MSCI ESG Government Ratings Methodology

MSCI ESG Research LLC

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Contents

1 What are MSCI ESG Government Ratings?

MSCI ESG Government Ratings reflect how countries' exposure to and management of environmental, social, and governance (ESG) risk factors may affect the long-term sustainability and long-term competitiveness of their economies. Managing these risks effectively has an important bearing on the long-term attractiveness of the country as an investment destination.

MSCI ESG Government Ratings use a quantitative, data-based method to measure this, using available indicators from reputable external sources (such as the World Bank). We apply the same methodology and weightings for all countries globally, and our ESG Government Ratings are a global spectrum from AAA to CCC.

1.1 ESG Risk Exposure and ESG Risk Management

Our methodology is based on assessing countries' ESG Risk Management relative to ESG Risk Exposure.

In measuring **ESG Risk Exposure** for a country, we consider **resources** (natural capital, human capital, and financial resources) as pre-requisites for a country's development and performance. Because countries are endowed with varying amounts of these resources, they have inherent advantages or disadvantages in converting these assets into productive goods and services. Other '**enabling' factors** are also included in our consideration of exposure – such as having an effective government and judiciary system, low vulnerabilities to environmental events and externalities, and a supportive economic environment. These can all help enable the effective utilization of an economy's resources.

In measuring **ESG Risk Management** for a country, we use data on **demonstrated performance** on these ESG areas. For example, we use data capturing outcomes on environmental sustainability, standard of living, and safety and freedom.

1.2 ESG Pillars and Risk Factors

We define the E, S and G pillars in ESG Government Ratings as follows:

Exhibit 1: Pillar Definitions

Pillar	Risk Factor
Environmental (E)	We assess the extent to which a country's long-term competitiveness is affected by its ability to protect, harness, and supplement its natural resources, and to manage environmental vulnerabilities and externalities.
Social (S)	We assess the extent to which a country's long-term competitiveness is affected by its ability to develop a healthy, productive, and stable workforce, and knowledge capital and to create a supportive economic environment.
Governance (G)	We assess the extent to which a country's long-term competitiveness is affected by its 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 'risk factors', within which we assess both ESG Risk Exposure and ESG Risk Management.

Exhibit 2: ESG Risk Factors

Pillar	Risk Factor
Environmental (E)	Natural Resources
Environmental (E)	Environmental Externalities and Vulnerability
Social (S)	Human Capital
Social (S)	Economic Environment
Governance (G)	Financial Governance
Governance (G)	Political Governance

2 Analytical and Methodology-related Process

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

Exhibit 3: MSCI ESG Government Ratings: Analytical Process

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┌─────────────────────────────────────────────┐
│        Identifying Risk Factors:            │
│  Determine Country Level ESG Risk Factors and│
│                  Weights                     │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│            Data Collection:                  │
│  Use credible data sources e.g., UN, World   │
│            Bank, IMF etc.                    │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│           Analysis and Rating:               │
│         Country Scores and Ratings           │
└─────────────────────────────────────────────┘
                      ↓
┌─────────────────────────────────────────────┐
│              Final Review:                   │
│    ESG Methodology Committee Approval        │
│    ESG Assessment Committtee Approval        │
└─────────────────────────────────────────────┘
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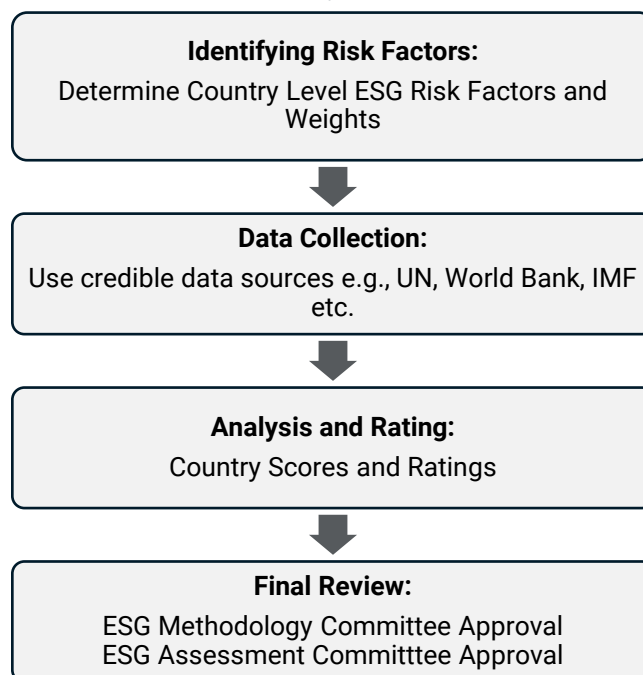
2.1 Identifying Risk Factors

Our framework begins by considering three types of resources. These are (1) natural resources, (2) human resources, and (3) financial resources.

