

# Climate-Related Prudential Risks

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Climate change creates financial risks to the safety and soundness of banks, insurers and the wider financial system, posing a significant threat to the stability of the financial system. Climate-related financial and sustainability risks are already starting to crystallise and have the potential to increase substantially in the future. For instance, physical risks that arise from increasing the severity and frequency of climate and weather-related events may lead to a reduction in asset values, a fall in profitability and an increase in the cost of settling underwriting losses for insurers. On the other hand, adjustment towards a carbon-neutral economy may prompt a reassessment of asset values, a fluctuation in energy prices, and a deterioration of the creditworthiness of borrowers, potentially leading to credit losses. While there is a pressing need for central banks, regulators and financial institutions to accelerate their capacity to assess and manage such financial risks that may result from climate change, academic research will be a key impetus to drive and support the ongoing efforts of the financial sector and the regulatory bodies in building capacity to address these risks.

Keywords: climate change ; climate risk ; risk management ; banking regulation

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## 1. Definition

Climate-related financial risks have started to intensify both at the micro and macro levels over the last decade. At the micro level, these already pose a threat to the safety and soundness of banks, insurers, and the wider financial system. At the macro level, on the other hand, they pose a significant threat to the stability of the financial system. For instance, it is estimated that the total annual economic costs around the world from natural disasters have frequently exceeded the 30-year average of \$140 billion in the last ten years and the number of extreme weather events has increased more than 300%. Climate-related claims burden is expected to increase up to over 100% by 2085 in the insurance sector due to more frequent climate events and sea level rise <sup>[1]</sup>.

## 2. Introduction

This has important implications for the financial system. Given increased instances of extreme weather events and shifts in climate patterns, these risks have the potential to intensify in the foreseeable future. Therefore, addressing climate-related financial risks within the existing regulatory and supervisory frameworks has gained more importance over the last few years, with increasing supervisory expectations for banks in some countries to actively identify and manage their climate-related risks <sup>[2]</sup>.

Parallel to this, academic research has also recently begun focusing on the risks from climate change for banks (see, *inter alia*, <sup>[3][4][5]</sup>) and the transition costs on banks (see, *inter alia*, <sup>[6][7]</sup>). On the other hand, a few recent studies (see, *inter alia*, <sup>[8][9][10]</sup>) have explored the financial stability aspects of climate change.

However, an important gap remains in the existing academic literature in terms of an up-to-date review of the regulatory and supervisory approaches with respect to prudential risks from climate change in the banking sector. It is against this backdrop that this article explores the international and national regulatory and supervisory agendas with respect to managing climate change-related prudential risks in the banking sector in light of the existing theoretical and empirical literature.

## 3. Data, Model, Applications and Influences

### 3.1. Impact of Climate Change Mitigation Policies and Regulatory Expectations on Banks

As climate change has started to transform banking and banking supervision in many countries, it is becoming increasingly fundamental for the banking sector to understand, identify, and address climate-related financial risks. While climate risk drivers may impact banks' credit risk, market risk, and operational risk profiles, evolving regulatory expectations pose operational, strategic, or reputational risks. Furthermore, to assess the potential impact of climate risks on their businesses and borrowers, banks are expected to adopt forward-looking scenario analysis and stress-testing.

Therefore, it has become for important banks to start to incorporate climate change into their risk management frameworks and strategic planning, by assessing their current loan portfolios and banking operations for any physical and transition impacts. Therefore, banks should start to improve the accuracy of information available on climate risks and

developing internal systems to manage and monitor climate risk. In recent years, there is also an expectation from banks to adapt a responsible and sustainable banking model to make societies resilient to environmental shocks. This introduces another layer of challenge and complexity to banks' strategies and risk management.

### 3.1.1. Board-Level Attention to Climate Risks and Integrating them into Internal Governance Frameworks

Banks in the UK are expected to integrate climate change-related financial risks into their internal governance and risk management processes, evidencing this in their risk management policies and processes, management information, and board risk reports. In addition, board-level attention to climate risks is now an important regulatory expectation. The PRA now expects banks' boards to understand and assess the financial risks from climate change that may affect the firm's operations and balance sheet. In particular, banks are expected to address and oversee these risks from within the firm's overall business strategy and risk appetite <sup>[11]</sup>.

