MOODY'S ANALYTICS

ANALYSIS
23 MARCH, 2021

Prepared by

Chris Lafakis
Chris.Lafakis@moodys.com
Director

Janet Lee
Janet.Lee@moodys.com
Director

Juan Licari
Juan.Licari@moodys.com
Managing Director

Petr Zemcik
Petr.Zemcik@moodys.com
Senior Director

Contact Us

Email
help@economy.com

U.S./Canada
+1.866.275.3266

EMEA
+44.20.7772.5454 (London)
+420.224.222.929 (Prague)

Asia/Pacific
+852.3551.3077

All Others
+1.610.235.5299

Web
www.economy.com
www.moodysanalytics.com

Climate Risk Macroeconomic Forecasting

EXECUTIVE SUMMARY

Why climate change scenarios?

As a result of accumulating evidence regarding global warming, regulators across the world have begun to require financial institutions to provide a self-assessment or to stress-test their balance sheets with respect to climate change risk. For example, the Bank of England's 2021 Biannual Exploratory Scenario, the Hong Kong Monetary Authority's 2021 stress test, and the European Banking Authority & European Central Bank's 2022 stress tests will be based on climate change scenarios. Moody's Analytics is expanding its capabilities to enable institutions to assess risks posed by climate change.

How it works

The Moody's Analytics methodological approach builds on the infrastructure around its Global Macroeconomic Model designed for macroeconomic forecasting (see macrofinancial variables in Chart 1). Constructing climate change scenarios starts with a trajectory for carbon dioxide emissions, the necessary policies to reduce these emissions, and the corresponding change in global temperatures. The newly constructed transition mechanism block includes a carbon dioxide tax in the system of simultaneous equations. The enhanced framework is employed to account for the long-term physical risk associated with climate change and then altered to incorporate risks linked to the transition to a carbon-neutral economy. Climate risk variables and assumptions are used to produce a wide range of macrofinancial indicators.

Benefits and features

The methodology is flexible and complementary to climate change forecasting by organizations such as the Network for Greening the Financial System and by regulators. It allows financial institutions to expand existing and regulatory scenarios or create bespoke scenarios based on firm-specific assumptions about temperature pathways and transition trajectories. The Moody's Analytics Global Macroeconomic Model is well-suited to generating climate change scenarios because of detailed trade and financial links that ensure the consistency of scenarios across countries. The model also generates forecasts for 15,000+ variables consistent with climate change scenarios.

Climate Risk Macroeconomic Forecasting

BY CHRIS LAFAKIS, JANET LEE, JUAN LICARI AND PETR ZEMCIK

Why climate change scenarios?As a result of accumulating evidence regarding global warming, regulators across the world have begun to require financial institutions to provide a self-assessment or to stress-test their balance sheets with respect to climate change risk. For example, the Bank of England's 2021 Biannual Exploratory Scenario, the Hong Kong Monetary Authority's 2021 stress test, and the European Banking Authority & European Central Bank's 2022 stress tests will be based on climate change scenarios. Moody's Analytics is expanding its capabilities to enable institutions to assess risks posed by climate change.

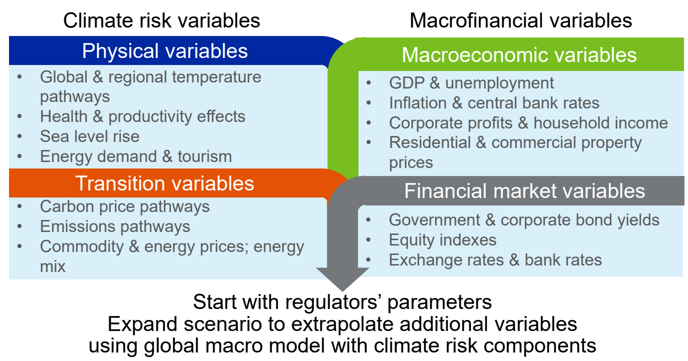
How it works

The Moody's Analytics methodological approach builds on the infrastructure around its Global Macroeconomic Model designed for macroeconomic forecasting (see macrofinancial variables in Chart 1). Constructing climate change scenarios starts with a trajectory for carbon dioxide emissions, the necessary policies to reduce these emissions, and the corresponding change in global temperatures. The newly constructed transition mechanism block includes a carbon dioxide tax in the system of simultaneous equations. The enhanced framework is employed to account for the long-term physical risk associated with climate change and then altered to incorporate risks linked to the transition to a carbon-neutral economy. Climate risk variables and assumptions are used to produce a wide range of macrofinancial indicators.

Benefits and features

The methodology is flexible and complementary to climate change forecasting by organizations such as the Network for Greening the Financial System and by regulators. It allows financial institutions to expand existing and regulatory scenarios or create bespoke scenarios based on firm-specific assumptions about temperature pathways and transition trajectories. The Moody's Analytics Global Macroeconomic Model is well-suited to generating climate change scenarios because of detailed trade and financial links that ensure the consistency of scenarios across countries. The model also generates forecasts for 15,000+ variables consistent with climate change scenarios.

