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Climate Risk Scenario Analysis for the Trading Book

CONTENTS

INTRODUCTION

As climate-related events continue to occur with increasing frequency and severity, environmental risks need to be considered in the trading book given the value of financial instruments that may be affected by environmental factors.

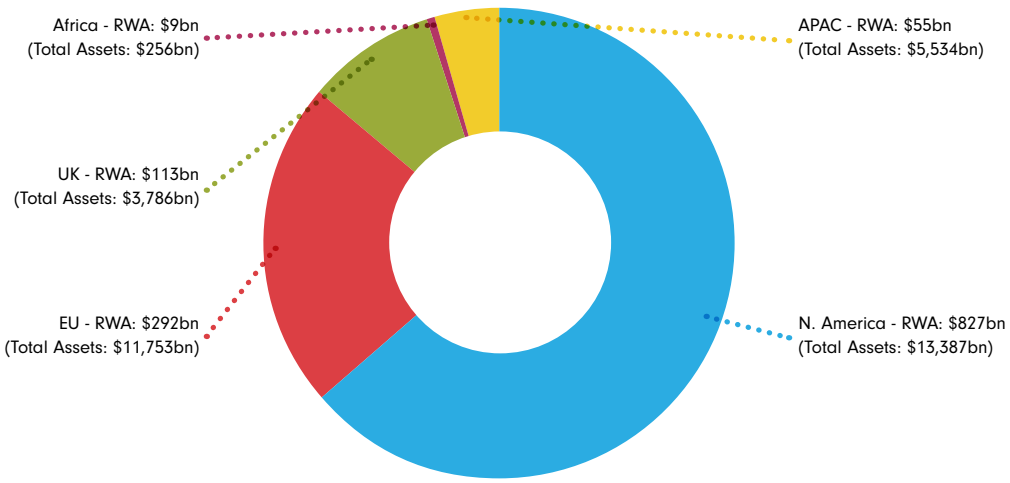
As a result, potential financial risks arising from climate change remain a key area of focus, particularly for investors and regulators. As part of a May 2022 discussion paper[1], the European Banking Authority noted that environmental risks can materialize through market risk and the trading book via multiple channels. For instance, the transition to a low carbon economy can impact commodity markets (eg, fossil fuels), and physical risks emerging from climate change can cause market price fluctuations, such as more frequent and severe extreme weather events causing losses in equities due to the destruction of firms' assets or capacity to produce.

Scenario analysis is a core tool to help inform strategy and business decision-making by assessing the scope and severity of these risks. However, much of the focus from regulators and banks has so far been on credit risk impacts in the banking book. How these risks affect the trading book has received less attention and research, and inclusion in regulatory exploratory exercises has been limited (eg, a carbon price shock in the European Central Bank's (ECB) short-term disorderly transition risk scenario[2]).

In the third quarter of 2022, ISDA and EY conducted a survey of ISDA members to provide a better understanding of the maturity of firms' approaches to climate risk and scenario analysis in the trading book. The survey also sought to explore bank target states and the key challenges affecting their ability to achieve this.

The survey reflects responses from 18 banks[3] that have a global footprint across nine countries and five regions. Fourteen are global systemically important banks and three are domestic systemically important banks. They collectively represent $35 trillion of assets and over $1.3 trillion of trading book risk-weighted assets[4] (see Figure 1).

Figure 1: Total Assets and Estimated Trading Book RWAs



[1] www.eba.europa.eu/eba-launches-discussion-role-environmental-risks-prudential-framework

[2] www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.climate_stress_test_report.20220708~2e3cc0999f.en.pdf

[3] Percentages in charts throughout the document reflect the total number of banks that participated in the survey (18) unless otherwise stated

[4] Trading book risk-weighted assets (RWAs) (market, counterparty credit and credit valuation adjustment) of $1.3 trillion on December 31, 2021 based on available pillar-three disclosure data. However, this is an underestimate as some banks do not break down standardized RWAs

EXECUTIVE SUMMARY

- Trading book climate change scenario analysis is viewed as a 2022/2023 priority for banks, either to develop capabilities or move from tactical to strategic solutions. Bank progress to date has been reactive to regulatory exercises and risk management expectations, and banking book capabilities remain more advanced. At an enterprise level, climate risk and greenhouse gas emissions remain the dominant areas of focus for environmental, social and governance (ESG) scenario analysis.

- Trading book scenario analysis approaches remain in the early stages of development. While banks are confident they have at least partial capabilities to quantify the market risk impacts of defined climate risk scenarios, they are still in the process of developing those capabilities. Less than half of the banks surveyed currently consider physical risks. While the most material transition risks are covered by the majority of banks, technological and societal effects are covered to a lesser extent. Within the trading book, capabilities for market risk are more mature than for counterparty credit risk.

- The assessment of climate risks in the trading book is expected to evolve alongside scenario analysis capabilities. Banks note low materiality as a reason why climate risk scenario analysis for the trading book has received less attention than for the banking book. However, challenges exist for scenario analysis – primarily, the lack of suitable data to support identification of climate risk shocks, selecting and calibrating parameters and mapping climate risk drivers to market risk factors.

- Banks are referencing climate risk frameworks in their internal capital adequacy assessment processes (ICAAPs), although they are not yet incorporating any capital adjustments as a result of their climate risk scenario analysis results. These assessments are not viewed as mature enough to inform capital. However, some banks are using these outputs in initial assessments to determine whether an overlay for climate risk should be considered.

- Climate risk is not viewed as a new type of risk for the trading book, but mostly as a driver of existing risks. Banks continue to place reliance on existing metrics (eg, risk sensitivities) to manage climate-related risks and only 11% have a quantified climate risk appetite. The direction of travel is to leverage existing metrics or develop new metrics that isolate the impacts from high climate-sensitive exposures and sectors. Scenario analysis outcomes are expected to inform the introduction of risk appetite limits (eg, worst loss).

- Climate risk is not typically being hedged through dedicated positions. Instead, banks are relying on their broader portfolio strategies and existing limit and risk management frameworks (eg, concentration limits). The intent to hedge climate risk in the future is low pending the development of climate risk products and the availability of relevant data.

- There is industry appetite for increased regulatory engagement, guidance and exploratory exercises on climate risk scenario assessment for the trading book. The scope of trading book inclusion in regulatory exercises has so far been limited, which has resulted in a variety of approaches to the categorization of portfolios and application of shocks. Banks highlight a need for greater standardization and data availability and see regulators playing a key role.

