MSCI ESG Government Ratings Methodology

MSCI ESG Research LLC

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Contents

Purpose of ESG Government Ratings

MSCI ESG Government Ratings provide an opinion of sovereign and sub-sovereign entities' exposure to and management of ESG risks. MSCI ESG Research defines ESG risks to sovereign or sub-sovereign entities as environmental, social, or governance-related issues that could impact the long-term sustainability of their economies.

MSCI ESG Government Ratings are point-in-time assessments[1] that rely mainly on a quantitative, data-based methodology to measure sovereign ESG risks, using available indicators from reputable public sources. Based on the Exceptional Events Framework, MSCI ESG Research may also apply some factor adjustments for a particular sovereign or sub-sovereign entity, as explained in the section below.

MSCI ESG Research applies the same scoring methodology and weightings for all entities rated globally within the sovereign or sub-sovereign universe. Ratings are relative in nature and are assigned on a global scale from AAA to CCC. For additional details on the definition of rating scales, refer to "MSCI ESG and Climate Symbols and Definitions" available here.

Overview

ESG Risk Exposure and ESG Risk Management

MSCI ESG Government Ratings Methodology is based on assessing a sovereign or sub-sovereign entity's ESG Risk Management relative to its ESG Risk Exposure (Exhibit 1).

ESG Risk Exposure considers resources (natural capital, human capital, and financial resources) as prerequisites for a sovereign's sustainable development and economic performance. Other enabling factors are also included in the consideration of exposure — such as having an effective political governance structure and judicial system, low vulnerability to climate change and natural hazards, and a supportive socioeconomic environment. These can all help enable the effective utilization of an economy's resources.

ESG Risk Management uses data on demonstrated performance on these ESG areas. For example, data capturing outcomes on environmental sustainability, standards of living, safety and freedom.

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[1] A point-in-time assessment is an assessment which is not monitored and does not change to reflect updates in underlying data, except at the time of assessment, i.e. on an annual basis in the present case.

Exhibit 1: MSCI ESG Government Ratings Framework: ESG Risk Exposure and Management

Step 5: Final rating		
Step 4: Final score		
Step 3: Risk exposure and management		
Step 2: Sub-factor calculation		
Step 1: New data		

Government ESG Rating (AAA-CCC)

Government ESG Score (0-10)

Mapped based on the rating zones

Combined based on the minimum function

ESG Risk Exposure (0-10: 10 is worst in class, highest risk)	ESG Risk Management (0-10: 10 is best in class, strong mgmt.)

Risk management and exposure scores derived as a weighted average of sub-factor scores

Environmental Risk Exposure (25%)	Social Risk Exposure (25%)	Governance Risk Exposure (50%)	Environmental Risk Management (25%)	Social Risk Management (25%)	Governance Risk Management (50%)
Natural Resource Risk Exposure	Human Capital Risk Exposure	Financial Governance Risk Exposure	Natural Resource Risk Management	Human Capital Risk Management	Financial Governance Risk Management
Climate Change and Natural Hazards Risk Exposure	Economic Environment Risk Exposure	Political Governance Risk Exposure	Climate Change and Natural Hazards Risk Management	Economic Environment Risk Management	Political Governance Risk Management

Simple average of all data points under each sub-factor is used to derive scores

Each raw data point is converted to a 10-point scale to normalize the data

ESG Pillars and Risk Factors

MSCI ESG Research defines the Environmental, Social, and Governance Pillars in ESG Government Ratings as follows:

Exhibit 2: ESG Pillar Definitions

Pillar	Definition
Environmental (E)	Assesses a government's ability to protect, harness, and supplement its natural resources, and to mitigate and adapt to climate change and natural hazards.
Social (S)	Assesses a government's ability to develop a healthy, productive, and stable workforce, and knowledge capital to create a supportive economic environment and foster innovation.
Governance (G)	Assesses a government's institutional capacity to support long-term stability and functioning of its financial, judicial, and political systems, and capacity to address the environmental and social risks.

These pillars are subsequently divided into six risk factors (Exhibit 3). Each risk factor has a corresponding assessment for ESG Risk Exposure and ESG Risk Management.
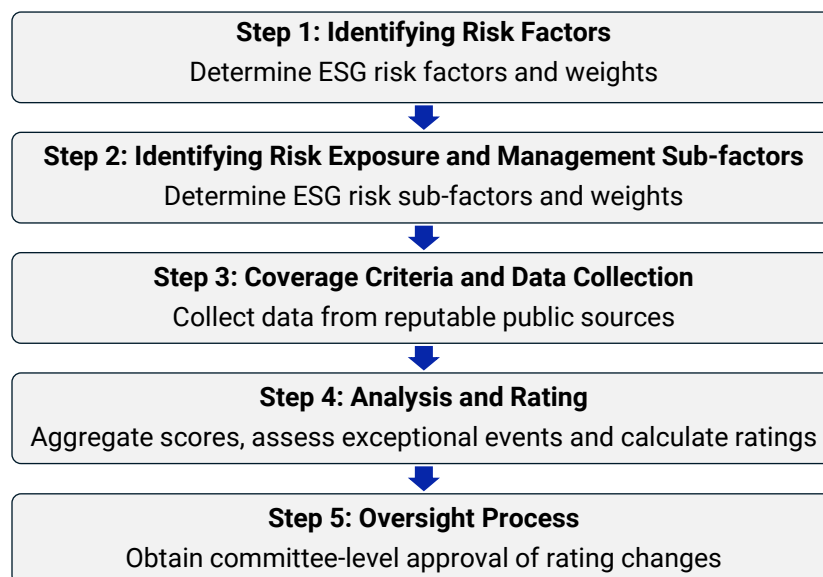
Exhibit 3: ESG Risk Factors

Pillar	Risk Factor	Definition
Environmental Pillar Score	Natural Resource Risk Factor Score	Assesses the availability of natural resources, the quality of ecosystems, and a government's ability to protect those resources to sustain economic growth model and competitiveness.
	Climate Change and Natural Hazards Risk Factor Score	Assesses vulnerability to natural hazards, an economic dependence on carbon-intensive assets, and the ability to mitigate their impacts through transition to a low-carbon economy.
Social Pillar Score	Human Capital Risk Factor Score	Assesses the risk of an economy not having balanced and productive human capital, including an educated, healthy, and skilled workforce that is a source of its innovation and competitiveness.
	Economic Environment Risk Factor Score	Assesses how conducive an economic environment and policy mix are to enable utilizing resources effectively, including macroeconomic stability, quality of infrastructure, and socioeconomic environment.
Governance Pillar Score	Financial Governance Risk Factor Score	Assesses the risk of lacking sufficient financial capital to manage resources in a sustainable way, as well as the level and quality of fiscal transparency and resource governance.
	Political Governance Risk Factor Score	Assesses the effectiveness of political governance structure, and judicial and penal system in supporting the value creation process through transparency and accountability of a government to its people.

Analytical and Methodology-Related Process

The exhibit below shows the key steps in assigning MSCI ESG Government Ratings.

Exhibit 4: MSCI ESG Government Ratings: Analytical Process Overview

Step 1: Identifying Risk Factors
Determine ESG risk factors and weights

Step 2: Identifying Risk Exposure and Management Sub-factors
Determine ESG risk sub-factors and weights

Step 3: Coverage Criteria and Data Collection
Collect data from reputable public sources

Step 4: Analysis and Rating
Aggregate scores, assess exceptional events and calculate ratings

Step 5: Oversight Process
Obtain committee-level approval of rating changes

Identifying Risk Factors

MSCI ESG Government Ratings framework begins by considering three types of resources: (1) natural capital, (2) human capital, and (3) financial resources that a sovereign or sub-sovereign is endowed with. Countries are endowed with varying amounts of these resources, which can create inherent advantages or disadvantages in converting them into productive goods and services. While these resources are pre-requisites for a country's development and competitiveness, they are not the sole determinants of its ESG assessment.

To assess a country's ability to effectively utilize its resources, the framework also considers three enabling factors: (1) resilience to natural hazards and climate risks, (2) a conducive economic environment, and (3) effective political governance. Together, these six risk factors provide a comprehensive view of a country's ESG performance.

Identifying Risk Exposure and Management Sub-factors

ESG risk exposure and management sub-factors provide a more granular assessment of a country's exposure to sustainability-related risks and its ability to mitigate and manage them effectively. Each exposure factor and management factor consists of multiple sub-factors that capture specific aspects of environmental, social, and governance-related vulnerabilities and outcomes.

Please refer to Appendix 1 for definitions of each exposure and management sub-factor.

Coverage Criteria and Data Collection

Coverage criteria for sovereign entities

MSCI ESG Research uses the IMF World Economic Outlook (WEO) as a starting point to determine the rated universe for MSCI ESG Government Ratings. Sovereigns are eligible to be assigned an ESG Rating if all of the following data availability criteria are met:

1. At least one data point is available per ESG risk factor,

2. Over 60% of data is available for each ESG pillar,

3. Over 80% of data is available for the overall rating assessment.

MSCI ESG Research does not assign an ESG Government Rating if a sovereign does not meet any of these criteria but may provide the underlying ESG raw data based on users' demand. The list of countries included in the IMF WEO and the minimum data availability criteria are reviewed every three years.

Coverage criteria for sub-sovereign entities

MSCI ESG Research uses the Bloomberg Global Aggregate Index as a starting point to determine the core reference universe for sub-sovereigns. Sub-sovereigns that are constituents of the top 95% by total amount of debt of the Bloomberg Global Aggregate Index are eligible to be assigned an ESG rating if all of the following criteria are met:

1. At least one data point is available per ESG risk factor,

2. Over 60% of data is available for the overall rating assessment.

Index constituents and the minimum data availability criteria are reviewed every three years.

Please refer to Appendix 5 for the full list of sovereign and sub-sovereign entities that are currently assigned a MSCI ESG Government Rating.

Data sources and treatment of absence of data

MSCI ESG Research collects and standardizes a wide range of publicly available data from inter-governmental databases and other third-party sources for each risk factor. Other third-party data includes data sourced from government databases, data vendors and non-governmental organizations (NGOs).

MSCI ESG Research relies only on reputable public sources to assess sovereigns' and sub-sovereigns' ESG Risk Exposure and ESG Risk Management and calculate ESG Government Ratings. The list of data sources used in MSCI ESG Government Ratings is available in Appendix 2 and 3.

If the data cannot be estimated for a given sovereign or a sub-sovereign, the indicator is excluded from the calculations of scores for that entity. The associated sub-factor weight is equally apportioned among the remaining available indicators.

Estimation methods

In certain cases, MSCI ESG Research uses estimations when data is not available or not of sufficient quality. The bases for MSCI ESG Research estimations typically rely on regional and income

averages, regional criteria, and extrapolation from country data to derive more granular values. The estimation approach applied is rules-based and depends on the type of data (i.e., environmental, social or governance) and entity (i.e., sovereign or sub-sovereign).

Data updates

Data are updated by MSCI ESG Research on an annual basis. Exceptional events are also assessed on an annual basis at the time of the annual update of the ESG Government Ratings through the Exceptional Events Framework.

Please refer to the Exceptional Events Framework section for additional details.

Data quality assurance

The MSCI ESG Government Ratings process includes multiple steps to review the quality of data, analysis and ensure consistent application of the methodology.

Formal in-depth quality review processes take place at each stage of assessment, including automated and manual quality checks of data, and review and assignment of ratings by ESG analytical personnel.

Data quality checks are conducted on all sovereign and sub-sovereign data prior to the publication of their ESG Government Rating. The quality assurance process for data used in ESG Government Ratings includes a combination of system and manual checks, such as system-driven validation rules, exception-based checks, and processes to identify outliers and outdated data.

Analysis and Rating

Assignment of ESG Government Ratings and governance

Annually, ESG data experts incorporate the latest data available from all relevant databases published up to three months prior to the MSCI ESG Government Ratings action date. Following data updates and quality review, ESG ratings analytical personnel review the factor inputs and the overall model output (such as the distribution of ESG Government Ratings and ESG Government Rating Buffer Zones). ESG ratings analytical personnel also reviews all Exceptional Events Framework proposals.

Assumptions and limitations

The model limitations may arise from data standardization, timing of updates, and methodological assumptions.

While MSCI ESG Government Ratings rely on publicly available data from reputable sources, data gaps, inconsistencies, and time lags may impact accuracy, with proxy indicators or regional estimates introducing potential biases.

Standardization techniques, like min-max scaling and winsorization, normalize raw data but may limit meaningful variations. Additionally, differences in data availability across countries can lead to uneven assessments, where some governments benefit from more comprehensive reporting while others are evaluated using fewer data points.

Due to the point-in-time assessment, ESG Government Ratings may not capture the latest information outside of those review cycles. Furthermore, time lags in data publication from primary sources, such as international organizations and government agencies, may result in ratings that rely on older data.

ESG sub-factors are weighted equally and applied to all countries for comparability purpose. This methodology approach does not capture country-specific policy environments or structural differences. Changes in factor definitions, weightings, or scoring techniques can affect comparability over time, and users should consider these limitations when interpreting results.