Chart 1: Constructing Climate Risk Scenarios

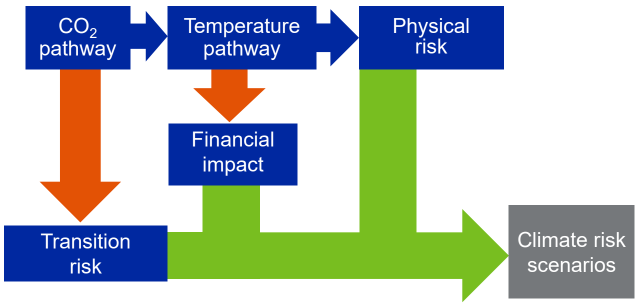


Source: Moody's Analytics

MOODY'S ANALYTICS CLIMATE RISK SCENARIO FRAMEWORK

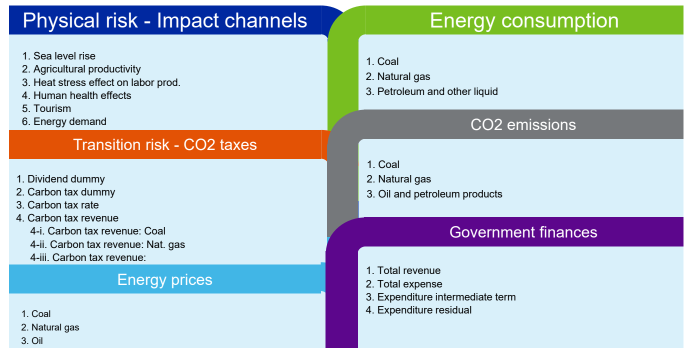
Moody's Analytics incorporates transition and physical risk channels associated with climate change into macroeconomic modelling (see Chart 2). Physical risk refers to the physical consequences of changing climate patterns implied by rising carbon dioxide emissions. Transition risk associated with climate change mitigation policies is embedded in the path for carbon taxes and other policies. This is combined with a financial impact linked to the timeline, according to which asset markets incorporate the climate risk in asset prices. Once the physical, transition and financial impacts are considered, we generate the climate risk scenarios. Moody's Analytics constructs forecasts of standard economic drivers consistent

Chart 2: Transition and Physical Risks



Source: Moody's Analytics

Chart 3: Transmission Channels



Source: Moody's Analytics

with various climate risk assumptions and the corresponding temperature pathways, using its Global Macroeconomic Model hosted on the web platform Scenario Studio.

Transmission channels

Physical risk

Physical risks can be separated into chronic and acute. There are six primary components of chronic physical risk:

- Sea level rise
- Human health effects
- Heat effect on labor productivity
- Agricultural productivity effects
- Tourism effects
- Energy demand effects

Acute physical risk refers to weather events that could become increasingly frequent or severe because of climate change. There are four primary components of acute physical risk:

- Heat waves and cold snaps
- Droughts and wildfires
- Flooding
- Tropical cyclones

The overall physical risk effect combines the impact on GDP for all the components of physical risk for each country by temperature over time. The risk components impact the long-term economic projections via real potential productivity, private consumption, exports, and global commodity prices. Both chronic and acute risks can be accommodated.

Transition risk

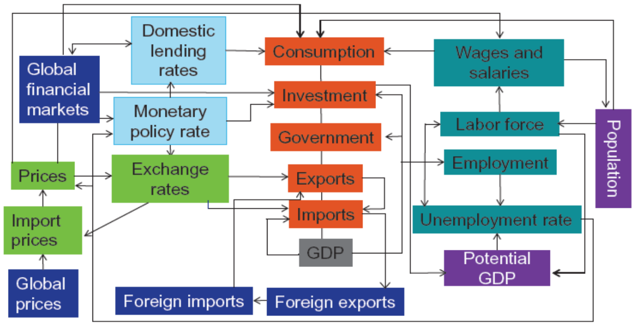
The impact of the transition to a zero-carbon economy is triggered by imposing taxes on carbon dioxide for key sources of energy such as coal, natural gas and petroleum. Chart 3 lists the components of the transition risk modelling, in addition to the previously described approach, to take account of the physical risk. The carbon tax rate is imposed exogenously based on assumptions regarding a government's climate change policy. Prices of coal, natural gas and petroleum depend on the carbon tax rate. Consumption of all three fossil fuels reflects the energy prices. Energy consumption mainly determines the emissions for each of the fossil fuels. Including the carbon dioxide tax also has implications for government finances. Overall tax revenue depends on tax income reflecting the GDP level and the revenue from the carbon tax. Expenditures depend on the carbon dividend dummy as well as the carbon tax revenue.