Furthermore, the PRA requires banks to embed the consideration of the financial risks from climate change in their governance arrangements. This requires banks to ascertain that their boards have the right information, knowledge, and tools with clear accountability for climate within the board and sub-committees to ensure an orderly transition to a lower-carbon economy. Banks are particularly required to ensure that their boards are supplied with a sufficient amount of high-quality, relevant management information with respect to climate risks to enable them to debate and take decisions in an informed way.

As a result, banks are expected to formally modify enterprise-wide risk appetite statements to acknowledge climate risks, as well as adopting granular climate reporting at the board level <sup>[11]</sup>. Table 1 below provides PRA's examples of strategic actions being taken by banks to address financial risks from climate change.

**Table 1.** Examples of Actions Being Taken by Firms with a Strategic Approach.

| Example Action  | What Should Firms Do?  |
|---|--|
| <b>Deepening understanding of the financial risks from climate change</b> | <ul style="list-style-type: none"> <li>Engage with clients to understand the risks clients face over the longer-term</li> <li>Publicly support enhanced climate-related financial disclosures</li> <li>Consider how to classify and identify assets to enable climate-related risk analysis across portfolios</li> <li>Use scenario analysis and forward-looking data to assess the longer-term financial risks</li> </ul> |
| <b>Agreeing a board-level firm-wide strategic response</b>                | <ul style="list-style-type: none"> <li>Review board-level responsibilities to respond to, and manage, the financial risks from climate change</li> <li>Consider whether the current and future financial impacts from climate change have been factored into the firm's risk appetite</li> </ul>   |
| <b>Considering how decisions today affect future financial risks</b>      | <ul style="list-style-type: none"> <li>Begin to integrate climate-related risk factors into forward-looking assessments</li> <li>Develop a comprehensive, firm-wide framework for climate-related risk management</li> </ul>   |

As can be seen from the table, the PRA considers climate-related financial risks to be sufficiently material to be considered at the board level. It expects banks to allocate responsibility for identifying and managing financial risks from climate change to an existing Senior Management Function(s) under the Senior Managers & Certification Regime (SM&CR), which have been in effect in the UK since 2016.

In the spirit of the SM&CR principles, the PRA expects banks to define clear responsibilities and accountabilities within their internal governance frameworks, ensuring that they have in place clear ownership of the climate change-related financial risks as well as the overall responsibility for setting the strategy, targets, and risk appetite relating to these risks at board level. In practice, this requires senior management to assign the responsibility for the oversight of climate risks to an existing Senior Management Function under the SM&CR. In fact, the findings of the PRA's aforementioned survey have indicated that the majority of the banks in the already satisfy this supervisory expectation <sup>[12]</sup>.

### 3.1.2. Embedding Climate Risks into Strategies and Overall Risk Management Frameworks

In the UK, banks are expected to identify, measure, and manage their credit risk, market risk, and operational exposures to financial risks from climate change through their risk management frameworks, as well as taking these risks into account within their business strategies, internal processes, and risk appetites. In other words, they should embed financial risks from climate change into their risk management frameworks, policies, and procedures. The PRA specifically expects banks to assess the impact of the financial risks from climate change on their overall risk profiles, business models, and long-term profitability. Table 2 provides examples from the PRA's approach to climate-related risk factors in terms of credit, market, and operational risks <sup>[11]</sup>.

**Table 2.** Examples of Climate-related Financial Risks.

| Risk            | Prudential Risk Area   |  |  |
|-----------------|--|--|--|
|                 | Credit risk  | Market risk  | Operational risk   |
| Physical risk   | Increasing flood risk to mortgage portfolio; Declining agricultural output increases default rates   | Severe weather events lead to re-pricing of sovereign debt                         | Severe weather events impact business continuity                 |
| Transition risk | Tightening energy efficiency standards impact property exposures; Stranded assets impair loan portfolios; Disruptive technology leads to auto finance losses | Tightening climate-related policy leads to repricing of securities and derivatives | Changing sentiment on climate issues leads to reputational risks |

As can be seen from the table above, the PRA considers both physical and transitional risks important for banks' prudential regulation. The regulator expects banks under its supervision to take a strategic, holistic, and long-term approach, carefully assessing how climate-related risks may impact their risk profiles. This essentially means that banks are expected to approach climate risk in the same way that they approach any other financial risks that they are exposed to.