Oversight Process

One MSCI ESG Research internal committee reviews all ratings changes and all factor score adjustments resulting from the Exceptional Events Framework on an annual basis.

Methodology update process

MSCI ESG Research methodology committee presides over the development, review and interpretation of ESG Research methodologies. Methodology update proposals are subject to market consultation prior to approval for implementation by this committee. It reviews and approves all changes to the ESG Government Ratings methodology, including:

- Changes to data sources that may have a high impact on model outputs,

- Changes to model calculations,

- Methodology proposals for consultation.

In addition to changes resulting from ordinary course methodology changes and enhancements, MSCI ESG Research may determine that it is necessary to change the ESG Government Ratings methodology due to exceptional events. MSCI ESG Research will inform users of ratings of such changes and planned implementation timing in due course.

MSCI ESG Government Ratings Framework

The MSCI ESG Government Ratings framework is presented in Exhibit 5. The six ESG risk factors combine to form three pillars (Environmental, Social and Governance). The ESG exposure and management scores for every risk factor are computed after assessing a country's performance on sub-factors. The scores for Environmental, Social and Governance Pillars are also separately calculated. Overall, 102 data points are evaluated to assess 31 sub-factors. Please refer to Appendix 2 and 3 for a list of definitions and data sources that are used to calculate each sub-factor.

Exhibit 5: MSCI ESG Government Ratings Framework

Pillar	Risk Factor	Weight (%)	Risk Exposure Sub-Factor	Weight (%)	Risk Management Sub-Factor	Weight (%)
Environmental (E)	Natural Resource Risk	10%	Energy Security	2%	Energy Resource Management	2%
			Productive Land and Mineral Resources	2%	Resource Conservation	2%
			Water Resource Exposure	2%	Water Resource Management	2%
			Biodiversity Exposure	2%	Biodiversity Management	2%
			Pollution and Waste Exposure	2%	Pollution and Waste Management	2%
	Climate Change and Natural Hazards	15%	Physical Risk Exposure	7.5%	Physical Risk Management	7.5%
			Transition Risk Exposure	7.5%	Transition Risk Management	7.5%
Social (S)	Human Capital Risk	15%	Basic Human Capital	5%	Basic Needs	5%
			Higher Education and Technology Readiness	6%	Human Capital Infrastructure	3%
					Human Capital Performance	3%
			Knowledge Capital	4%	Knowledge Capital Management	4%
	Economic Environment Risk	10%	Economic Environment	10%	Wellness	10%
Governance (G)	Financial Governance Risk	20%	Financial Capital and Trade Vulnerability	20%	Financial Management	20%
	Political Governance Risk	30%	Institutions	10%	Stability and Peace	10%
			Judicial and Penal System	10%	Corruption Control	10%
			Governance Effectiveness	10%	Political Rights and Civil Liberties	10%

Scoring and Rating Methodology

Risk Factors Weights

The ESG pillars and underlying risk factors are assigned weights to generate the final ESG Government Ratings. Risk factor weights are the same for all countries globally and are reviewed periodically.

The current weights of each ESG pillar were determined after assessing the impact intensity of that pillar on the long-term competitiveness over the short-, medium-, and long-term time horizons. The matrix in Exhibit 6, below, provides the preliminary weight of a pillar after considering the risk intensity in different time horizons. After determining the weights of pillars, MSCI ESG Research performed a similar exercise to determine weight of the six risk factors. In the next step, the weight of risk factors is distributed approximately equally to sub-factors underneath.

Exhibit 6: Weight-Determining Matrix

		Time horizon		
		Short-term (<2 years)	Medium-term (2 to 5 years)	Long-term (5+ years)
Impact intensity	High	Highest weight		
	Moderate			
	Low			Lowest weight

The Governance Pillar is assigned a higher weight (50%) than the Environmental and Social Pillars (25% each), based on the outcomes of the weight-determining matrix. Unlike environmental and social issues, which tend to materialize over longer time horizons, lapses in governance may typically have shorter term consequences on financial management, institutional effectiveness, and political stability. Furthermore, weak governance could also hinder a country's development in other areas, such as environmental or social progress.

Raw Data to Score Conversion

In order to determine the rating, the raw data is first converted into 0 to 10 scores:

- For risk exposure data points, the best-in-class value is assigned a numeric score of zero (0) and worst-in-class value is assigned 10, that is, the best value represents the lowest risk exposure, and the worst value represents the highest risk exposure.

- For risk management data points, the scale is reversed because the best-in-class value is assigned a numeric score of 10 and the worst in class is assigned zero (0), that is, the best value means the strongest risk management and the worst value means the lowest risk management.

Standardization techniques are used to convert raw data into scored assessments. These standardization techniques typically rely on min-max scaling, where 0-10 scores are determined linearly between a range of two values:

- For data points with optimal targets established at the global or local level, and applicable across multiple countries, MSCI ESG Research applies these **policy-based thresholds** to scale the data. For example, in assessing *Terrestrial and Marine Protected Areas (% of territorial area)*, MSCI ESG Research utilizes an upper threshold of 30%, aligning with the Global Biodiversity Framework's objective to protect at least 30% of land and water areas by 2030.[2] The lower threshold is set at 0%, identifying countries with no protected areas.

- For data points based on aggregated indexes, MSCI ESG Research considers the minimum and maximum range of values set by the **min-max index scaling**. For example, in assessing the exposure to *Gender Inequality Index (3Y AVG, 0-1 score)*, MSCI ESG Research applies an upper threshold of 0 that represents countries with the highest level of gender equality (low exposure risk) and a lower threshold of 1 to identify countries with the highest gender disparity (high exposure risk).

- For data points with highly skewed distributions, MSCI ESG Research typically applies a **logarithmic transformation** to normalize the data. For example, in assessing *Hydrocarbon Rents (3Y AVG, % of GDP)*, MSCI ESG Research establishes the upper threshold based on the maximum value of the log-transformed data, and the lower threshold based on the minimum value of the log-transformed data.

- For other data points where no global optimum values could be identified or where index scaling or logarithmic transformations are not applicable, MSCI ESG Research considers the **5th and 95th percentile** to set these thresholds. For example, in assessing *Poverty Headcount (% of population, national definition)*, MSCI ESG Research sets an upper threshold of 56.2% (95th percentile) and a lower threshold of 4.9% (5th percentile) to help limit the impact of outliers when determining relative scores.

Determination of the ESG Government Score

An example aggregation for the ESG Risk Management score (see Exhibit 7 below) shows how scores are aggregated from the lowest data point level to the top-level ESG Government Rating.

For this sample country, the raw value of water withdrawal relative to internal renewable resources is 190% and the corresponding numeric score (between 0 and 10) is *3.0*. This country does not have sufficient internal resources to meet its water demand and it relies on water imports to maintain its water consumption. Similarly, the numeric score for the water stress is used to assess the management of water resources, which is *6.8*.

In the second step, a simple average of these two scores is calculated to determine the Water Resource Management Sub-factor score, which is *4.9*. The numeric scores for the other sub-factors, Energy Resource Management (*5.0*), Resource Conservation (*6.0*), Water Resource Management (*5.0*), Biodiversity Management (*3.4*), and Pollution and Waste Management (*4.8*) are determined the same way.

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[2] Convention on Biological Diversity, Kunming-Montreal Global Biodiversity Framework (2022).

In the third step, the risk factor management score is computed as the weighted average of these five sub-factors. The resulting score for the Natural Resource Risk Management is **4.8.** Similarly, the Climate Change and Natural Hazards Risk score is calculated as **8.3**.

In the fourth step, the Environmental Risk Management score of **4.2** is computed as the weighted average of the Natural Resource Risk Management score and the Climate Change and Natural Hazards Risk Management score. The Social Risk Management score (**8.0**) and Governance Risk Management score (**6.5**) are determined the same way.

In the last step, the weighted average of the Environmental Risk Management, Social Risk Management, and Governance Risk Management scores is calculated to determine the ESG Risk Management score (**6.3**).

Exhibit 7: ESG Risk Management: Example Score Aggregation
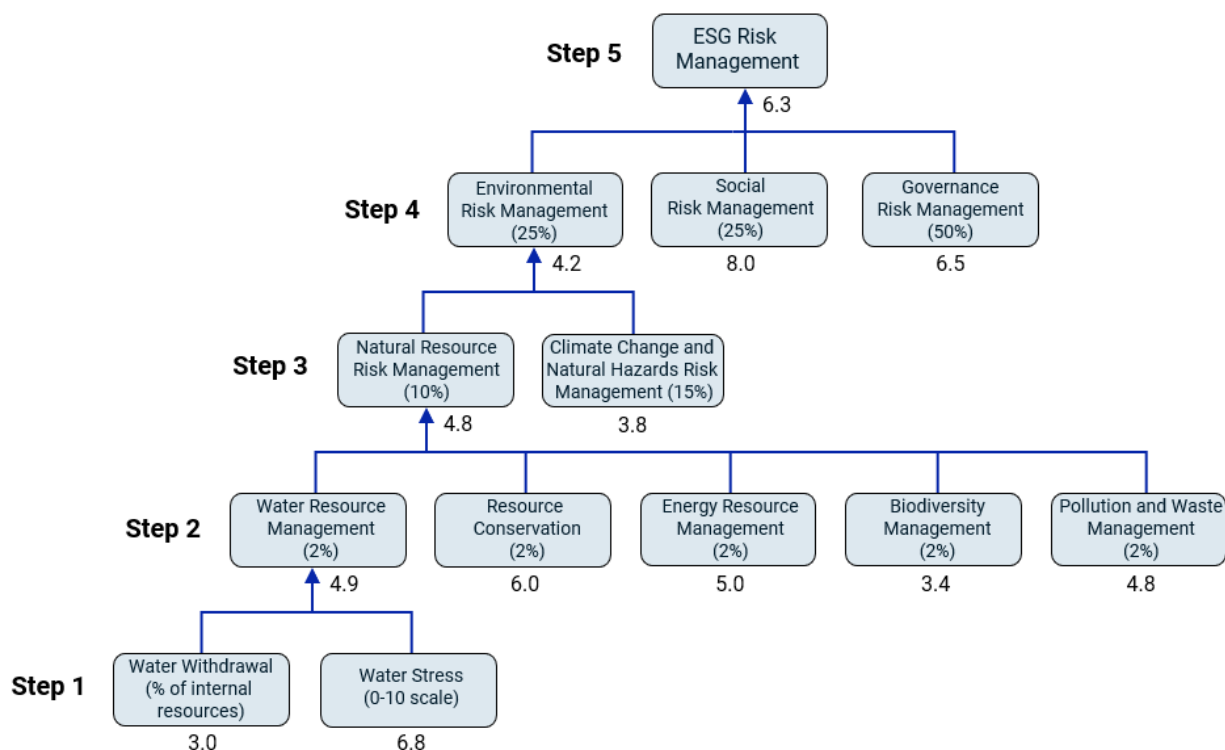
Note: Values are for a sample country, for illustrative purposes only.

Using the same steps (step 1 to 5), the ESG Risk exposure score for this country is then calculated, which is **3.0**. In order to determine the rating, the ESG Government Score is calculated as below:

$$ESG\ Government\ Score:$$
$$= Min\begin{Bmatrix}(ESG\ Risk\ Management\ Score + 1), \\ Average(10 - ESG\ Risk\ Exposure\ Score, ESG\ Risk\ Management\ Score)\end{Bmatrix} \dots (1)$$

With this approach, a country's ESG Government Score is constrained by its risk management score if its overall risk management is weak. This formula with minimum management threshold reflects

MSCI.COM | PAGE 14 OF 57

MSCI ESG Research's view that a country with poor risk management may not be able to harness its available resources effectively, even if those resources are abundant.

ESG Government Score to ESG Government Rating

ESG Government Scores are calculated for all countries and then converted into a letter rating. The AAA rating represents the highest ESG Rating (i.e., lower ESG risk exposure and stronger risk management) whereas the CCC rating represents the lowest ESG Rating (i.e., higher ESG risk exposure and weaker risk management).

Rating transition lines represent the score boundaries for each rating letter, from AAA to CCC. The rating transition lines are determined through statistical analysis of the ESG Government Scores each year:

1. Calculate the **average** and **standard deviation** of the current year's ESG Government Scores.[3]

2. Determine thresholds for AAA and CCC ratings:

Exhibit 8: Computation of AAA and CCC Rating Thresholds

ESG Government Score (formula)	Level
Average + 2 x standard deviation	Threshold for AAA rating
Average	Midpoint of BBB rating
Average - 2 x standard deviation	Threshold for CCC rating

Other rating thresholds (for **AA, A, BBB, BB and B**) are determined by **dividing the zone** between AAA and CCC ratings into **five equal zones**. The exact values for rating thresholds (Exhibit 9) vary slightly each year because they are calculated based on each year's ESG Government Ratings score distribution.

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[3] The model's standard deviation and average calculations are based on a subset of countries and do not include all markets because: (i) they may be more likely to place erratic pressure on the average calculation and (ii) data availability issues for smaller countries may increase variability.