Moody's Global Macroeconomic Model

Generation of the climate risk scenarios relies on the Moody's Analytics Global Macroeconomic Model hosted on the web-based platform Scenario Studio. The model forecasts more than 15,000+ time series across 100 countries, which collectively constitute more than 95% of global GDP. Model equations are specified based on economic theory, and they feature shock properties that are essential in scenario construction, including the creation of economic forecasts consistent with different climate change assumptions. The model captures both short-term business cycle dynamics and long-run trends. Short-term forecasts are determined by fluctuations in aggregate demand, whereas long-term forecasts are determined by an economy's labor force and labor force productivity growth. The forecasting horizon has been extended to 2100 to accommodate the long-term nature of climate change scenarios. The model captures both the interconnectedness among economic regions and country-specific idiosyncracies. The linkages among countries and regions are characterized by trade and financial flows. The cross-country linkages include the impact of global prices and exchange rates on economic performance. While the model structure is similar across countries, the framework allows for country-specific variations of key equations and for the inclusion of tailpipe equations for variables important for some countries (see Chart 4). The interconnectedness among regions allows for the capture of global and regional economic impacts of climate change scenarios. The key variables that are impacted by the block of climate transition risk equations are real imports via the effective domestic oil price; disposable income via the carbon dioxide tax revenue and indirectly via government expenditures; indirectly, the exchange rate and gross value added for industries. The GVA is one of the drivers of employment in 20 industries (see Chart 5).

Chart 4: MA Global Macroeconomic Model

100+ country modules linked via trade and finance



Source: Moody's Analytics

Chart 5: Industrial Coverage

TCFD Recommendation	PRA General Insurance Stress Test 2019	Moody's Global Model Coverage	
Eight higher-risk sectors to have more detailed climate-related financial disclosures.	Nine sectors to provide factors to assess the potential impact on the market of investments from transition and physical risks in each of the climate scenarios.	• Employment and gross value added by industry for most European countries and some Asian countries • 20 industries according to NACE classification (seven in the goods-producing sector and 13 in the service-providing sector).	
TCFD higher-risk industries » Energy » Transportation » Materials & buildings » Agriculture, food & forest products » Banks » Insurance companies » Asset owners » Asset managers	**PRA higher-risk industries** » Fuel extraction » Power generation » Transport » Energy-intensive ind. (materials/metals) » Agriculture & food security » Water utilities » Real estate assets (incl. CRE, rental & leasing, construction, infrastructure) » Sovereign & municipal bonds » Others	**Moody's higher-risk industries** » Mining & quarrying » Electricity: gas, steam & air cond. supply » Transportation & storage » Manufacturing » Agriculture, forestry & fishing » Water supply; sewerage, waste management & remediation » Construction » Real estate » Financial & insurance » Public administration & defense	**Moody's higher-risk industries** » Wholesale & retail trade » Accommodations & food service » Information & communication » Professional scientific & technical » Administrative & support service » Education » Human health & social work » Arts, entertainment & recreation » Other services » Activities of household as employers

Source: Moody's Analytics

Flexible Moody's Analytics approach

Our approach to constructing climate scenarios shares some socioeconomic features of the commonly used Integrated Assessment Models. These are captured by modules connected to describe how greenhouse gas emissions affect climate and how climate change affects the economy. The energy system serves as the conduit through which environmental and economic variables interact. Most IAM energy systems are detailed representations of the sources of energy supply, which subsequently determine emissions. Moody's Analytics uses output from these IAMs as an input into its scenario construction process. The main IAM inputs are fossil fuel consumption by source, temperature pathways and carbon prices.

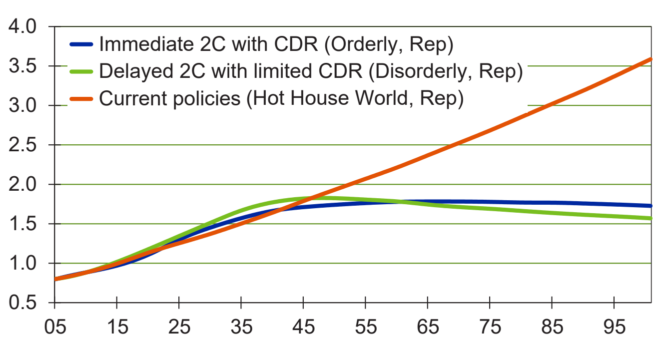
Our approach is flexible and complementary to IAMs. It is possible to include both physical and transition risk, while chronic and acute physical risks can each be accommodated. The approach also allows for idiosyncratic assumptions about the carbon dioxide tax and temperature pathways. Generated climate change scenarios are consistent with these assumptions.