Given that the global population has already reached a high level, and at the same time, many developing countries are trying to reduce poverty and increase living standards, there is pressure on **natural resources** in both developed and developing countries. The availability of natural resources such as land, energy, and water, is likely to provide long-term competitive advantages to any country having these resources.

In terms of **human capital**, it is beneficial for a country to have a skilled, productive, and healthy workforce to promote the generation of new and innovative ideas, business models, products and services that enable it to compete in a globalized economy. Countries that maintain a healthy population and minimize their health expenditure can invest more in other areas to foster economic growth and well-

being. Additionally, a balanced demographic age profile is advantageous so that the working population of a country can support its dependent population (especially old age population).

The availability of **financial resources** is another factor that may have an impact on a country's long-term competitiveness. Higher debt levels may result in higher national interest payments in the future, resulting in reduced investment and expenditure in priority areas such as job creation, education, health, and security. In the absence of sufficient financial resources in future due to higher debt levels, a country may not be able to invest in management of its environmental and social risks.

Although the availability of resources is necessary for providing competitive advantage to a nation, it alone cannot ensure long-term competitiveness. There are other factors, which can facilitate or restrict the potential benefits of a country's resources, most notably the prevailing **economic environment** in a country. The economic environment consists of factors such as fiscal policy, monetary policy, industrial policy, infrastructure, inflation, gross domestic product (GDP) growth and level of income. The economic environment has a great impact on business, which, in turn, affects utilization and management of resources. For example, a country may not be able to reap a demographic dividend unless it has a supportive economic environment that can create opportunities for its population; and without a supportive economic environment, this dividend may even become a liability.

Additionally, a country's growth can be constrained if it is vulnerable to environmental hazards such as earthquakes, storms, tsunamis or floods, and environmental externalities such as pollution. These natural hazards and externalities may affect national resources adversely by reducing their potential benefits. Further, the affected country may need to devote some of its financial resources towards addressing these hazards and externalities.

Another factor that can restrict or facilitate the potential benefits of national resources is the lack or presence, respectively, of institutional mechanisms to effectively allocate, utilize and manage these resources. In our view, these institutional mechanisms are even more important than the actual availability of resources. For example, many countries, despite having an abundance of natural resources, have not achieved higher living standards due to poor governance. In order to ensure effective management of national resources, a country should have an effective government and judiciary.

The definitions for all six ESG risk factors are as follows:

E	**Natural Resources**	The **Natural Resources** risk factor (18%) assesses natural resource availability and natural resource management. In our analysis, we consider three critical natural resources: energy and minerals, water, and land.
	Environmental Externalities and Vulnerability	The **Environmental Externalities and Vulnerability** risk factor (7%) measures a nation's exposure to environmental externalities such as air and water pollution, which may cause losses due to health impacts, and its vulnerability to natural hazards including weather-driven and other environmental catastrophes, which can lead to significant damages and loss of productivity.
S	**Human Capital**	The **Human Capital** risk factor (15%) assesses the risk of lacking balanced and productive human capital. Poor quality of human capital may affect a country's long-term competitiveness adversely. To have beneficial human capital, a country should have an educated, healthy, balanced, and skilled workforce. Such a workforce will be able to understand and adapt to the latest technologies, and to develop new and innovative ideas, business models, products, and services.
	Economic Environment	The **Economic Environment** risk factor (10%) assesses how conducive a country's economic environment is to enable utilizing its resources effectively. A country's economic environment consists of factors such as its fiscal policy, monetary policy, industrial policy, infrastructure, inflation, GDP growth, and income.
G	**Financial Governance**	The **Financial Governance** risk factor (20%) assesses the risk of lacking sufficient financial capital to manage resources in a sustainable way. High debt levels may reduce a country's ability to invest in the future, disrupt the business environment and may affect competitiveness and sustainability in the long-term. Weak financial governance may also affect a country's capacity to manage other environmental and social risks such as energy security, job creation etc. requiring sufficient financial resources.
	Political Governance	The **Political Governance** risk factor (30%) assesses the effectiveness of a country's political governance structure and its ability to support the value creation process. Political governance refers to how a country manages the state, establishes transparency and accountability to its people, and promotes a sense of nationhood. Poor political governance may not only affect the stability and security of a country, but it may also constrain its social and economic progress.