The markets that are used in the calculation are: MSCI Developed Markets, MSCI Emerging Markets, all MSCI Standalone Markets, and All MSCI Frontier Markets (except only the West African Economic and Monetary Union (WAEMU)). This approach helps to reduce variability in the model calculations related to data unavailability issues for smaller countries. These are defined as per MSCI classifications. See https://www.msci.com/our-solutions/indexes/market-classification for more details.

Exhibit 9: ESG Rating Zones for ESG Government Ratings 2025

ESG Government Rating	Minimum ESG Government Score	Maximum ESG Government Score
AAA	8.01	10.00
AA	7.17	8.00
A	6.34	7.16
BBB	5.51	6.33
BB	4.68	5.50
B	3.85	4.67
CCC	0.00	3.84

Average ESG Government Score: 5.93	
Standard Deviation of ESG Government Score: 1.04	

Rating thresholds and rating zones can be represented on a two-dimensional chart plotting ESG Risk Exposure scores and ESG Risk Management scores, as shown in Exhibit 10, below. The lines in Exhibit 10 represent the rating thresholds between one ESG Government Rating and another. Below a certain management level (dotted line), the ESG Risk Exposure score does not affect the ESG Government Rating, which is solely determined by the ESG Risk Management score.

Exhibit 10: Rating Thresholds and Rating Zones by ESG Risk Exposure and Management Scores
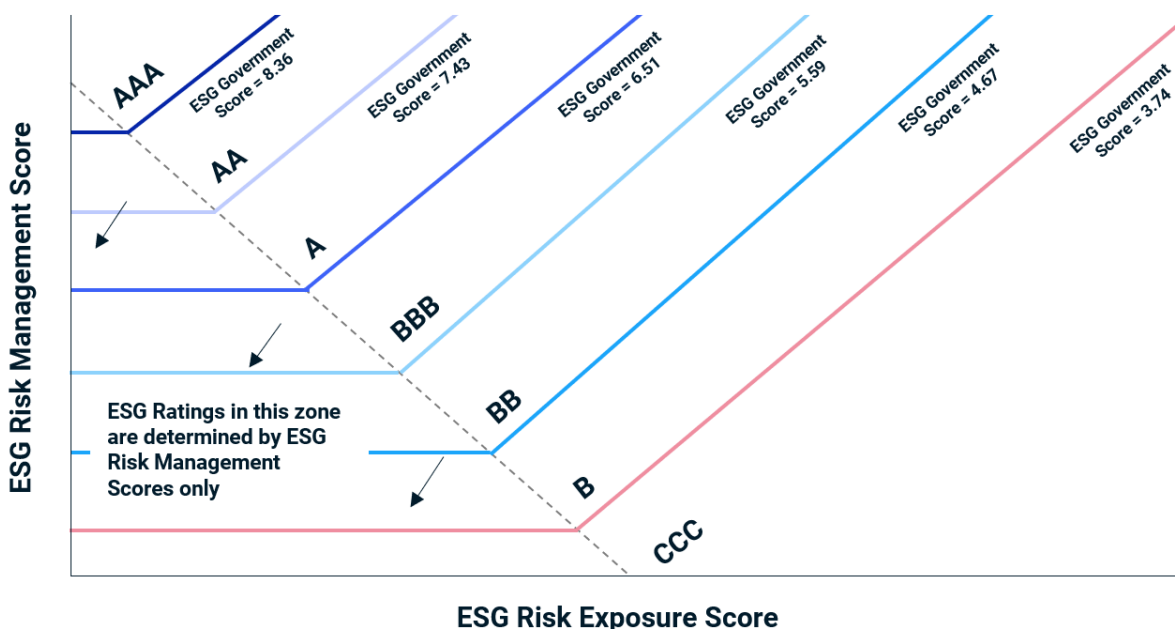
Determining Rating Buffer Zones

In cases where an ESG Government Score lies near a rating threshold separating two rating zones, it may be possible that a small change in the scoring of a single Risk Factor could result in a large enough change in the country's ESG Risk Exposure or ESG Risk Management score to trigger a change in ESG Government Rating. In order to address such potential rating volatility, MSCI ESG Research uses a buffer zone of 0.3-point score range around each rating threshold. Any country with an ESG Government Score within the buffer zone around a rating threshold retains its previous year's ESG Government Rating, even if its ESG Government Score moved across the rating threshold between one rating zone and another. This approach results in fewer ratings fluctuations (see Exhibit 11).

Exhibit 11: Rating Before and After Accounting for Buffer Zone

Scenario	Country A	Country B
Government ESG Rating: Pre-buffer zone	BB	A
Government ESG Rating: Post-buffer zone	BBB	BBB
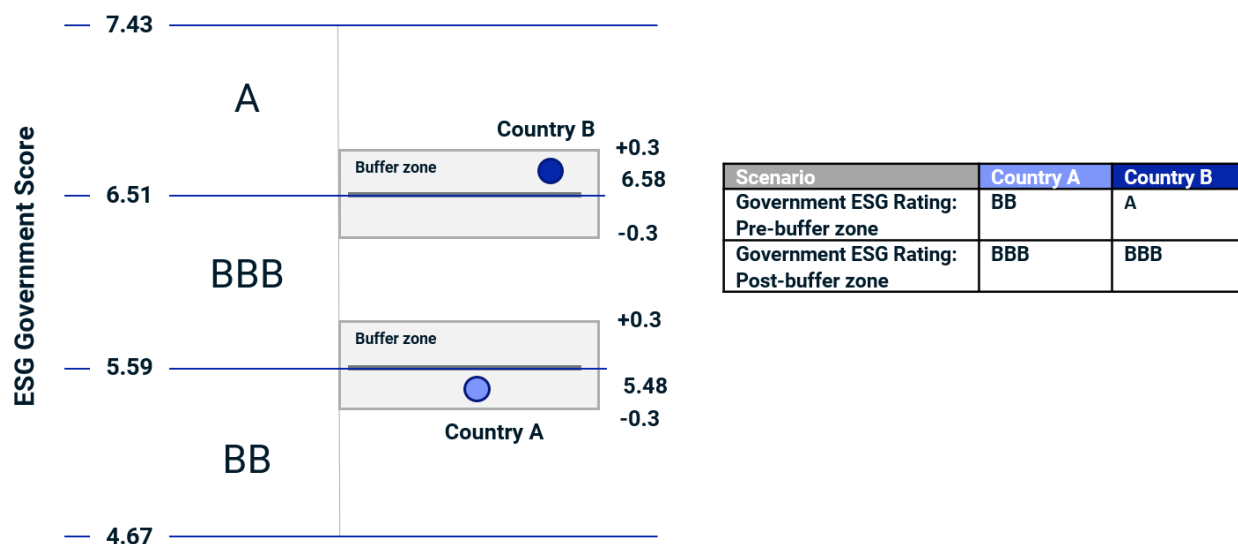
However, this logic is not applicable when ESG Government Score transitions from one buffer zone to another buffer zone, in which case the rating as originally calculated is retained.

When there are changes to the methodology, the buffer zone may be increased to limit rating turnover driven purely by methodology changes. The buffer zone is reassessed each year. Upper or lower rating buffer zones are assigned to ESG Government Scores to reflect their placement within the rating zones. These buffer zones are assigned to highlight the upper or lower placement, respectively, of their ESG Government Scores from one year to the next.

Buffer zone is assessed based on the direction of movement of an ESG Government Score, regardless of whether or not the score crossed a rating threshold from one rating zone to another. If a country's ESG Government Score has upward movement and lies in a buffer zone, it is assigned an Upper Buffer Zone. Similarly, if a country's ESG Government Score has downward movement and lies in a buffer zone, it is assigned a Lower Buffer Zone. A country with an ESG Government Score that lies outside any buffer zone is not assigned a buffer zone, even if it crossed a rating threshold. Different score movement scenarios and their resulting buffer zones are shown in Exhibit 12.

When initiating a rating assessment for a new sovereign or sub-sovereign, MSCI ESG Research considers the first rating assessment as a starting point.[4]

Exhibit 12: Government ESG Score Movements and Resulting Rating Buffer Zones and ESG Government Ratings
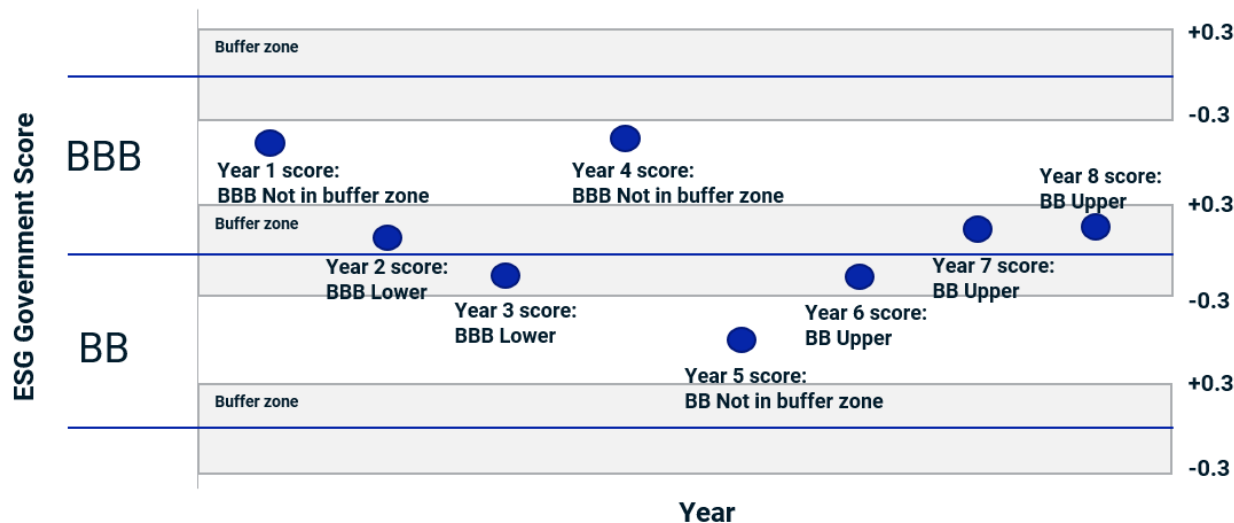
Sub-national political entities (Sub-sovereigns)

Entities with an ESG Entity Sub-type of Sub-national Political Entity, also known as local authorities or sub-sovereigns, are exposed to similar ESG risk factors as sovereigns. These ESG risk factors may affect the sustainable development of sub-sovereigns' economies in the medium to long-term. Hence, MSCI ESG Research has adapted the MSCI ESG Government Ratings methodology to rate sub-sovereign issuers such as states, provinces, cities, and municipalities. These modifications fall into the following categories:

- Under the six ESG risk factors, MSCI ESG Research collects additional sub-sovereign specific data points, sourced manually from individual national and sub-national sources (up to 16 local data points that include, but are not limited to, renewable energy consumption, GHG emissions, income inequality and public debt, dependent on data availability fields). Please refer to the Appendix 2 and 3 for a comprehensive list of definitions and data sources for each data point.

- To compute risk factor exposure and management scores for a sub-sovereign, MSCI ESG Research takes equal parts sovereign-level score and sub-sovereign specific score, with an exception of Political Governance Risk Factor scores that are based solely on related sovereign's risk exposure and risk management scores (see Exhibit 13).

- Exceptional Events Framework may also be applied if the events are specific to the sub-sovereign as explained under the section "Exceptional Events Framework".

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[4] When initiating a rating assessment for a new joint sub-sovereign (such as German Laender issuers) or a supranational issuer, MSCI ESG Research calculates both the current and prior year's ESG Government Rating and ESG score to determine its buffer zone placement.

- To determine ESG Government Ratings for sub-sovereigns, MSCI ESG Research applies the same approach of scoring and rating thresholds as in the case of sovereigns.

The MSCI ESG Government Ratings framework for sub-sovereigns is presented in Exhibit 13 below.

Exhibit 13: MSCI ESG Government Ratings Framework for Sub-sovereign Entities

Pillar	Risk Factor	Weight (%)	Risk Exposure Score	Weight (%)	Risk Management Score	Weight (%)
Environmental (E)	Natural Resource Risk	10%	Related sovereign score	5%	Related sovereign score	5%
			Sub-sovereign score	5%	Sub-sovereign score	5%
	Climate Change and Natural Hazards	15%	Related sovereign score	7.5%	Related sovereign score	7.5%
			Sub-sovereign score	7.5%	Sub-sovereign score	7.5%
Social (S)	Human Capital Risk	15%	Related sovereign score	7.5%	Related sovereign score	7.5%
			Sub-sovereign score	7.5%	Sub-sovereign score	7.5%
	Economic Environment Risk	10%	Related sovereign score	5%	Related sovereign score	5%
			Sub-sovereign score	5%	Sub-sovereign score	5%
Governance (G)	Financial Governance Risk	20%	Related sovereign score	10%	Related sovereign score	10%
			Sub-sovereign score	10%	Sub-sovereign score	10%
	Political Governance Risk	30%	Related sovereign score	30%	Related sovereign score	30%

Joint Sub-sovereign Rated Entities

Selected joint sub-sovereign issuers such as the German Laender issuers are assessed by calculating weighted average scores based on the underlying sub-sovereigns, weighted by the share of the issue's proceeds going to each participating entity.

