



The interaction between climate-related risks and market risk

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As climate change rapidly evolves from a distant concern to an immediate challenge, it has become imperative for the financial sector to understand the interconnection between climate-related risks and other financial risks. This focus on climate change has been highlighted by governments, industry groups, regulators, and public and private institutions, both locally and globally.

The Prudential Authority 2021 Climate Risk Survey Report¹ indicated that approximately 71% of financial institutions in South Africa believe climate-related risks could materially affect their business, with 90% of these financial institutions having initiated efforts to gain a deeper understanding of how these risks could impact their business. Additionally, 51% of financial institutions have integrated climate-related factors into their corporate strategies, while 41% have discussed climate-related risks at the board level.

This article explains the interaction between climate-related risks and market risk in the financial services environment by defining each risk and suggesting how financial institutions can incorporate climate-related risks into their current market risk assessment and management systems.

What are ESG and Climate Risks?

Environmental, Social and Governance (ESG) refers to environmental, social, and governance factors affecting a business; ESG-related business approaches involve engaging stakeholders. Conscientiously measuring and reporting on ESG-related activities enables stakeholders to understand how the company is managing risks and opportunities associated with these factors. For example:

Environmental factors include assessing a company's environmental performance and its impact on the planet, including issues such as climate, natural resources, pollution, waste, and environmental opportunities.

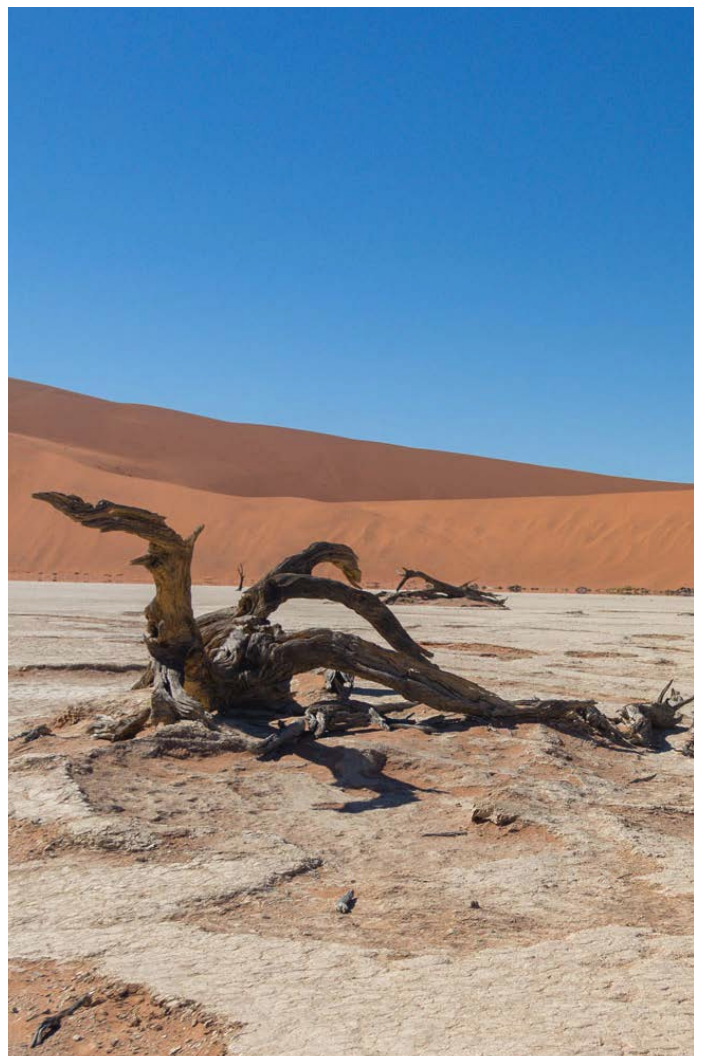
Governance addresses how a company or organisation is governed and managed, focusing on evaluating internal systems, structures, and practices that affect the company's ethical and responsible behaviour.

Social factors are associated with a company's impact on society and how it manages its relations with stakeholders, including human capital, product liability, stakeholder resistance, and prospects for societal advancement.

This article will focus on environmental factors, specifically risks associated with climate change. Climate-related risk is categorised into three key divisions as follows.

Physical risks emerge from the potential adverse consequences of the heightened severity and/or frequency of weather phenomena like floods, hurricanes, and fluctuations in sea levels.

Transition risks relate to the shift towards a low-carbon economy.

