THE FUTURE OF TRADING BOOKS: INCORPORATING CLIMATE RISK IN PRUDENTIAL FRAMEWORKS

Introduction to the Trading Book and Climate Risk Regulation

On October 2022, the International Swaps and Derivatives Association (ISDA) released a report titled "Climate Risk Scenario Analysis for the Trading Book", which provides guidance for banks and financial institutions on how to assess climate risk in their trading books. The trading book refers to the portfolio of financial instruments that banks hold for trading purposes.

Over the past few years, climate risk has become an increasingly important consideration for financial institutions and regulators. Climate risks can arise from physical impacts of natural disasters and extreme weather events, as well as transition risks from the move to a low-carbon economy, changes in regulations, and shifts in consumer preferences.

Since 2017, the Financial Stability Board's Task Force on Climate-Related Financial Disclosures (TCFD) has been providing guidance to address the impact of climate-related risks on the global financial system. There has been a more than fivefold increase in the number of companies adhering to TCFD disclosures since 2017, as regulatory bodies shift their attention to how businesses manage climate-related risks. The TCFD recommendations are divided into four sections:

In addition, EU regulatory agencies have considered the impact of climate risk on the market risk prudential framework. The discussion paper (EBA, May 2022), states that climate risk materializes through multiple channels under two main buckets:

Physical Risk	Transitional Risk
A. Price fluctuations due to extreme climate B. Counterparty Credit Risk C. Credit Valuation Adjustments	A. Trading of fossil fuel commodity instruments

In the paper, the EBA questioned whether some parts of existing regulations need to be challenged, which could lead to potential changes.

The paper notes that counterparty credit risk (CCR) and credit valuation adjustments (CVA) are similar to concepts in current risk frameworks. Climate-related adjustments could be made to fit areas such as CVA. The effect to commodity instruments is in the early stages and will depend on the transition to a low-carbon economy.

Therefore, the main risk worth examining in this paper is arguably the fluctuation in prices. Due to the absence of sufficient historical data, there is uncertainty surrounding the extent to which environmental risks can intensify and/or explain market shocks during stressed periods.

Overall, the TCFD and EBA stress the need to integrate climate risks into an entity's risk management framework, tailored to their unique circumstances. This implies, as suggested by the ISDA report, that banks should gradually incorporate climate risk scenario analysis in their frameworks as forward-looking methodologies to cope with climate risk in their trading books.

Climate Risk Scenario Analysis Today

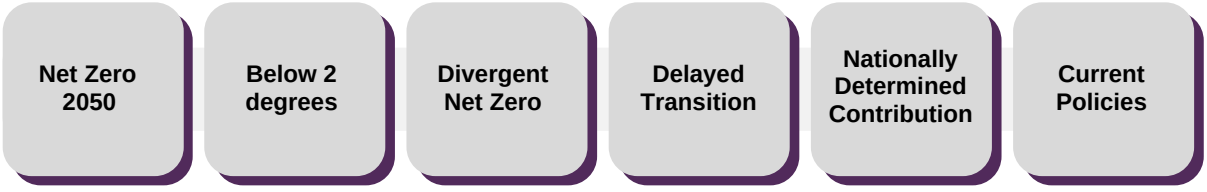
Climate Risk Scenario Analysis is defined as the process of modelling potential future scenarios based on different climate outcomes and their financial implications. Today, financial institutions assess the potential impact of climate change relying on scenarios from the ECB short-term disorderly transition or the Network for Greening the Financial System (NGFS).

For example, the ECB draws short, and a long-term scenario as illustrated below:

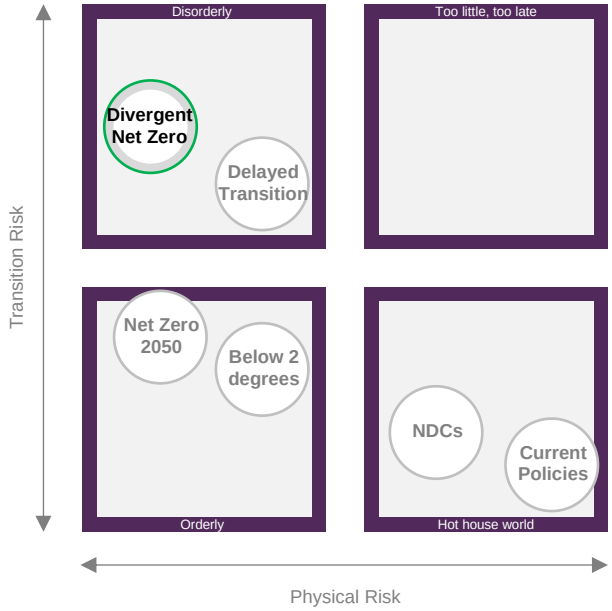
Scenarios Horizon	10 to 30 years	1 to 5 years
Transition Risk	Represented by shadow carbon price (NGFS)	Specific climate policies or events may be modelled in greater detail
Physical Risk	Chronic physical risk	Mainly physical risk, often with a focus on specific extreme event
Objectives	Assessing trade-offs between climate risk policies & inaction Understanding structural changes	Assessing the impact of one-off, adverse events focusing on specific details

The macroprudential challenge of climate change (europa.eu) (p46).