Supranational Bodies

Entities with an ESG Entity Sub-type of Supranational Administrative Body receive the weighted average scores and ratings of their underlying sovereign shareholders, determined by the percentage ownership of each sovereign in the supranational (its contribution to the supranational's capital).

Entities with an ESG Entity Sub-type of International Financial Institution, such as multilateral development banks, are evaluated according to the MSCI ESG Ratings methodology available here.
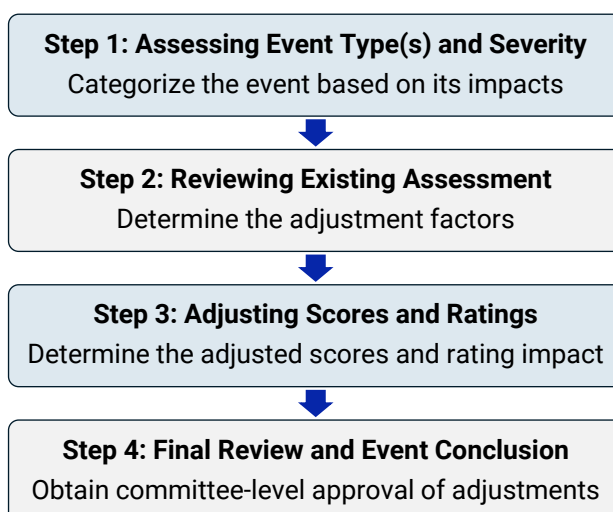
Exceptional Events Framework

The Exceptional Events Framework is a mechanism that is used to track high-impact global events and incorporate their impact on ESG Government Ratings. This review process enables MSCI ESG Research to reflect exceptional events that have a severe or very severe impact (these severity levels are defined below) on a sovereign or a sub-sovereign's ESG profile, beyond what is already captured by the data in the quantitative model, which uses historical data.

To reinforce the exceptional part of this assessment, the framework is only applied at the point of the annual review and events of moderate or minor severity do not result in an ESG score deduction. The Exceptional Events Framework does not consider human rights impacts or humanitarian situations in a country other than the country being assessed.

The framework categorizes events into four types (natural hazards, domestic political events, geopolitical events, and economic crises). MSCI ESG Research may apply an adjustment to ESG risk factors based on the outcome of the Exceptional Events Framework. The process compares the severity of the event against the existing score in the ratings model for the affected topic and applies a deduction to the relevant ESG risk factor score. Examples of such events may include (but are not limited to):

- **Natural hazards** such as earthquakes, wildfires or floods that could have a significant negative impact on a sovereign's economic activity, the local population and environment.

- **Domestic political events** including a civil war, a military coup or an internal conflict that may prevent an orderly functioning of government institutions and impact a country's socio-economic stability.

- **Geopolitical events** that may manifest in various forms, for example a country's engagement in a cross-border armed conflict or international sanctions imposed on the leadership or economic sectors of a country.

- **Economic crises** that are accompanied by a severe currency crisis, balance of payments crisis, debt default or banking crisis.

Exhibit 14: Exceptional Events Framework: Assessment Process

Step 1: Assessing Event Type(s) and Severity
Categorize the event based on its impacts

↓

Step 2: Reviewing Existing Assessment
Determine the adjustment factors

↓

Step 3: Adjusting Scores and Ratings
Determine the adjusted scores and rating impact

↓

Step 4: Final Review and Event Conclusion
Obtain committee-level approval of adjustments

Step 1: Assessing Event Type(s) and Severity

Identify and assess exceptional events that have occurred: An event could be classified into one or more categories based on the information available at the time of the annual ratings review. For example, a civil war (domestic political risk) could escalate to a regional conflict (geopolitical risk). Similarly, a season of record wildfires (natural hazards risk) could lead to economic and domestic political instability (economic crisis and political risk).

Each event category has a dedicated Severity Assessment Scorecard. The objective of the scorecard is to break down the event into several quantitative and qualitative observations to capture a wide spectrum of risks. MSCI ESG Research determines whether an observation has occurred or not by accessing data from reputable public sources (such as the United Nations resolutions, UNICEF's humanitarian action and emergencies, Amnesty International reports, forecasts from local government or international development organizations).

In order to understand what kind of observations are considered in the severity assessment, consider an example scorecard for an exceptional event related to natural hazards (see Exhibit 15).

Exhibit 15. Severity Assessment Scorecard: Example for Natural Hazards

(1) Benchmarking in terms of area affected		
Description of the event	**Severity assessment**	**Affected Risk Factors**
The flooding in the country affected 3.5% of the country's total area.	Severe	Climate Change and Natural Hazards Risk Exposure, Natural Resource Risk Management
(2) Benchmarking in terms of population affected		
Description of the event	**Severity assessment**	**Affected Risk Factors**
More than 8,000 people died, 30,000 people were injured and 1,500,000 people were displaced as a result of the flooding. In total, more than 7% of the country's population was affected.	Very severe	Climate Change and Natural Hazards Risk Exposure, Economic Environment Risk Management, Human Capital Risk Management
(3) Benchmarking in terms of GDP affected		
Description of the event	**Severity assessment**	**Affected Risk Factors**
An international financial institution estimated the total economic losses of the flooding to exceed USD 10 billion. This constitutes around 11% of the country's GDP.	Very severe	Economic Environment Risk Exposure, Financial Governance Risk Exposure, Economic Environment Risk Management

Every observation is mapped to the most relevant risk factor(s) in ESG Government Ratings model and corresponds to a certain level of impact severity and severity points. The highest impact severity (for natural hazards) or the cumulative severity points of the observations that have been met (for

domestic political events, geopolitical events, and economic crises) are used to assess the outcome of the Severity Assessment Scorecard. The severity level corresponds to one of four categories as mentioned below:

- Very severe
- Severe
- Moderate
- Minor

Step 2: Reviewing Existing Assessment

The severity assessment of the event is compared to the existing performance of a sovereign or a sub-sovereign on the relevant factors and sub-factors that reflect its susceptibility to that type of event risk. MSCI ESG Research determines the quartile placement of the factor score based on the distribution of scores for all sovereigns or sub-sovereigns for a given factor (see Exhibit 16).

Score adjustments are proposed only for those events, which were assessed as severe or very severe in the Severity Assessment Scorecard. Events of moderate or minor severity do not result in an ESG score deduction.

Exhibit 16: Comparing Severity Assessment with Existing Assessment

Existing assessment[5]

Severity assessment	Best in class (7.5-10.0)	Second quartile (5.0-7.5)	Third quartile (2.5-5.0)	Worst in class (0.0-2.5)
Minor	No adjustment needed	No adjustment needed	No adjustment needed	No adjustment needed
Moderate	No adjustment needed	No adjustment needed	No adjustment needed	No adjustment needed
Severe	**Adjustment required**	**Adjustment required**	**Adjustment required**	No adjustment needed
Very severe	**Adjustment required**	**Adjustment required**	**Adjustment required**	**Adjustment required**

Step 3: Adjusting Scores and Ratings

A score adjustment is made to reflect the impact of the event on a sovereign or a sub-sovereign's overall ESG assessment. If any adjustment is required as per step 2, the following values (Exhibit 17.1) are used to make appropriate adjustments in the risk factor scores.

However, using the same adjustment factors for sub-sovereigns could result in multiple score adjustments for the same exceptional event. This is because 50% of the ESG factor score assessment of a sub-sovereign is based on the related sovereign's assessment. To avoid double

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[5] Scores in table represent ranges for management sub-factors; for exposure sub-factors the ranges should read 0.0-2.5, 2.5-5.0, 5-7.5, 7.5-10.0.

counting of exceptional events that have already been included in the ESG assessment of the related sovereign, the adjustment factors in Exhibit 17.2 are used instead.

Exhibit 17.1: Sovereign Adjustment Factors

Severity assessment	Existing assessment			
	Best in class (7.5-10.0)	**Second quartile (5.0-7.5)**	**Third quartile (2.5-5.0)**	**Worst in class (0.0-2.5)**
Minor	0	0	0	0
Moderate	0	0	0	0
Severe	3	2	1	0
Very severe	4	3	2	1

Exhibit 17.2: Sub-sovereign Adjustment Factors (to avoid double counting)

Severity assessment	Existing assessment			
	Best in class (7.5-10.0)	**Second quartile (5.0-7.5)**	**Third quartile (2.5-5.0)**	**Worst in class (0.0-2.5)**
Minor	0	0	0	0
Moderate	0	0	0	0
Severe	1.5	1	0.5	0
Very severe	2	1.5	1	0.5

In the case of risk exposure factors, the adjustment factor is **added** in the risk factor exposure score (to indicate higher risk exposure).

In the case of management factors, the adjustment factor is **deducted** from the risk factor management score (to represent weaker risk management).

After the adjustment is made to the relevant risk factor scores, all of a sovereign or a sub-sovereign's derived scores are re-calculated, which could have an impact on its ESG Government Rating or Rating Buffer Zone.

Example of Natural Hazards Exceptional Event: 2022 Floods in Pakistan

- **Country of Assessment**: Pakistan

- **Event details**: Historic monsoon rains and flooding

- **Possible Sub-factors**: Physical Risk, Economic Environment, Financial Capital and Trade Vulnerability, Wellness

- **Related Risk Factors**: Climate Change and Natural Hazards, Economic Environment Risk, Financial Governance Risk

- **Severity**: Very severe

Step 4: Final Review and Conclusion of Exceptional Events.

Any existing events assessed in the Exceptional Events Framework are reviewed at the time of the annual publication of MSCI ESG Government Ratings. The annual frequency of the review enables MSCI ESG Research to identify if the latest available data began to reflect the impact of the exceptional events relative to its severity. In addition, the impact assessment of new events may also be initiated during the annual review.

An event may be considered concluded after one year, if there is evidence that the event is no longer ongoing and if similar incidents have not occurred following the initiation of the assessment, resulting in lower severity assessment for that event. These could include, but not limited to, a change in the quartile placement of the relevant factor score due to availability of updated data.

All factor score adjustments and any resulting changes to ESG Government Ratings require a committee approval. Conclusion of exceptional events is also subject to the committee approval.

Appendix 1: ESG Risk Sub-factor Definitions

Risk Exposure Sub-factors

Risk factor	Risk sub-factor	Definition
Natural Resource Risk Exposure Score	Energy Security Risk Exposure Score	Assesses exposure to energy security risks based on the availability of fossil fuel and nuclear reserves, and reliance on energy imports.
	Productive Land and Mineral Resources Risk Exposure Score	Assesses exposure to productive land and mineral resource risks based on the availability of agricultural and forest land, and mineral wealth.
	Water Resource Risk Exposure Score	Assesses exposure to water resource risks based on the availability of renewable water resources.
	Biodiversity Risk Exposure Score	Assesses exposure to biodiversity risks based on the assessment of the diversity of habitat types, endemism of species, and their threat status.
	Pollution and Waste Risk Exposure Score	Assesses exposure to pollution and waste risks based on the concentration of air pollutants, and the vulnerability to environmental contamination from waste.
Climate Change and Natural Hazards Risk Exposure Score	Physical Risk Exposure Score	Assesses exposure to physical risks based on the assessment of natural hazards and climate risks (such as earthquakes, floods, tsunamis, tropical cyclones, droughts, storm winds, sea level rise and epidemics), and the projected change of exposure to such risks.
	Transition Risk Exposure Score	Assesses exposure to transition risks based on the territorial and imported emissions intensities, economic dependency on carbon assets, and fiscal burden of reliance on carbon assets.
Human Capital Risk Exposure Score	Basic Human Capital Risk Exposure Score	Assesses exposure to basic human capital risks based on the assessment of health levels of a population, its literacy levels, gender equality and ability of the workforce to support the dependent population.
	Higher Education and Technology Readiness Risk Exposure Score	Assesses exposure to higher education and technology readiness risks based on the availability of workforce with higher education, and the prevalence of technology infrastructure.
	Knowledge Capital Risk Exposure Score	Assesses exposure to knowledge capital risks based on the levels of high-technology exports, and the number of patent applications filed by residents and journal articles.

Risk factor	Risk sub-factor	Definition
Economic Environment Risk Exposure Score	Economic Environment Risk Exposure Score	Assesses exposure to economic environment risks based on the stability of macroeconomic environment, and quality of a nation's trade and transport infrastructure.
Financial Governance Risk Exposure Score	Financial Capital and Trade Vulnerability Risk Exposure Score	Assesses exposure to financial capital risks based on the public debt burden, international investment position, and exports concentration.
Political Governance Risk Exposure Score	Institutions Risk Exposure Score	Assesses exposure to quality of institutions risks based on the democracy and press freedom scores.
	Judicial and Penal System Risk Exposure Score	Assesses exposure to judicial and penal system risks based on the rule of law scores.
	Governance Effectiveness Risk Exposure Score	Assesses exposure to quality of governance risks based on the government effectiveness and regulatory quality scores.

