exposure to climate-related risks, based on its current business model and on the outcomes of different climate-related scenarios.

Supervisors should also be alert to the possibility that LFIs can underestimate the impact of climate change-related risks. As such, supervisors ought to promote climate change-related risk scenarios by collaborating with other stakeholders to develop data and analytical tools on climate change, to run their own stress tests, and to carefully assess the outcome of scenarios and their plausible impact on LFIs' loans, capital ratios and securities portfolios.

**Supervisory intensity and early intervention:** There is a direct link between the level of supervision, the degree of intervention and the LFI's overall risk profile assessment.<sup>17</sup> The intensity/level of supervision reflects the potential impact of the LFI's impact on the stability of the financial system. The degree of intervention and the frequency of supervision will depend on the nature, size, complexity, and risk profile of the LFI, including the impact of climate-related risks on this profile. Supervisors should aim to act promptly and intervene at an early stage.

**Clear internal governance processes:** The RBS framework recognizes that the board and senior management of an LFI should be responsible and accountable for its compliance with laws, regulations, supervisory directives, and standards, including any relating to the management of climate-related risks. The governance process may include early warning thresholds. The board and senior management are expected to be proactive in providing timely responses and notifying the Bank of significant matters affecting the LFI.

**Principles-based and forward-looking supervision:** The RBS framework is principles-based and forward-looking. Supervisors should identify the areas of greatest concern by assessing an LFI's business models and risks, its associated strategies, and the adequacy of its governance, management, and internal controls, to help the supervisors identify and address weaknesses at an early stage, including significant weaknesses arising from climate-related risks. Principles-based supervision applies sound judgment in identifying and evaluating risks and distinguishes the complexity and diversity among LFIs, avoiding a "one size fits all" approach.<sup>18</sup>

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<sup>15</sup> The objectives include (i) exploring the impacts of climate change and the transition to a low-carbon economy on the bank's strategy and the resiliency of its business model; (ii) identifying relevant climate-related risk factors; (iii) measuring vulnerability to climate-related risks and estimating exposures and potential losses; (iv) diagnosing data and methodological limitations in climate risk management; and (v) informing the adequacy of the bank's risk management framework, including risk mitigation options. See Basel Committee (2021b).

<sup>16</sup> See Toronto Centre (2020).

<sup>17</sup> See Eastern Caribbean Central Bank (2017).

<sup>18</sup> See Eastern Caribbean Central Bank (2017).

## Conclusion

Climate-related risks can translate into physical and transition risks that can potentially result in large financial losses and may present new challenges to LFI's risk management practices. To ensure sound comprehensive and effective identification, measurement, and mitigation of climate-related risks, supervisory authorities should incorporate climate-related financial risks into their RBS Framework.

The Bank's risk-based approach allows for the identification and coordination of strategies to address financial system-related risks, captured in a risk matrix and composite rating that will be updated through a continuous supervisory process to reflect changes in the LFI's risk profile as and when they occur. For the LFIs to identify and manage these risks, they are also expected to develop climate change scenarios that form the basis of stress tests.

## Annex 1: Climate change in Jamaica

### Introduction<sup>19</sup>

In 2004, a number of homes along Caribbean Terrace, a residential area on the southeastern coast of Jamaica, were destroyed by Hurricane Ivan. In 2007, several houses in the same area were destroyed by Hurricane Dean. In July 2019, residents of Rocky Point, a fishing village on Jamaica's south coast, woke up to flooded streets as high tides and windy conditions had caused the sea to wash approximately 200 metres inland, flooding drains and leaving knee-deep water on the streets and inside people's homes. At the Hellshire Fishing Beach, fishermen watched as their beach disappeared over a matter of weeks. The sea now lapped at the sides of buildings.

While coastal communities in Jamaica have experienced flooding over the years, in recent times the frequency of severe weather events and the magnitude of damage have increased due to climate change. According to a 2010 United Nations Development Programme (UNDP) report, *Modeling the Transformational Impacts Climate Change on the Caribbean*, "Rising sea levels caused by climate change are set to cause billions of dollars in damage to the island states and wipe out the best Caribbean tourist resorts by the middle of the century."

