MSCI Climate VaR Methodology Part 1: Overview

An overview of the MSCI Climate Value-at-Risk methodologies, model outputs and typical use cases.

MSCI ESG Research

April 2020

Contents

1 Overview

MSCI ESG Research firmly believes that climate change presents clear and pressing risks and opportunities to financial markets.[1] In addition to the life and death risks of increasing temperatures and rising oceans, climate change also highlights the economic and investment risks and opportunities associated with the world's transition to a low carbon economy. An extensive body of scientific evidence has established that man-made factors are driving climate change on our planet. Citizens are demanding action from governments, companies and investors, because we face a catastrophic future unless remedial action is taken swiftly. Investors all over the world need to incorporate this new reality into their investment portfolios.

For these reasons, MSCI ESG Research is offering the Climate Value-at-Risk (Climate VaR) metric, which provides a forward-looking and returns-based impact metric for investors. The development of this metric leveraged an integrated approach, considering the latest academic findings from climate science as well as input from the financial services industry.[2]

As ever more manifestations of extreme weather arise, we have seen the investment industry undergo a sea change.[3] Policy makers have also begun to forge robust and incisive climate change regulations on a global level[4] and the topic of evaluating companies' climate change resilience has become a pre-eminent investment issue.

Broadly speaking, evidence of tangible action continues: more companies have disclosed the carbon-intensity of their operations,[5] more shareholder resolutions have urged managements to address climate change-related issues and investor

---

[1] For more information, see The MSCI Principles of Sustainable Investing, www.msci.com/esg-investing.

[2] In 2019, Carbon Delta together with twenty institutional investors and UNEP FI piloted a metric for determining the value at risk for equity, bond, and real estate portfolios. https://www.unepfi.org/investment/tcfd/

[3] TCFD. "Second TCFD Status Report Shows Steady Increase in TCFD Adoption," June 2019. https://www.fsb-tcfd.org/wp-content/uploads/2019/06/Press-Release-2019-TCFD-Status-Report_FINAL.pdf.

[4] For a list of climate change pledges by country, see MSCI ESG Research, "Who will lead the race to cut carbon?" February 2019. https://www.msci.com/who-will-lead-the-race-to-cut-carbon.

[5] In 2019, over 8,400 companies disclosed through CDP – a 20% increase on the previous year. Reporting companies now represent over 50% of global market capitalization according to CDP: https://www.cdp.net/en/companies/companies-scores.

pledges,[6] and widely publicized divestments have redirected money to more environmentally benign assets.[7]

We believe that readying a business model for a decarbonized future goes beyond reporting and marketing in response to green initiatives; it is one of fundamental transition. Against this background, identifying business models with resilience to the regulatory and physical risks associated with climate change has emerged as an investor need. By providing investors with a climate finance metric that helps discriminate between climate change-resilient assets and those that may be less resilient, MSCI ESG Research seeks to support the transition to a low carbon economy.

Climate VaR can be used to inform action, e.g. diversify, divest, or engage.

1.1 PURPOSE OF THE METHODOLOGY GUIDE

This methodology guide series is intended to provide practitioners with a detailed understanding of how MSCI ESG Research calculates Climate Value-at-Risk and to illustrate potential uses of this data for our institutional investor clients. MSCI ESG Research believes that a transparent modeling approach is crucial to drive innovation in the evaluation of climate-related investment risks. In the following sections, we provide a description of our climate change assessment methodologies.

1.2 MSCI CLIMATE VALUE-AT-RISK AT A GLANCE

In 2019, MSCI acquired Carbon Delta,[8] a Zurich-based data analytics firm with offices in Germany and the United Kingdom that conducts assessments of climate change risks and opportunities embedded within investment portfolios. The firm developed a fully automated and forward-looking financial climate risk metric called "Climate Value-at-Risk" (Climate VaR).

The overall methodology of Climate VaR is designed to be closely aligned with the Task Force on Climate-related Financial Disclosures (TCFD) recommendations to

---

[6] WSJ. "Show Us Your Climate Risks, Investors Tell Companies," February 2019. https://www.wsj.com/articles/show-us-your-climate-risks-investors-tell-companies-11551349800.