MOODY'S ANALYTICS ECONOMIC PROJECTIONS CONSISTENT WITH NGFS SCENARIOS

NGFS climate scenarios

In June 2020, the Network for Greening the Financial System released its phase one climate risk scenarios. These scenarios focus on transition risk and do not feature acute physical risk. Also, they do not include geographic specificity on chronic physical risk. Instead, the NGFS publishes chronic physical risk costs according to three different global damage functions. The NGFS phase one scenarios feature three representative scenarios in which assumptions are varied in order to construct a distribution of economic costs (see Chart 6 for temperature pathways). The Orderly scenario is one of early policy action to transition the world to net zero CO2 emissions. The Disorderly scenario is one in which policy action is delayed yet implemented at a later date with greater intensity. In both the Orderly and Disorderly scenarios, the global temperature increase is no greater than the Paris target of 2°C above pre-industrial levels. The third scenario, Hot House World, is one in which there is limited action to transition the world to a lower carbon economy. The global temperature increase exceeds the Paris target.

Chart 6: NGFS Scenarios

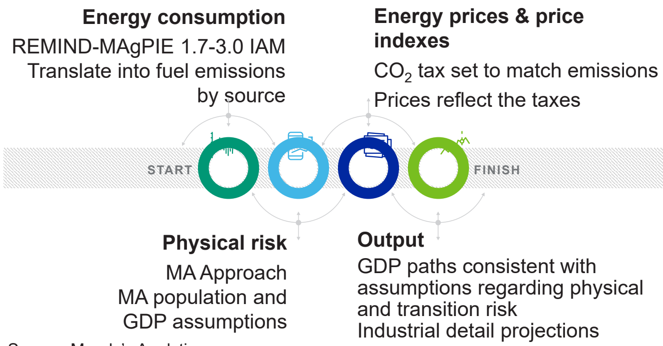


Sources: Network for Greening the Financial System, Moody's Analytics

Moody's Analytics uses its global macroeconomic model to create a full set of quarterly economic projections through 2100 consistent with the three NGFS scenarios. Following the NGFS recommendation, and for the sake of consistency across scenarios, we have decided to use the NGFS-provided output from the Regional Model for Investment and Development to construct climate risk scenarios aligned with the NGFS assumptions. The REMIND outputs published by the NGFS become inputs into our model used to assess the macroeconomic cost of transition risk.

Chart 7 summarizes the adopted process to produce scenarios consistent with NGFS. We match energy consumption translated into fuel emissions by source. For the physical risk, we apply the Moody's Analytics approach including the assumptions with respect to projections of population and

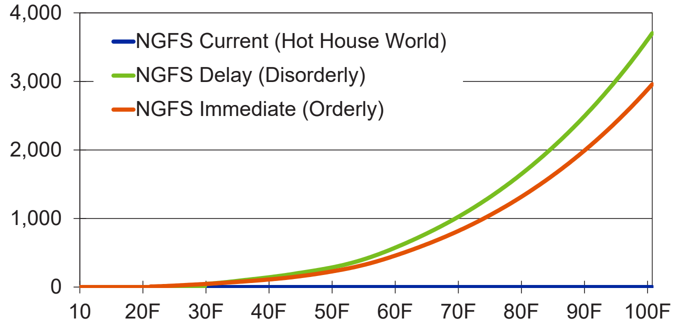
Chart 7: NGFS Consistent Scenarios



Source: Moody's Analytics

Chart 8: U.K. Carbon Dioxide Tax Rate

£ per metric ton, NSA



Sources: Network for Greening the Financial System, Moody's Analytics

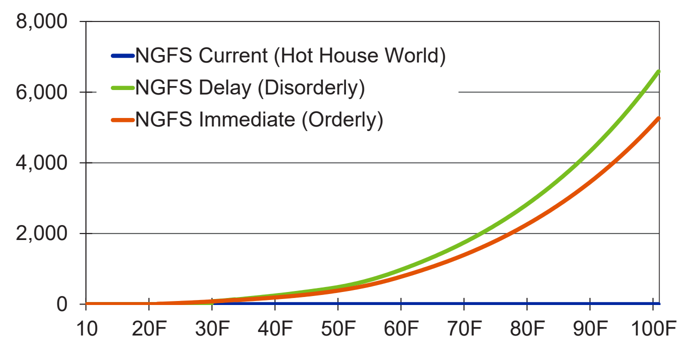
GDP. For transition risk, we have opted to match energy consumption and emissions, as they are well-defined, while the GDP paths published by NGFS depend on assumptions with respect to population and other variables that are inconsistent with ours. We also use the NGFS carbon price trajectories and our model to produce forecasts for domestic energy prices, which simultaneously interact with other model variables to produce our full set of macroeconomic forecasts. The ranking of our GDP paths is similar to those of the NGFS, though there are differences in absolute levels. The end product is a set of macroeconomic scenarios consistent with NGFS assumptions on fossil fuel usage, carbon emissions, and carbon prices.