Risk Management Sub-factors

Risk Factor	Risk Sub-factor	Definition
Natural Resource Risk Management Score	Energy Resource Risk Management Score	Assesses management of energy resource risks based on the energy productivity, renewable energy consumption, primary energy use, and energy resource depletion rate.
	Resource Conservation Risk Management Score	Assesses management of resource conservation risks based on the agricultural product exports, mineral resource depletion rate, and government spending on environmental protection.
	Water Resource Risk Management Score	Assesses management of water resource risks based on the water withdrawal rates, and water stress levels.
	Biodiversity Risk Management Score	Assesses management of biodiversity risks based on the trends of forested area loss, and a government's efforts to designate biodiversity-rich areas as protected areas.
	Pollution and Waste Risk Management Score	Assesses management of pollution and waste risks based on the trends in concentration of air pollutants, related deaths due to pollution, and treatment of waste materials.
Climate Change and Natural	Physical Risk Management Score	Assesses management of physical risks based on the assessment of ability of governments to cope wth disasters.

Risk Factor	Risk Sub-factor	Definition
Hazards Risk Management Score	Transition Risk Management Score	Assesses management of transition risks based on the territorial emissions intensity and demonstrated progress in reducing emissions, and trade in low-carbon technology products.
Human Capital Risk Management Score	Basic Needs Risk Management Score	Assesses management of basic needs risks based on a population's access to basic and safely managed water, sanitation and electricity, the prevalence of food insecurity, and education enrollment rates.
	Human Capital Infrastructure Risk Management Score	Assesses management of human capital infrastructure risks based on the assessment of availability of school teachers, nurses, physicians and hospital beds.
	Human Capital Performance Risk Management Score	Assesses management of human capital performance risks based on a nation's life expectancy, infant and maternal mortality rates, literacy rates, and education enrollment rates.
	Knowledge Capital Risk Management Score	Assesses management of knowledge capital risks based on the availability of researchers and technicians in research and development, and the related spending.
Economic Environment Risk Management Score	Wellness Risk Management Score	Assesses management of wellness risks based on the assessment of population subject to vulnerable employment, poverty and income inequality, the level of unemployment and rights of workers.
Financial Governance Risk Management Score	Financial Management Risk Score	Assesses management of financial risks based on the current account and fiscal balance, assessment of public budget transparency, quality of governance in extractive industries, and trends in exports concentration.
Political Governance Risk Management Score	Stability and Peace Risk Management Score	Assesses management of stability and peace risks based on the assessment of relative peacefulness of a nation, and the likelihood of political instability or politically-motivated violence.
	Corruption Control Risk Management Score	Assesses management of corruption control risks based on the assessment of perceptions of public-sector corruption, and the extent to which public power is exercised for private gain.
	Political Rights and Civil Liberties Risk Management Score	Assesses management of political rights and civil liberties risks based on the political rights, civil liberties, and voice and accountability scores.

Appendix 2: MSCI ESG Government Rating Data for Sovereigns

Environmental Pillar Risk Exposure

Risk sub-factor	Data point	Description
Energy Security Risk Exposure Score	Proven Fossil and Nuclear Fuel Reserves (TJ/ capita)	Proven reserves of coal, oil, natural gas, and nuclear fuel (uranium) in terajoules per capita (TJ/ capita). Data sources: MSCI ESG Research, EIA, World Nuclear Association, World Bank, IMF.
	Net Energy Imports (% of energy consumption)	Net energy imports are estimated as total energy consumption minus energy production and represented as a percentage of total energy consumption. Data sources: MSCI ESG Research, EIA.
Productive Land and Mineral Resources Risk Exposure Score	Agricultural and Forest Land (km2/ thousand people)	Agricultural and forest land in square kilometers per thousand people (km2/ thousand people). Data sources: MSCI ESG Research, World Bank, IMF, national sources.
	Mineral Rents (% of GDP)	The 3-year average of mineral rents as a percentage of GDP. Mineral rents are calculated as the difference between the value of production for a stock of minerals at world prices and their total costs of production. They include tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate. Data sources: MSCI ESG Research, World Bank.
Water Resource Risk Exposure Score	Internal Renewable Water Resources (thousand m3/ capita)	Internal renewable water resources (internal river flows and groundwater from rainfall) in thousand cubic meters per capita (thousand m3/ capita). Data sources: MSCI ESG Research, World Bank.
Biodiversity Risk Exposure Score	Endangered Species (% of total species)	Percentage of animal species (including mammals, birds, reptiles, amphibians, fish and invertebrates) classified as either critically endangered, endangered or vulnerable by the International Union for the Conservation of Nature (IUCN). Data sources: MSCI ESG Research, World Bank.
	Biodiversity Habitat Index (0-100 score)	Measure of terrestrial biodiversity, assessing the global impacts of habitat loss, degradation, and fragmentation on plants, invertebrates, and vertebrates. It combines remotely-sensed data with advanced ecological modeling at approximately 1 km resolution. Values range from 0 (worst) to 100 (best). Data source: World Bank.

Risk sub-factor	Data point	Description
	Index of Carbon Stocks in Forests (3Y AVG, 100=1992)	Amount of carbon stored in the living biomass of forests. It is expressed relative to the carbon stock levels in 1992, which is assigned a baseline value of 100. A value above 100 indicates increased carbon storage, while below 100 reflects reduced storage due to deforestation or degradation. Calculated as a 3-year average of values. Data sources: MSCI ESG Research, IMF.
Pollution and Waste Risk Exposure Score	Fine Particulate Matter Concentrations (mcg/ m3)	Annual mean levels of fine particulate matter of PM2.5 in urban and rural areas in micrograms per cubic meter (mcg/ m3). Data source: WHO.
	Nitrogen Oxide Emissions (Gg/ thousand km2)	Nitrogen oxide emissions by land area in gigagrams per thousand square kilometers (Gg/ thousand km2). Data sources: MSCI ESG Research, EDGAR, UNFCCC, World Bank, national sources.
	Sulfur Dioxide Emissions (Gg/ thousand km2)	Sulfur dioxide emissions by land area in gigagrams per thousand square kilometers (Gg/ thousand km2). Data sources: MSCI ESG Research, EDGAR, UNFCCC, World Bank, national sources.
	Non-Methane Volatile Organic Compound emissions (Gg/ thousand km2)	Non-methane volatile organic compound emissions by land area in gigagrams per thousand square kilometers (Gg/ thousand km2). Data sources: MSCI ESG Research, EDGAR, UNFCCC, World Bank, national sources.
	Solid Waste Generation (tons/ capita)	Solid waste generation (including residential, commercial, and institutional waste) in tons per year per capita (tons/ capita). Data sources: MSCI ESG Research, World Bank, UNDESA, OECD, Eurostat, national sources.
Physical Risk Exposure Score	INFORM Risk Hazard and Exposure Index (0-10 score)	Physical exposure to earthquakes, river and coastal floods, tsunamis, tropical cyclones, droughts and epidemics. Exposure is measured in terms of the number and share of affected population. Maximum score of exposure to any of these hazards is considered. Regional average is assumed for missing values. Values range from 0 (best) to 10 (worst). Data sources: MSCI ESG Research, DRMKC (European Commission).

Risk sub-factor	Data point	Description
	World Risk Index Exposure (0-100 score)	Physical exposure to earthquakes, river and coastal floods, tsunamis, droughts, storm winds and sea level rise. Exposure is measured in terms of the number and share of affected population. Maximum score of exposure to any of these hazards is considered. Regional average is assumed for missing values. Values range from 0 (best) to 100 (worst). Data sources: MSCI ESG Research, World Risk Index.
	INFORM Climate Change Risk Index (0-10 score)	Change in exposure to climate-related hazards that include river and coastal floods, droughts and epidemics. Exposure is measured in terms of the number and share of affected population. Score is computed as an average of pessimistic and optimistic scenarios in 2050. Regional average is assumed for missing values. Values range from 0 (best) to 10 (worst). Data sources: MSCI ESG Research, European Commission.
Transition Risk Exposure Score	Scope 1 Excl. LULUCF Intensity (tCO2e/ USD million GDP-PPP)	The most recently reported or estimated Scope 1 emissions intensity of greenhouse gases excluding land use, land-use change and forestry (LULUCF) for the country or territory in tons of CO_2 equivalent per year per purchasing power parity-adjusted GDP (tCO2e/ USD million GDP-PPP). Data sources: MSCI ESG Research, UNFCCC, PRIMAP, EDGAR, national sources, World Bank, IMF.
	Imported Emissions Intensity (tCO2e/ capita)	The estimated imported emissions intensity in tons of CO_2 equivalent per capita (tCO2e/ capita) for the country or territory (if available). MSCI ESG Research calculates imported emissions as a sum of Scope 2 and Scope 3 emissions. Data sources: MSCI ESG Research, OECD, MRIO, World Bank, IMF.
	Hydrocarbon Rents (3Y AVG, % of GDP)	The 3-year average value of hydrocarbon rents as a percentage of GDP. The hydrocarbon rents include coal, oil and gas rents. Data sources: MSCI ESG Research, World Bank.
	Explicit and Implicit Fossil Fuel Subsidies (% of GDP)	Value of explicit and implicit fossil fuel subsidies as a percentage of GDP. Explicit subsidies measure the amount that the fuel's supply cost exceeds the price paid by the fuel user. Implicit subsidies measure the difference between the fuel's full social cost and the price paid by the fuel user. Data sources: IMF, World Bank.

Environmental Pillar Risk Management

Risk sub-factor	Data point	Description
Energy Resource Risk Management Score	Energy Productivity (USD million GDP-PPP/ kgoe)	Energy intensity measured as purchasing power parity-adjusted GDP per unit of energy consumption in kilograms of oil equivalents per year (USD million GDP-PPP/ kgoe). Data sources: MSCI ESG Research, EIA, World Bank, IMF.
	Renewable Energy (% of total final energy consumption)	Renewable energy (including hydropower, geothermal, biofuels, renewable waste, solar, wind, biogas, and marine sources) as a percentage of total final energy consumption. Data source: World Bank.
	Energy Consumption (kgoe/ capita)	Primary energy use before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport in kilograms of oil equivalents per capita (kgoe/ capita). Data sources: MSCI ESG Research, EIA, World Bank, IMF.
	Energy Resource Depletion Rate (% of GNI)	Depletion rate of energy resources calculated as a ratio of the value of the stock of coal, crude oil and natural gas to the remaining reserve lifetime (capped at 25 years) as a percentage of gross national income. Data sources: MSCI ESG Research, World Bank, United Nations Statistics Division.
Resource Conservation Risk Management Score	Net Agricultural Product Exports (% of GDP)	Difference in the value of exports and imports of all food items (Standard International Trade Classification [SITC] 0 + 1 + 22 + 4) and agricultural raw materials (SITC 2 less 22, 27 and 28) as a percentage of GDP. Data sources: MSCI ESG Research, UNCTAD, World Bank, IMF.
	Mineral Resource Depletion Rate (% of GNI)	Depletion rate of mineral resources calculated as a ratio of the value of the stock of tin, gold, lead, zinc, iron, copper, nickel, silver, bauxite, and phosphate to the remaining reserve lifetime (capped at 25 years) as a percentage of gross national income. Data sources: World Bank, United Nations Statistics Division.
	Government Expenditure on Environmental Protection (% of GDP)	Sovereign entity's spending on the protection of biodiversity landscape, environmental protection R&D, pollution abatement, waste and wastewater management as a percentage of GDP. Data sources: MSCI ESG Research, IMF, World Bank, Eurostat, United Nations.

Risk sub-factor	Data point	Description
Water Resource Risk Management Score	Water Withdrawal (% of internal renewable water resources)	Total annual freshwater withdrawals that comprise water consumption for agriculture, industry and domestic use as a percentage of internal renewable water resources (internal river flows and groundwater from rainfall). They include withdrawals from desalinization plants in countries where they are a significant source but exclude evaporation losses from storage basins. Data source: World Bank.
	Water Withdrawal (m3/ capita)	Total annual freshwater withdrawals that comprise water consumption for agriculture, industry and domestic uses in cubic meters per capita (m3/ capita). They include withdrawals from desalination plants in countries where they are a significant source but exclude evaporation losses from storage basins. Data sources: MSCI ESG Research, World Bank, national sources.
	Water Stress (0-10 score)	Exposure to baseline water stress measured as a ratio of total water withdrawals to available renewable surface and ground-water supplies. Water withdrawals include domestic, industrial, irrigation, and livestock uses. Values range from 0 (best) to 10 (worst). Data sources: MSCI ESG Research, WRI.
Biodiversity Risk Management Score	Forest Cover Change (3Y CAGR, %)	The 3-year compound annual growth rate (CAGR) of the percentage change in forest cover relative to a country's land area. Forest cover includes natural or planted trees of at least 5 meters in situ, and excludes trees in agricultural production systems, urban parks and gardens. Data sources: MSCI ESG Research, World Bank, national sources.
	Ecological Footprint of Consumption (global hectares/ person)	Amount of biologically productive land and water required to produce the resources that a country's population consumes, support its urban infrastructure, and absorb waste. It is expressed in global hectares, which are standardized units that represent the average productivity of a hectare of land worldwide, adjusted to account for the varying productivity of different areas to reflect their true contribution. Data source: Global Footprint Network.
	Terrestrial and Marine Protected Areas (% of territorial area)	Biodiversity-rich areas designated as protected areas through legal or other effective means as a percentage of a country's total territorial area. Data sources: MSCI ESG Research, World Bank, national sources.

