Protecting portfolios from climate risk

Institutional investors are developing methods to measure exposure to climate change. Here's what advisors need to know.

By: Mark Burgess | September 20, 2019 | 15:00

Mark Burgess

The Lucretius problem, as described by economic thinker Nassim Taleb, holds that every worst-case event was not only worse than what came before but more severe than anyone previously imagined. Ancient Egyptians used the Nile's high-water mark as a

worst-case scenario for future floods, just as Japanese engineers built the Fukushima nuclear reactor to withstand the worst recorded earthquake. They didn't imagine that there could be one even more catastrophic.

Climate change is forcing investors to think in these terms, incorporating models to forecast the risks, opportunities and worst-case scenarios in a world that's physically changing.

"There's an acceleration of global warming connected to these extreme events that is not forecastable by looking at historical trends," says Andre Bertolotti, head of global sustainable research and data at BlackRock Sustainable Investing in New York.

A paper he co-wrote on climate risk in the U.S. electricity sector says that investor expectations about the risk from extreme weather are based on past events, making the risk difficult to price. As weather patterns change at an accelerating rate, deviating from historical trends, institutional investors like BlackRock are experimenting with more sophisticated climate models.

"This is a new area where the physical science of climate modelling is interacting with financial data and financial markets," Bertolotti says.

He points out that the U.S. National Oceanic and Atmospheric Administration already has the definition for a Category 6 hurricane in its back pocket.

"It's never happened; nobody's ever seen one," Bertolotti says. "God forbid it should happen, but … they're ready."

Asset managers are also preparing, testing methods to measure what impact more frequent and powerful hurricanes, earthquakes, floods and droughts will have on companies and portfolios, and how the transition to a low-carbon economy will affect

bottom lines. This interest comes as central banks—including the Bank of Canada—list climate change as a key vulnerability for the financial system, and as experts call for asset managers to integrate climate into risk management as part of their fiduciary duties.

Emily Chew, global head of environmental, social and governance (ESG) research and integration at Manulife Investment Management in Boston, says advisors need to become more fluent in sustainable and responsible investing.

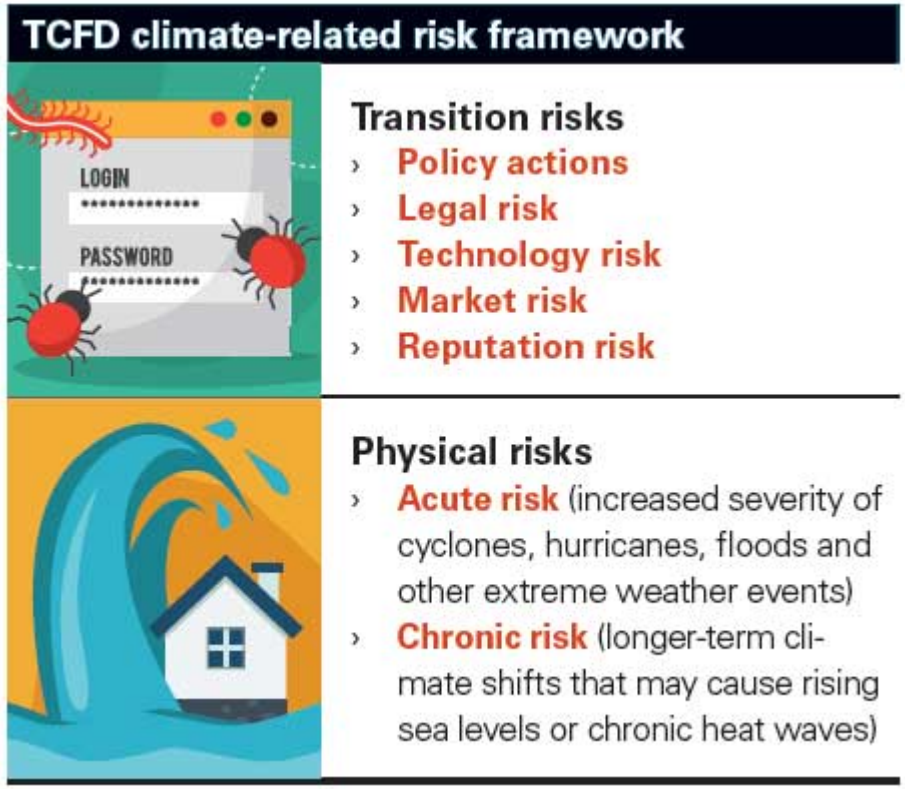
“They need to understand what institutional asset managers are doing to produce the products that go on the platform,” she says. “They need to understand what their clients want.”