Charts 8 and 9 summarize the U.K. and U.S. carbon tax rate until 2100 for the three NGFS representative scenarios. In the Orderly scenario, the carbon tax is put into effect starting in the third quarter of 2021, and the carbon tax rate rises over time with the increase significantly intensifying in the second half of the century. In the Disorderly scenario, the carbon tax is not implemented until the first quarter of 2030, and because of the late start, the carbon tax rate needs to be higher than the immediate scenario in order to make up for the lost time. In the Hot House World scenario, the carbon tax rate is zero since no additional future action is taken to mitigate climate risks.

The carbon tax will raise the effective domestic energy prices of fossil fuels tremendously. Charts 10 and 11 show that prior to 2030, energy prices for U.K. coal and U.S. natural gas in the Disorderly scenario are the same as in the Hot House World scenario, but they will rise rapidly and exceed the Orderly scenario starting in 2030. As a result of the very large carbon tax rate imposed in the Or-

Chart 9: U.S. Carbon Dioxide Tax Rate

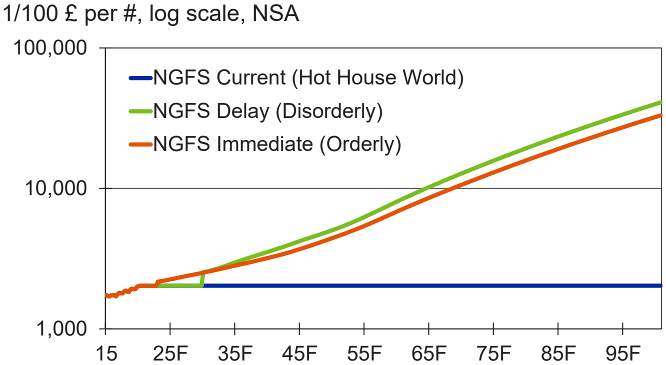
$ per metric ton, NSA



Sources: Network for Greening the Financial System, Moody's Analytics

Chart 10: U.K. Effective Domestic Price: Coal

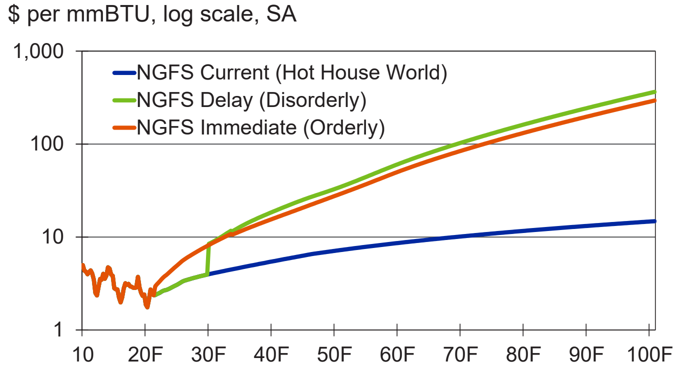
1/100 £ per #, log scale, NSA



Sources: U.K. Department for Business, Energy & Industrial Strategy, Moody's Analytics

Chart 11: U.S. Effective Domestic Price: NG

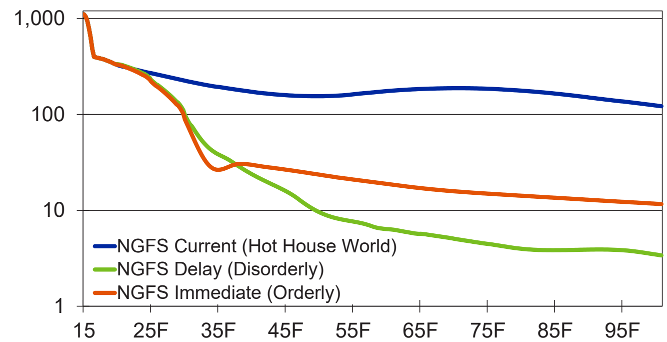
$ per mmBTU, log scale, SA



Sources: Network for Greening the Financial System, Moody's Analytics

Chart 12: U.K. Energy Consumption: Coal

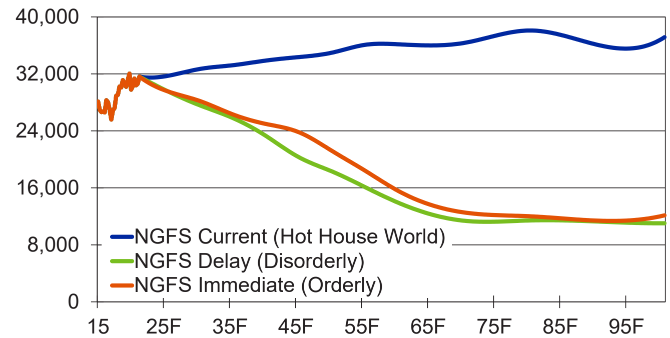
BTU, tril, log scale, SAAR



Sources: U.S. Energy Information Administration, Moody's Analytics

Chart 13: U.S. Energy Consumption: NG

Ths, short tons, SAAR



Sources: Network for Greening the Financial System, Moody's Analytics

derly and Disorderly scenarios, fossil fuels consumption will fall dramatically. Chart 12 shows that U.K. coal consumption will be driven to near zero in the Orderly and Disorderly scenarios, and without the carbon tax, U.K. coal consumption will continue its long-term decline but will not fall to zero by 2100 in the Hot House World scenario. In the U.S., natural gas consumption is projected to rise steadily in the Hot House World scenario, but in the the Orderly and Disorderly scenarios it is projected to decline by over 50% in 2100 (see Chart 13).