Jamaica is a small developing country in the Caribbean with a population of approximately 3 million and GDP of about US\$13.8 billion. Due to its location, size and vast low-lying coastlines, Jamaica is particularly exposed to rising sea levels and water temperatures, increased storm intensity, and increased uncertainty in the volume of rainfall. According to the IMF, Jamaica is one of the top 20 countries most exposed to natural disasters in the world. Recently in 2021, severe floods and droughts occurred repeatedly. As climate conditions change and the risk of extreme weather events increases, Jamaica must consider these risks, particularly given the country's heavy reliance on tourism, agriculture, energy, construction, and mining, which are all sectors susceptible to weather-related shocks.

What do these climate events have to do with the financial system? When we consider risk within the context of the financial system, we mostly focus on credit, liquidity, market, and other financial risks. However, in recent times, the significance of risks such as cyber risks and climate-related risks, and their potential to exacerbate traditional financial risks, have become topical. Policymakers are therefore increasingly recognizing the importance of climate change and its implications for the financial sector.

Climate change can have an impact on the financial system through different channels, whether from damage to property and infrastructure or from changes in policy, technology, and consumer behaviour. Financial system supervisors must therefore implement policies to mitigate climate-related risks. This is particularly true in the Jamaican context. Jamaica has experienced severe weather events that have disrupted activities, particularly in the country's main revenue-earning sectors such as tourism and agriculture, and had an adverse impact on the country's economic growth and development.

Between 2000 and 2019, Jamaica experienced 22 storm events and 35 flood events. Hurricane Sandy (2012) accounted for J\$9.7 billion (or 0.8% of 2011 GDP) in direct and indirect damage. Jamaica's economy, people, and way of life have been significantly impacted by climate variability and change. Financial institutions in Jamaica are exposed to climate risks through loans given and investments in sectors that are susceptible to climate events, such as agriculture, real estate, and tourism. Depending on the extent of their exposure to these sectors, adverse climate events could result in significant losses. Given that the impacts associated with climate change may give rise to considerable future losses for banking institutions, climate risk must be a factor in the development of a resilient and stable financial system.

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<sup>19</sup> This Annex was prepared by Desmarie Brooks of the Jamaica Deposit Insurance Corporation.

## What are climate risks?

Climate-related risks can be divided into two major categories: physical risks and transition risks. Physical risks arise from damage to property, infrastructure, and land, while transition risks result from changes in climate policy, technology, and consumer and market sentiment during the adjustment to a lower-carbon economy. Financial institutions may be impacted by physical risks due to the impact of climate events on customers or through the impact of climate events on the wider economy which feeds into the financial system. Exposures can result from increased default risk of loan portfolios or lower values of assets. For example, rising sea levels in the Caribbean Terrace community in Jamaica, coupled with a higher incidence of extreme weather events, resulted in losses for homeowners and diminished property values, leading to greater risks in mortgage portfolios.

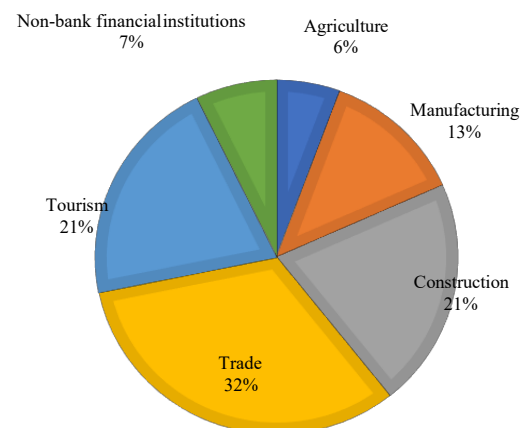
In 2015, the Climate Change Policy Framework for Jamaica was published. The main objectives as outlined in the document were to: mainstream climate change considerations into national policies; support the institutions responsible for research, data collection, analysis and projections at the national level on climate change, its impacts, and appropriate adaptation and mitigation measures; facilitate informed decision-making and strategic actions at all levels; and facilitate and coordinate the national response to the impacts of climate change and promote low carbon development.