Chew maintains that too many advisors have discouraged clients from sustainable options because they believe all products are about excluding companies. “That is not a current and accurate message to be giving clients,” she says.

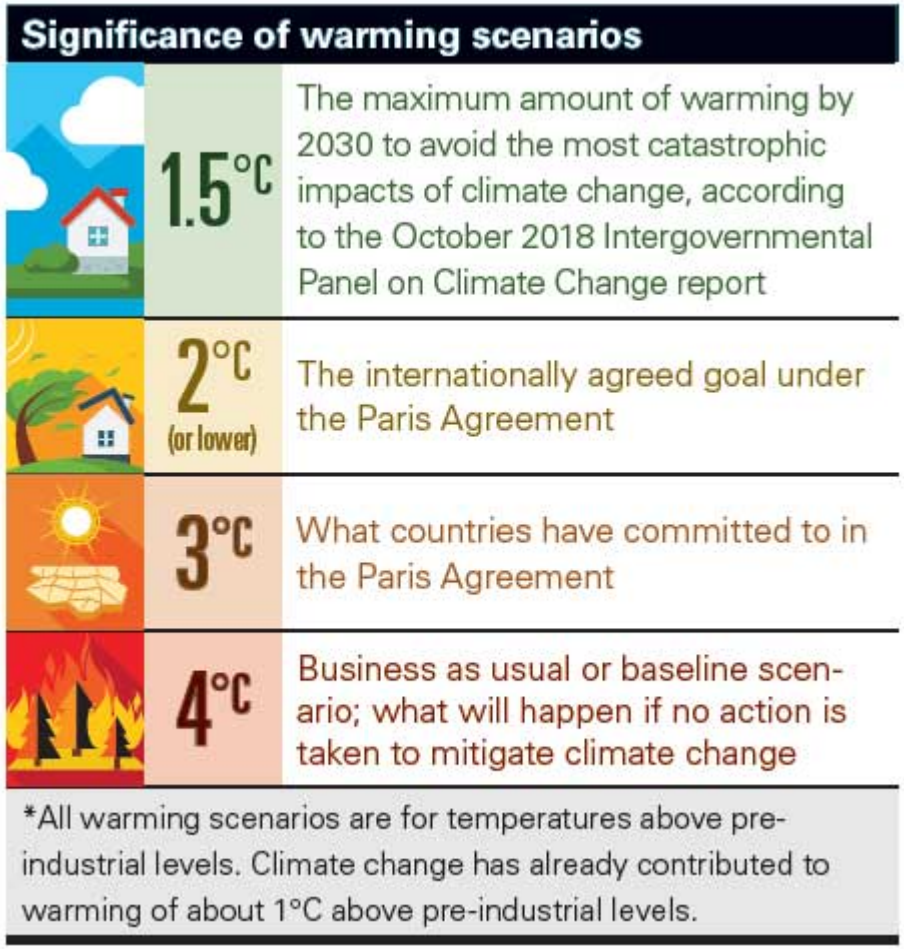
A new way to rank companies

Manulife was part of a United Nations-driven pilot project for climate risk assessment that responded to the Financial Stability Board’s Task Force on Climate-related Financial Disclosures (TCFD).

