Managing Financial Risk in a Changing Climate Landscape

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Analysis of the impacts of climate change has gained momentum in recent years. Research by scientists, policymakers, governments and nonprofit groups has shown that climate change touches a wide range of areas, including GDP, productivity, health, property values, energy prices, tourism and migration. These effects, directly or indirectly, eventually find their way into financial markets and have implications for lending, borrowing and pricing. The implications are significant and have the potential to disrupt the financial system. Climate change is increasingly being viewed as a core financial and strategic risk, and not simply as a reputational risk. Not surprisingly, it is attracting the attention of financial sector regulators. Where do we stand today and how can financial institutions prepare for this changing climate landscape?

Different forms of climate risks

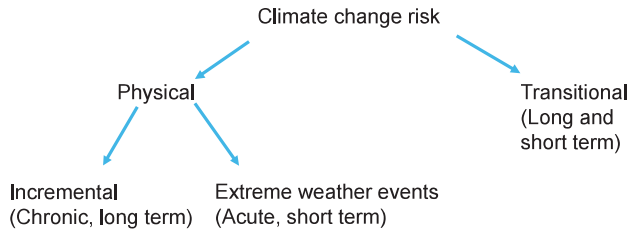
The risks from climate change are generally grouped into two distinct categories (see Chart 1).

Physical risks stem from the physical changes in climate, including rising temperatures, changing precipitation levels, and more severe and frequent natural disasters. Physical risks can be further grouped into two categories: chronic risks from the incremental shifts in climate conditions that happen over many decades; and acute risks from the increasing frequency and severity of extreme weather events.

Incremental shifts in climate conditions include rising land and sea temperatures, changes in precipitation patterns, and rising sea levels. Last year was the second warmest year ever recorded, and the last five years were the warmest in the last 140 years.[1]

Transitional risks arise from the gradual transition into a low-carbon economy and the resulting repricing of certain assets. A recent example is how a global push toward renewable energy has clobbered demand for General Electric's natural-gas turbines and sliced this critical power division's profits.

Chart 1: Different Shades of Climate Risks



Source: Moody's Analytics

These changes are not sudden. Instead, they build up over decades and eventually affect agricultural output, productivity and income, property values, etc. So financial institutions supporting the agricultural sector, including livestock and fisheries, are exposed to the long-term risks accompanying these shifting climate trends. However, since businesses are conditioned and encouraged to think about the short term—five years at most—their query is usually, "What is in it for me?"

Not all the risks are long term

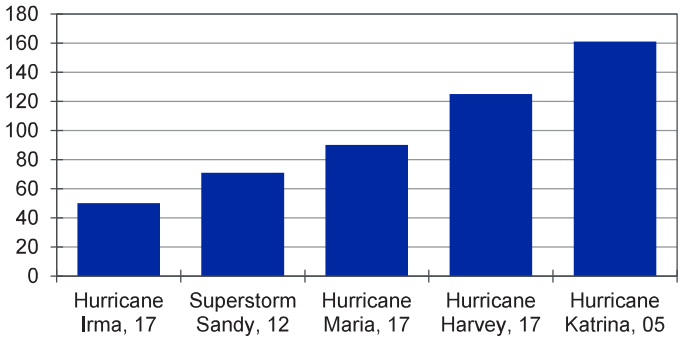
Unlike the slow buildup of the risks from the incremental shifts in climate patterns, the risks from the increasing frequency and severity of extreme weather events are immediate.

Whether or not the higher incidence of natural disasters is being caused by the

1 Global Climate Report, National Oceanic and Atmospheric Administration, November 2019. https://www.ncdc.noaa.gov/sotc/global/201911/supplemental/page-1

Chart 2: Hurricanes Cost the U.S. Economy

Costliest weather events in U.S. history, $ bil



Sources: National Oceanic and Atmospheric Administration, Moody's Analytics

slow changes in climate patterns,[2] they have the potential to create debilitating credit losses. Natural disasters in recent years have included floods, droughts, hurricanes, tornadoes and wildfires. Hurricanes have inflicted billions of dollars in damage in the U.S. alone (see Chart 2). Wildfires have decimated properties and wiped out businesses. CoreLogic estimates the total property losses from Northern California's Camp Fire to be $11 billion to $13 billion—the single biggest insurance loss event of 2018. That, along with the other wildfires in the state, drove California's largest utility, PG&E, to bankruptcy, the first major corporate casualty of climate change.

Other near-term climate risks that can have immediate repercussions on businesses are energy-related policy changes and technological breakthroughs. A case in point is how Germany's renewable energy subsidies boosted demand for companies generating energy from renewable sources and thereby wiped out the profits of its large utility companies, which produce electricity from conventional sources.