- Regulatory scenario assessments (eg, the UK Prudential Regulatory Authority's Climate Biennial Exploratory Scenario) have been structured to encourage banks to understand longer-term impacts on current strategy (by applying a static balance sheet), but only one-fifth of respondents identify strategy as a reason to complete scenario analysis for the trading book.

This paper comprises four main topics:

Section 1: Overview of Scenario Capabilities and Participation

This provides an overview of firms' scenario analysis capabilities for climate risk in the trading book and how this compares to their banking book capabilities.

Section 2: Scenario Definition

This section sets out how firms are seeking to use scenario analysis for the trading book and the choices being made across scenario definitions in that context, including reference scenario(s), risk coverage, scenario duration, the use of third parties and scenario expansion.

Section 3: Scenario Execution

This section explores some of the choices that firms have applied when executing scenario analysis for the trading book and some of the challenges that constrain firms' ability to achieve a target state.

Section 4: Risk Management

This section explores firms' approaches to the risk management of climate risk in the trading book, including capital assessments, types of risk, methodologies, risk mitigation and risk appetite setting.

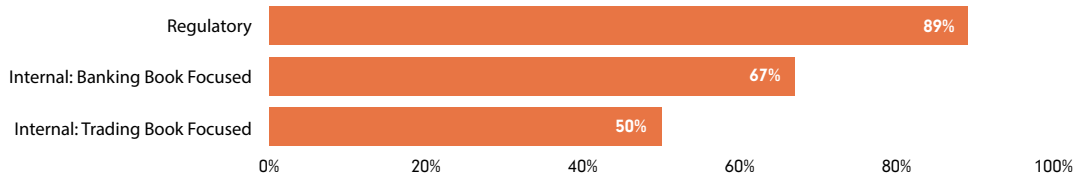
PART 1: OVERVIEW OF SCENARIO CAPABILITIES AND PARTICIPATION

This section explores the maturity of bank capabilities for trading book scenario analysis. To put this into context, the survey covers the extent and development of bank enterprise-wide scenario abilities and coverage of wider ESG factors where applicable.

Nearly all participating banks (89%) have taken part in a regulatory-driven scenario analysis and over two-thirds have conducted internally-driven scenario analysis for their banking book. Regulators have played a key role in accelerating work on climate risk, and their focus on the banking book is reflected in banks' responses that this is an area they have developed more.

Progress on the trading book is at the early stage of development, with half of responding firms having carried out an internal climate scenario analysis for their trading book (see Figure 2).

Figure 2: Type of Climate Risk Analysis Conducted

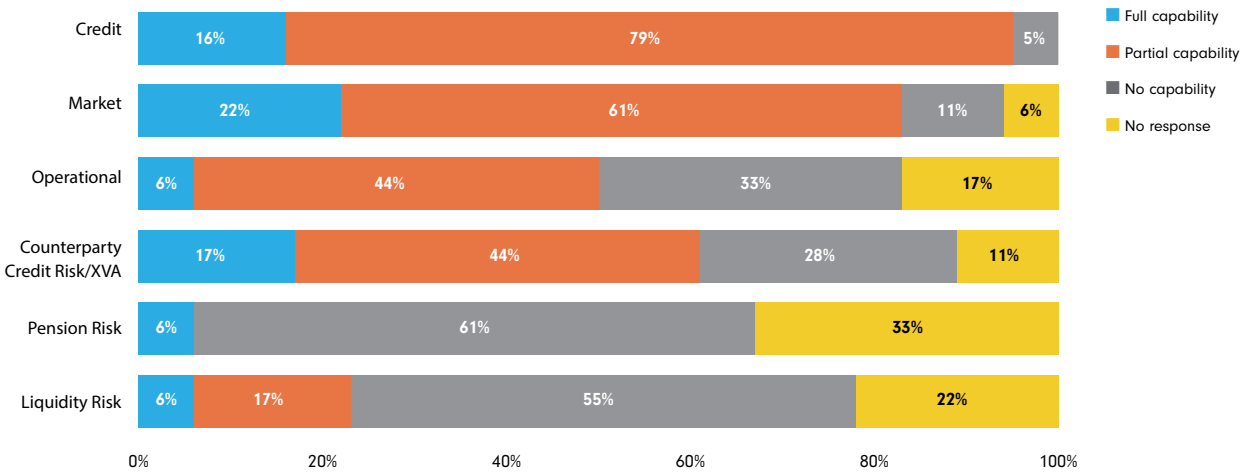


Overall, banks qualify their climate risk scenario analysis capabilities as basic or evolving. Where banks have carried out a climate-driven scenario analysis for the trading book, some have focused on updating existing market risk scenarios and looked to tie them to a climate-risk-driven shock.

In considering scenarios for both the trading and banking books, banks almost exclusively focus on climate change and greenhouse gas emissions, with a few expanding their coverage of ESG topics to capture other dimensions, such as resource depletion, reputational risks due to exposure to conflict regions and data protection.

The level of bank capacity to quantify the effects of defined climate risk scenarios varies by risk type (See Figure 3).

Figure 3: Level of Capability to Quantify the Impact of Defined Climate Risk



Over 80% of banks have at least the partial ability to quantify climate scenario impacts for credit and market risk, with 22% of respondents stating they have full market risk capabilities.

By contrast, 17% of banks have developed the full capability to run climate scenario analysis for counterparty credit risk and XVA, while 44% have partial capability.

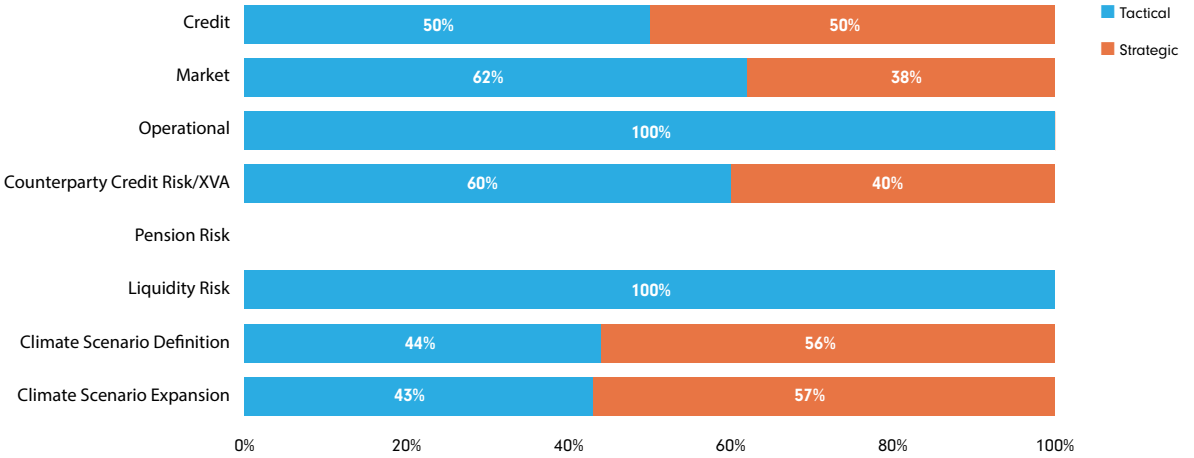
Only 6% of banks are fully able to run scenario analysis for operational risk, while 44% have partial capability. Pension and liquidity risks are not currently well covered, with 6% of banks having full capability.