Climate-related risks are a fundamental consideration for the Jamaican economy and the financial system, and the potential implications for the financial system are substantial. According to International Monetary Fund (2018), one of the main risks to the financial system in Jamaica is exposure from natural disasters. The report warns that a natural disaster would result in protracted negative growth and large losses for banks and other financial institutions.

The susceptibility of the country to natural disasters is owing to its low-lying coastal zone, mountains, and five major fault lines. In the event of a natural disaster, Jamaica's financial sector would experience an increase in credit and market risk. Figure 1 shows the allocation of loans across sectors and reinforces the magnitude of the impact on institutions of a climate event, given that the sectors to which loans are concentrated are susceptible to climate risks.

According to the IMF, non-performing loans, capital, and liquidity would be adversely impacted after a natural disaster, with possible secondary effects on FX reserves, growth, and debt levels. If mitigating factors are not employed, climate risks are likely to escalate, resulting in adverse impacts for Jamaica. These include increased occurrence of natural disasters and extreme weather events; greater impact from storm surges; weakened protective ecosystems such as coral reefs; compromised water resources; and coastline erosion and property loss from sea level rises. Jamaica has a significant dependence on its coastline given that tourism and its associated infrastructure is mainly concentrated on the island's coasts.

FIGURE 1: SECTORAL STRUCTURE OF LENDING



Transition risks are also a consideration for the Bank of Jamaica, as sentiment surrounding climate change in Jamaica increases and climate risk-related policies are developed. Jamaica's Vision 2030 National Development Policy (a long-term strategic guide to achieve development aimed at making Jamaica "the place of choice to live, work, raise families, and do business")

includes a national strategy to adapt to climate change as well as to contribute to the global efforts to reduce climate change. The national outcome is described in Box 1. Specifically, one of the central areas of action in this policy document is the incorporation of climate change mitigation and adaptation in physical planning systems (in the location and design of social and economic infrastructure, livelihoods, location of housing, biodiversity, water production, and land use management).

**Box 1: Vision 2030 National Outcome # 14**

“Hazard Risk Reduction and Adaptation to Climate Change: Natural and man-made hazards which lead to disasters have dire consequences for economic activities, infrastructure, human welfare and natural resources management. To a large extent, disasters result from the failures of development policy to mitigate vulnerability to hazard events. Climate change is likely to increase the incidence of natural disasters by causing extreme weather events to occur more frequently. Under Vision 2030 Jamaica, we will place greater emphasis on hazard risk management activities and programmes for reducing our existing and future vulnerability. We will incorporate climate change scenarios in future economic and land use planning and provide a framework to ensure that we reduce the risks associated with natural hazards by integrating hazard considerations into our country’s development planning.”

Vision 2030 Jamaica

To contribute to the global efforts to reduce climate change, Jamaica plans to embark on energy conservation efforts, use cleaner technologies, develop alternative sources of energy, and engage in reforestation. In addition, the government of Jamaica’s Climate Change Policy Framework (2015) outlines the strategies the country will employ to respond to the impact of climate change and build resilience. The primary aim of the framework is to “create a sustainable institutional mechanism to facilitate the development, coordination and implementation of policies, sectoral plans, programmes, strategies and legislation to mitigate as well as adapt to climate change.” There are several other national plans and policies to address climate change. In 2022, Jamaica launched the Jamaica Systemic Risk Assessment Tool (J-SRAT), giving the country the capacity to conduct informed climate risk analysis and to identify the areas in Jamaica most vulnerable to climate risk, thereby ensuring the effective and efficient investment of public and private resources.