[7] In 2018, nearly 1,000 institutional investors with USD 6.24 trillion in assets have committed to divest from fossil fuels, up from USD 52 billion four years ago: Arabella Advisors, "The Global Fossil Fuel Divestment and Clean Energy Investment Movement," September 2019. https://www.arabellaadvisors.com/wp-content/uploads/2018/09/Global-Divestment-Report-2018.pdf

[8] MSCI, Press Release: "MSCI to Strengthen Climate Risk Capability with Acquisition of Carbon Delta," https://www.msci.com/documents/10199/e884e4bb-dde8-ee6a-6dfc-e38eabaaafd8

conduct scenario analysis on investment portfolio.[9] Unique features of the modeling approach are summarized within the box below:

Climate Value-at-Risk (Climate VaR) is designed to provide a forward-looking and return-based valuation assessment to measure climate related risks and opportunities in an investment portfolio. The fully quantitative model offers deep insights into how climate change could affect company valuations. Our software-based and modular modeling approach enables a fast and flexible adaptation to the particular needs of institutional investors. With an extensive and readily available database, MSCI ESG Research has the unique capacity to provide investors with state-of-the-art climate risk analysis within a very short timeframe.

- We have developed a database with readily available climate risk analysis for over 10,000 companies, covering both equities and corporate bonds with a total of over 300,000 securities.
- We calculate and analyze policy-related transition risks under 1.5°C, 2°C and 3°C scenarios.
- We compute physical risks due to numerous extreme weather events, such as extreme heat, cold, wind, precipitation, snowfall and tropical cyclones.
- We provide Scope 1 GHG footprints for all companies in our database along with intra- and inter- portfolio analysis.
- We compute the warming potential of individual securities and provide guidance on a 2°C alignment at the portfolio level.
- Our low carbon patent analysis articulates potential future technology opportunities on an enterprise and portfolio level.
- Our performance-based methodology of computing costs resulting from climate change provides a simple mechanism to integrate risks directly into standard financial reporting frameworks

[9] TCFD, https://www.tcfdhub.org/scenario-analysis/

1.3 AN INTEGRATED AND TRANSPARENT APPROACH

Exhibit 1 - MSCI ESG Research's Climate Value-at-Risk modeling process

In order to provide a quantitative, forward-looking analysis of how climate change may provide risks or opportunities within an investment portfolio, MSCI ESG Research deploys a holistic approach that is both data-driven and transparent.

The first step in the process of assessing climate risks and opportunities is to understand what the various impacts of climate change may be on the assets themselves, categorized into three core pillars: physical risks, transition risks, and technology opportunities.

MSCI ESG Research starts with individual enterprises and assesses how future physical effects of climate change may be borne out for individual assets belonging to the enterprise in question in a 15-year time horizon. This impact modelling considers a number of physical hazards or perils that are both chronic and acute in nature and are known as **physical risks**. At the same time, climate change policies that countries enact in order to decarbonize also equate to potential impacts for companies in a 15-year time horizon; these are known as **transition risks**. Finally, the modelling approach considers the opportunities born out of the changes required to meet the transition to a low carbon economy in a 15-year time horizon; we refer to these as the **technology opportunity**. These components are described in detail in subsequent sections. The pillars are illustrated below.

Exhibit 2 - The distinct pillars of climate risk and opportunities that when combined create the aggregated Climate Value-at-Risk (Climate VaR)

After modelling the impacts of climate change, step two is to calculate the potential costs and potential revenues. We assess each individual impact in terms of the potential financial impact on the company's operation: from a business interruption and corresponding loss in productivity and therefore revenue, to an acute extreme weather event which damages assets and renders them inoperable. We also factor the costs from increasingly stringent legislation into this calculation process – the costs to decarbonize and meet national targets in the countries of operation – and model potential future revenues and profits arising from low carbon innovation.