The link between climate change and financial risks

Financial risks from climate change run the gamut from credit risks to operational risks, liquidity risks, market risks and reputational risks. The risks, both long and short term, vary by industry, region and the location of each firm's physical assets and supply chains. This makes it hard to quantify and generalize these risks across institutions. A pilot project convened by the U.N. Environment Programme Finance Initiative and led by 16 banks covering a diverse group of industries provides good estimates and analysis.[3]

Some risks, especially those from sudden extreme events or policy changes, are obvious. For example, when a severe hurricane results in a long-standing blackout and property loss, business activity comes to a standstill and businesses' and consumers' ability to make payments on loans is severely tested. This is a credit risk for lenders in the area. In cases where most of the losses are insured, the costs are still passed on to consumers and businesses in the form of higher insurance premiums. Federal aid, if provided, also costs consumers in the form of higher taxes or higher interest rates. The repricing of assets as property values decline creates market risk, and loss of business continuity creates operational risk.

Businesses are also exposed in the short term to the transitional risks from policy and technology changes. For example, the new carbon tax in Alberta will create immediate additional costs for utility companies and other carbon-intensive industries in Canada's largest crude oil-producing province. For lenders supporting these industries, this translates into significant downside risks.

Similarly, breakthroughs in energy-related technologies such as cheaper batteries for electric cars will hurt the auto industry and, by extension, its creditors, if the industry does not adapt to the changing technologies.

On regulators' radar

With climate-related risks increasingly being viewed as having the potential to destabilize the financial system, central banks are paying attention. This is to be expected since maintaining financial stability in their countries is part of the mandate of most central banks.

The Bank of England is leading the charge in this area through its banking supervision arm, the Prudential Regulation Authority. The PRA had an activity-filled 2019. In March, it co-established with the Financial Conduct Authority the Climate Financial Risk Forum—an industry forum with banks, insurers and asset managers—to discuss best practices in managing climate-related risks. In June, it included a set of climate scenarios in the 2019 insurance stress tests to test the impact of both the physical and transitional risks from climate change on the liabilities and investments of the U.K.'s largest insurers. In December, it published a proposal to extend this exercise to the large banks in the U.K. by including a set of climate scenarios in the 2021 Biennial Exploratory Scenario exercise. The PRA is collecting comments on the proposal and will announce the final decision by the end of this year.

Like the Bank of England, the European Central Bank is also considering including climate scenarios in the 2022 European Banking Authority stress tests to test the resilience of the largest banks in the European Union. Other central banks are also taking on active roles. The Network of Central Banks and Supervisors for Greening the Financial System, or NGFS, formed in 2017, has more than 40 members and observers today (see Chart 3).

Its goal is to measure the risks to the financial system from climate change and to recommend steps to manage these risks. Other institutions such as the European Bank for Reconstruction and Development are also taking major steps in this field. Through its Sustainability Energy Initiative, the bank is incorporating climate risk assessments and adaptation measures in its investment operations.

Many regulators are also debating whether businesses should be required to disclose

2 "Explaining Extreme Events From a Climate Perspective," Bulletin of the American Meteorological Society, 2018. https://www.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american-meteorological-society-bams/explaining-extreme-events-from-a-climate-perspective/

3 "Navigating a New Climate," UNEP Finance Initiative, July 2018. https://www.unepfi.org/wordpress/wp-content/uploads/2018/07/NAVIGATING-A-NEW-CLIMATE.pdf

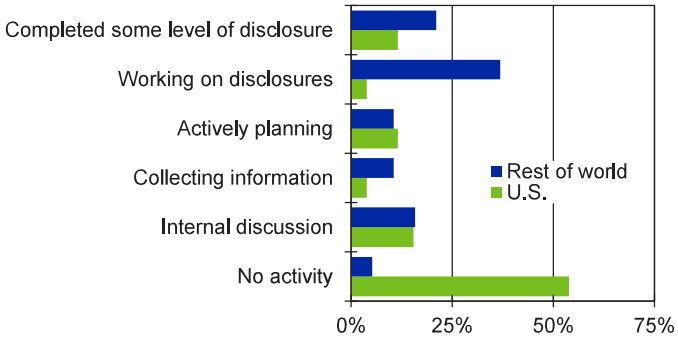
Chart 3: Banks and Supervisors Team Up

Members of the Network of Central Banks and Supervisors for Greening the Financial System (NGFS)

Sources: NGFS, Moody's Analytics

Chart 4: U.S. Institutions Trail Global Peers

Financial institution climate risk activity by region



Source: Moody's Analytics Climate Risk Global Mid-Market Banking Survey

more details of their climate-risk exposures to inform investors and other stakeholders. The Financial Stability Board established the Task Force on Climate-Related Financial Disclosures (TCFD), an industry-led group, to integrate disclosures on climate risks. The recommendations published by the task force in 2017 address the four broad areas of risk management and are regarded as an industry benchmark: governance, strategy, metrics and targets.[4]

The Federal Reserve is not a member of the NGFS and is behind other central banks when it comes to taking measurable steps to tackle the financial risks from climate change. But it is gradually recognizing the materiality of the risks and is joining the conversation with experts and researchers in this field. In November, the Federal Reserve Bank of San Francisco held the Fed system's first climate research conference.