2.1.1 Natural Resources Risk

The **Natural Resources** risk factor (18%) assesses natural resource availability and natural resource management. In our analysis, we consider three critical natural resources: energy and minerals, water, and land.

Energy is part of almost every economic activity, and it is critical for maintaining living standards. However, energy resources are not distributed equally among countries – most countries rely on energy imports. In our assessment of the **Energy Security Risk Score**, we consider proven fossil and nuclear fuel reserves and net energy imports. Scarcity of energy resources in a country implies higher exposure to energy security risk. Those countries with abundant energy resources have an advantage that — if properly managed — can enhance living standards and result in economic growth, development and foreign exchange income. Reliance on imports for meeting energy needs results in higher foreign currency outflows and makes a country's economy vulnerable to global energy price fluctuations. Further, in extreme situations like war, it can put a country at risk; energy imports may be disturbed, adversely affecting the country's productivity.

We assess the **Energy Resource Management Score** based on energy productivity, renewable energy, energy consumption and energy resource depletion. Energy security risk can be reduced or mitigated by increasing energy efficiency, reducing consumption levels, and producing renewable energy. A country with higher exposure to energy resource risks can manage these risks in part by producing more renewable energy, which reduces its reliance on fuel and energy imports and can enhance its energy security. Higher energy consumption levels increase risk because this may result in high energy resource depletion and greater fuel and energy imports, leading to higher foreign currency outflow, affecting a country's trade balance.

Because water is a basic human requirement and a key requirement for many industries, scarcity of water may put severe constraints on a country's stability, peace, and growth. Threats to access to this critical resource have resulted in conflicts within countries and between neighboring countries. In our assessment of the **Water Resources Score**, we use data for internal renewable water resources. Scarcity of water resources in a country implies higher exposure to water resource risk.

We consider water withdrawal relative to internal renewable resources and a country's population together with water stress to calculate the **Water Resource Management Score**. Water resource risk can be managed in part by improving water utilization efficiency and changing water usage patterns. Higher withdrawal may be unsustainable in the long term, and thus may increase water resource risk.

Similar to the availability of energy and water resources, we consider the availability of productive land (agricultural and forest land), and mineral resources can provide competitive advantage to a nation in a resource-constrained global economy. We consider these indicators in our assessment of **Productive Land and Mineral Resources Score**. Higher availability of productive land may support higher agricultural production and consumption, and thus can contribute to greater food security and higher economic growth. Similar to energy-rich nations, mineral resources-rich nations have an advantage that – if properly managed – can enhance living standards and result in economic growth, development, and foreign exchange income.

Sustainable conservation of existing natural resources is required to maintain or improve a country's long-term access to resources. For the **Resource Conservation Score**, we consider data for net agricultural product exports, mineral resource depletion rate and net forest depletion rate. Negative value of a country's net agricultural products exports implies net import of agricultural products, and thus higher food security risk to the country. A higher value for mineral resource depletion and forest depletion represents greater reliance on income from mineral resources or forests.

2.1.2   Environmental Externalities and Vulnerability Risk

The **Environmental Externalities and Vulnerability** risk factor (7%) measures a nation's exposure to environmental externalities such as air and water pollution, and its vulnerability to natural hazards including weather-driven and other environmental catastrophes, which can lead to significant damages and loss of productivity.

In our assessment of the **Vulnerability to Environmental Events Score**, we measure the extent to which the natural environment of a country is prone to damage and degradation. Biodiversity is considered a hedge against many environmental issues, as greater biodiversity supports ecosystem services, including air quality, climate (e.g., CO_2 sequestration), water purification, pollination, and prevention of soil erosion. We also consider lack of biodiversity in a nation as an environmental vulnerability. In addition, a higher percentage of endangered species within a country indicates weak protection of and a greater loss of biodiversity.

Our framework also considers potential regulatory risk to a country due to higher greenhouse gas (GHG) emission level. International negotiations over climate regulations revolve around a country's share in global GHG emissions and per capita GHG emissions levels. A higher level of emissions may result in higher monetary implications for the country in future.

For the **Environmental Performance Score**, we consider a country's management of natural hazards to be strong if, historically, less of its population is affected by the

occurrence of natural disasters. We also include data for forest cover change because an increase in forest cover is desirable as it can positively affect biodiversity in a country. In order to assess the management of CO_2 emissions in a country, we assess the trend in the CO_2 intensity of a country's economy. A negative value implies decreasing CO_2 intensity of its economy.