Granular economic projection examples

Moody's Analytics generates country-level economic scenarios, whereas NGFS/REMIND issues forecasts for 17 geographic units. Some of those geographic units are countries, and for those countries we use country-provided inputs to construct economic scenarios. When a country-level forecast is not provided by REMIND, we take the growth rates of the region that country resides in and extrapolate those growth rates at the country level.

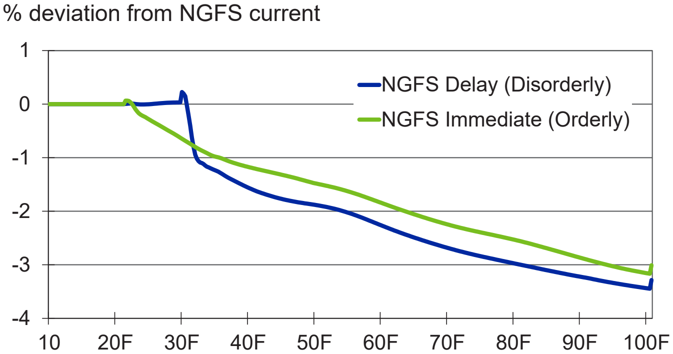
After calibrating to the NGFS carbon tax and fossil fuels consumption pathway, and adjusting for the effects of chronic physical risk for the U.K. and the U.S., we use the Moody's Analytics Global Macro Model to generate the full scenario pathway for the U.K., U.S., and the rest of the global economy. Since the U.K. is not a separate region in the NGFS scenarios, we calibrate the U.K. using the carbon tax rate and fossil fuels consumption pathway for the EU as a proxy. The scenario outputs are the entire suite of economic and financial variables currently in the Moody's Analytics Global Macro Model universe. Charts 14 and 15 show the projected percentage loss in real GDP between scenarios. Since the impacts of chronic physical risk are small and almost negligible for the U.K. and the U.S., losses in real GDP for these two countries are mostly due to transition risk alone.

Loss of GDP at the aggregate level may give a false impression of the full impact from transition risk for individual industries. In transitioning to a low carbon economy, there needs to be a substantial reallocation of resources, and the inflation pressures from energy prices will affect industries and sectors differently. High-risk industries such as mining and utilities will be hit much harder than low-risk industries such as professional services. The U.S. mining industry is projected to experience a nearly 40% reduction in employment in both the Orderly and Disorderly scenarios (see Chart 16).

A key feature of the Moody's Analytics approach is generation of the full set of standard macrofinancial variables in addition to the transition drivers. An example is term structure of interest rate in the U.K. (see Chart 17).

