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Climate-Related Scenario Analysis: Risks and Opportunities Associated with Climate Change

Over the past decade, there has been growing attention around the world from financial regulators, business leaders, investors, and policymakers to the threat climate change poses to financial systems and economies at global, national, and local scales. The intensity and frequency of extreme weather and climate-related disaster events are increasing and already imposing substantial economic costs.

Such costs to the economy are expected to increase further as the cumulative impacts of past and ongoing global emissions continue to drive rising global temperatures and related climate changes, leading to increased climate-related risks to the financial system.

The increasing economic effects of climate change imply that climate-related financial risks are an emerging threat to the financial stability of the United States. There is broad scientific consensus that climate change is driven by GHG emissions caused by human activity. According to the Intergovernmental Panel on Climate Change (IPCC), climate change is impacting every region of the Earth's climate, these impacts are intensifying, and some of these impacts, such as sea-level rise, are likely to be irreversible.

Increasing adverse effects from climate change to households, communities, and businesses will exacerbate climate-related risks to the U.S. and global financial systems if not addressed. According to the National Oceanic and Atmospheric Administration's (NOAA's) National Centers for Environmental Information (NCEI), 2020 was a "historic year of extremes" for the United States.¹ The year 2020 witnessed 22 separate \$1 billion-dollar-or-greater weather and climate disasters, a record number of such events, which caused a combined \$95 billion in damages. Moreover, the 2020 experience reflected a long-running trend, as the frequency and costs of severe weather-related events have been rising over the last two decades. This trend reflects the impact of climate change, as well as other factors, such as increased economic development in high-risk areas.

Climate-related financial risks can be grouped into two broad categories: physical risks and transition risks.

- **Physical risks** refer to the harm to people and property arising from acute, climate-related disaster events such as hurricanes, wildfires, floods, and heatwaves as well as longer-term chronic phenomena such as higher average temperatures, changes in precipitation patterns, sea-level rise, and ocean acidification.
- **Transition risks** refer to stresses to certain institutions or sectors arising from the shifts in policy, consumer and business sentiment, or technologies associated with the changes necessary to limit climate change. One key category of policy changes associated with transition risks are those

¹ [National Centers for Environmental Information \(NCEI\) \(noaa.gov\)](https://www.noaa.gov/news/ncei-2020-historic-year-extremes)



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directed at incentivizing or requiring reductions in GHG emissions. A variety of economic mechanisms, including carbon pricing, taxes or subsidies, or regulation, could be used to lower GHG emissions. For example, a key element of the Biden Administration’s plan to reduce GHG emissions is a Clean Electricity Standard. Such a regulatory mechanism could potentially raise the implicit or shadow price of carbon depending on the stringency of the standard and related incentives, subsidies, or penalties. This regulatory approach can incentivize the transition of GHG-intensive production processes, products, or services to lower-GHG, facilitating the achievement of climate-related goals while also potentially creating climate-related financial risks.

As the United States and other countries undertake the transition to a less GHG-intensive economy, public policy, adoption of new technologies, and shifting consumer and investor preferences have the potential to impact the allocation of capital in their economies. If these changes occur in a disorderly way owing to substantial delays in action or abrupt changes in policy, their impact on firms, market participants, individuals, and communities is likely to be more sudden and disruptive. Identifying risks and responding to emerging threats to financial stability helps integrate climate-related physical and transition risks because these stresses manifest as traditional risks to financial institutions such as credit risk, liquidity risk, market risk, and operational risk, which have long been the focus of prudential supervision and regulation by the U.S. Treasury’s Financial Stability Oversight Council (FSOC) members.

U.S. regulators have been encouraging the development and adoption of climate scenario analysis for some time. Several agencies and organizations have made these recommendations:

- In a report on climate-related financial risk, the members of the Financial Stability Oversight Council (FSOC) recommended the use of scenario analysis as a tool for assessing climate-related financial risks, taking into account their supervisory and regulatory mandates and the size, complexity, and activities of regulated entities. The report defines climate scenario analysis as *“a forward-looking projection of risk outcomes that provides a structured approach for considering potential future risks associated with climate change.”*²
- Federal Reserve Board Governor Lael Brainard helped to set expectations regarding efforts to build, iterate, and enhance climate risk modelling by outlining efforts to develop scenario analysis to model the possible risks associated with climate change for both individual institutions and the entire financial system. *“Scenario analysis is a useful tool in assessing the links between climate-related risks and economic outcomes because it requires assessing the implications for financial stability and individual financial institutions in a systematic way.”*
- Scenario analysis is one of the proposed principles for climate-related financial risk management recently released by the U.S. Office of the Comptroller of the Currency (OCC). The guidance states that scenario analysis exercises *“differ from traditional stress testing exercises that typically assess the potential impacts of transitory shocks to near-term economic and financial conditions.”* Acting Comptroller of the Currency Hsu separately stated that *“Boards should push senior management*

² [Financial Stability Oversight Council Identifies Climate Change as an Emerging and Increasing Threat to Financial Stability | U.S. Department of the Treasury](#)



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hard to develop scenario analyses, both top down and bottom up, as doing scenario analysis well takes time.”³

Taking action to reduce the impact of, and to adapt to climate change is not just about environmental impacts, is it also about pursuing economic growth and development that is strategic, resilient, and sustainable. Recognizing both the economic risks and opportunities inherent to a changing climate, the Financial Stability Board (FSB) established the [Task Force on Climate-related Financial Disclosures](#) (TCFD) in 2015 to develop specific disclosures to assess climate risks and opportunities, which are now maintained by the [IFRS Foundation](#).

³ [The Use of Scenario Analysis in Disclosure of Climate-related Risks and Opportunities - TCFD Knowledge Hub \(tcfdhub.org\)](#)