Risk sub-factor	Data point	Description
Pollution and Waste Risk Management Score	Deaths due to Indoor and Outdoor Air and Water Pollution (per million people)	Indoor and outdoor air and water pollution-related deaths per million people based on ambient and household attributable death rate, and the mortality rate attributed to exposure to unsafe water, unsafe sanitation and lack of hygiene services. Data sources: MSCI ESG Research, WHO.
	Fine Particulate Emissions Damage (% of GNI)	The damage due to exposure of a country's population to ambient PM2.5 and ozone pollution, and household air pollution as a percentage of gross national income. Damages are calculated as foregone labor income due to premature death. Data source: World Bank.
	Fine Particulate Matter Emissions Trend (3Y CAGR, %)	The 3-year compound annual growth rate (CAGR) of the percentage change in PM2.5 emissions concentration. Data sources: MSCI ESG Research, WHO.
	Nitrogen Oxide Emissions Trend (3Y CAGR, %)	The 3-year compound annual growth rate (CAGR) of the percentage change in nitrogen oxide emissions concentration. Data sources: MSCI ESG Research, EDGAR, UNFCCC, national sources.
	Sulfur Dioxide Emissions Trend (3Y CAGR, %)	The 3-year compound annual growth rate (CAGR) of the percentage change in sulfur dioxide emissions concentration. Data sources: MSCI ESG Research, EDGAR, UNFCCC.
	Non-Methane Volatile Organic Compound Emissions Trend (3Y CAGR, %)	The 3-year compound annual growth rate (CAGR) of the percentage change in non-methane volatile organic compound emissions concentration. Data sources: MSCI ESG Research, EDGAR, UNFCCC, national sources.
	Waste Treatment Recycling (% of treated waste)	Rate of treatment of waste materials through recycling as a percentage of total waste treated. Data sources: MSCI ESG Research, World Bank, UNDESA, OECD, Eurostat, national sources.
Physical Risk Management Score	INFORM Lack of Coping Capacity (0-10 score)	Ability of a government to cope with disasters through formal and organized activities, existing infrastructure and efforts to reduce disaster risk. Regional average is assumed for missing values. Values range from 0 (best) to 10 (worst). Data sources: MSCI ESG Research, European Commission.
Transition Risk Management Score	Scope 1 Excl. LULUCF Intensity Trend (3Y CAGR, %)	The 3-year compound annual growth rate (CAGR) of the percentage change in the most recently reported or estimated Scope 1 emissions intensity of greenhouse gases excluding land use, land-use change and forestry (LULUCF) for the country territory. Data sources: MSCI

Risk sub-factor	Data point	Description
		ESG Research, UNFCCC, PRIMAP, EDGAR, World Bank, IMF.
	Target Emissions Gap (%)	Progress in reduction of a sovereign entity's emissions from the first nationally determined contribution (NDC) enforcement year in 2015 until 2030. It is calculated as a percentage difference between the average annual growth rate of a country's emissions between 2015 and 2022, and the growth rate required to meet its NDC target in 2030. Data sources: MSCI ESG Research, IMF, Climate Watch.
	Exports of Low-Carbon Technology Products (% of total exports)	Exports of low-carbon technology products (including mechanics like wind turbines, solar panels, biomass systems and carbon capture equipment) of a country as a percentage of its total exports. Data source: IMF.
	Imports of Low-Carbon Technology Products (% of total imports)	Imports of low-carbon technology products (including mechanics like wind turbines, solar panels, biomass systems and carbon capture equipment) as a percentage of its total imports. Data source: IMF.

Social Pillar Risk Exposure

Risk sub-factor	Data point	Description
Basic Human Capital Risk Exposure Score	Old-Age Dependency Ratio (% of labor force)	Number of people older than 65 years as a percentage of the total labor force (those aged 15 years and above). Data sources: MSCI ESG Research, World Bank, national sources.
	Gender Inequality Index (3Y AVG, 0-1 score)	Gender inequalities in reproductive health, political empowerment, educational attainment and labor market participation. Calculated as a 3-year average of scores. Values range from 0 (best) to 1 (worst). Data sources: MSCI ESG Research, HDR.
	Adult Literacy Levels (% of population)	Number of people aged 15 and above who are literate, calculated as a share of the total population. For developed countries, a 99% adult literacy rate is assumed in the absence of specific data disclosures. Data sources: MSCI ESG Research, World Bank, UNESCO, UNECE, UNDP, European Institute of the Mediterranean, national sources.

Risk sub-factor	Data point	Description
	Projected Mortality due to Non-Communicable Diseases (%)	The probability of dying from non-communicable diseases (NCDs) such as cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases of an economically productive population between the ages of 30 and 70. Measures the burden of mortality due to NCDs within the population's most economically productive age group. Data source: WHO.
Higher Education and Technology Readiness Risk Exposure Score	Higher Education Levels (% of working-age population)	Number of people in the labor force with advanced education as a percentage of the working-age population with advanced education. Advanced education is defined as short cycle tertiary education, bachelor's degree, master's degree, doctoral degree or equivalent education level according to the International Standard Classification of Education 2011. Data sources: World Bank, ILO.
	ICT Development Index (0-100 score)	Development level of information and communication technology (ICT) based on internet usage, mobile broadband penetration, mobile data affordability, and the availability of digital infrastructure. Values range from 0 (worst) to 100 (best). Data source: ITU.
Knowledge Capital Risk Exposure Score	High-Technology Exports (USD/ capita)	Value of exports of high-technology products such as aircraft, computers, pharmaceuticals, scientific instruments, and electrical machinery in USD per capita (USD/ capita). Data sources: MSCI ESG Research, World Bank.
	Journal Articles (per million people)	The average number of scientific and technical journal articles published per million people in the following fields: physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth and space sciences. Data sources: MSCI ESG Research, World Bank.
	Patent applications (5Y AVG, per million people)	The average number of patent applications filed by residents per million people, calculated as a 5-year average (where available). Patent applications are worldwide patent applications filed through the Patent Cooperation Treaty procedure or with a national patent office for exclusive rights for an invention. Data sources: MSCI ESG Research, World Intellectual Property Organization, national sources.
Economic Environment Risk Exposure Score	Transport and Trade Infrastructure (1-5 score)	The quality of transport and trade-related infrastructure based on the assessment of roads, ports, railroads, and airports, as well as efficiency in customs procedures

Risk sub-factor	Data point	Description
		and the ease of international shipments. Values range from 1 (best) to 5 (worst). Data source: World Bank.
	Macroeconomic Environment (0-10 score)	Assessment of a country's macroeconomic environment based on the 3-year average of primary balance and savings rate as a percentage of GDP, real GDP growth rate and inflation rate. Values range from 0 (best) to 10 (worst). Data sources: MSCI ESG Research, IMF.

Social Pillar Risk Management

Risk sub-factor	Data point	Description
Basic Needs Risk Management Score	Prevalence of Food Insecurity (% of population)	Percentage of a country's population exposed to moderate or severe food insecurity. A household is classified as moderately or severely food insecure when at least one adult in the household has reported being exposed to low-quality diets or having reduced the quantity of food they would normally eat because of lack of resources. Data source: World Bank.
	Access to Electricity (% of population)	Percentage of a sovereign entity's population with access to electricity. Data source: World Bank.
	Primary Education Enrolment Rate (% of children)	Percentage of primary-school-age children enrolled in primary or secondary education. Data sources: World Bank, UNESCO, UNICEF, national sources.
	Access to Basic Water Services (% of population)	Percentage of a country's population using at least basic and safely managed drinking water services. Basic drinking water services are defined as drinking water from an improved source (piped water, boreholes or tube wells, protected dug wells, protected springs, and packaged or delivered water). Data source: World Bank.
	Access to Basic Sanitation Services (% of population)	Percentage of a country's population using at least basic and improved sanitation services (pit latrines with slabs at a minimum). Data sources: World Bank, national sources.
Human Capital Performance Risk Management Score	Life Expectancy (years)	The average number of years a newborn is expected to live if mortality and fertility patterns at the time of its birth remain constant in the future. Data source: UNDESA.

Risk sub-factor	Data point	Description
	Higher-Education Enrolment Levels (0-10 score)	The average school gross enrolment rate at secondary and tertiary levels. Values range from 0 (best) to 10 (worst). Data sources: MSCI ESG Research, World Bank, national sources.
	Youth Literacy Rate (% of youth population)	The percentage of the population of 15-24 years of age who can both write and read with understanding a short simple statement about their everyday life. Regional and income classification average is assumed for missing values. Data sources: MSCI ESG Research, World Bank, UNESCO, WHO.
	Infant Mortality Rate (per thousand live births)	The number of infants dying before reaching one year of age per thousand live births in a given year, based on constant fertility and mortality rates. Data source: UNDESA.
	Maternal Mortality Rate (per million live births)	The number of maternal deaths from pregnancy related causes (excluding accidental or incidental causes) per million live births. Data sources: World Bank, national sources.
Human Capital Infrastructure Risk Management Score	Pupil-Teacher at Primary Level (ratio)	The ratio of students in primary school to teachers in primary school. Regional and income classification average is assumed for missing values. Data sources: MSCI ESG Research, World Bank, UNESCO, Eurostat, national sources.
	Pupil-Teacher at Secondary Level (ratio)	The ratio of students in secondary school to teachers in secondary school. Regional and income classification average is assumed for missing values. Data sources: MSCI ESG Research, World Bank, UNESCO, Eurostat, national sources.
	Nurses and Midwives (per thousand people)	The number of professional, auxiliary and enrolled nurses and midwives, and other associated personnel such as dental nurses and primary case nurses per thousand people. Data sources: MSCI ESG Research, WHO, WHO EMRO, World Bank, national sources.
	Hospital Beds (per thousand people)	The number of inpatient beds available in public, private, general and specialized hospitals and rehabilitation centers per thousand people. Data sources: MSCI ESG Research, WHO, World Bank, UNICEF, national sources.
	Physicians (per thousand people)	The number of generalist and specialist medical practitioners per thousand people. Data sources: MSCI ESG Research, WHO, WHO EMRO, World Bank, Pan American Health Organization, United Nations Population Fund, national sources.

Risk sub-factor	Data point	Description
Knowledge Capital Risk Management Score	Researchers in R&D (per million people)	The number of professionals who conduct research and improve or develop concepts, theories, models techniques instrumentation, and software of operational methods including graduate and postgraduate PhD students (International Standard Classification of Education 2011 level 7 or 8) per million people. Regional and income classification average is assumed for missing values. Data sources: MSCI ESG Research, World Bank.
	Technicians in R&D (per million people)	The number of people whose main tasks require technical knowledge and experience in engineering, physical and life sciences or social sciences and humanities per million people. They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers. Regional and income classification average is assumed for missing values. Data sources: MSCI ESG Research, World Bank.
	R&D Expenditure (% of GDP)	Current and capital expenditures (both public and private) as a percentage of GDP on creative work undertaken on a systemic basis in order to increase the stock of knowledge and use it to devise new applications. Data sources: World Bank, Eurostat, OECD, national sources.
Wellness Risk Management Score	Vulnerable Employment (% of total employment)	The number of unpaid family workers and own-account workers as a percentage of total employment. Regional and income classification average is assumed for missing values. Data sources: MSCI ESG Research, World Bank.
	Poverty Headcount (% of population, national definition)	The number of people living below the national poverty line as a percentage of total population. The poverty rate as defined by national poverty lines reflects the share of the population that fails to meet the standard a country thinks is necessary to cover basic needs. Data sources: World Bank, UNESCWA, ADB, national sources.
	Gini Index (3Y AVG, 0-100 score)	The extent to which the distribution of income in the population deviates from a perfectly equal distribution. Calculated as a 3-year average of scores. Values range from 0 (best) to 100 (worst). Data sources: MSCI ESG Research, UNU WIDER.

Risk sub-factor	Data point	Description
	Unemployment (3Y AVG, % of labor force)	The 3-year average percentage share of the total labor force that is without work but available for and seeking employment. Data sources: World Bank, ILO, IMF.
	Youth Unemployment (3Y AVG, % of youth labor force)	The 3-year average percentage share of the youth labor force (usually aged 15-24 considered) without work but available for and seeking employment. Data sources: World Bank, national sources.
	Workers' Rights (1-5 score)	The level of workers' rights in law and in practice based on the International Labour Organization (ILO) Conventions including civil liberties, the right to establish and join unions, trade union activities, the right to collective bargaining and the right to strike. Data sources: MSCI ESG Research, ITUC.