Among the banks that hold partial or full capabilities, strategic implementation efforts have focused on climate scenario definition (56%) and assessing credit risk (50%). Market risk and scenario expansion were identified as a key focus by 38% and 57%, respectively (see Figure 4).

Most banks have developed internal capabilities, although external vendor solutions are being used for credit risk and to incorporate specific parameters across scenarios (see Figure 5).

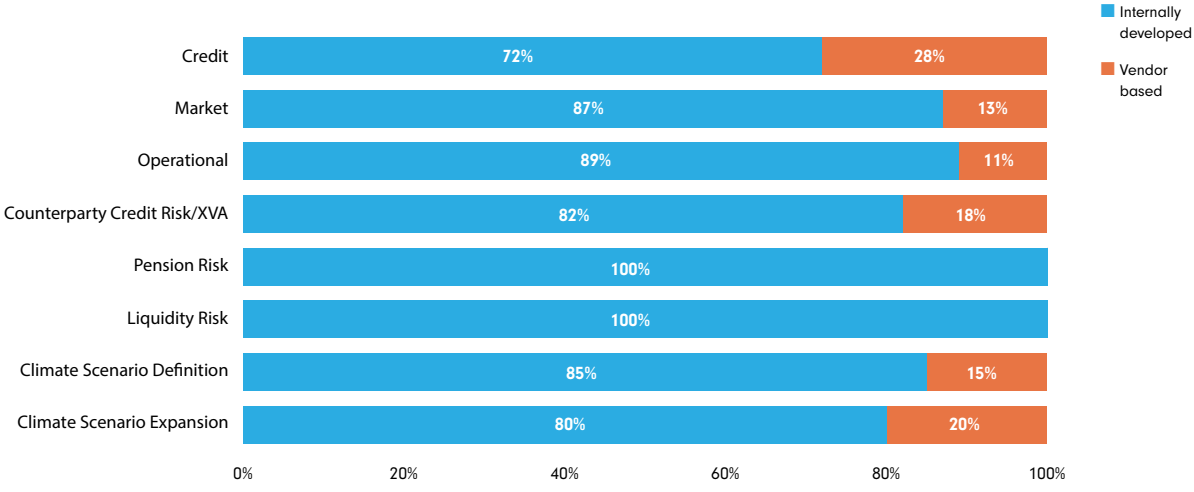
Overall, firms indicate their climate risk scenario analysis capability for credit risk is more advanced than their market risk capability.

Figure 4: Type of Approach



Responses only from those banks that have full or partial capabilities to run scenario analysis

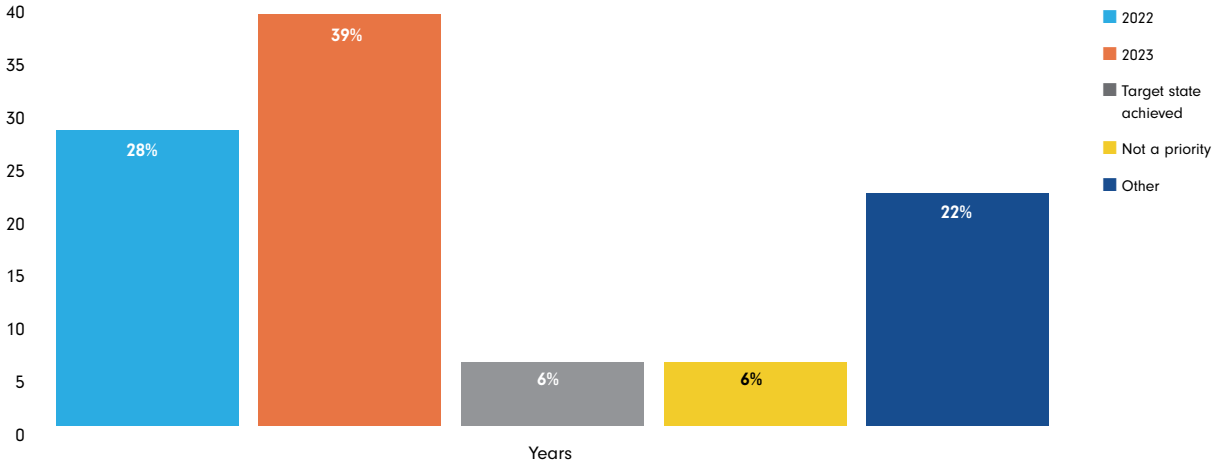
Figure 5: Type of Capability



Responses only from those banks that have full or partial capabilities to run scenario analysis

Most banks have prioritized the development of trading book scenario analysis capabilities in 2022 and 2023 as regulatory exercises continue to progress. Those that specified 'other' are either targeting this as a priority after 2023, are pending implementation or have yet to define a plan (see Figure 6).