Similarly, the NGFS has designed six potential scenarios:



Based on the current policy/environmental outcome, each scenario will carry different implications as a function of physical and transitional risk.



https://www.ngfs.net/ngfs-scenarios-portal/explore

The higher the transitional risk, the higher the cost to implement new policies, the lower the transitional risk, the higher the physical risks. It is important that banks understand the different repercussions of those developments to their business models and gradually implement processes to hedge risks arising from those scenarios.

Government authorities are actively developing up-to-date, forward-looking scenarios to address climate risk, but the integration of **climate change scenario analysis into the trading book** is still in its early stages. As regulations become more stringent, financial institutions will likely seek to align their investments with Environmental, Social, and Governance (ESG) goals and comply with climate-related financial disclosure requirements, such as those of the TCFD. Banks should strive for constant assessment of their frameworks to best comply with climate risk and the ongoing proposed scenarios from governments and regulatory bodies. It is important to breakdown the potential implications that will affect prudential market risk frameworks and more specifically trading books.

Climate Risk and Capital Requirements in the Trading Book

The Fundamental Review of the Trading Book (FRTB) is a framework designed by the Basel Committee on Banking Supervision that sets out the rules to quantify the amount of regulatory capital that banks must hold against Market Risk exposures. Under the FRTB framework, banks can calculate their capital requirements under the Standardized Approach (SA) or the Internal Model Approach (IMA).

We shall now explore how these settings will be affected by the mounting interest around climate risk. Our analysis further explores ideas raised in the EBA's discussion paper 'Role of Environmental Risks in Prudential Framework' (2022).

The Standardised Approach (SA)

The standardised approach uses pre-determined risk weights for different types of assets. This approach is composed of three main pillars described below.

Blocks	Standardised Approach
Sensitivity-Based Method	SbM uses three risk measures, namely delta, vega, and curvature, along with predetermined correlation parameters, to compute capital requirements
Default Risk Charge	The DRC model is designed to account for the risk of sudden price changes in financial instruments that are exposed to credit risk. This model is calibrated based on how credit risk is treated in the banking book.
Residual Risk Add-On	The RRAO serves as a fee implemented to account for risks that are not taken into consideration by the SbM and DRC.

Implications and Potential Changes

The SbM risk weight is calibrated based on historical data, therefore the poor data quality in relation to climate risk may fail to account for the effect of climate risk. Forward-looking projections and climate change scenario analysis could incorporate that risk, but this would differ substantially from the current proposed framework.

Another solution would be to add a separate block to better reflect climate risk in SbM. The attribution of specific risk weight to commodity instruments would result in more accurate prices volatility. However, not all regulators are currently applying the same measures. In the Advanced Standardized Approach (ASA), a new standardized approach, the PRA with Basel 3.1 applies a 60% RW to carbon certificates classified under the commodity bucket. On the other hand, within the CRR3 proposal, there is a provision aimed at reducing the risk weight, to 40%, assigned to commodity delta risk factors associated with carbon emissions trading within the EU.

Research by ISDA argued that the RW should be around 37% based on historical data from the EU Emissions Trading System (ETS). The UK regulator is currently taking a more conservative approach compared to the EU. UK entities should carefully evaluate the capital repercussions affecting their models.

Within the scope of the DRC model, further add-ons of capital could be imposed to products with underlying exposure to climate risk or wide-ranging ESG risks. Such products could be options with relevant payoffs dependent on climate-related events. Furthermore, the SA approach does not allow for the same level of flexibility in incorporating bank-specific risk factors and may not be as accurate in

assessing climate risk. Banks should carefully consider which approach is most appropriate for their trading book and risk profile.

The Internal Model Approach (IMA):

This approach allows banks to use their own risk models to calculate their capital requirements, rather than relying on standardized rules. The IMA approach to calculate capital requirements can be broken down as follows:

Blocks	Internal Model Approach
Calculation of Expected Shortfall	ES is a model to calculate the risk of losses in firms' trading positions due to movements in market variables (referred to as risk factors). Value at Risk (VaR) and Stressed value at Risk (SVaR) are the two models used in the existing framework. Banks are allowed to customise their expected shortfall (ES) model, but they must meet certain minimum standards.
Calculation of capital for Modellable Risk Factors	Trading desks that are authorised to employ the IMA must incorporate all risk factors that are considered to be modellable in the bank's internal, enterprise-wise ES model.
Calculation for capital requirements for Non-modellable Risk Factors	The capital requirements for NMRFs must be assessed using a stress scenario that is at least as cautious as the ES calibration utilised for modelled risks, with a loss calibrated to a 97.5% confidence threshold over a stress period. The bank is responsible for determining a uniform 12-month period of stress for all NMRFs in the same risk class when determining the stress period.
Calculation of Default Risk Capital Requirements	Banks should have a different model to quantify the default risk of trading book positions.