### Supervisory response

Having recognized the potential impact of physical and transition climate-related risks on the financial system and the substantive implications for financial stability, the Bank of Jamaica plans to improve oversight in this area. In its 2021 Financial Stability Report, the Bank indicated that it would be incorporating climate-related risks in its supervisory activities and conducting climate-specific stress testing of the financial system. The Bank has highlighted the exposure of financial institutions to climate risks through investments in sectors most susceptible to climate risks, such as agriculture, real estate, energy, and tourism.

According to the Financial Stability Report, the main climate risks that could impact the financial system in the short-term would be derived from lower real GDP following capacity declines as a result of a climate-related event such as a hurricane; higher inflation from decreased supply; an increase in interest rates to moderate inflation; and depreciation of the local currency. The Bank



of Jamaica conducted stress tests in 2021 to determine the impact of a hurricane shock on the solvency of financial institutions in Jamaica and found that financial sectors maintained capital above prudential requirements.

In addition to incorporating climate-related risks in stress-testing, in February 2022 the Bank of Jamaica joined the Sustainable Banking and Finance Network (SBFN), whose main aim is to promote sustainable financing in the banking and non-banking sector. SBFN members are working to move their financial sectors towards sustainability with two goals: to improve management of ESG risks, including climate risk, across the financial sector; and to increase the flow of capital to activities that have a positive impact on the environment and society, including climate change mitigation and adaptation.

Notwithstanding the ongoing progress of the Bank of Jamaica in incorporating climate-related risks in its oversight activities, continued and deliberate efforts are needed to enhance the measurement, monitoring, and management of these risks.

## Annex 2: Climate-related risks and risk-based supervision in Nigeria

### Risk-based supervision<sup>20</sup>

Bank supervision is a critical element of the financial safety net of most countries. It is the continuous monitoring of the activities of banks to assess their health, compliance with regulatory requirements, and risk to depositors' funds. This oversight is necessary to ensure early detection of unsound practices and the enforcement of prompt corrective action. Effective bank supervision promotes public confidence in the banking system and enhances the stability of the financial system. Van Greuning and Bratanovic (2009) assert that with growing integration and interdependence of international financial markets, bank supervision has become an increasingly important means to strengthen both national systems and the global financial system.

Given that risk is inherent in banking, the assessment of the risk profile of banks is at the core of bank supervision. Adopted by Nigeria in 2013, risk-based supervision (RBS) is widely regarded as the preferred supervisory approach. Risk-based supervision is a supervisory methodology that is risk-focused and prioritizes the allocation of supervisory resources to the activities of the bank that are the most significant drivers of its risk profile. At the core of the RBS methodology is identifying the significant activities of banks and assessing the inherent risks in them. These inherent risks are evaluated in terms of the quality of the governance and the risk management control functions available in the bank to determine the overall net risk of the bank, which is buffered by the quality of the bank's capital and earnings to arrive at a composite risk rating (see Figure 1).

**Figure 1: Risk matrix used for risk-based supervision of Nigerian banks**

<b>FINANCIAL INSTITUTION RISK MATRIX AS AT .....</b>					
<b>Significant Activities</b>	<b>Materiality</b>	<b>Inherent Risks</b>	<b>Quality of Risk Management</b>	<b>Net Risk</b>	<b>Direction of Risk</b>
Activity 1 Activity 2 Activity 3 Etc...		<ul style="list-style-type: none"> <li>• Credit</li> <li>• Market</li> <li>• Liquidity</li> <li>• Insurance</li> <li>• Legal &amp; Regulatory</li> <li>• Strategic</li> </ul>	<ul style="list-style-type: none"> <li>• Financial Analysis</li> <li>• Compliance</li> <li>• Internal Audit</li> <li>• Risk Management</li> <li>• Senior Management</li> <li>• Board Oversight</li> </ul>		
<b>Overall Net Risk Rating</b>					
<b>Capital</b>		<b>Earnings</b>			
<b>Composite Risk</b>		<b>Direction of Risk</b>		<b>Time Frame</b>	

Source: Supervisory Guide

<sup>20</sup> This Annex was prepared by Esuru Ahaneku of the Nigeria Deposit Insurance Corporation.