We apply these cost and revenue projections to individual securities and value the impacts across asset classes, through equities, fixed income, and real estate assets; these calculations can be aggregated upwards to the scale of the entire portfolio.

This transparent approach applies conservative assumptions to provide realistic potential impacts of climate change on a company's bottom line. Flexible inputs and the use of third-party data such as United Nations Framework Convention on Climate Change (UNFCCC) data aim to provide additional quality safeguards and improve the accuracy of the model.

Exhibit 3 - Properties of MSCI ESG Research's data modelling approach

2 Typical use cases

We have seen a wide range of use cases from financial institutions using MSCI ESG Research analysis and data. Please contact a member of the MSCI ESG Research team to find out more detailed information on how other financial institutions have integrated and deployed the data and analysis. The main themes we observe are below.

- **Engagement**: clients such as pension funds have utilized the Climate VaR metric in their discussions with portfolio companies to make them aware of the risks of climate change to their business operations, e.g. transition risk from regulation, damage to assets, and business interruption. Such clients often take the view that divestment is the last course of action and engagement is preferable. The quantification of costs under different scenarios can be used to communicate the potential risk from climate change.
- **Investment decision-making:** clients such as asset managers have used the technology opportunity component of MSCI ESG Research's analysis to identify companies that they believe may have been incorrectly priced by the market. The 'green' patent analysis provides extra financial information that can be integrated into investment decision making processes. The quantitative and transparent approach may support such use cases. Product development is another avenue that has been actively explored by clients, utilizing the Climate VaR metric in dedicated ESG products either as a quantitative model input, in universe selection, or in screening processes.
- **Risk analysis:** MSCI ESG Research's Climate VaR metric can be aggregated across portfolios, so that investment managers can understand portfolio-wide climate risk levels. Some risk departments have set Climate VaR targets or risk tolerance levels for portfolio managers.
- **Monitoring & compliance:** certain jurisdictions such as France have introduced mandatory reporting requirements for investors. Notably, Article 173 requires investors in the country to comply or explain in terms of their portfolio alignment with the 2°C warming target set out in the Paris Agreement within the United Nations Framework Convention on Climate Change.[10]

[10] https://www.unpri.org/climate-change/french-energy-transition-law-global-investor-briefing-on-article-173/295.article

- **TCFD reporting:** MSCI ESG Research's analysis is closely aligned with the recommendations of the Task Force on Climate-related Financial Disclosures developed by the Financial Stability Board.[11] MSCI ESG Research supports clients with their reporting disclosure requirements and our analysis can be used to communicate the risks of assets and portfolios .

[11] https://www.fsb-tcfd.org, see https://www.msci.com/tcfd for more information.

3 Coverage

3.1 UNIVERSE COVERAGE AS OF APRIL 2020

Metric	Number of Issuers Covered
Enterprise/Equity/Debt Policy Climate VaR	9,467
Enterprise/Equity/Debt Technology Climate VaR	9,394
Enterprise/Equity/Debt Physical Climate VaR	7,295
Warming Potential	10,032

Metric	Number of Fixed Income Instruments Covered
Bond Policy Climate VaR	413,852
Bond Technology Climate VaR	422,058
Bond Physical Climate VaR	378,084

3.2 TREATMENT OF SUBSIDIARIES

MSCI ESG Research assigns issuer level Climate VaR and Warming Potential numbers to majority-owned subsidiaries of issuers. Fixed income instruments derive some issuer level information from their direct issuer, if available, or go up the hierarchy until data is available.

3.3 AVAILABILITY OF HISTORY

We currently provide historical back-casted data on policy and technology opportunities Climate VaR from 2015 to the current year, on an annual basis.

3.4 UPDATE CYCLE

The data from the Climate Risk Center at MSCI ESG Research has an update cycle of 2 months.