Higher levels of air and water pollution lead to adverse impacts on human capital, such as poor health and premature mortality, as well as to land degradation. For our assessment of the **Environmental Externalities Score**, we consider the emissions levels of four air pollutants (particulate matter, nitrogen oxide, sulfur dioxide and non-methane volatile organic compound emissions).

The **Management of Environmental Externalities Score** incorporates data for deaths due to air and water pollution, fine particulate emissions damage, and the trend in air pollutants. A negative emissions trend implies reduction in a country's emissions levels and consequently possible reduction in associated adverse health impacts.

2.1.3   Human Capital Risk

The **Human Capital** risk factor (15%) assesses the risk of lacking balanced and productive human capital. Poor quality of human capital may affect a country's long-term competitiveness adversely. To have beneficial human capital, a country should have an educated, healthy, balanced, and skilled workforce. Such a workforce will be able to understand and adapt to the latest technologies, and to develop new and innovative ideas, business models, products and services.

An educated and healthy workforce that can support the dependent population, indicates a good quality of human capital. To determine a country's **Basic Human Capital Score**, we assess adult literacy levels, health levels, population demographics, and gender equality.

In order to develop its human capital, a country must be able to provide for the basic needs of its population at a bare minimum. The **Basic Needs Score** assesses a country's performance on providing basic services to its population and measures the prevalence of food insecurity, access to electricity, access to basic water and sanitation services, and primary education enrollment rate.

The **Higher Education and Technology Readiness Score** evaluates a country's higher-education levels and its population's technological readiness, as these enable efficient utilization of a skilled workforce. A technologically ready workforce will have more access to information and is likely to be more productive.

We measure the **Human Capital Performance Score** by evaluating life expectancy, higher-education enrolment rate, youth literacy rate, and infant and maternal mortality rates. Improvement in these parameters indicates improving human

development and increased focus on creating a healthy and productive workforce. Improvement in these parameters can also be due to improvement in the level of education and healthcare infrastructure, increased access to such infrastructure, or better management of environmental externalities.

Better provisioning of health and education infrastructure may increase access to education and healthcare, which can improve the quality and productivity of the future as well as the current workforce. Our assessment of the **Human Capital Infrastructure Score** includes pupil-teacher ratios at primary and secondary levels, and the availability of nurses and midwives, physicians and hospital beds relative to the size of the population.

Knowledge capital enhances a country's competitiveness and thus enables it to increase the living standard of its population. We consider high-technology exports, patent applications, and journal articles to measure the **Knowledge Capital Score**.

The **Knowledge Capital Management Score** assesses a country's investment in creating knowledge capital by considering its research and development (R&D) expenditure, and researchers and technicians in R&D relative to the size of population.

2.1.4   Economic Environment Risk

The **Economic Environment** risk factor (10%) assesses how conducive a country's economic environment is in utilizing its resources effectively. A country's economic environment consists of factors such as its fiscal policy, monetary policy, industrial policy, infrastructure, inflation, GDP growth, and income.

An economic environment conducive to effective utilization of natural, human and financial resources is desirable. For example, a country facing recession may not be able to utilize its human capital optimally and effectively irrespective of the quality of its human capital; and its economic environment may result in unemployment and working poverty, which, in turn, may lead to public unrest in the country.

In our assessment of the **Economic Environment Score**, we consider the stability of a country's macroeconomic environment that is a key factor enabling a country's productive use of its natural and human capital. Inflation results in a decrease in the real value of money over time and uncertainty over future inflation may discourage investment and savings, while higher income growth may create additional jobs. A country with higher labor market freedom promotes a favorable environment for setting up businesses. We also evaluate the quality of a country's infrastructure because lack of infrastructure can act as a bottleneck and may result in increased costs and delays, thereby making the country's products and services nonviable in competitive markets.

Desirable features of a country's economic well-being include higher employment levels, no poverty, lower income inequality, and strong workers' rights. We consider these metrics in the **Wellness Score** assessment.

2.1.5 Financial Governance Risk

The **Financial Governance** risk factor (20%) assesses the risk of lacking sufficient financial capital to manage resources in a sustainable way. High debt levels may reduce a country's ability to invest in the future, disrupt the business environment and may affect competitiveness and sustainability in the long term. Weak financial governance may also affect a country's capacity to manage other environmental and social risks such as energy security and job creation that require sufficient financial resources.

In our assessment of the **Financial Capital Score**, we consider public debt, trade vulnerability and net international investment position. Higher debt levels result in higher interest costs in the future and, in turn, less money to be used by the country for itself, which can constrain investment in the management of environmental and social risks. It can further increase a country's exposure to ESG risks and affect future growth and well-being adversely. In order to measure the trade vulnerability of a country, we look at the geographic concentration of its exports, and diversification of merchandise and commercial services exports.