The risk-based supervisory approach is of benefit for many reasons. First, it is a logical and publicly documented approach that enhances transparency between supervisory authorities and supervised institutions, thereby reducing ambiguity and limiting the scope for discretionary actions by supervisors. Transparency is a key principle of RBS, ensuring there are no surprises, as the process is characterized by ongoing dialogue and interviews with the supervised entities' board and senior management. Therefore, supervised institutions can reasonably predict their composite risk ratings and take proactive steps to improve on weaknesses. This incentive for effective risk management leads to favorable outcomes in terms of systemic stability.

Second, the RBS approach results in a more efficient allocation of supervisory resources, as the riskiest banks are more intensely and frequently monitored. This alignment of supervisory resources to the risk profile of banks ensures that supervisors have a comprehensive view of the peculiarities of the different banks in their jurisdictions and creates the environment for innovative targeted supervisory action as opposed to a one-size-fits-all approach. This promotes innovation and proactiveness in bank supervision.

Third, the risk focus of RBS ensures the proactive identification of emerging risks and the management of existing risks in the banking system by supervisory authorities. It provides the context for ongoing discussions about risks with banks, which is especially crucial given the speed of technological innovation and the convergence of international financial markets in recent times. These interactions facilitate continuous information gathering during normal and stress periods (for example during the COVID-19 pandemic), enabling rapid supervisory responses, especially at critical periods. Therefore, RBS enhances the supervisory regime by ensuring that regulatory guidelines are relevant and implementable by taking into consideration the actual challenges of the supervised entities.

### [Integrating climate-related risks into risk-based supervision](#)

In Nigeria, climate-related risks are integrated into the risk-based supervision process through two major tools: the internal capital adequacy assessment process (ICAAP) and the implementation of the Nigerian Sustainable Banking Principles. Both tools are principles-based approaches that rely on self-regulation and market discipline to be effective. Climate-related risks fall under the purview of Pillar 2 risks and are assessed during the supervisory review and evaluation of banks' ICAAPs.

The climate-related risk assessment includes risk governance, and the identification, monitoring, control, and reporting of climate-related risks. As with the supervisory review of any other risk, evaluating the adequacy of governance around climate-related risks is key. Supervisors expect the board to set the tone for managing climate-related risk through the formulation of policies and the entrenchment of a viable risk culture in the bank. This high-level involvement is expected to strengthen the mandate of the Chief Risk Officer and the implementation of risk management and controls at operational levels. This is especially critical in cases where climate-related risks are new to the institution's risk universe and there is a need to drive awareness and manage change throughout the organization.

Supervisory review also focuses on the adequacy of the identification of risk drivers. This varies across banks in line with their strategic objectives and the profile of their credit portfolios. Exhaustive identification correlates with the extent of board oversight on climate risk and can indicate the extent of supervisory attention required. Weak identification limits the controls that can be put in place and increases the potential for inadequate risk-based pricing of assets. Poor asset pricing is of concern to supervisory authorities as it weakens the mechanism for the transmission of climate-related risk awareness and associated costs in financial markets, thereby minimizing market discipline. The resulting consequence is that a significant level of climate risk would remain on the books of the financing banks.

In 2012, the Central Bank of Nigeria, in collaboration with the Bankers' Committee (a forum of all bank chief executives, regulators and supervisors) agreed to the adoption of a set of nine principles referred to as the Nigerian Sustainable Banking Principles (NSBPs). Drawn from the United Nations Sustainable Development Goals, the NSBPs aim to ensure that Nigerian banks balance their economic and financial goals with environmental and social considerations to ensure sustainability.

The NSBPs are focused primarily on three sectors: power, agriculture, and oil and gas. Being a set of mutually agreed principles, banks are required to conduct an environmental risk assessment for borrowers in the target sectors and price the risk into the lending. Also, banks are required to report on the NSBPs annually in good faith, as there are no regulatory sanctions for failure to report. The expectation is that the market would discipline defaulters; however, this depends on the maturity of the awareness of climate-related issues in Nigerian financial markets, which is still relatively low even among institutional investors. Hence the incentive for climate-related risk management and reporting is more crucial for banks that operate in international markets, where the risk awareness and maturity are stronger.