Spearheaded by Bank of England governor Mark Carney and former New York mayor Michael Bloomberg, the TCFD provides a framework for companies to report climate-related information for investors. The recommendations break climate vulnerabilities into two categories: the risks related to the transition to a lower-carbon economy, and the physical impacts.



Manulife and 19 other institutional investors teamed up with Swiss climate modelling firm Carbon Delta to develop a common methodology for assessing climate risk that builds on the TCFD framework. The project used climate scenarios to create a database through which managers can run equities and portfolios. The 20 firms in the consortium used the same underlying data.



The result is company rankings based on exposure to policy risk, physical risk and technological opportunities from climate change, Chew says. The methodology also measures the climate value at risk for companies using 1.5˚C, 2˚C, 3˚C and 4˚C warming scenarios over a 15-year time horizon, which can be rolled up to the portfolio level.

Policy risk is measured by taking the greenhouse gas (GHG) reduction targets made by each country in the Paris Agreement, which would lead to approximately 3˚C of warming above pre-industrial levels. Each country is assigned a carbon budget to meet

those commitments, which is then filtered through a series of assumptions for different industries and down to individual companies, Chew says.

To estimate a company's annual emission reduction costs, Carbon Delta takes the company's annual GHG reduction requirements and multiplies the reduction amount by carbon price estimates:

$$\text{Total cost} = \begin{matrix}\text{required GHG}\\ \text{reduction amount}\end{matrix} \times \begin{matrix}\text{price per}\\ \text{tCO}_2\text{e}\end{matrix}$$

The methodology adjusts the budget for 2°C and 1.5°C scenarios.

To measure the technological opportunity of transitioning to a low-carbon economy, Carbon Delta built a database of more than 100,000 patents and used historical data to project a value for those with green potential. The result is an estimate of potential profit from technology used to offset the policy risk of a low-carbon future, Chew says.

Physical risk measures the impacts of extreme weather "already baked into our climate system" under a business-as-usual scenario for the next 15 years. The model estimates the cost of business interruption by calculating the number of days in a given region that meet a hazard intensity threshold based on historical data.

$$\text{Cost} = \begin{matrix}\text{number of}\\ \text{exceedances}\end{matrix} \times \text{vulnerability} \times \begin{matrix}\text{vulnerability}\\ \text{reduction}\end{matrix} \times \begin{matrix}\text{optimal}\\ \text{revenue}\end{matrix}$$

The model projected extreme weather impacts to 500,000 global sites mapped to approximately 25,000 companies, Chew says. For example, extreme heat "means that not only will there be increased cooling costs, but there will be an increased number of days where a plant actually has to shut down because it's too hot to operate."

After calculating a company's climate costs and profits over the next 15 years for each transition scenario (1.5°C, 2°C, 3°C and 4°C), and across physical risks, policy risks and technological opportunities, Carbon Delta calculates a company's climate value at risk (CVaR) by dividing the present value of future costs or profits by the company's market value:

$$\text{CVaR}_{\text{enterprise}} = \frac{\text{present value of climate costs or profits}}{\text{market value of enterprise}}$$

Testing portfolios

After applying the methodology to a number of Manulife portfolios, Chew says the percentage of value at risk is usually "fairly negligible": between 1% and 4%. Still, there are companies with 80%, or even 100%, of their value at risk.

"We see companies that are potentially going to be wiped out if they can't pass the cost on to their consumers, and that for us is really about giving us a basis for engaging with companies," she says.

In a case study for the consortium's report, Manulife analyzed the climate risks for a portfolio invested primarily in large-cap Canadian equities benchmarked against the S&P/TSX index. It found the portfolio value at risk in a 1.5°C scenario (where transition risk is higher) was almost 200 basis points, while it was 32 basis points in a 3°C warming scenario with lower transition risk.

The companies with the highest value at risk were an oil and gas company and another providing heavy equipment services to that sector. The high score was due to transition risks—namely, the potential that oil production stops making economic sense. The

report doesn't name the companies.