Therefore, banks are required to undertake a thorough assessment of the climate change risks in their investment and loan portfolios on an ongoing basis, as well as on their critical outsourcing arrangements. Some examples of actions that banks have been taking so far include the identification and monitoring of mortgage concentrations in high-risk areas, establishing prudent risk limits, and constraining exposures to carbon-intensive industries.

### 3.1.3. Identifying Material Exposures and Disclosure of Key Metrics

In some jurisdictions, banks are now expected to adopt a comprehensive and strategic approach to managing their climate change risks. The PRA, for instance, has already published a Supervisory Statement, providing regulatory guidelines for banks to enhance their approaches to managing their climate-related financial risks <sup>[11]</sup>. As per this supervisory statement, the PRA now explicitly requires banks to identify how financial risks from climate change may affect their business model and to include any material exposures relating to the financial risks from climate change in their ICAAPs. Banks are also explicitly expected to explain how they have determined what constitutes a material exposure in the context of their business models.

On the other hand, public disclosure of the potential climate-related risks and opportunities is now a key regulatory expectation in some countries, as per the TCFD recommendations. Accordingly, regulatory authorities in some jurisdictions have already started to harden their stance on climate change reporting. While there are different means through which this information can be disclosed, the TCFD's recommendation to corporations is to disclose relevant climate-related financial information in their public annual reports.

Given the comprehensive, practical, and flexible nature of the TCFD framework for corporate disclosure of climate-related risks and opportunities, it is expected to gain more popularity over time. In fact, TCFD's most recent status report indicates that the average number of recommended disclosures per company already increased by around 30% between 2016 and 2018. In some G20 countries, disclosure of material climate risks in financial reports has already been introduced as a legal obligation. For instance, in the UK, all listed companies and large asset owners are now expected to report climate risks by 2022 <sup>[13]</sup>.

At the EU level, environment, social, and governance (ESG) disclosure and benchmark regulations were finalized in 2019 with the publication of the ESG disclosure regulation and low-carbon benchmarks regulation, which are the initiatives under the EBA's Sustainable Finance Action Plan. The plan requires banks to actively identify and manage their climate-related risks, and disclose their key metrics, starting from 2021 <sup>[14]</sup>. There is a common understanding that improving their ESG rating is expected to help banks reduce their funding costs. However, consistent measurement of ESG remains a big challenge and a common taxonomy is needed. The EU's Green Taxonomy and the Green Bond Standard are expected to help in this area.

Box 1 provides an indicative list of suggested climate risk disclosures based on TCFD's recommendations and the authors' own suggestions. One of the Task Force's key recommended disclosures relates to the resilience of an organization's strategy to different climate-related scenarios, including a 2 °C or lower scenario. Other disclosures include

a mix of quantitative and qualitative information, such as an account of the firms' integration of climate risks into overall risk management frameworks, corporate targets with respect to climate risks, and metrics such as a firm's own carbon emissions and greenhouse gas metrics.

**Box 1.** Indicative List of Quantitative and Qualitative List of Climate Risk Disclosures for Banks.

- Internal governance and board oversight
- Climate risk related risks and opportunities
- Resilience of bank's business strategy to climate-related scenarios
- Financial planning with respect to climate risks
- Integration into banks' overall risk management framework
- Processes to identify, assess, and manage climate risk disclosures
- Corporate targets with respect to climate risks
- Metrics such as a bank's own carbon emissions and greenhouse gas metrics
- Transition risks in the bank's lending and investment portfolio
- Physical risks to banks assets and investments
- Financing of green growth sectors
- Reputational risks with respect to climate risks
- Compliance with the ESG factors
- Level of lending to high-risk sectors

Source: Compiled from <sup>[11][12][15][16]</sup> by the authors.

**3.1.4. Assessing Capital Impact through Scenario Analysis and Stress Testing**

From a prudential standpoint, climate change requires firms to assess the related financial risks on their capital structure. This means that banks should monitor climate change risks on an ongoing basis to identify and assess potential threats in a timely manner, taking preventive action where necessary to ensure that their capital sources remain adequate to mitigate relevant risks. However, BCBS's aforementioned survey has revealed that the majority of members to the Committee have not factored, or have not yet considered factoring, the mitigation of climate-related risks into the prudential capital frameworks <sup>[17]</sup>.