Staying ahead

Regulation should not be the only reason why businesses think about climate change. It is in every business' interest to bake in the risks of climate change in their business-as-usual planning to provide more accurate information to investors, stockholders and other stakeholders. This will also help spot opportunities early. Why? While the climate-related risks are weighted on the downside in the long run for the overall economy, in the short run there are industry- and region-specific winners and losers created by the repricing of certain assets. That is why it is important for each institution to conduct its own analysis. Unfortunately, U.S. institutions lag significantly behind their international peers in their efforts to act on climate risk (see Chart 4).

We discuss here some emerging best practices to manage the climate-related financial risks.

Scenario analysis

Since most climate events are unprecedented, the only way to quantify their impacts on the financial sector is by running various climate scenarios, both short and long term.

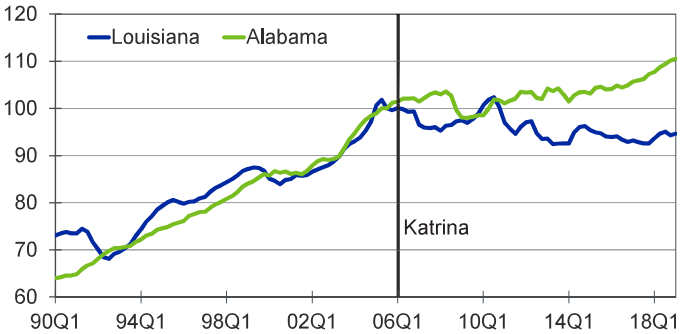
Extreme weather events and the introduction of climate-friendly policies and technological breakthroughs expose companies to immediate short-term risks. The impacts of extreme weather events are likely the easiest to quantify since those have occurred in the past and we have benchmarks. Since the impacts from natural disasters are localized, institutions need to perform the impact analysis at the granular subnational level. As an example, Hurricane Katrina's impacts on Mississippi and neighboring Alabama were not the same (see Chart 5).

Testing capital adequacy levels against natural disaster shocks is not new. Following Superstorm Sandy, many regional banks with operations in hurricane-prone parts of the country included natural disaster events in the Bank Holding Company idiosyncratic scenarios they were required to run as part of their Dodd-Frank Act stress test exercise.

Scenario analysis will also help to identify areas of opportunities. For example, while a breakthrough in electric battery storage technology will hurt auto producers and conventional auto sales, it will boost sales of electric vehicles. The net impact on an auto lender can be understood only by running a scenario. Similarly, a move to raise the ethanol content of an ethanol-gasoline blend,

Chart 5: Disaster Impact Is Region-Specific

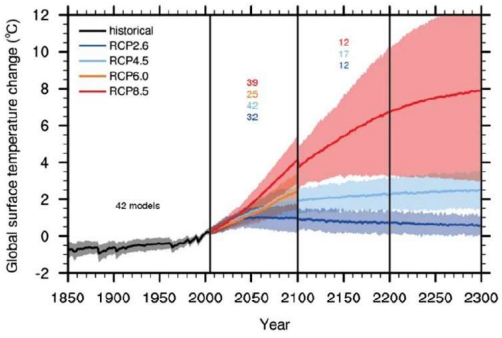
Real GDP, 2012$, 2005Q3=100



Source: Moody's Analytics

4 Recommendations of the Task Force on Climate-Related Financial Disclosures, TCFD, June 2017. https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-TCFD-Report-062817.pdf

Chart 6: Climate Models Show a Range

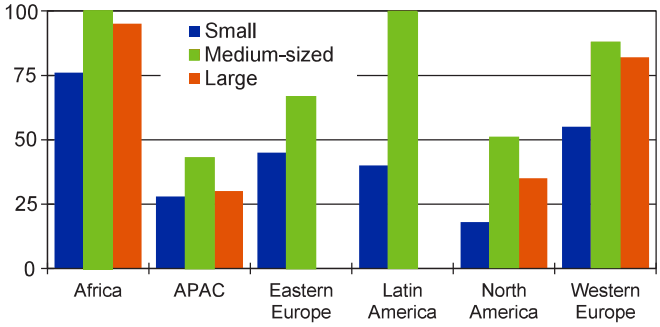


Global annual mean surface air temperature anomalies (relative to 1986-2005) by RCP over time. The solid lines represent the CMIP5 multi-model mean, while the 5%-95% across the distribution of individual models is represented by the shaded region.