Chew notes that the figures could change as governments respond to climate change. With the Paris Agreements tracked for 3°C warming and business as usual leading to 4°C, action will be necessary, she says, meaning the "quantum of policy risk" for companies could move rapidly.

"Obviously, as the science gets better, the physical risk could continue to move as well," she says.

TD Asset Management, another consortium member, applied the methodology using a 2°C warming scenario to a Canadian smaller-cap, dividend-paying equity portfolio to evaluate the risk to the utility sector. While the portfolio's climate value at risk was only 3.2%, utilities made up 73% of that risk.

Chew notes that the methodology is focused on direct carbon emissions. A utilities company burning fossil fuels will be penalized for the policy risk while an automobile or oil and gas company's risk is downstream and not captured.

"Your climate exposure is the extent to which the customers of your product are going to want to buy your product," she says, which the TCFD refers to as market or reputation risk.

"If the buyers of your product are moving to constrain their carbon, you could still have market access risk. We're still figuring out how to model that appropriately."

Putting physical risk on the map

Like TD, BlackRock sought to assess climate risk in the utilities sector. The asset manager worked with climate modelling firm Rhodium to measure the physical risks to U.S. electric utilities, commercial real estate and municipal bonds—investments it chose because they're backed by fairly permanent physical assets with known locations, the report published in April says.

For utilities, the study geo-located 4,500 power plants owned by publicly traded companies. It then overlaid historical data from 233 extreme weather events that caused more than US$1 billion in damages to see how they impacted company valuations. If investors believed the companies had mitigated their exposure to climate risks, then stock prices would not have reacted to extreme weather damage.

"This approach bypasses a detailed analysis of how well-prepared a particular location is for a storm and goes straight to the market to understand what investors think, which is what we care about," BlackRock's Andre Bertolotti says.

The report found the risks are not priced in; when hurricanes occurred, investors reacted by selling stocks of affected companies. The share price recovered after about 30 days.

For commercial mortgage-backed securities, the study laid Rhodium's hurricane modelling over BlackRock's database of 60,000 commercial properties. It used modelling because historical weather data doesn't capture the acceleration of extreme events caused by global warming, Bertolotti says—what's referred to as the "hockey stick effect."

The study found a 275% increase in the risk of Category 5 hurricanes between now and 2050 under a no-climate-action scenario. Beyond the direct physical damage to commercial real estate, climate change could lead to insurance risk, higher utilities costs

and higher capital spending to make buildings more resilient. It could also lead to an increase in delinquencies as tenants abandon properties after severe weather damage. The study said climate risks were already “significant” and set to grow.

When it came to debt, the study found a rising share of the US$3.8-trillion municipal bond market in the U.S. is set to come from regions facing climate-related economic losses. BlackRock compared prices of municipal bonds that were similar except for their location: areas sensitive to climate risks versus areas that aren’t. It found climate-related risks weren’t being factored into prices, and forecast that 58% of U.S. metro areas will be facing annualized climate-related GDP losses of 1% or more as early as 2060 (Arizona, coastal Florida and the Gulf Coast are most at risk).

Bertolotti says the report was an “initial proof of concept” and that there’s demand for more research. One challenge for expanding physical risk assessment to equities will be accounting for multinational companies’ complex supply chains, he says. There’s also the question of data: the study focused on the U.S. because high-quality data was available.

There’s an index for that

The BlackRock report notes the potential to apply similar techniques to measure risk in sovereign bonds. Indexing firm FTSE Russell has made the first attempt.

The FTSE Climate Risk-Adjusted World Government Bond Index, which launched in July, weights countries based on preparedness for and resilience to climate change. The modelling for the index was created by environmental analytics firm Beyond Ratings, which FTSE Russell-owner the London Stock Exchange Group acquired in June.

Paris-based Beyond Ratings CEO Rodolphe Bocquet calls sovereigns a “lagging asset class” when it comes to incorporating ESG factors. Climate change can lead to higher expenditures as governments invest in low-carbon infrastructure and protection from physical risk; decreased economic activity can reduce revenues.