Chart 14: U.K. Real GDP Scen Comparison

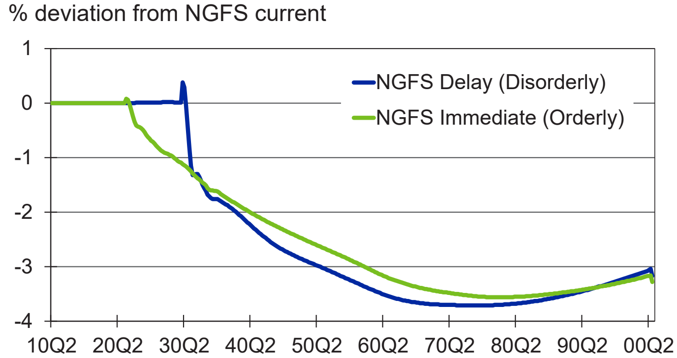
% deviation from NGFS current



Sources: Network for Greening the Financial System, Moody's Analytics

Chart 15: U.S. Real GDP Scen Comparison

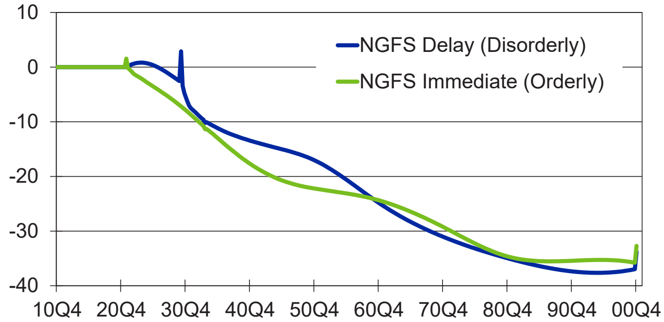
% deviation from NGFS current



Sources: Network for Greening the Financial System, Moody's Analytics

Chart 16: U.S. Mining Employment

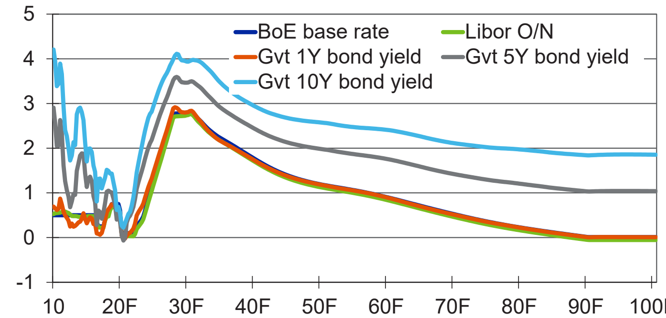
% deviation from NGFS current



Sources: Network for Greening the Financial System, Moody's Analytics

Chart 17: U.K. Yield Curve–Delay Scenario

% p.a., NSA



Sources: Bank of England, ICE Benchmark Administration Limited, Moody's Analytics

APPLICATIONS FOR CLIMATE CHANGE SCENARIOS

Climate risk adjusted credit risk

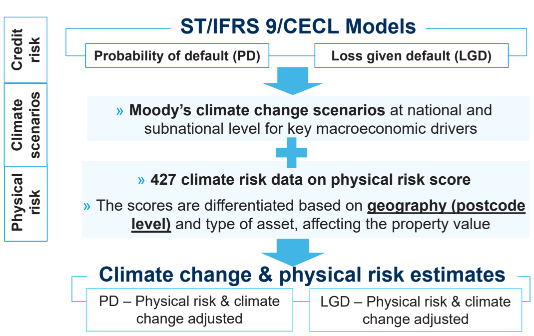
The climate change scenarios are used as input and the first step in the credit risk assessment of portfolios of financial institutions. They are further combined with facility-level data such as the previously discussed physical risk scores by 427 (see Chart 18). The data requirements are similar to standard stress-testing and/or IFRS 9/CECL type calculations. These data inputs are used to generate projections of risk parameters such as probability of default, loss given default, and the corresponding expected credit losses. The analysis of instrument-level performance based on the portfolio data snapshots, combined with the facility-level climate risk score from 427, will result in adjustment factors for PDs and LGDs to account for the climate change risk. The output includes a variety of instrument-level metrics combined with the adjustment factors.

ESG scores and climate risk

For corporate portfolios, assessment from the perspective of environmental, social and governance factors needs to be combined with climate change risk assessment. In addition to the climate change projections, the ESG rating is required as well. Here we leverage on ESG ratings produced by Vigeo Eiris, acquired recently by Moody's Corporation. VE evaluates the efforts of corporates to pursue a sustainable business. It relies on the attribution of scores (from 0 to 100) relative to 38 environmental, social and governance criteria. VE rates some 5,000+ companies (to be expanded to 10,000+ in 2021), and we use an ESG score predictor for over 100,000 small and medium-sized enterprises. Chart 19 illustrates how climate risk sensitivities are used jointly with ESG drivers to assess the impact on credit risk.

Chart 18: Climate Risk Sensitivities

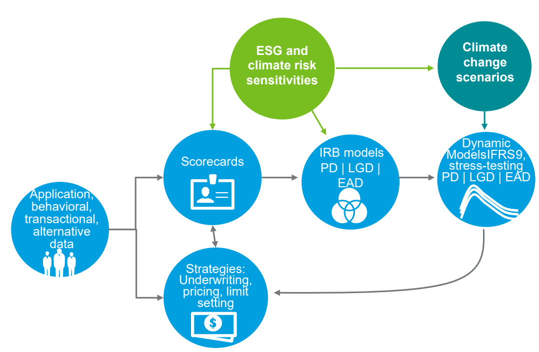
Climate change and credit risk



Sources: Network for Greening the Financial System, Moody's Analytics

Chart 19: ESG Scores in Practice

From origination to provisioning and strategy setting



Source: Moody's Analytics

About the Authors

Chris Lafakis is a director at Moody's Analytics. He is the lead modeler for the Moody's Analytics climate risk initiative and is responsible for climate modeling and scenario creation. He also has expertise in macroeconomics, energy economics, model development and model validation. Based in West Chester PA, he also contributes to Economic View. Mr. Lafakis has been quoted by media outlets, including The Wall Street Journal, CNBC, Bloomberg, and National Public Radio and often speaks at economic conferences and events. Mr. Lafakis received his bachelor's degree in economics from the Georgia Institute of Technology and his master's degree in economics from the University of Alabama.