In the UK, banks are already expected to start preparing to incorporate climate-related risk factors in their risk modeling frameworks to understand the short- and long-term financial risks to their business model and capital adequacy. More specifically, the PRA expects banks to take into account quantitative and qualitative metrics to monitor their exposure to climate change risks and to include any material climate-related financial risks in their ICAAPs. The PRA also expects banks to use stress testing within their ICAAPs to ensure their climate change-related exposures are covered by a commensurate amount of capital. The regulator is not prescriptive. However, it requires banks to develop their own scenarios and to calibrate them based on the general practice and experience in the industry <sup>[11]</sup>.

The broad expectation from banks is to identify the factors that may impair asset values, increase credit risks, and reduce the value of their investments. In terms of physical risk scenarios, banks may consider mortgage lending in risky geographies against severe natural disaster scenarios and related simulations. Regarding transition risk scenarios, on the other hand, they can stress test their lending portfolios to energy, transportation, and industrial sectors, as well testing their trading positions under various stress scenarios. However, it remains a major challenge for banks to identify indicative types of data that they can use in undertaking granular financial analysis. For instance, BCBS's survey has shown that data availability is one of the main operational challenges in assessing climate-related financial risks <sup>[17]</sup>.

The EBA's Action Plan on Sustainable Finance proposes to develop dedicated climate change stress tests. However, specific details have not been published as of early 2020 <sup>[14]</sup>. Specific requirements and variables with respect to stress scenarios are likely to differ depending on the assessment of the national regulators. However, climate-related scenario analysis is expected to be used more actively by banks to identify lending portfolio sensitivity to both physical and transition risks. In the UK, for instance, BoE's plan is to use certain variables with respect to rising temperatures, weather variability, and sea level rise to assess the resilience of the business models of the largest banks, insurers, and the financial system to the physical and transition risks of climate change <sup>[18]</sup>.

Table 3 summarizes the indicative stress testing scenario variables proposed by the BoE as part of its planned climate change stress tests under 2021 Biennial Exploratory Scenario (BES), which will be the first comprehensive assessment of the UK financial system's exposure to climate-related risks.

**Table 3.** Bank of England's Indicative Scenario Variables.

| Climate Risk Variables  |  | Macrofinancial Variables   |   |
|---|--|--|---|
| Physical variables  | Transitional variables   | Macroeconomic variables  | Financial market variables  |
| <ul style="list-style-type: none"> <li>• Global and regional temperature pathways</li> <li>• Frequency and severity of specific climate-related perils in regions with material exposure (including UK flood</li> <li>• subsidence and freeze)</li> <li>• Longevity</li> <li>• Agricultural productivity</li> </ul> | <ul style="list-style-type: none"> <li>• Carbon price pathways</li> <li>• Emissions pathways (aggregate, and decomposed into world regions and sectors)</li> <li>• Commodity and energy prices (including renewables), by fuel type</li> <li>• Energy mix</li> </ul> | <ul style="list-style-type: none"> <li>• Real GDP (aggregate and decomposed by sector)</li> <li>• Unemployment</li> <li>• Inflation</li> <li>• Central bank rates</li> <li>• Corporate profits (aggregate and decomposed by sector)</li> <li>• Household income</li> <li>• Residential and commercial property prices</li> </ul> | <ul style="list-style-type: none"> <li>• Government bond yields for major economies</li> <li>• Corporate bond yields for major economies (investment grade and high yield)</li> <li>• Equity indices</li> <li>• Exchange rates.</li> <li>• Bank Rate</li> </ul> |

As can be seen from the table, the variables include both climate and macrofinancial variables that the BoE proposed under its BES scenarios. The table suggests, in particular, that banks with exposure to clients in energy and transportation sectors, where the transition to a lower-carbon economy may have a substantial impact on banks' business models, should particularly take into account the risk of reduced earnings and business disruption. Given that the BCBS's survey has shown that a large number of members identified difficulties in the mapping of transmission channels of climate-risks as the key operational challenge in assessing climate-related financial risks, the BES scenarios are important for other jurisdictions as well.

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