This approach allows banks to use their own risk models to calculate their capital requirements, rather than relying on standardized rules. To use the IMA approach, banks must meet certain requirements related to model validation, data quality, and risk management.

Implications and Potential Changes

Physical impacts, the transition to a low-carbon economy or asset pricing, are all risk factors related to the bigger bucket of climate risk. However, the instability of weather conditions, the uncertainty in future regulations, technology limitations and the inability to quantify shifts of data points to produce sensitivities, makes climate risk difficult to include in the VaR models.

Adjusting historical data to account for environmental risks may be an option for banks, but it may have negative effects on the accuracy of capturing financial risks unrelated to environmental factors and could result in double-counting.

Allowing for environmental risks outside the current framework may be a more practical approach because certain banks already account for event risks that cannot be captured solely by historical data in their internal models. Limited studies show that climate risk impacts market risk factors such as asset pricing. A study shows that there is a positive correlation between carbon emission intensity and stock returns. (Bolton et al 2020) or that green stocks are more liquid (Bonagura et al., 2012). In fact, banks are currently required to test correlation scenarios beyond those observed in the stress period (Article 46 3 b EBA final draft RTS on “assessment methodology of market risk”) and this will likely continue under FRTB. To account for climate risk, banks may incorporate an add-on to the risk measure resulting from their internal model.

Overall, the IMA approach is particularly important for assessing climate risk in the trading book as it allows banks to incorporate their own models and assumptions about climate risk. However, the models used must be able to capture the full range of climate risks, including physical and transition risks, which may not be realistic under current framework market risk framework.

What can banks do going forward?

Next Steps

There are several tools available to banks and financial institutions for measuring climate risk in the trading book. One such tool is the MSCI climate value at risk (VaR) model, which estimates the potential losses that could occur due to climate-related events. The MSCI climate VaR model uses a variety of climate scenarios to estimate the impact of climate risk on different asset classes, including equities, fixed income, and real estate.

In addition to using external models like the MSCI climate VaR model, banks can also develop their own internal models for assessing climate risk. This could be performed by running hypothetical portfolios. These models should incorporate both physical and transition risks and consider a range of different scenarios and assumptions.

However, it is important to note that no model can fully capture the complexity and uncertainty of climate risk. Banks should use a combination of different tools and methods to assess climate risk and regularly review and update their models as new information becomes available.

Conclusion: Addressing Climate Risk in the Trading Book

As the impacts of climate change become more apparent, it is essential for banks and financial institutions to incorporate climate risk into their risk management frameworks and trading book strategies. Scenario analysis and stress testing are key tools for assessing climate risk, and banks should use a combination of external and internal models to capture the full range of physical and transition risks.

Regulatory authorities are increasingly focused on climate risk, and banks should expect new guidelines and requirements to be introduced in the coming years. Banks that take proactive steps to address climate risk and align their investments with ESG goals are likely to be better positioned to manage the risks and opportunities associated with the transition to a low-carbon economy. Other steps that banks can take to address climate risk in their trading books include developing new risk management strategies, collaborating with other financial institutions, and engaging with regulators and policymakers.

Resources:

- *Task Force on Climate-Related Financial Disclosures | TCFD)* (2023). Available at: https://www.fsb-tcfd.org/.
- *Climate Risk Scenario Analysis for the Trading Book – International Swaps and Derivatives Association* (2022). Available at: https://www.isda.org/2022/10/20/climate-risk-scenario-analysis-for-the-trading-book/.
- *EBA launches discussion on the role of environmental risks in the* (2022). Available at: https://www.eba.europa.eu/eba-launches-discussion-role-environmental-risks-prudential-framework.
- *MAR33 - Internal model's approach: capital requirements calculation* (no date). Available at: https://www.bis.org/basel_framework/chapter/MAR/33.htm?inforce=20230101&published=20200327.
- *Regulatory Technical Standards on Internal Model Approach for* (2021). Available at: https://www.eba.europa.eu/regulation-and-policy/market-risk/rts-on-assessment-methodology-for-market-risk-internal-models.
- European Central Bank (2022) *Climate shocks can put financial stability at risk, ECB/ESRB report shows*. Available at: https://www.ecb.europa.eu/press/pr/date/2022/html/ecb.pr220726~491ecd89cb.en.html#:~:text=The%20European%20Central%20Bank%20(ECB,harm%20companies%20and%20banks%20alike
- Bolton, P. and Kacperczyk, M. (2020) "Do Investors Care about Carbon Risk?, " *Journal of Financial Economics (JFE)*. Available at: https://doi.org/10.2139/ssrn.3398441.
- Bonagura et al. (2021), 'Stocks' liquidity and Environmental Performance', Journal of the Italian Banking Association.

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