Governance Pillar Risk Exposure

Risk sub-factor	Data point	Description
Financial Capital and Trade Vulnerability Risk Exposure Score	Government Debt (3Y AVG, % of GDP)	The 3-year average of general government gross debt as a percentage of GDP. Data sources: MSCI ESG Research, IMF, World Bank.
	Trade Vulnerability (0-1 score)	The concentrations of a country's merchandise exports, commercial services exports, and export destinations based on the Herfindahl-Hirshman index. Maximum score for concentration of any of these export characteristics is considered. Values range from 0 (best) to 1 (worst). Data sources: MSCI ESG Research, UNCTAD, World Bank, CIA.
	Net International Investment Position (3Y AVG, % of GDP)	The 3-year average of foreign assets and liabilities position of a country as a percentage of GDP. Data sources: MSCI ESG Research, IMF, World Bank, national sources.
Institutions Risk Exposure Score	Democracy Index (3Y AVG, 0-10 score)	The level of democracy based on the assessment of electoral process and pluralism, functioning of government, political participation, political culture, and civil liberties. Calculated as a 3-year average of scores. Values range from 10 (best) to 0 (worst). Data sources: MSCI ESG Research, EIU.
	World Press Freedom Index	The ability of journalists as individuals and collectives to select, produce and disseminate news in the public interest independent of political, economic, legal and

Risk sub-factor	Data point	Description
	(3Y AVG, 0-100 score)	social interference, and in the absence of threats to their physical and mental safety. Calculated as a 3-year average of scores. Values range from 100 (best) to 0 (worst). Data sources: MSCI ESG Research, Reporters Without Borders.
Judicial and Penal System Risk Exposure Score	Rule of Law (-2.5 to 2.5 score)	Perceptions of the extent to which agents have confidence in and abide by the rules of society, including the quality of contract enforcement, property rights, the police and the courts, and the likelihood of crime and violence. Values range from 2.5 (best) to -2.5 (worst). Data source: World Bank.
Governance Effectiveness Risk Exposure Score	Government Effectiveness (-2.5 to 2.5 score)	Perceptions of the extent to which agents have confidence in and abide by the rules of society, including the quality of contract enforcement, property rights, the police and the courts, and the likelihood of crime and violence. Values range from 2.5 (best) to -2.5 (worst). Data source: World Bank.
	Regulatory Quality (-2.5 to 2.5 score)	Perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Values range from 2.5 (best) to -2.5 (worst). Data source: World Bank.

Governance Pillar Risk Management

Risk sub-factors	Data point	Description
Political Rights and Civil Liberties Risk Management Score	Political Rights (0-40 score)	The level of political rights, including electoral process, political pluralism and participation, and functioning of government. Values range from 0 (worst) to 40 (best). It is also possible for a country's political rights score to be less than zero (between -1 and -4) if it receives mostly or all zeros for each political rights questions and a large negative score for the political rights discretionary question. Data source: Freedom House.
	Civil Liberties (0-60 score)	The level of civil liberties, including freedom of expression and belief, associational and organizational rights, rule of law, and personal autonomy and individual rights. Values range from 0 (worst) to 60 (best). Data source: Freedom House.

Risk sub-factors	Data point	Description
	Voice and Accountability (-2.5 to 2.5 score)	Perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media. Values range from 2.5 (best) to -2.5 (worst). Data source: World Bank.
Stability and Peace Risk Management Score	Global Peace Index (3Y AVG, 1-5 score)	The relative peacefulness of a nation, including the level of societal safety and security, the extent of ongoing domestic and international conflict, and the degree of militarization. Calculated as a 3-year average of scores. Values range from 1 (best) to 5 (worst). Data sources: MSCI ESG Research, Vision of Humanity (Institute for Economics and Peace).
	Political Stability and Absence of Violence or Terrorism (-2.5 to 2.5 score)	Perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Values range from 2.5 (best) to -2.5 (worst). Data source: World Bank.
Corruption Control Risk Management Score	Corruption Perceptions Index (3Y AVG, 0-100 score)	Perceptions of public-sector corruption, including bribery, diversion of public funds, use of public office for private gain, nepotism in the civil service, state capture and mechanisms available to prevent corruption. Calculated as a 3-year average of scores. Values range from 100 (best) to 0 (worst). Data sources: MSCI ESG Research, Transparency International.
	Control of Corruption (-2.5 to 2.5 score)	Perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Scores range from 2.5 (best) to -2.5 (worst). Data source: World Bank.
Financial Management Risk Score	Current Account Balance (3Y AVG, % of GDP)	The 3-year average of the current account balance as a percentage of GDP, which covers the exports and imports of goods and services, payments of income, and current transfers between residents of a country and non-residents. Data sources: MSCI ESG Research, IMF, national sources.
	Fiscal Balance (3Y AVG, % of GDP)	The 3-year average of general government net lending or borrowing as a percentage of GDP, calculated as revenue minus total expenditure. It measures the extent to which general government is either putting financial resources at the disposal of other sectors in the economy and non-residents (net lending), or utilizing the financial resources generated by other sectors and non-

Risk sub-factors	Data point	Description
		residents (net borrowing). Data sources: MSCI ESG Research, IMF, World Bank.
	Open Budget Index (0-100 score)	The level of budget transparency and accountability system including public availability of budget information, opportunities for the public to participate in the budget process, and the role of formal oversight institutions (such as a legislature or national audit office). Value ranges from 100 (best) to 0 (worst). Data source: International Budget Partnership.
	Resource Governance Index (0-100 score)	The level of budget transparency and accountability system including public availability of budget information, opportunities for the public to participate in the budget process, and the role of formal oversight institutions (such as a legislature or national audit office). Values range from 100 (best) to 0 (worst). Data source: Natural Resource Governance Institute.
	Geographic Concentration of Exports Trend (-1 to 1 score)	Year-over-year change in the geographic concentration of a sovereign entity's exports. Up to seven most important trading partners are considered for a given country. Export concentration is estimated based on the Herfindahl-Hirshman index. Values range from -1 (best) to 1 (worst). Data sources: MSCI ESG Research, CIA.
	Merchandise Export Concentration Trend (-1 to 1 score)	Year-over-year change in the merchandise export concentration of a sovereign entity by product group based on the Herfindahl-Hirshman index. Values range from -1 (best) to 1 (worst). Data sources: MSCI ESG Research, UNCTAD.
	Commercial Services Export Concentration Trend (-1 to 1 score)	Year-over-year change in the commercial services export concentration of a sovereign entity. Commercial services include transport and travel services, insurance and financial services, and computer, communication and other services. Export concentration is estimated based on the Herfindahl-Hirshman index. Values range from -1 (best) to 1 (worst). Data sources: MSCI ESG Research, World Bank.

Appendix 3: MSCI ESG Government Rating Data for Sub-sovereigns

Risk factors	Data point	Description
Natural Resource Risk	Net Energy Imports (% of energy consumption)	Net energy imports are estimated as total energy consumption minus energy production and represented as a percentage of total energy consumption. Data sources: MSCI ESG Research, DCCEEW, EIA, national and sub-national sources.
	Fine Particulate Matter Concentrations (mcg/ m3)	Annual mean levels of fine particulate matter of PM2.5 in urban and rural areas in micrograms per cubic meter (mcg/ m3). Data sources: EEA, US EPA, Instituto Nacional de Estadistica (INE), national and sub-national sources.
	Renewable Energy (% of total final energy consumption)	Renewable energy (including hydropower, geothermal, biofuels, renewable waste, solar, wind, biogas, and marine sources) as a percentage of total final energy consumption. Data sources: Agentur für Erneuerbare Energien (AEE), DCCEEW, Canada Energy Regulator (CER), national and sub-national sources.
	Tree Cover Change (%)	Indicates how much more or less tree cover a given area had in 2020 compared to 2000 as a percentage. Tree cover change was determined using tree cover extent for the years 2000 and 2020, which are based on tree height information. This factor is only used in the ratings methodology for sub-sovereign entities. Data source: Global Forest Watch.
Climate Change and Natural Hazards	Scope 1 Excl. LULUCF Intensity (tCO2e/ capita)	The most recently reported Scope 1 emissions intensity of greenhouse gases excluding land use, land-use change and forestry (LULUCF) for the sub-sovereign entity in tons of CO2 equivalent per capita per year (tCO2e/capita). This factor is only used in the ratings methodology for sub-sovereign entities. Data sources: MSCI ESG Research, EDGAR, ECCC, DCCEEW, US EPA, national and sub-national sources.
	Scope 1 Excl. LULUCF Intensity Trend (%)	The 3-year compound annual growth rate (CAGR) of the percentage change in the most recently reported or estimated Scope 1 emissions intensity of greenhouse gases excluding land use, land-use change and forestry (LULUCF). Data sources: MSCI ESG Research, EDGAR, ECCC, DCCEEW, World Bank, IMF, national and sub-national sources.
	Population Affected by Natural Disasters (per million people)	People (3-year average, per million people) requiring immediate assistance during a period of emergency as a result of a natural disaster (drought, extreme temperature, flood, storm and wildfire), including displaced, evacuated, homeless and injured people. This factor is only used in the ratings methodology for sub-sovereign entities. Data sources: MSCI ESG Research, World Bank, HDR, national and sub-national sources.

Risk factors	Data point	Description
Human Capital Risk	Old-Age Dependency Ratio (% of labor force)	Number of people older than 65 years as a percentage of the total labor force (those aged 15 years and above). For sub-sovereign entities, the working age population (those aged 15-64 years) considered in the denominator. Data sources: MSCI ESG Research, German Federal Statistical Office, Australian Bureau of Statistics, Statistics Canada, national and sub-national sources.
	Hospital Beds (per thousand people)	The number of inpatient beds available in public, private, general and specialized hospitals and rehabilitation centers per thousand people. Data sources: MSCI ESG Research, Gesundheitsberichterstattung des Bundes (GBE), Australian Institute of Health and Welfare (AIHW), Canadian Institute for Health Information (CIHI), national and sub-national sources.
	Physicians (per thousand people)	The number of generalist and specialist medical practitioners per thousand people. Data sources: MSCI ESG Research, German Medical Association, Canadian Institute for Health Information (CIHI), national and sub-national sources.
Economic Environment Risk	GDP Growth (%)	3-year compound annual growth rate (CAGR) of real Gross Domestic Product (GDP). This factor is only used in the ratings methodology for sub-sovereign entities. Data sources: MSCI ESG Research, Statistikportal, Australian Bureau of Statistics, Statistics Canada, Swiss Federal Statistical Office (FSO), national and sub-national sources.
	Gini Index (0-100 score)	The extent to which the distribution of income in the population deviates from a perfectly equal distribution. Values range from 0 (best) to 100 (worst). Data sources: MSCI ESG Research, Statistikportal, Australian Bureau of Statistics, Statistics Canada, national and sub-national sources.
	Unemployment (% of labor force)	The percentage share of the total labor force that is without work but available for and seeking employment. Data sources: German Federal Employment Agency, Australian Bureau of Statistics, Statistics Canada, national and sub-national sources.
	Youth Unemployment (% of youth labor force)	The 5-year average percentage share of the youth labor force (usually aged 15-24 considered) without work but available for and seeking employment. Data sources: German Federal Employment Agency, Australian Bureau of Statistics, Statistics Canada, national and sub-national sources.
Financial Governance Risk	Government Debt (3Y AVG, % of GDP)	The 3-year average of government debt as a percentage of GDP. Data sources: MSCI ESG Research, German Federal Statistical Office, US Census Bureau, Federal Finance Administration (FFA), national and sub-national sources.

Risk factors	Data point	Description
	Fiscal Balance (3Y AVG, % of GDP)	The 3-year average of government net lending or borrowing as a percentage of GDP, calculated as revenue minus expenditure. Data sources: MSCI ESG Research, German Federal Statistical Office, Australian Bureau of Statistics, national and sub-national sources.