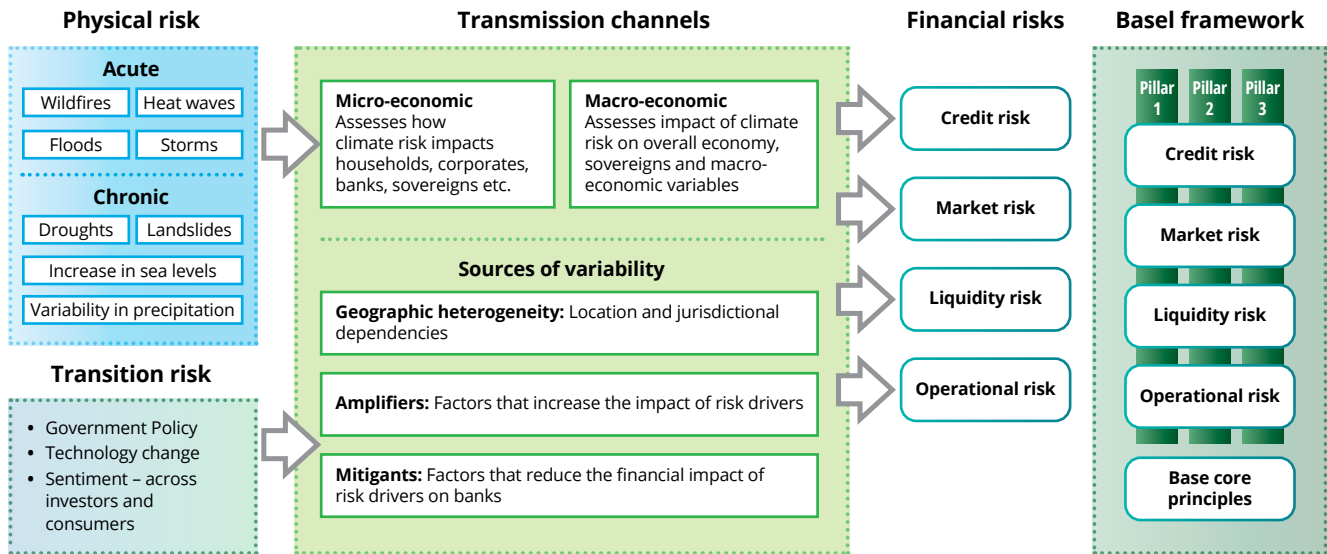


¹Prudential Authority Climate Survey Report 2021.pdf (resbank.co.za)

Climate-Related Risks in the Context of Financial Services

The Basel Committee on Banking Supervision's (BCBS) research² shows that most jurisdictions do not have an explicit mandate regarding climate-related financial risks. However, the BCBS believes that such risks could potentially impact the safety and soundness of individual financial institutions and, consequently, pose risks to financial stability. Accordingly, some jurisdictions and international organisations have incorporated climate-related risks into their existing supervisory and regulatory frameworks.

The diagram below shows that climate-related risk manifests within recognised financial risk categories, such as credit, market, liquidity, and operational risks, through the transmission channels and the sources of variability (e.g., how climate-related risks can impact the valuation of firm-level assets and firms' credit worthiness). The exposure to each type of climate-related risk depends on the asset.



Source: Climate-related risk drivers and their transmission channels, Basel Committee on Banking Supervision

The following examples demonstrate the impact climate-related risk has on financial risks.

Physical Risks

Buildings near the sea or in wildfire-prone areas face a heightened susceptibility to climate-related risks, leading to an elevated frequency of insurance claims. This, in turn, exerts upward pressure on insurance premiums due to the amplified climate-related exposure. Businesses in climate-vulnerable sectors (for example, mining and agriculture) may experience financial distress, potentially leading to increased default rates on loans held by banks and other financial institutions. The sudden shifts in asset values, particularly for companies with exposure to climate risks, can affect investment portfolios and market stability. Regulators may impose stricter requirements on financial institutions to assess and disclose their exposure to such risks, potentially leading to compliance costs and legal liabilities.

In summary, physical risks associated with climate change can have a cascading effect on the financial sector, impacting asset valuations, credit quality, and overall financial stability. This underscores the importance of integrating climate risk assessments into financial decision-making and risk-management processes.