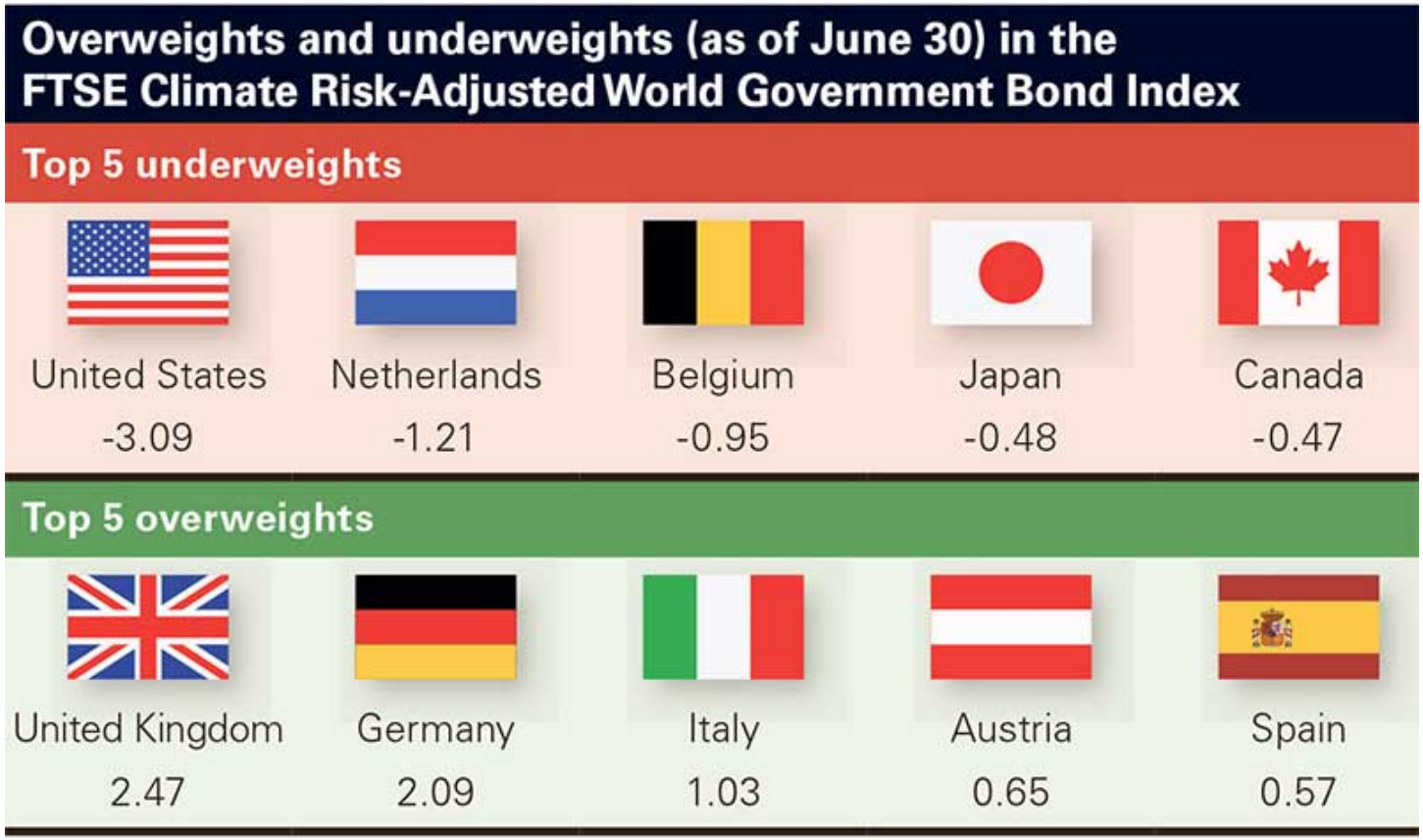
Beyond Ratings’ methodology assigns the 22 countries in the index a carbon budget based on a 2°C warming scenario by 2050. That budget is used to determine the difference between a country’s current emissions and what they need to be. For example, Canada and the U.S. need to reduce emissions by 5% each year between now and 2050 under the 2°C scenario, Bocquet says. Since both countries’ five-year emission reduction trend is far below the target, both are underperforming on transition risk and are underweight in the index (see chart below).