Figure 6: Priority for Climate Risk Scenario Assessment for the Trading Book

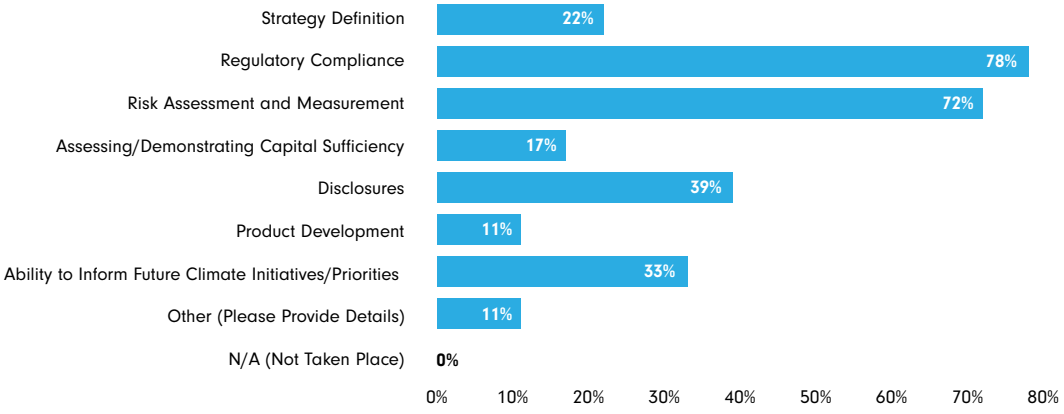


PART 2: SCENARIO DEFINITION

This section explores the purposes of scenario analysis conducted for the trading book and provides insights on how the scenarios are defined. Overall, banks recognize climate change as a new driver of risk and see value in understanding how it may affect their business.

Most banks use scenario analysis for risk assessment and measurement and therefore to achieve regulatory compliance (see Figure 7). Fewer firms currently use assessments for disclosure purposes (39%) or for strategy definition (22%). However, there is potential for scenario analysis to enhance senior management understanding of possible vulnerabilities and how these feed into overall strategy.

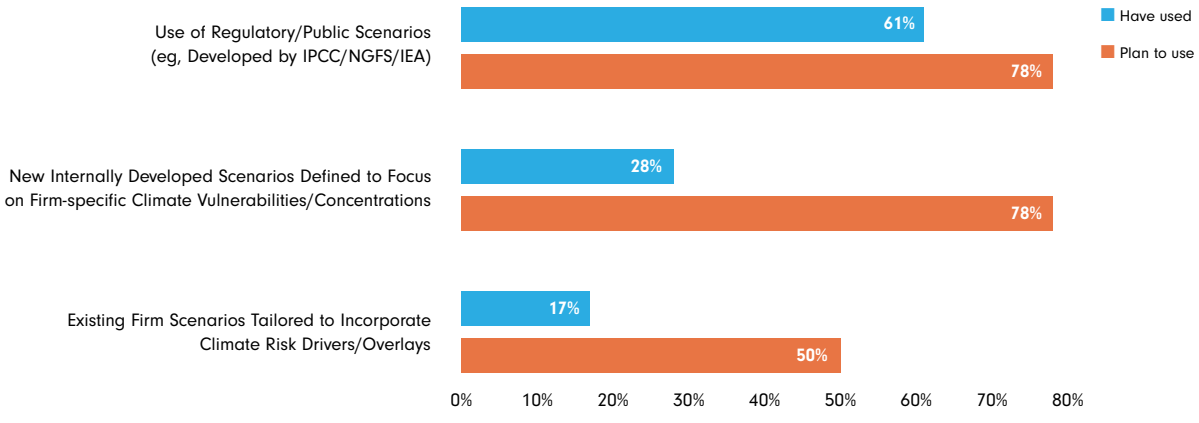
Figure 7: Purpose of Trading Book Climate Risk Scenario Analysis Conducted



Within this context, the survey explores the choices being made on scenario definition. These include the choice of reference scenarios and decisions on risk coverage, scenario duration, scenario expansion and the use of third parties.

The results show that most banks (61%) have leveraged existing regulatory or public scenarios, with a smaller proportion having developed their own scenarios. Looking forward, most banks plan to develop new scenarios to focus on firm-specific climate vulnerabilities and concentrations (see Figure 8).

Figure 8: Choice of Climate Scenario for Trading Book Analysis



The types of scenarios reflect regulatory work to date, with banks almost exclusively using ECB and Network for Greening the Financial System (NGFS) scenarios. The scenarios most referenced for the trading book were the ECB short-term disorderly transition scenarios (50% of participants) and the NGFS delayed transition scenario (25% of respondents).

Only one bank is using some of the more recently published United Nations Environment Program scenarios that cater for shorter-term shocks. Scenarios set out by the International Energy Agency, the Intergovernmental Panel on Climate Change, the Climate Action Tracker and Representative Concentration Pathways were referenced rarely or not at all.

Irrespective of the scenarios used, a range of scenario expansions and overlays are applied to reference scenarios. These include the use of expert judgement, benchmarking, historical analysis to broaden scenario scope, internal expansion and addition of parameters to the scenarios, and adapting the scenario for a short-term trading horizon by accelerating some of the impacts.

Scenario Duration and Liquidity Horizon

A common theme across the assumptions and scenario expansion that banks used in their trading book analysis was the use of very short-term or instantaneous shocks.

Almost all banks (83%) agreed that the duration of a climate scenario for the trading book should be short term/point of time. However, there were different views on the most appropriate timeline. Respondents suggested the application of instantaneous shocks or the use of a one-week time horizon or longer (eg, three months) to align to existing liquidity horizon assumptions for different product types. One bank highlighted the potential benefit of accelerating some of the longer-term impacts within a one-year time horizon as a means of capturing potential significant climate effects on bank strategy. Another described efforts to align market risk and longer-term scenarios to maintain consistency.

Treatment of duration and liquidity horizon remains an area of development. When asked whether they will amend liquidity horizon assumptions for a climate risk scenario versus assumptions within the current market risk scenario framework, banks were split, with marginally more noting they do not plan to amend liquidity horizons.

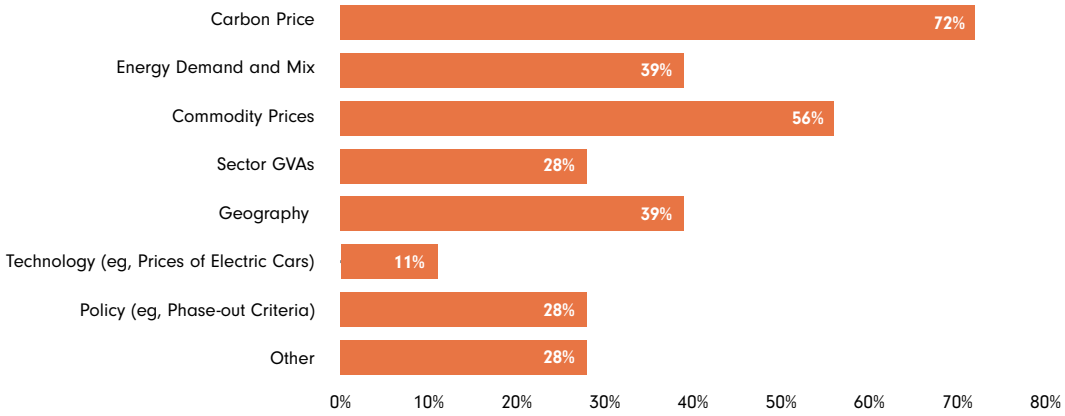
Scenario Coverage and Climate Risk Materiality

The survey also explores how coverage is defined for trading book scenario analysis and which climate risks are deemed most material.