Transition Risks

Transition risks also have significant implications for the financial sector. Transition risks are associated with the global shift towards a low-carbon, sustainable economy and can impact financial institutions in several ways, such as the devaluation of assets in industries that are carbon-intensive or unsustainable. Financial institutions holding investments in these sectors may experience losses in their portfolios. Regulatory risk changes can affect the profitability and stability of businesses. Financial institutions holding investments in these sectors (for example mining & agriculture) may experience losses in their portfolios. Transition to a low-carbon economy can lead to shifts in consumer preferences and market dynamics. Financial institutions may face market risks related to changes in the demand for specific products or services, which can affect investments and loans in specific industries.

In summary, transition risks can influence the financial sector by affecting asset values, credit quality, market dynamics, and reputation. Financial institutions should incorporate sustainability considerations into their risk assessments and strategies to navigate these risks effectively and identify opportunities in the evolving landscape.

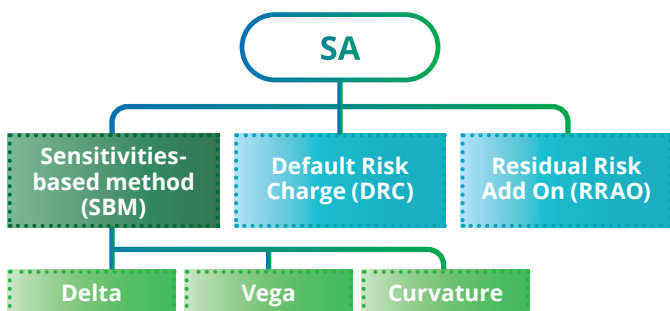
²Principles for the effective management and supervision of climate-related financial risks (bis.org)

Climate-Related Risk and Market Risk

What is the relationship between climate-related risk and market risk? Market risk is the risk of financial loss arising from changes in market prices, such as equities, interest rates, foreign exchange currency, commodities, and credit spreads. There are multiple market risk frameworks, including the commonly used Fundamental Review of the Trading Book (FRTB), Value at Risk (VaR), and Stress Testing. This section explores the three frameworks, unpacking the possible impact of climate-related risk.

Fundamental Review of the Trading Book (FRTB)

The BCBS's Standardised Approach (SA) to market risk, the Fundamental Review of the Trading Book (FRTB) framework, has three building blocks: the **Sensitivity-Based Method (SBM)**, **Default Risk Charge (DRC)**, and **Residual Risk Add-On (RRAO)**. The FRTB subdivides the market risk scope into five primary risk classes: equity, interest rate, credit spread, foreign exchange, and commodity risks. The section below highlights how climate-related risks impact the measurement of market risk.



The **SBM** outlined in the FRTB framework assigns risk weights directly, calibrated using historical data representing a stress period. Given the rising frequency and severity of climate-related risks, relying solely on historical data for market risk estimation may not sufficiently capture its true impact. Climate risks were less prevalent and impactful in the past, necessitating a more forward-looking approach. Therefore, it is prudent to consider incorporating scenarios that anticipate the evolving landscape of climate-related risks within the FRTB framework. This ensures a more comprehensive and adaptive risk assessment, aligning with the dynamic nature of emerging challenges in the financial landscape.

The **DRC** calculation outlined in the FRTB framework predominantly addresses equity and credit risks. With the anticipated rise in frequency and severity of climate-related events, adjustments to the risk weights utilised in DRC calculations become imperative. External ratings will incorporate climate-related risk factors, emphasising due diligence requirements to ensure a comprehensive evaluation of risks associated with default.

This proactive approach aligns with the evolving financial landscape, acknowledging the importance of integrating climate-related risk into risk assessments for a more robust and forward-looking risk management strategy.

The **RRAO** pertains to instruments, including weather options, characterised by their dependence on climate-related events for payoff. The inclusion of weather options in the RRAO scope is due to the exotic nature of their underlying structures. Presently, exposures to these options are considered immaterial. However, if banks increasingly engage in active hedging against climate-related risks, these weather options could gain material significance. If risks associated with these instruments escalate, recalibration of this framework may be necessary.

An alternative application of the RRAO framework could involve capitalising on climate-related risks and providing dedicated prudential treatment for exposures linked to environmental risks. This strategic approach will preserve the integrity of the two primary components of the framework, the SBM and DRC, without requiring amendments. Nevertheless, adjustments to the RRAO framework are essential as it lacks risk sensitivity, relying on gross notional amounts and prohibiting netting. To address this, an extension of the RRAO scope is warranted, encompassing simple trading book instruments susceptible to climate-related risks.

In conclusion, we expect that climate-related risks will lead to higher capital requirements, as the potential losses from these risks are integrated into the framework.