The physical risk pillar uses three data points: the percentage of a country’s population living less than five metres above sea level; the number of deaths generated by climate events such as storms and heatwaves, as measured in a database from the University of Leuven in Belgium; and the historical variation in agricultural production, combined with the agricultural sector’s weight in the overall economy.

For now, Bocquet says, the risks are based on historical data, though Beyond Ratings is developing forward-looking indicators based on climate modelling that would include potential future impacts of climate events.

Resilience risk measures a country’s capacity to adapt to climate change, using indicators including debt to GDP, fossil fuel subsidies, biodiversity, inequality and governance factors. “The ability to implement climate change policy and to allow a low-carbon economy is dependent on social acceptability,” Bocquet says, pointing to the “yellow vest” movement in France that disrupted fuel price policy.

For now, the index doesn't incorporate different warming scenarios or adjust ratings based on a bond's duration. The methodology could potentially be applied to various indexes—the company is already at work on a climate-adjusted version of the FTSE Canada Universe Bond Index.



Engagement tool or investment opportunity?

Bertolotti stresses that BlackRock's risk assessment tools aren't a trading strategy—to short companies when a hurricane forms in the Atlantic, for example—but rather an engagement tool for assessing how companies are addressing long-term issues.

"So what if warehouse Z is in a tornado alley or in a hurricane-exposed area? Does that mean you shouldn't buy the asset? The answer is no," he says.

"Once we have that information and we understand the exposure, we can begin a process of asking questions of that company as to how it's addressing this particular challenge."

More investors will be seeking disclosures and asking companies about insurance, capex plans that include strengthening physical facilities, and disaster recovery plans, Bertolotti says. "Things like this are going to be the real outcome of our work."

Chew also says the results are used for engagement more than for screening. The portfolio managers responsible have different investment horizons and priorities, and will apply the information as they see fit, though she says some managers have scaled back or sold companies based on climate risks. The tools could also facilitate thematic sustainable investing, she adds.

The advisor's role

A Natixis report from earlier this year, based on its 2018 global survey of more than 12,000 investors, found a gap between the level of interest in ESG and advisors' knowledge. Part of this comes down to a need for better information and reporting standards so advisors can more confidently talk to clients about options, but the report said many North American advisors have a limited understanding of what ESG investing means.

Chew says advisors need to learn to suss out clients' objectives around climate risk. For many with a 30-year investment horizon, the conversation will be about using climate data to avoid long-term risks rather than excluding companies. Other clients may want to avoid any investments that contribute to carbon emissions, asking to divest from fossil fuel companies or to put their money in sectors making a positive impact.

Advisors need to have these asset allocation discussions with clients and help them meet their objectives that are both financial and broader in nature, Chew says.

"Clients who aren't satisfied with the conversation they're having with their advisor are ultimately going to find an advisor who can have this conversation, as you get a generation of clients for whom this is more important."

Climate change's impact on company earnings

Revenues: Transition and physical risks may affect demand for products and services, particularly with the emergence of carbon pricing.

Capital and financing: Climate-related risks and opportunities may change the profile of an organization's debt and equity structure. Debt levels could rise to compensate for reduced cash flow or for capex and R&D, and changes to capital and reserves could result from operating losses and asset write-downs.

Expenditures: Lower-cost suppliers may be more resilient to changes in cost resulting from climate-related issues, and investors should understand capex plans —including the willingness of capital markets to fund organizations with high

exposure to climate-related risks.

Assets and liabilities: Supply and demand changes from different policies, technology and market dynamics related to climate change could affect the valuation of organizations' assets and liabilities.

Source: Task Force on Climate-related Financial Disclosures