The scope of assets included in trading book climate risk analysis varies by bank. The most commonly listed assets are credit and equities. Only 44% listed commodities cash and derivatives products as currently included, but this rose to 72% when firms were asked about their aspirations for scope. A small number of banks stated the whole trading book is in scope.

Transition risk is included in most banks' trading book scenario analysis (75%), although coverage of physical risk is much lower (40%). For transition risks, shocks to carbon and commodity prices are the most commonly considered climate drivers in scenarios (approximately 70% of firms). Almost half of firms are considering counterparty failure and 56% are applying multi-factor shocks across market segments. These responses align closely with whether a bank has used the ECB short-term scenario (which focuses on a carbon price shock).

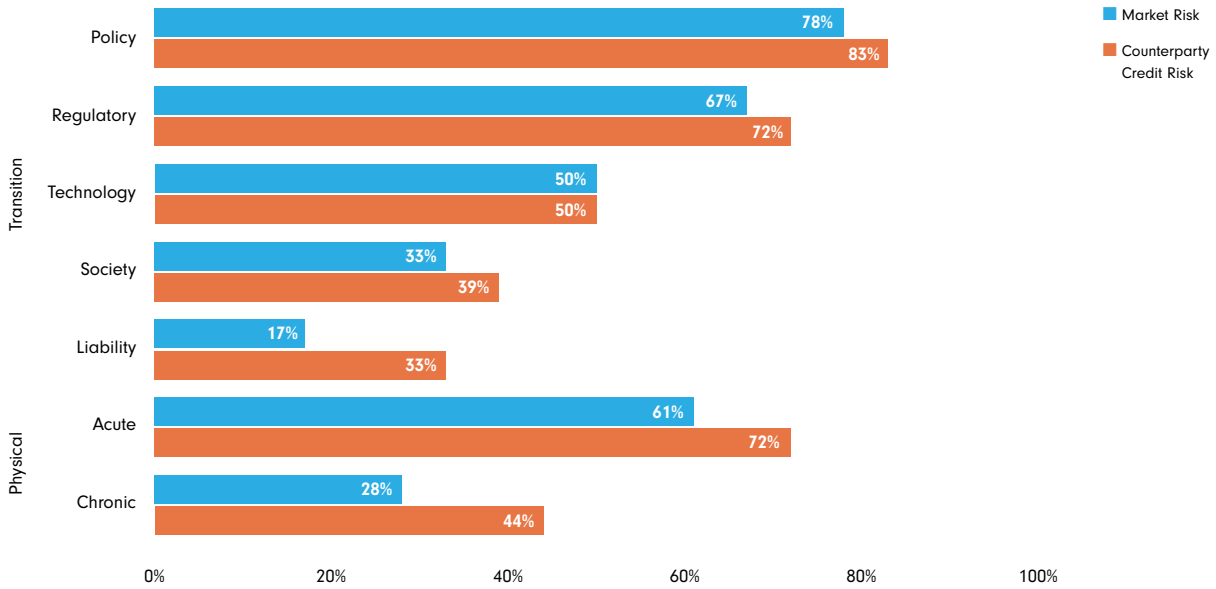
Figure 9: Scenario Parameters Included in Trading Book Scenario Analysis



Some banks stated they expect acute physical risks to potentially have material impacts on the trading book, but this is not currently fully addressed in either regulatory or bank-specific approaches. This is reflected in the current scope of assets covered by scenario analysis, with equities and credit (in scope of the ECB exercise) the main focus to date.

Figure 10 highlights the risks banks deem most material for market and counterparty credit risk. Policy and regulatory issues are the most commonly considered material transition risks (over 80% of banks). Acute risk (eg, floods and hurricanes) is the most material physical risk for market and counterparty risk (over 60%). For counterparty credit risk, policy (over 80%) and regulatory risks (over 70%) are identified as the most material transition risks, while acute risk is the most significant physical risk (over 70%).

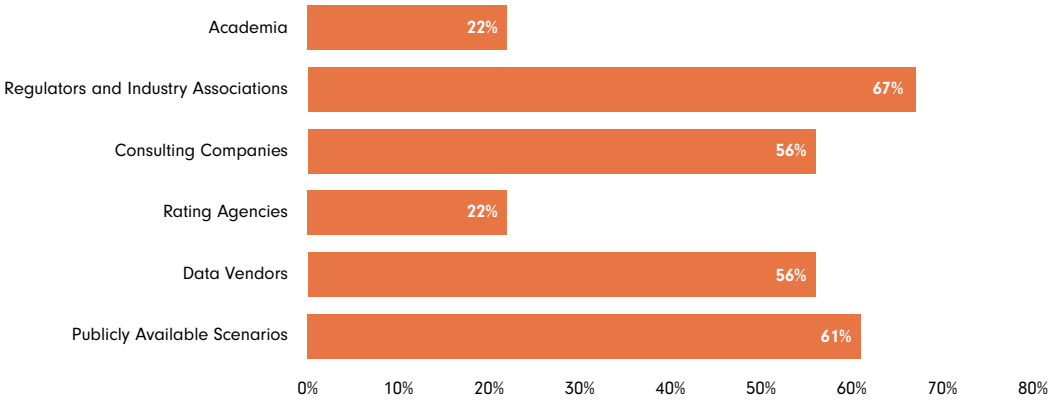
Figure 10: Climate Risks Deemed Material for Market Risk and Counterparty Credit Risk



External Engagement and Third-party Support

Respondents identified regulators, industry associations and providers of publicly available scenarios as the most common external organizations they engage with for climate risk scenario analysis (see Figure 11).

Figure 11: External Organizations Supporting on Trading Book Climate Risk Scenario Analysis



Firms that have engaged with external third parties have typically done so for reasons such as scenario design, peer analysis and other general data and modeling issues. Those that engaged for methodology support highlighted the following areas:

- Ability to convert broad-based scenarios into actionable stress tests;
- Exploring scenario methodologies with external providers that could be easily integrated into banks' own frameworks; and
- Exploring external scenario modeling tools.