Janet Lee is a director with the Economics and Business Analytics unit at Moody's Analytics. Currently she is working on the climate risk research effort to quantify the economic impact of acute physical risk and developing models to link transition risk to the macroeconomy. Previously, she led custom projects to develop loss-forecasting and stress-testing models for clients, which included large and medium-size commercial banks, credit unions, auto captives, and financial technology lenders. Janet graduated from the University of Chicago and did her PhD studies in economics at the University of Pennsylvania. She is a CFA charter holder and has previously worked at Prudential Financial and the Federal Reserve Bank of Chicago.

Dr. Juan M. Licari is a managing director at the Moody's Analytics London office. He is the global head of the Business Analytics team consisting of risk modelers, economists and statisticians in the U.K., the U.S., China, United Arab Emirates, Czech Republic, and Singapore. Dr. Licari's team provides consulting support to major industry players, builds econometric tools to model credit phenomena, and implements several stress-testing platforms to quantify portfolio risk exposure. His team is an industry leader in developing and implementing credit solutions that explicitly connect credit data to the underlying economic cycle, allowing portfolio managers to plan for alternative macroeconomic scenarios. He currently leads the overall effort to address climate change risk from the perspective of climate risk economic scenarios, economic losses linked to climate events, the impact of climate change on retail portfolios, and the ESG score predictor for small and medium enterprises. Dr. Licari has extensive hands-on experience as a project lead with respect to development, validation, calibration and monitoring of IRB, IFRS 9 and stress-testing credit risk models especially for U.K. banks and financial institutions, for both retail and corporate portfolios. He is actively involved in communicating the team's research and methodologies to the market, including senior management and board members. He often speaks at credit events and economic conferences worldwide. Dr. Licari holds a PhD and an MA in economics from the University of Pennsylvania and graduated summa cum laude from the National University of Cordoba in Argentina.

Dr. Petr Zemcik is a senior director at the Moody's Analytics London office who manages a team of risk modelers and economists in the London and Prague offices. He frequently serves as an engagement lead and a head modeler for projects across several lines of business in the U.K., continental Europe, the Middle East, and Africa to design and validate PD/LGD/EAD credit risk models for IFRS 9, A-IRB, and stress-testing. He supervises quality control, development and validation of macroeconomic country models, credit risk products using proprietary data, satellite market risk models, and other forecasting products. He currently manages the development of climate risk scenarios at Economics and Business Analytics. He previously worked at CERGE-EI, a joint workplace of the Center for Economic Research and Graduate Education of Charles University in Prague and the Economics Institute of the Academy of Sciences of the Czech Republic, and at Southern Illinois University in Carbondale IL. He holds a PhD and an MA in economics from the University of Pittsburgh and an MSc in econometrics and operations research from the University of Economics in Prague.

About Moody's Analytics

Moody's Analytics provides financial intelligence and analytical tools supporting our clients' growth, efficiency and risk management objectives. The combination of our unparalleled expertise in risk, expansive information resources, and innovative application of technology helps today's business leaders confidently navigate an evolving marketplace. We are recognized for our industry-leading solutions, comprising research, data, software and professional services, assembled to deliver a seamless customer experience. Thousands of organizations worldwide have made us their trusted partner because of our uncompromising commitment to quality, client service, and integrity.

Concise and timely economic research by Moody's Analytics supports firms and policymakers in strategic planning, product and sales forecasting, credit risk and sensitivity management, and investment research. Our economic research publications provide in-depth analysis of the global economy, including the U.S. and all of its state and metropolitan areas, all European countries and their subnational areas, Asia, and the Americas. We track and forecast economic growth and cover specialized topics such as labor markets, housing, consumer spending and credit, output and income, mortgage activity, demographics, central bank behavior, and prices. We also provide real-time monitoring of macroeconomic indicators and analysis on timely topics such as monetary policy and sovereign risk. Our clients include multinational corporations, governments at all levels, central banks, financial regulators, retailers, mutual funds, financial institutions, utilities, residential and commercial real estate firms, insurance companies, and professional investors.

Moody's Analytics added the economic forecasting firm Economy.com to its portfolio in 2005. This unit is based in West Chester PA, a suburb of Philadelphia, with offices in London, Prague and Sydney. More information is available at www.economy.com.

Moody's Analytics is a subsidiary of Moody's Corporation (NYSE: MCO). Further information is available at www.moodysanalytics.com.

DISCLAIMER: Moody's Analytics, a unit of Moody's Corporation, provides economic analysis, credit risk data and insight, as well as risk management solutions. Research authored by Moody's Analytics does not reflect the opinions of Moody's Investors Service, the credit rating agency. To avoid confusion, please use the full company name "Moody's Analytics", when citing views from Moody's Analytics.

About Moody's Corporation

Moody's Analytics is a subsidiary of Moody's Corporation (NYSE: MCO). MCO reported revenue of $4.8 billion in 2019, employs more than 11,000 people worldwide and maintains a presence in more than 40 countries. Further information about Moody's Analytics is available at www.moodysanalytics.com.