Value at Risk (VaR)

VaR modelling is a widely accepted approach with broad regulatory approval due to its numerous advantages. One of its key strengths is its comparability, as it can assess market risk across various asset classes with differing risk profiles. Moreover, VaR is easily interpretable because it provides risk measurements in either currency or percentage terms, making it user-friendly for analysts.

Traditionally, VaR has been utilised to gauge conventional financial risks such as market, credit, and operational risks. However, the growing financial implications of climate change have prompted the integration of climate risks into the risk assessment. This has given rise to **Climate Value at Risk (Climate VaR)**, a novel metric designed to estimate potential financial losses attributable to climate change for a company or a portfolio of assets. Similar to VaR, Climate VaR hones in on the risks and opportunities linked to climate-related change.

The computation of Climate VaR typically involves a blend of historical data, modelling methodologies, and scenario analyses. The resulting estimate offers a range of possible financial losses that a company or asset portfolio might incur due to climate-related occurrences, such as extreme weather events, rising sea-levels, or temperature fluctuations.

This information proves valuable for evaluating the potential influence of climate change on financial performance and for identifying strategies to mitigate or adapt to these risks. For instance, a company with a high Climate VaR might decide to invest in renewable energy sources or climate-resilient infrastructure to reduce its exposure to climate-related risks.

Banks must recognise the pivotal role of data in this context. While Climate VaR serves as a valuable tool for assessing the impact of climate change on investments and credit exposures, the reliability and credibility of this approach hinge on **data quality**. Access to high-frequency climate data, encompassing observations related to various physical risks, is paramount in calculating Climate VaR. Equally crucial is having extensive historical climate data on the assets and collateral within an investment or credit portfolio. Furthermore, data granularity, including geolocation data for assessing physical risks and information on climate risk drivers, is essential. High-frequency data is also instrumental in establishing correlations, a fundamental aspect of achieving accurate Climate VaR assessments, facilitating risk identification, and guiding appropriate actions.

Stress Testing

Traditional stress tests were designed to study the impact of external shocks on bank solvency. Assessing climate-related impacts requires some fundamental changes. Climate-related risks are expected to materialise over much longer time horizons than those used in traditional banking sector risk management. In addition, data covering future climate patterns may be unavailable or unreliable, given the current changes in climate patterns.

Measuring the impact of climate risk requires granular exposure data, ideally by sector and region, to differentiate and assess risks. However, this data may not currently be available. In addition, modelling techniques need to be adapted to support an exercise that, at a minimum, needs to be composed of four parts: modelling the climate variables, measuring the impact of climate on macroeconomic variables, breaking down the overall macroeconomic impact across sectors, and quantifying the combined impact on financial firms' market risk exposures.

By conducting stress testing for climate risk on market risk, financial institutions can gain insights into the potential vulnerabilities of their portfolios and better prepare for the challenges climate change poses to financial markets. This proactive approach can help safeguard investments, enhance risk management, and align with evolving regulatory standards related to climate risk assessment.

Conclusion

Climate-related risks have a pervasive influence, notably impacting market risk alongside various traditional risk types, culminating in novel risk outcomes distinct from historical patterns. Transition risks introduce pronounced market risk as assets within the energy sector, including coal, oil, gas reserves, and fossil fuel power generators, face potential stranding due to climate considerations. However, this risk extends beyond energy to encompass other high-emission or fossil fuel-dependent sectors like steel, cement, refineries, and chemicals, further amplifying market risk in the face of a low-carbon transition. Physical risk in the form of stranded assets, stemming from chronic climate impacts (such as shifting agricultural regions and rising sea levels), significantly influences market risk, especially in industries like agriculture, real estate, and tourism.

The interaction between climate-related risks and market risk is multifaceted and dynamic. The increase in climate-related risk will impact the three market risk frameworks (FRTB, VaR, and Stress testing). Financial institutions must ensure that they have accurate data to estimate Climate VaR and Stress Test. There should be sufficient infrastructure to handle new measures of VaR and changes in the current FRTB structures.

Deloitte's Offerings

Deloitte offers a comprehensive suite of services designed to address various aspects of risk management and business sustainability. For example, Deloitte offers Stress Testing Analysis, which evaluates an organisation's financial resilience under different adverse scenarios, helping companies prepare for uncertain futures. The Deloitte team also has the skills and expertise to build a Climate VaR model to assist financial institutions in measuring the impact of climate-related risk on investments or credit exposures. In addition, Deloitte's multifaceted offerings provide a holistic approach to risk management, incorporating cutting-edge tools and strategic insights to help organisations navigate the complexities of the modern business landscape.



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