The ICAAPs and NSBPs are effective entry points for the assessment of climate-related risks for the Nigerian banking industry. However, the awareness of climate-related risks in financial markets has been accelerated by the recent global context. The culmination of the effects of events such as the Russia-Ukraine war, the U.S.-China trade war, and crashes in commodity markets during the COVID-19 pandemic have resulted in economic declines characterized by inflationary pressures in many countries. The need for sustainable energy, food security and social safety nets is heightened globally. In this context, there is need to expand the frontiers of supervisory action regarding climate-related risks. This can be done by enhancing the integration of climate-related risk management into the routine risk-based supervision in Nigeria, which is an ongoing process.

To achieve this, there is need for high-level involvement, clear policy statements in this regard, setting implementation targets for the industry, and defining implementation timeframes. The current risk matrix used to supervise Nigerian banks focuses on six risks: credit, market, operational, strategic, legal/regulatory, and liquidity risks. Climate-related risk can be embedded into the RBS process by modifying the RBS risk matrix temporarily to include it as a seventh risk over the implementation timeline (see Figure 2).

Given the exposure of most banks to the agricultural sector, the power sector, or the oil and gas sector, including climate-related risk in the matrix would make it top of mind for supervisors and supervised entities. This should ensure that critical risks such as transition risks that can have an impact on the business in the medium to long term receive adequate supervisory attention. This can be supported by ongoing dialogue on transition risks, especially in advocating for market-based deleveraging while keeping the possibility of regulatory forbearance in view. Also, advocacy would create the platform for collaborative partnerships across industries to reduce the risk of contagion to the banking sector.

Furthermore, there is need to develop and implement unambiguous guidelines that specify supervisory expectations in the areas of governance, risk drivers, and the specification of clear metrics for climate-risk measurement. The guidelines would set the supervisory tone and foster engagement on climate-related risk management at high levels in banks. Setting aside regulatory capital for climate-related risks should be the measure of last resort, to be deployed in cases where controls and mitigation measures are inadequate. This is the logical next step to enhance the current supervisory assessment of climate-related risks in Nigerian banks.

**Figure 2: Modified Risk Matrix for Risk-Based Supervision**

FINANCIAL INSTITUTION RISK MATRIX AS AT .....					
Significant Activities	Materiality	Inherent Risks	Quality of Risk Management	Net Risk	Direction of Risk
Activity 1 Activity 2 Activity 3 Etc...		<input type="checkbox"/> Credit <input type="checkbox"/> Market <input type="checkbox"/> Liquidity <input type="checkbox"/> Insurance <input type="checkbox"/> Legal & Regulatory <input type="checkbox"/> Strategic <input type="checkbox"/> <b>Climate-related</b>	<ul style="list-style-type: none"> <li>• Financial Analysis</li> <li>• Compliance</li> <li>• Internal Audit</li> <li>• Risk Management</li> <li>• Senior Management</li> <li>• Board Oversight</li> </ul>		
<b>Overall Net Risk Rating</b>					
<b>Capital</b>		<b>Earnings</b>			
<b>Composite Risk</b>		<b>Direction of Risk</b>		<b>Time Frame</b>	

### Challenges in supervising climate-related risks in Nigeria

Although the Nigerian financial system is ripe for the next step in the supervision of climate-related risks, there is need to address crucial issues that may hamper progress.

#### Ubiquity of climate-related risks

The pervasiveness of climate-related risks is such that their risk factors can be addressed under other primary inherent risk categories, such as credit, market, operational, and reputational risk. Hence, a wide range of climate-related risk factors may be assessed under broader risk types. In recognizing substance over form, supervisory authorities must consider whether the risk assessment is sufficiently broad for climate-related risk management to be effectively addressed. Therefore, to be effective from a supervisory standpoint, it is critical to identify and prioritize the climate-related risk factors to which the local banking industry is most susceptible.