Sources: Four Twenty Seven, IPCC Fifth Assessment Report, Moody's Analytics

Chart 7: Lenders Screen for ESG Risks

ESG-based screening by bank size, asset; avg % of assets



Sources: Fitch Ratings, Moody's Analytics

mandated by the Renewable Fuel Standards, will impact energy producers and ag lenders differently. All else equal, this will lower oil prices but boost corn prices.

These scenarios could occur within the next five years, so are considered short term. But companies also need to test their business models against the risks from the slow incremental changes in climate that occur over many decades. The climate scenarios based on different levels of radiation concentration, published by the U.N.'s Intergovernmental Panel on Climate Change in 2017, are based on global climate models and are considered an industry benchmark in this area. There have been studies[5] that have discussed the economic impacts—on energy prices, GDP, employment, interest rates, property prices—of these scenarios. Financial firms should use the results of these studies as a starting point to estimate the impact of the long-term climate changes on their business.

Global climate models use climate science to simulate the future state of the earth. These models produce a range of possible future outcomes. Climate intelligence firm Four Twenty Seven's scenario analysis focuses on this range, which represents the uncertainty in how physical climate risks may manifest in the next few decades.[6] Using a percentile-based analysis, they address the distribution of outcomes of various climate variables from a pool of global climate models in use by the scientific community (see Chart 6).

Enhanced credit models

To properly utilize the outputs of these scenarios, in the form of energy prices, land use, population and macro effects, financial firms should update, and in most cases rebuild, their credit models to incorporate industry- and region-specific climate risk variables. These models include the models for underwriting, risk rating or scoring, default, recovery, asset and liability management, and risk-weighted assets. For example, the risk ratings of borrowers and the values of collateral should reflect climate risks, and these updated ratings would feed into the models for underwriting and default. Many institutions already consider certain climate risk factors in their credit decision process. A recent survey by Fitch finds that environmental, social and governance risks are an important determinant of the underwriting decision in banks above $100 billion in assets (see Chart 7). However, these considerations are mostly qualitative in nature. A rigorous quantitative model-based approach will be the next step.

Including climate risk drivers in the default and exposure-at-default models will also have a material impact on loss provisioning against long-duration assets. This is because under the new expected loss accounting rules, IFRS 9 and CECL, companies must set aside reserves for the losses expected over the entire life of the loan and not just over the loss emergence period.[7] So, both short- and long-term climate risks can potentially alter the estimated allowances and, therefore, the retained earnings.

Finally, most credit models today produce reasonable predictions for at most five years. To capture the effects of the incremental climate changes that accumulate over time, these models must be updated, so that they are able to generate results for the next 20 to 30 years at least.

Climate-related risk disclosures

Companies should prepare to adopt the TCFD recommendations on climate-related financial disclosures. Investors and other stakeholders are already demanding greater transparency around climate risk exposures and the steps being taken to mitigate these risks. For example, Climate Action 100+ is the world's largest group by assets of more than 370 institutional investors that is putting pressure on companies to act on climate change. Greater transparency in this area will ensure the accurate assessment and pricing of climate-related risks and opportunities.

Tighter governance

Institutions should take a firm-wide long-term strategic approach to climate risk. The TCFD recommends board-level engagement to ensure adequate oversight. Climate risk considerations today roll up to the ESG groups on most financial institutions. But

5 Chris Lafakis, "The Economic Implications of Climate Change," Moody's Analytics, June 2019. https://www.moodysanalytics.com/-/media/article/2019/economic-implications-of-climate-change.pdf

6 Four Twenty Seven, "Demystifying Climate Scenario Analysis for Financial Stakeholders", December 2019. http://427mt.com/wp-content/uploads/2019/12/Demystifying-Scenario-Analysis_427_2019.pdf

7 Under IFRS 9, applies only to loans that are either credit deteriorated or impaired. Under CECL, applies to all loans.

given the financial stakes, the credit and risk teams should have direct oversight on climate risks.

The takeaway

There is little doubt that climate change exposes financial institutions to numerous short- and long-term risks. These risks differ by industry type and region and are therefore not easy to estimate or generalize. That is why these risks have up until now been mostly handled qualitatively as a reputational risk. But the increased frequency of events and the magnitude of impact have brought these risks into the mainstream. Stakeholders are demanding a more direct quantification of the exposures. This requires a move from a qualitative risk evaluation framework to a more quantitative one based on emerging research and scenario analysis.