PART 3: SCENARIO EXECUTION

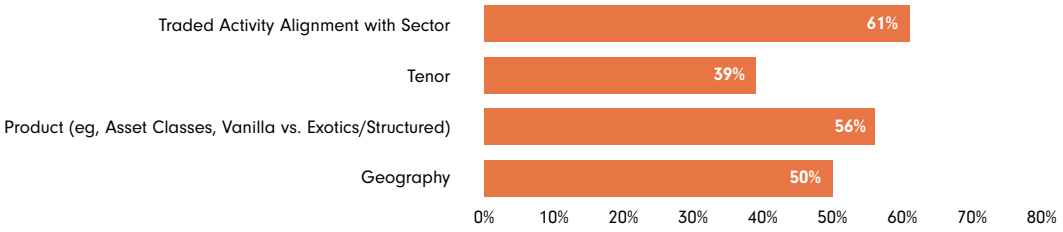
This section explores some of the choices that firms have applied when executing scenario assessments for the trading book, and some of the challenges that constrain their ability to achieve their target state.

In completing scenario analysis, banks use either a top-down or a hybrid of top-down and bottom-up approaches to define trading book climate risk scenarios, with only 6% using a bottom-up-only approach. Most banks conducted purely quantitative or a hybrid of quantitative and qualitative analysis.

No banks are currently integrating climate risk directly into their valuation models. Some banks noted that climate risk is already reflected in other market parameters, that it is currently only relevant to niche products, and that work is ongoing to establish whether there is evidence of observable climate risk factors and available market data.

In carrying out scenario analysis, most banks consider a number of dimensions, with sector the most common to assess the impact of climate scenarios (see Figure 12).

Figure 12: Categorization of Trading Book for Climate Risk Scenario Analysis



Banks described the improvements to their current practices and priorities for achieving a target state for carrying out climate scenario analysis for the trading book. Responses show that banks are seeking to increase the quality of scenario analysis methodologies, and examples include:

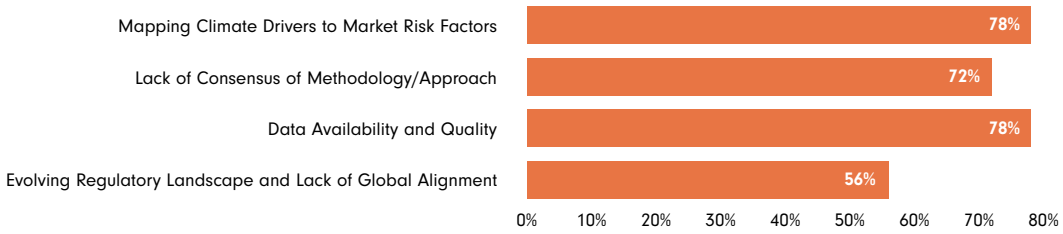
- Improving capabilities for sector analysis and the ability to segment the portfolio by industry (eg, NACE[5] categorization);
- Improving data quality – including data required to support sector categorization;
- Enhancing the breadth of scenario coverage (eg, beyond carbon shocks) to incorporate additional ESG stress factors; and
- Advancing capabilities to assess physical risk.

[5] Nomenclature Statistique des Activités Économiques dans la Communauté Européenne (statistical classification of economic activities in the European Community), https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Statistical_classification_of_economic_activities_in_the_European_Community_(NACE)

Challenges in Achieving a Target State

The survey explores the key challenges banks have identified in developing and executing climate risk scenario analysis for the trading book. These include mapping climate drivers to market risk factors, data availability and quality and lack of consensus on methodology and approach (see Figure 13).

Figure 13: Challenges in Developing a Climate Risk Scenario Analysis for the Trading Book



When viewed in combination with wider survey inputs, these challenges reflect two key themes: trading book scenario analysis execution choices and data availability and quality.

1. **Trading book scenario analysis execution choices:** A majority of respondents (78%) acknowledged challenges in identifying and defining climate risk shocks, as well as mapping climate drivers to market risk factors. A lack of consensus on methodology and approach was identified by 72% of respondents, while 67% highlighted challenges in selecting and calibrating parameters.

   As a result of these challenges, banks see the potential benefits of engaging with regulators to help define and run an exploratory scenario for the trading book. This would allow the ability to compare outputs and identify emerging standards, as well as provide a valuable learning exercise for both the industry and regulators.

2. **Data availability and quality:** A majority of banks (78%) identified data availability and quality as a key challenge. This includes access to consistent, granular and reliable data to assess climate risk, including information from firm disclosures.

   To address this issue, respondents expressed a need for greater data availability from data providers and further data standardization from regulators and international bodies (eg, the Task Force on Climate-Related Financial Disclosures (TCFD)). Data standards across sectors, industries, firms and asset locations are identified as necessary to help achieve greater consistency and reliability.

   In particular, standardization of climate-related information and definitions is considered important for promoting clarity and consistency in scenario analysis. This might include requiring notional exposures and fair values in existing disclosures to be disaggregated by both asset classes and economic sectors using NACE values as a reference.

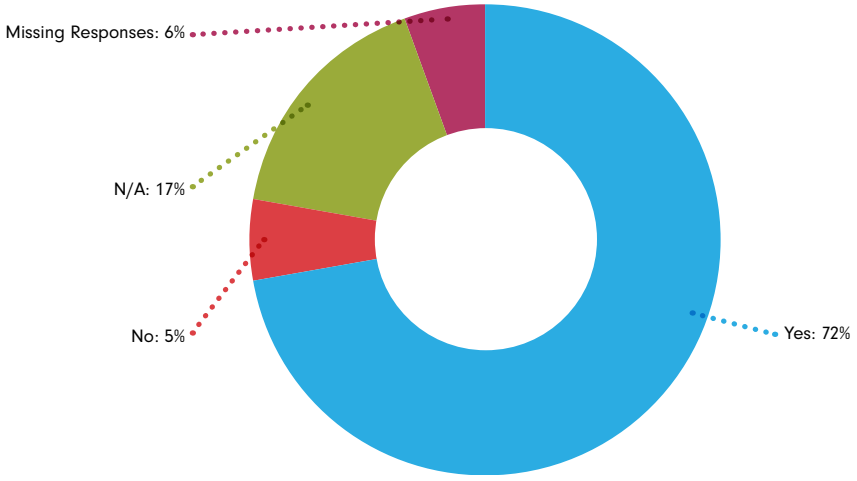
PART 4: RISK MANAGEMENT

This section explores current risk practices and plans for incorporating climate risk into bank risk management frameworks, ICAAPs and risk mitigation approaches.