Contact us

clientservice@msci.com

AMERICAS

Americas	1 888 588 4567 *
Atlanta	+ 1 404 551 3212
Boston	+ 1 617 532 0920
Chicago	+ 1 312 675 0545
Monterrey	+ 52 81 1253 4020
New York	+ 1 212 804 3901
San Francisco	+ 1 415 836 8800
São Paulo	+ 55 11 3706 1360
Toronto	+ 1 416 628 1007

EUROPE, MIDDLE EAST & AFRICA

Cape Town	+ 27 21 673 0100
Frankfurt	+ 49 69 133 859 00
Geneva	+ 41 22 817 9777
London	+ 44 20 7618 2222
Milan	+ 39 02 5849 0415
Paris	0800 91 59 17 *

ASIA PACIFIC

China North	10800 852 1032 *
China South	10800 152 1032 *
Hong Kong	+ 852 2844 9333
Mumbai	+ 91 22 6784 9160
Seoul	00798 8521 3392 *
Singapore	800 852 3749 *
Sydney	+ 61 2 9033 9333
Taipei	008 0112 7513 *
Thailand	0018 0015 6207 7181 *
Tokyo	+ 81 3 5290 1555

* = toll free

ABOUT MSCI

MSCI is a leading provider of critical decision support tools and services for the global investment community. With over 45 years of expertise in research, data and technology, we power better investment decisions by enabling clients to understand and analyze key drivers of risk and return and confidently build more effective portfolios. We create industry-leading research-enhanced solutions that clients use to gain insight into and improve transparency across the investment process.

About MSCI ESG Research Products and Services

MSCI ESG Research products and services are provided by MSCI ESG Research LLC, and are designed to provide in-depth research, ratings and analysis of environmental, social and governance-related business practices to companies worldwide. ESG ratings, data and analysis from MSCI ESG Research LLC. are also used in the construction of the MSCI ESG Indexes. MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc.

To learn more, please visit www.msci.com.

Notice and disclaimer

This document and all of the information contained in it, including without limitation all text, data, graphs, charts (collectively, the "Information") is the property of MSCI Inc. or its subsidiaries (collectively, "MSCI"), or MSCI's licensors, direct or indirect suppliers or any third party involved in making or compiling any Information (collectively, with MSCI, the "Information Providers") and is provided for informational purposes only. The Information may not be modified, reverse-engineered, reproduced or redisseminated in whole or in part without prior written permission from MSCI.

The Information may not be used to create derivative works or to verify or correct other data or information. For example (but without limitation), the Information may not be used to create indexes, databases, risk models, analytics, software, or in connection with the issuing, offering, sponsoring, managing or marketing of any securities, portfolios, financial products or other investment vehicles utilizing or based on, linked to, tracking or otherwise derived from the Information or any other MSCI data, information, products or services.

The user of the Information assumes the entire risk of any use it may make or permit to be made of the Information. NONE OF THE INFORMATION PROVIDERS MAKES ANY EXPRESS OR IMPLIED WARRANTIES OR REPRESENTATIONS WITH RESPECT TO THE INFORMATION (OR THE RESULTS TO BE OBTAINED BY THE USE THEREOF), AND TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, EACH INFORMATION PROVIDER EXPRESSLY DISCLAIMS ALL IMPLIED WARRANTIES (INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF ORIGINALITY, ACCURACY, TIMELINESS, NON-INFRINGEMENT, COMPLETENESS, MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY OF THE INFORMATION.

Without limiting any of the foregoing and to the maximum extent permitted by applicable law, in no event shall any Information Provider have any liability regarding any of the Information for any direct, indirect, special, punitive, consequential (including lost profits) or any other damages even if notified of the possibility of such damages. The foregoing shall not exclude or limit any liability that may not by applicable law be excluded or limited, including without limitation (as applicable), any liability for death or personal injury to the extent that such injury results from the negligence or willful default of itself, its servants, agents or sub-contractors.

Information containing any historical information, data or analysis should not be taken as an indication or guarantee of any future performance, analysis, forecast or prediction. Past performance does not guarantee future results.

The Information should not be relied on and is not a substitute for the skill, judgment and experience of the user, its management, employees, advisors and/or clients when making investment and other business decisions. All Information is impersonal and not tailored to the needs of any person, entity or group of persons.