MSCI.COM | PAGE 45 OF 57

Appendix 4: MSCI ESG Government Ratings Data Sources

- Asian Development Bank (ADB)

- Australian Bureau of Statistics

- Canada Energy Regulator

- Climate Watch

- Department of Climate Change, Energy, the Environment and Water of the Australian Government (DCCEEW)

- Disaster Risk Management Knowledge Centre (DRMKC), European Commission

- Economist Intelligence Unit (EIU)

- Emission Database for Global Atmospheric Research (EDGAR), European Commission

- Environment and Climate Change Canada (ECCC)

- Eora Global Supply Chain Multi-Regional Input-Output (MRIO)

- European Environment Agency (EEA)

- European Institute of the Mediterranean

- Eurostat

- Freedom House

- German Federal Statistical Office

- Global Footprint Network

- Global Forest Watch

- Global Multi-Regional Input-Output (MRIO) Database

- Human Development Report (HDR), UN Development Programme

- International Budget Partnership

- International Labor Organization (ILO)

- International Monetary Fund (IMF)

- International Telecommunication Union (ITU), United Nations

- International Trade Union Confederation (ITUC)

- National Statistics Institute of Spain (INE)

- Natural Resource Governance Institute (NRGI)

- Organization for Economic Cooperation and Development (OECD)

- Pan American Health Organization

- Potsdam Real-Time Integrated Model for Assessment of Emission Pathways (PRIMAP)

- Regional Office for the Eastern Mediterranean (EMRO), World Health Organization

- Reporters Without Borders

- Statistics Canada

- Swiss Federal Statistical Office

- Transparency International

- United Nations

- United Nations Conference on Trade and Development (UNCTAD)

- United Nations Department of Economic and Social Affairs (UNDESA)

- United Nations Economic and Social Commission for Western Asia (UNESCWA)

- United Nations Educational, Scientific and Cultural Organization (UNESCO)

- United Nations Framework Convention on Climate Change (UNFCCC)

- United Nations International Children's Emergency Fund (UNICEF)

- United Nations Population Fund

- United Nations Statistics Division

- United Nations University World Institute for Development Economics Research (UNU WIDER)

- US Census Bureau

- US Central Intelligence Agency (CIA)

- US Energy Information Administration (EIA)

- US Environmental Protection Agency (EPA)

- Vision of Humanity, Institute for Economics and Peace

- World Bank

- World Intellectual Property Organization (WIPO)

- World Health Organization (WHO)

- World Nuclear Association

- World Risk Index

- World Resources Institute (WRI)

- Other national and sub-national sources (such as national and regional statistical offices, central banks, national and regional governments, ministries and departments).

MSCI.COM | PAGE 47 OF 57

Appendix 5: MSCI ESG Government Ratings Coverage

MSCI ESG Government Ratings model assesses ESG risks for 182 sovereigns (Exhibit 18), 53 sub-sovereign entities (plus selected German Laender issuances) and three supranational administrative bodies (Exhibit 19) under its coverage. These lists may change over time.

Exhibit 18: MSCI ESG Government Ratings – Sovereigns

Sovereign rating coverage		
Afghanistan	Cameroon	Finland
Albania	Canada	France
Algeria	Cape Verde	Gabon
Angola	Central African Republic	Gambia
Antigua and Barbuda	Chad	Georgia
Argentina	Chile	Germany
Armenia	China	Ghana
Australia	Colombia	Greece
Austria	Comoros	Grenada
Azerbaijan	Congo DR	Guatemala
Bahamas	Congo Republic	Guinea
Bahrain	Costa Rica	Guinea-Bissau
Bangladesh	Cote d'Ivoire	Guyana
Barbados	Croatia	Haiti
Belarus	Cyprus	Honduras
Belgium	Czech Republic	Hong Kong
Belize	Denmark	Hungary
Benin	Djibouti	Iceland
Bhutan	Dominican Republic	India
Bolivia	East Timor	Indonesia
Bosnia and Herzegovina	Ecuador	Iran
Botswana	Egypt	Iraq
Brazil	El Salvador	Ireland
Brunei	Equatorial Guinea	Israel
Bulgaria	Eritrea	Italy
Burkina Faso	Estonia	Jamaica
Burundi	Ethiopia	Japan
Cambodia	Fiji	Jordan

Kazakhstan	Nicaragua	South Sudan
Kenya	Niger	Spain
Kiribati	Nigeria	Sri Lanka
Kuwait	Norway	Sudan
Kyrgyzstan	Oman	Suriname
Laos	Pakistan	Swaziland
Latvia	Panama	Sweden
Lebanon	Papua New Guinea	Switzerland
Lesotho	Paraguay	Syria
Liberia	Peru	Taiwan
Libya	Philippines	Tajikistan
Lithuania	Poland	Tanzania
Luxembourg	Portugal	Thailand
Macedonia	Qatar	Togo
Madagascar	Romania	Tonga
Malawi	Russia	Trinidad and Tobago
Malaysia	Rwanda	Tunisia
Maldives	Saint Lucia	Turkey
Mali	Saint Vincent and Grenadines	Turkmenistan
Malta	Samoa	Uganda
Mauritania	Sao Tome and Principe	Ukraine
Mauritius	Saudi Arabia	United Arab Emirates
Mexico	Senegal	United Kingdom
Moldova	Serbia	United States
Mongolia	Seychelles	Uruguay
Montenegro	Sierra Leone	Uzbekistan
Morocco	Singapore	Vanuatu
Mozambique	Slovakia	Venezuela
Myanmar	Slovenia	Vietnam
Namibia	Solomon Islands	Yemen
Nepal	Somalia	Zambia
Netherlands	South Africa	Zimbabwe
New Zealand	South Korea	

Exhibit 19: MSCI ESG Government Ratings – Sub-sovereign entities & Supranational bodies

Germany (DE)	Germany (DE)	Canada (CA)
State of North Rhine-Westphalia	State of Baden-Württemberg	Province of Ontario
State of Lower Saxony	State of Thuringia	Province of Quebec
State of Berlin	State of Saxony	Province of British Columbia
State of Hesse	State of Bavaria	Province of Alberta
State of Schleswig-Holstein	State of Mecklenburg-Western Pomerania	Province of Manitoba
State of Rhineland-Palatinate	Selected Laender issuances	Province of Saskatchewan
State of Saarland		Province of New Brunswick
State of Bremen		Province of Newfoundland and Labrador
State of Brandenburg		Province of Nova Scotia
State of Hamburg		City of Montreal
State of Saxony-Anhalt		City of Toronto

Switzerland (CH)	Australia (AU)	Others
Republic and Canton of Geneva	Australian Capital Territory	Region of Wallonie
Canton of Zurich	State of Western Australia	Autonomous Community of Basque
Canton of Basel-Stadt	State of Queensland	Autonomous Community of Andalusia
Canton of Basel-Landschaft	Northern Territory	Autonomous Community of Madrid
Canton of Lucerne	State of South Australia	State of California
Canton of St. Gallen	State of New South Wales	State of Illinois
Canton of Graubünden	State of Victoria	Region of Île-de-France
Canton of Vaud	State of Tasmania	City of Paris
Canton of Solothurn		Tokyo Metropolitan

Supranational Bodies	Supranational Bodies	
European Union (EU)	European Financial Stability Facility (EFSF)	
European Stability Mechanism (ESM)		

Appendix 6: Determining the Adjusted ESG Government Scores

ESG Government Score rating thresholds for AAA and CCC ESG Ratings do not match the corresponding rating thresholds for corporate MSCI ESG Ratings, an example of which are shown in Exhibit 20. In this example, the Industry-Adjusted Company Score threshold values for AAA and CCC Company ESG Rating are 8.57 and 1.43, respectively. MSCI ESG Research follows the method described in this section to derive an equivalently scaled Adjusted ESG Government Score for each country that can be used for comparison with companies. Adjusted ESG Government Scores can be used to enable multi-asset-class portfolio-level analytics.

Exhibit 20: Example Rating Thresholds for Corporate ESG Ratings

Rating	Minimum Final Score	Maximum Final Score
AAA	8.58	10.00
AA	7.15	8.57
A	5.72	7.14
BBB	4.30	5.71
BB	2.87	4.29
B	1.44	2.86
CCC	0.00	1.43

Adjusted ESG Government Scores are calculated to derive an equivalently scaled score between corporate ESG Ratings scale and ESG Government Ratings scale. It is calculated by following the steps outlined below:

1. MSCI ESG Research calculates the ESG Government Scores corresponding to the best-in-class threshold and the worst-in-class threshold on the corporate ESG Ratings thresholds (Exhibit 21). Linear interpolation is used to fill in all the remaining values.

Exhibit 21: Translation to Equivalent Adjusted ESG Government Scores

ESG Government Score (formula)	Equivalent Adjusted ESG Government Score	Rationale
Average + 2 x standard deviation	8.58	Threshold for AAA rating
Average	5.00	Mid-point of BBB rating
Average - 2 x standard deviation	1.44	Threshold for CCC rating

2. For countries that are in a buffer zone of an adjacent rating band but retaining the prior ESG Government Rating, the Adjusted ESG Government Score is constrained to the minimum and maximum range associated with the same prior corporate ESG Rating. Countries that meet these criteria will have Adjusted ESG Government Scores that are +/-0.01 away from the transition point in corporate ESG Ratings scale. For example, a country with an ESG Government

Rating of BBB that is in the buffer zone of the 'BBB-A' ESG Government Rating band, will have a maximum Adjusted ESG Government Score of 5.70, which is -0.01 away from the 'A' corporate ESG Rating threshold.

3. The above two steps result in the following conversion formula for Adjusted ESG Government Score (equation 2). Importantly, this translation does not alter the ESG Government Ratings — it is simply a linear translation of scores.

$$Adjusted\ ESG\ Government\ Score$$
$$:= Max\left\{ Min \left\{ \begin{array}{c} Linear\ Factor\ x\ ESG\ Government\ Score + Linear\ Intercept, \\ Max\ score\ on\ corp.\ ESG\ Ratings\ scale\ for\ the\ country's \\ ESG\ Government\ Ratings \end{array} \right\}, \\ \begin{array}{c} Min.\ score\ on\ corp.\ ESG\ Ratings\ scale\ for\ the\ country's \\ ESG\ Government\ Ratings \end{array} \right\} \dots (2)$$

The **Linear Factor** and **Linear Intercept** values change each year, and hence are available upon request from MSCI ESG Research.

Calculation of the ESG Government Score, Adjusted ESG Government Score, and ESG Government Rating is explained using following example (Exhibit 22).

Exhibit 22: Example Calculation of ESG Government Score, Adjusted ESG Government Score and ESG Government Rating

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Example Country:

ESG Risk Management Score = 7.03

ESG Risk Exposure Score = 2.09

ESG Government Score (using Equation 1) is calculated as follows:

$ESG\ Government\ Score = Min\ \{(7.03 + 1), Average(10 - 2.09, 7.03)\}$

$ESG\ Government\ Score = Min\{8.03, Average(7.91, 7.03)\}$

$ESG\ Government\ Score = Min(8.03, 7.47)$

$ESG\ Government\ Score = 7.47$

ESG Government Ratings (using Exhibit 9) are calculated as follows:

The ESG Government Score of 7.47 lies above the lower rating threshold (7.15) and below the upper rating threshold (8.19) defining the rating zone corresponding to a ESG Government Rating of **AA.** The ESG Government Score is not in the buffer zone (+/-0.3 on either side of lower and upper rating threshold), and so will retain the rating as originally calculated - **AA.**

Adjusted ESG Government Score (using Equation 2) is calculated as follows:

In this particular hypothetical year, the Linear Factor = 1.37, and the Linear Intercept = -2.69

Appendix 7: ESG Government Ratings Model History

MSCI ESG Government Ratings uses the following numeric notation to indicate the model version: MAJOR.MINOR. These two parts are numeric and indicate a specific type of model update.

- **Major** version number indicates a major model update.

- **Minor** version number indicates a minor model update.

The following is the history of the MSCI ESG Government Ratings model from its beginning in 2012.

January 1, 2012 – MSCI ESG Government Ratings model version 1.0

- MSCI ESG Government Ratings start date with 91 sovereign entities in ratings coverage.

January 1, 2014 – MSCI ESG Government Ratings model version 2.0

- Changes to the Social Pillar Sub-factors:

   o Health Levels Sub-factor removed. Underlying metrics moved to Basic Human Capital Sub-factor.

   o Employment Sub-factor removed. Underlying metrics moved to Wellness Sub-factor.

   o Human Capital Performance Sub-factor added.

   o Human Capital Infrastructure Sub-factor added.

- Ratings coverage expanded to 132 sovereign entities.

January 23, 2015 – MSCI ESG Government Ratings model version 3.0

- Changes to the Environmental Pillar Sub-factors:

   o Bio-capacity Sub-factor and Consumption Levels Sub-factor consolidated into Productive Land and Mineral Resources Sub-factor.

- Ratings coverage expanded to 198 sovereign entities.

February 8, 2023 – MSCI ESG Government Ratings model version 3.1

- Calculation method of Adjusted Government ESG Scores in buffer zone changed to the minimum and maximum range associated with the corporate ESG Ratings.

March 19, 2024 – MSCI ESG Government Ratings model version 4.0[6]

- Substantial revision to the Environmental Pillar structure:

   o Climate Change and Natural Hazards Risk Factor replaced Environmental Externalities and Vulnerability Risk Factor.

   o Climate Change and Natural Hazards Risk Factor assigned a higher weight of 15% while Natural Resource Risk Factor assigned a lower weight of 10%.

   o Physical Risk Sub-factor added.

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[6] The update to the MSCI ESG Government Ratings Methodology in July 2024 aligned key changes made to the assessment framework for sovereigns to that of sub-sovereigns.

- o Transition Risk Sub-factor added.

- o Biodiversity Risk Sub-factor added.

- o Pollution and Waste Risk Sub-factor added.

- Sovereign Watch mechanism replaced by Exceptional Events Framework.

- Updated coverage list based on the IMF World Economic Outlook and minimum data availability criteria. 182 sovereign entities in ratings coverage.

April 8, 2025 – MSCI ESG Government Ratings model version 4.1

- Updated standardization techniques for raw data conversion to a 10-point scale.

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