Climate scenario analytics

pwc

Climate scenario analytics focuses on assessing and quantifying the financial impact of climate change on a financial institution.

To accelerate the scaling up of green finance and develop recommendations for central banks' role in climate change, the Network for Greening the Financial System (NGFS) was set up, which is a network of 114 central banks and financial supervisors. The NGFS provides different plausible scenarios with respect to climate change, covering a broad range of physical and transition risks with the help of a consortium of renowned academic research institutions. The NGFS has designed certain climate scenarios, as listed below:

1. **Net Zero 2050:** Net Zero 2050 is an ambitious goal that looks at limiting global warming to 1.5 °C above pre-industrial temperatures through the deployment of low emission technologies and stringent climate policies, reaching net zero CO_2 emissions by 2050. Countries such as the EU, the US and Japan are taking the lead in achieving this target and have committed to reach net zero emissions for all greenhouse gases by 2050.

1. **Low demand:** The low demand scenario assumes significant shift in consumption pattern/preference, lowering energy demand and thereby reducing anthropogenic CO_2 emission. This mitigates the pressure on the economic system to achieve global net zero emissions by 2050.

2. **Delayed transition:** This scenario assumes there is no reduction in global annual emissions until 2030. As a result, more stringent policies are required to limit warming to below 2 °C with limited negative emissions.

3. **Nationally Determined Contributions (NDCs):** NDCs assume that the heterogenous and moderate climate ambitions declared by member countries in the beginning of 2021 continue in the twenty-first century. NDCs include all of the pledged policies, irrespective of the implementation status.

4. **Current policies:** This scenario assumes that only currently implemented policies are retained. This leads to severe physical risks which are mostly irreversible in nature, like raised sea levels.

5. **Fragmented world:** The fragmented world scenario assumes delayed and varying climate policy ambitions globally. This leads to inflated transition risks in a few economies and poses higher physical risks overall due to the ineffective policy transition.

National Institute Global Econometric Model (NiGEM), one of the leading global macroeconomic models, provides key variable forecasts for all countries and regions for all of the above-mentioned NGFS scenarios. These key variables are also often referred to as exogenous variables as they are external to a model, but their values are used to explain other variables with the model. Some of the exogenous variables include:

Carbon prices	US treasury 10-year yield
WTI crude oil price	European Central Bank deposit facility announcement rate
Henry Hub natural gas price	UK Bank of England official bank rate
US real gross domestic product (GDP)	Eurozone 10-Years Government Benchmark Bond Yield
Eurozone real GDP	JPY overnight Mutan call rate
ASIA real GDP	Japan 10-Year Government Bond Yield
US House Price Index	US BBB Corporate to Treasury 10-Year Spread
US Commercial Real Estate Price Index	Eurozone corporate BBB asset swap spread
UK Housing Price Index	Developing Asia corporate investment grade 5-year CDS spread
S&P 500 Index	VIX Index
STOXX Europe 50 price index	Euro STOXX 50 Implied Volatility
US effective federal funds rate	EUR/USD spot rate

A few procedures that could be followed for assessing the financial impact of various climate scenarios could include:

1. identifying the key exogenous variables which would be sufficient to forecast all the other variables
2. building methodologies for forecasting the key exogenous variable paths while assessing their behaviour under various climate scenarios
3. using the exogenous forecasts to generate the forecast paths of all required variables
4. using all these variable paths to assess the probable future financial impact on the bank's books under each climate scenario.

Key exogenous variable paths

For building the key exogenous paths, we would first have to understand the narrative of the climate scenario (NGFS has provided a detailed narrative for all climate scenarios.). The primary factors which should be considered for the climate scenario are physical and transition risks.

Simply put, physical risk comprises damage to property, land and infrastructure caused by extreme weather events and natural disasters, such as storms, wildfires and floods. On the other hand, transition risk consists of the regulatory, legal and market changes that occur as the world transitions to a lower-carbon economy, such as carbon taxes, carbon disclosure mandates and the transition to renewable energies.

For example, while creating carbon prices paths, Net Zero 2050 scenario would have higher carbon prices in the early years compared to other climate scenarios, as the former puts severe penalties for using non-renewable resources.

From NiGEM, we would get the paths of key variables for all countries and regions, but each financial institution should also individually assess the suitability of the paths provided in the context of their books/exposure.

For example, for forecasting US GDP, the open-source damage data which contains dollar damages of various climate events in the US like hurricanes, tropical cyclones etc. could be used to assess their impact on the US GDP. These models could be qualitative or quantitative in nature, depending on the suitability and data availability.

Climate risk models are still evolving, and there are no defined industry standard model methodologies. So, we would also have to rely on the academic research and publications available and consider the suitability of these approaches/methodologies in the context of each financial institution. We should thus model the key variables like GDP, unemployment, federal funds, TS10Y and inflation by leveraging the suitable approach.

Forecasting all variable paths

For the purpose of regulatory scenario analysis like Current Expected Credit Losses (CECL) and Comprehensive Capital Analysis and Review (CCAR), financial institutions often develop models for forecasting all macroeconomic variables using which they can assess the financial impact of every regulatory scenario. Similarly, for climate scenario analytics, we could use these existing model methodologies which would forecast all the other variable paths using key variable/exogenous paths. Once, we have all the variable paths, we can assess these to analyse the financial impact on the bank under various climate scenarios.

Infrastructure

Considering the infrastructure aspect, since the regulatory submissions like CCAR, CECL are done periodically as per requirement, financial institutions often develop robust IT platforms for conducting these exercises. The same existing infrastructure could also be used for climate scenario analytics after incorporating appropriate additional features/modules.

Conclusion

In a nutshell, climate scenario analytics is an important tool for financial institutions to assess and calculate the impact of climate change. Adopting the framework given by NGFS and with models such as NiGEM, scenarios can be evaluated by financial institutions to curb the risks due to climate change.

Further, integrating climate scenario analytical methodologies with the existing regulatory framework such as CECL and CCAR can provide an insight into the financial impact. This can support regulatory compliance and provide financial institutions with a framework to help navigate the uncertainties due to climate change.

Finally, the adoption of climate scenario analytics by financial institutions will help them to transition towards a low-carbon economy, resulting in long-term sustainability and resilience.

About PwC

At PwC, our purpose is to build trust in society and solve important problems. We're a network of firms in **151** countries with over **360,000** people who are committed to delivering quality in assurance, advisory and tax services. Find out more and tell us what matters to you by visiting us at www.pwc.com.

PwC refers to the PwC network and/or one or more of its member firms, each of which is a separate legal entity. Please see www.pwc.com/structure for further details.

Contact us:

Manish Maini
Partner – Risk Consulting
PwC India
manish.maini@pwc.com

Vikash Jaiswal
Director – Risk Consulting
PwC India
vikash.jaiswal@pwc.com

Dwaipayan Majumder
Senior Manager – Risk Consulting
PwC India
dwaipayan.m.majumder@pwc.com

Akash Anand
Senior Associate – Risk Consulting
PwC India
akash.a.anand@pwc.com

pwc.in

Data Classification: DC0 (Public)

KS/October 2024-M&C 41671