None of the Information constitutes an offer to sell (or a solicitation of an offer to buy), any security, financial product or other investment vehicle or any trading strategy.

It is not possible to invest directly in an index. Exposure to an asset class or trading strategy or other category represented by an index is only available through third party investable instruments (if any) based on that index. MSCI does not issue, sponsor, endorse, market, offer, review or otherwise express any opinion regarding any fund, ETF, derivative or other security, investment, financial product or trading strategy that is based on, linked to or seeks to provide an investment return related to the performance of any MSCI index (collectively, "Index Linked Investments"). MSCI makes no assurance that any Index Linked Investments will accurately track index performance or provide positive investment returns. MSCI Inc. is not an investment adviser or fiduciary and MSCI makes no representation regarding the advisability of investing in any Index Linked Investments.

Index returns do not represent the results of actual trading of investible assets/securities. MSCI maintains and calculates indexes, but does not manage actual assets. Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the index or Index Linked Investments. The imposition of these fees and charges would cause the performance of an Index Linked Investment to be different than the MSCI index performance.

The Information may contain back tested data. Back-tested performance is not actual performance, but is hypothetical. There are frequently material differences between back tested performance results and actual results subsequently achieved by any investment strategy.

Constituents of MSCI equity indexes are listed companies, which are included in or excluded from the indexes according to the application of the relevant index methodologies. Accordingly, constituents in MSCI equity indexes may include MSCI Inc., clients of MSCI or suppliers to MSCI. Inclusion of a security within an MSCI index is not a recommendation by MSCI to buy, sell, or hold such security, nor is it considered to be investment advice.

Data and information produced by various affiliates of MSCI Inc., including MSCI ESG Research LLC and Barra LLC, may be used in calculating certain MSCI indexes. More information can be found in the relevant index methodologies on www.msci.com.

MSCI receives compensation in connection with licensing its indexes to third parties. MSCI Inc.'s revenue includes fees based on assets in Index Linked Investments. Information can be found in MSCI Inc.'s company filings on the Investor Relations section of www.msci.com.

MSCI ESG Research LLC is a Registered Investment Adviser under the Investment Advisers Act of 1940 and a subsidiary of MSCI Inc. Except with respect to any applicable products or services from MSCI ESG Research, neither MSCI nor any of its products or services recommends, endorses, approves or otherwise expresses any opinion regarding any issuer, securities, financial products or instruments or trading strategies and MSCI's products or services are not intended to constitute investment advice or a recommendation to make (or refrain from making) any kind of investment decision and may not be relied on as such. Issuers mentioned or included in any MSCI ESG Research materials may include MSCI Inc., clients of MSCI or suppliers to MSCI, and may also purchase research or other products or services from MSCI ESG Research. MSCI ESG Research materials, including materials utilized in any MSCI ESG Indexes or other products, have not been submitted to, nor received approval from, the United States Securities and Exchange Commission or any other regulatory body.

Any use of or access to products, services or information of MSCI requires a license from MSCI. MSCI, Barra, RiskMetrics, IPD and other MSCI brands and product names are the trademarks, service marks, or registered trademarks of MSCI or its subsidiaries in the United States and other jurisdictions. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and Standard & Poor's. "Global Industry Classification Standard (GICS)" is a service mark of MSCI and Standard & Poor's.

MIFID2/MIFIR notice: MSCI ESG Research LLC does not distribute or act as an intermediary for financial instruments or structured deposits, nor does it deal on its own account, provide execution services for others or manage client accounts. No MSCI ESG Research product or service supports, promotes or is intended to support or promote any such activity. MSCI ESG Research is an independent provider of ESG data, reports and ratings based on published methodologies and available to clients on a subscription basis. We do not provide custom or one-off ratings or recommendations of securities or other financial instruments upon request.

Privacy notice: For information about how MSCI ESG Research LLC collects and uses personal data concerning officers and directors, please refer to our Privacy Notice at https://www.msci.com/privacy-pledge.