Risk Framework Embedding

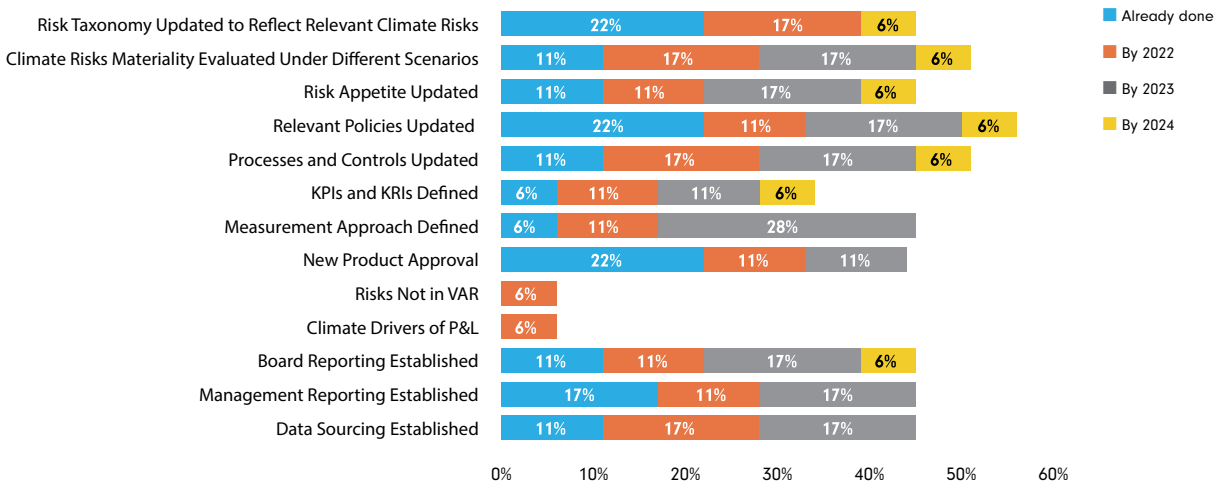
A majority of banks (72%) agree that climate risk scenario analysis should be included in trading book risk management processes and frameworks. Others plan to incorporate it when understanding of climate risk in their trading book is more mature. Specific details such as metrics, risk factors and methodologies are yet to be finalized.

Figure 14: Arguments for the Inclusion of Climate Risk Scenarios into Trading Book Risk Management Processes



If not implemented already, firms plan to incorporate climate risk into their broader market and counterparty credit risk management frameworks during 2022–2024. Evaluation of climate risk materiality under different scenarios will be prioritized, followed by updating relevant policies and associated processes and controls. Overall, climate risk is not viewed as a new type of risk for the trading book, but primarily as a driver of risk.

Figure 15: Bank Plans to Incorporate Climate Risks in Market Risk Management Frameworks



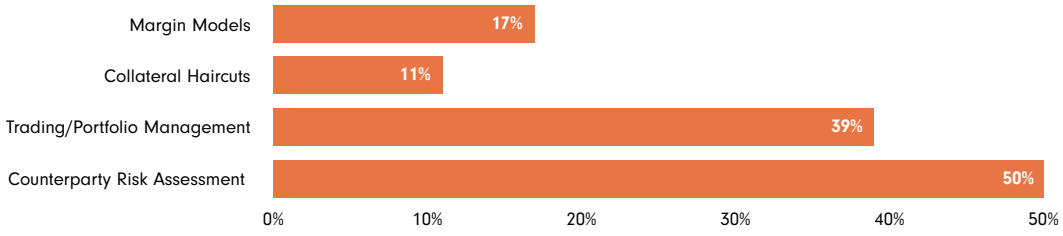
Around half of banks provided details on how climate risks have been incorporated, or will be incorporated, into their market risk frameworks. Figure 15 shows the steps banks plan to take by the end of 2022: 39% expect to have updated their risk taxonomy to reflect relevant climate risks, 33% plan to update relevant policies and 33% expect to have embedded climate risks into their new product approval processes. It is a similar picture for counterparty credit risk, albeit slightly less progressed.

Methodologies and Metrics

When it comes to methodologies and metrics, 88% of banks have not developed specific climate-related risk factors for market risk management purposes.

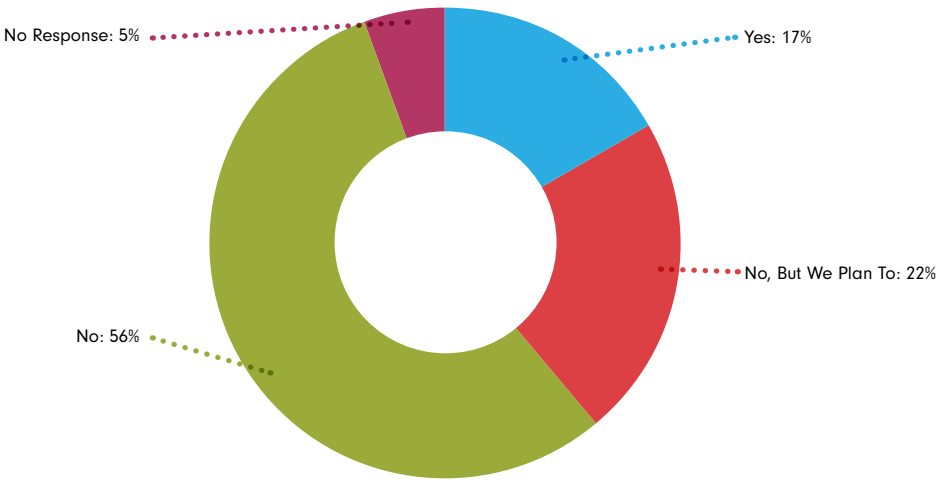
Where banks have identified a need to adapt risk management frameworks for climate risk in the trading book, counterparty risk assessment and trading and portfolio management strategies are the most common areas highlighted (see Figure 16).

Figure 16: Areas for Adapting the Risk Management Framework to Address Climate-related Financial Risk in the Trading Book



Less than half of respondents (39%) have developed or are planning to develop a specific metric to capture climate risk in the trading book (see Figure 17). Others refer to the use of existing metrics to manage climate-related risks instead – for example, using scenario analysis to isolate those exposures relevant for climate risk (eg, high-risk countries and industries).