Being a nation focused on agriculture and oil, and having many banks exposed to these sectors, Nigeria's climate-related risk is assessed and reasonably understood in terms of agriculture and oil and gas business financing. The norm is for banks' environmental risk assessments to focus on carbon footprint indicators and portfolios that can attract green financing. However, the next step is to manage critical risks such as transition risks. The prioritization of transition risk by supervisory authorities would ensure that banks develop plans for long-term exposures in high-risk industries, conduct separate assessments, and establish concerted management, especially as they create new loans in high-risk sectors.

### **Capacity building**

To expand the supervisory scope, there is need for capacity-building at both supervisory and industry levels. Capacity-building would range from sensitizations at general levels to encouraging the targeted development of climate-related risk specialists. The trend is for climate-related risk management to be available in regulatory agencies and larger banks that can afford specialist risk management personnel, rather than in smaller banks. However, limited capacity at both general and role-specific levels would hamper the effective implementation of climate-risk management at institution and systemic levels. Also, the quality of climate-risk management skills would impact the depth of assessment and result in unevenness in implementation across the industry.

### **Availability of data**

The availability and quality of climate-risk related data specific to Nigeria is lacking. Information is gathered in silos across institutions with different objectives. Also, there is lack of sufficiently long-term historical information that can be used to develop reliable models and forecasts. This may hamper the development of empirical implementation targets, cause supervisors and banks to revert to qualitative approaches, and limit the depth of decision-making to support the supervisory objectives. Extrapolation and the use of proxy data may be suitable at preliminary stages; ultimately, collaboration and clear definition of data requirements that may be gathered over time would be necessary.

### **Measurement of climate-risk capital**

Closely related to data availability is the issue of measurement. The use of stress tests and internal models for the quantification of climate risk capital require a combination of standardized metrics and logical approaches that align with a bank's strategic objectives. The burden of standardization rests on supervisors, while financial institutions are tasked with internal model development. Given that the indices of climate risk range from highly qualitative to technical quantitative measures, entrenching climate risk measurement systems in banks would require investments in research, changes to management information systems, and additional information requirements from borrowers. The additional costs arising from these adjustments could serve as a deterrent to smaller banks. Hence, a major supervisory challenge would lie in defining the minimum measures as a base across banks regardless of size and complexity.

### **Market attitude**

Existing levels of climate-related risk awareness may prove insufficient to change market attitudes. The adoption of climate risk awareness by financial markets is critical to strengthen the business incentive for climate risk management. The requirement for heavy investments in driving market awareness may skew the cost-benefit unfavorably in the short to medium term. Thus, financial institutions may be unwilling to make those investments. In that case, the burden may rest solely on the supervisory authorities in the public interest. If not well managed, this can reinforce the perception of climate risk management as a box-ticking exercise.

### **Scope of supervisory requirements**

Clear definition of supervisory requirements would ease the integration of climate-related risks into the risk-based supervision process. Supervisory authorities would need to decide how to scale the implementation process without losing effectiveness. Critical decisions will include whether to issue circulars for managing transition risks in key portfolios rather than a full-blown guideline specifying supervisory requirements in terms of climate-risk governance, identification, reporting and controls; the extent of supervisory actions for banks that fail to meet the minimum requirements; setting implementation targets across banks by license type; and defining what constitutes unacceptable implementation.

## Conclusion

The evolution and impact of climate-related risk globally has implications for the Nigerian financial system.

The Basel Committee has undertaken several consultations in relation to integrating climate-related risks and has recently issued its Principles for the Effective Management and Supervision of Climate-Related Risks (2022). Progress should commence towards the full adoption or the adaptation of these principles by national supervisory authorities.

Although climate-related risk awareness is low in Nigeria's financial markets, supervisory authorities have taken early steps to manage them, and expectations are for more supervisory action in that regard in the near future. Given the current global context, the time is ripe for the next step – a more in-depth integration of climate-related risks into risk-based supervision.

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