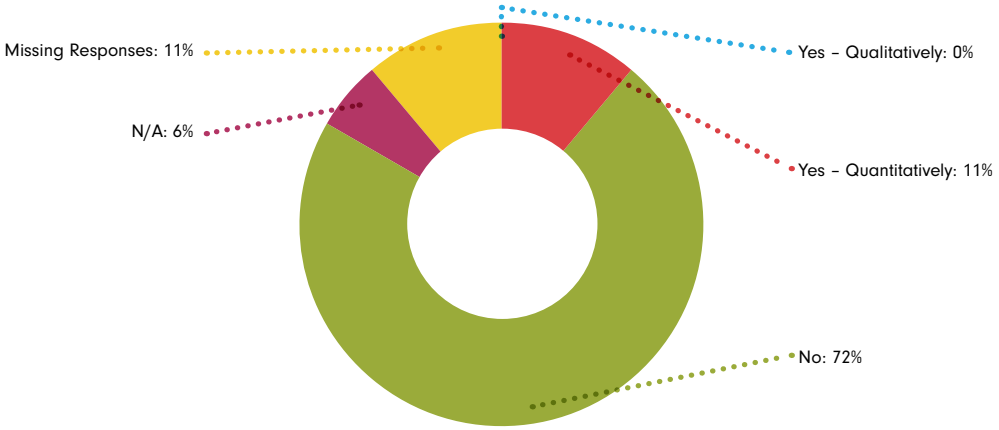
Figure 17: Has the Bank Developed a Specific Metric to Capture Climate Risk in the Trading Book?



Risk Appetite, Mitigation and Controls

Risk appetite: Only 11% of banks have defined a quantitative risk appetite for climate risk in the trading book, although a number of firms stated they will explore this in the future. Others noted that exposures are captured in existing frameworks and stress-test results will be incorporated into overall limit monitoring (see Figure 18).

Figure 18: Has your Firm Defined a Risk Appetite for Climate Risks in the Trading Book?



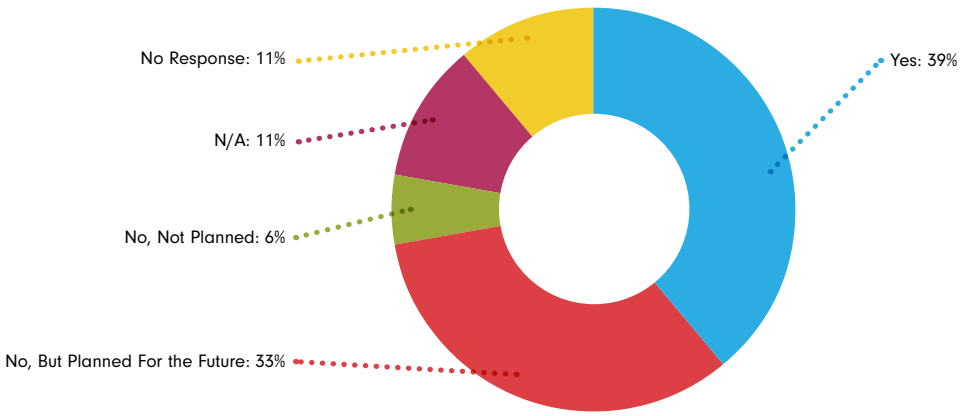
Key performance indicators (KPIs)/key risk indicators (KRIs): Most banks (83%) have not yet developed climate market risk methodologies to quantify KPIs and KRIs for limit monitoring and capital calculations, although this will be explored in the future as climate risk capabilities evolve.

Risk mitigation: Banks typically do not hold any derivatives specifically for the purpose of hedging climate and environmental risks. Climate risk exposures are currently mitigated through existing limits and risk management frameworks (eg, concentration limits on single names and counterparty limits). Less than a quarter of respondents (22%) intend to hedge climate risks, while 60% do not intend to, pending development of climate risk products and availability of relevant data.

Capital and ICAAP Inclusion

A majority of banks (72%) include or plan to include an assessment of climate risk impact on the trading book in their ICAAP (see Figure 19). Where banks do not, this is typically a materiality-based exclusion.

Figure 19: Climate Risks ICAAP Inclusion



Some banks are using scenario assessment outputs to determine whether an overlay for climate risk should be considered for capital. However, banks overall note that approaches still need to evolve further to inform capital.

NEXT STEPS

Based on the results of the survey, there are several likely next steps:

1. Most banks are completing climate risk scenario analysis and intend to develop their capability this year and into 2023, with particular focus on the trading book. This is aligned with efforts by global regulators, such as the ECB, to embed climate risk and wider environmental risks into broader risk management.

2. The survey identifies key challenges relating to data, methodology and standardization – for example, the ability to translate acute physical risks (such as floods and hurricanes) into scenario parameters. The survey highlights an appetite for joint initiatives to address this, including with regulators – for example, via a targeted trading book exploratory scenario exercise that builds on recently completed initiatives that have helped accelerate progress for the non-trading book.

3. There is substantial regulatory focus on climate risk and capital treatment in risk management frameworks. In June 2022, the Basel Committee on Banking Supervision published *Principles for the Effective Management of Climate-related Financial Risks*[6], which covers expectations for banks and regulators, including issues to consider when assessing capital accuracy for market risk management. A number of regulators are also developing approaches aligned with these principles. These include:

    - An ECB report on its thematic review of climate-related and environmental risk, due to be published in October 2022;
    - A report by the Bank of England on the use of capital and how future scenario analysis exercises might guide further work, expected in the fourth quarter of 2022;
    - A pilot micro-prudential scenario analysis exercise by the US Federal Reserve to assess climate-related financial risks facing lenders, expected in 2023. Associated communications add that the Federal Reserve does not intend to take climate risk into capital planning;
    - A possible follow up to the Hong Kong Monetary Authority's 2021 pilot climate risk stress test in 2023.

4. Broader market initiatives on disclosure (eg, by the TCFD) could help drive greater availability and consistency of data. However, further work is required on definitions and standards – for example, reporting against the EU taxonomy and the treatment of derivatives in various sustainable finance disclosures. Green taxonomy initiatives in Europe, the UK and a number of Asian countries continue to evolve.

5. The ongoing development of sustainable finance products and sustainability-linked derivatives has the potential to provide additional active risk mitigation tools over time.

[6] www.bis.org/bcbs/publ/d532.htm

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