Strong financial governance is a critical factor determining the long-term sustainability of an economy. For evaluating the **Financial Management Score**, we include the data for fiscal balance and current account balance. A fiscal deficit may prompt a country's government to borrow, which may result in increased debt. We also consider a country's fiscal transparency and resource governance in our assessment.

In order to assess the management of a country's trade vulnerability risk, we compute change in geographic concentration of its exports, in its merchandise exports' concentration and in its commercial services exports' concentration. Negative values of these data points indicate decreasing concentration risk of exports.

2.1.6 Political Governance Risk

The **Political Governance** risk factor (30%) assesses the effectiveness of a country's political governance structure and its ability to support the value creation process. Out of the six ESG risk factors, political governance is the highest weighted in our model. Political governance refers to how a country manages the state, establishes transparency and accountability to its people, and promotes a sense of nationhood. Poor political governance may not only affect the stability and security of a country,

but it may also constrain its social and economic progress. Moreover, a country's political governance may also have important bearing on its financial governance.

We evaluate the quality of institutions under the **Institutions Score** as the first step in assessing political governance. A country with a fully developed democracy allows all adult citizens to have an equal say in the decisions that affect their lives, which can facilitate effective allocation and management of national resources. Greater press freedom may promote the accountability of different stakeholders, which can lead to enhanced overall well-being.

We also consider that an effective and efficient judicial and penal system is a prerequisite for effective governance in a country, which is measured by the **Judicial and Penal System Score**. An ineffective judiciary or penal system in a country may promote illegal activities, corruption, exploitation and poor law enforcement due to poor public and civil service delivery, which may result in severe social, economic and political crises in that country.

The **Governance Effectiveness Score** assesses the capacity of the government to effectively formulate and implement sound policies.

The **Stability and Peace Score** considers the political stability and absence of violence or terrorism in a country, in addition to any ongoing domestic conflicts or involvement in international conflicts. Through its governance practices, a government should be able to provide security to its population and bring peace and political stability.

We evaluate the **Corruption Control Score** by measuring the perceptions of prevalence of public sector corruption. Failure to control corruption may lead to rent-seeking behavior, economic inefficiencies, and capture of the political process. The environment of uncertainty created by corruption can lead to low development, higher income inequality, and lower economic growth.

For our assessment of the **Political Rights and Civil Liberties Score**, we consider the level of political rights and the level of civil liberties in a country, as well as voice and accountability. A higher level of political rights and civil liberties may imply greater human rights, greater participation and fewer internal conflicts.

2.2 MSCI ESG Government Ratings Framework

The MSCI ESG Government Ratings framework is presented in Exhibit 4. Six ESG risk factors combine to form three pillars (Environmental, Social, and Governance). Exposure and management scores for every risk factor are computed after assessing a country's performance on sub-factors. Overall, 92 **data points** are evaluated to assess 27 sub-factors. Please refer to **Appendix 1** for a list of definitions and data sources.

Exhibit 4: Framework - MSCI ESG Government Ratings

Pillar	Risk Factor	Weight (%)	Risk Exposure	Weight (%)	Risk Management	Weight (%)
Environmental Risk	Natural Resource Risk	18%	Energy Security Risk	6%	Energy Resource Management	6%
			Productive Land and Mineral Resources	6%	Resource Conservation	6%
			Water Resources	6%	Water Resource Management	6%
	Environmental Externalities and Vulnerability Risk	7%	Vulnerability to Environmental Events	3%	Environmental Performance	3%
			Environmental Externalities	4%	Management of Environmental Externalities	4%
Social Risk	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 Risk	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%

2.3   Scoring and Rating Methodology

2.3.1   Risk Factors Weights

Each ESG pillar and its underlying risk factors are assigned weights to generate the final ESG Government Ratings. Risk factor weights are the same for all countries globally, but may be 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 terms. The matrix in Exhibit 5, below, provides the preliminary weight of a pillar after considering the risk intensity in different time horizons. After determining the weights of pillars, we performed a similar exercise to determine weight of six risk factors. In the next step, the weight of risk factors is distributed approximately equally to sub-factors underneath. In the last step, these preliminary weights (of Pillars, Risk Factors and Sub-factors) are under-weighted or over-weighted based on the input by the ESG Methodology Committee.

Exhibit 5: 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 tool. Unlike environmental and social issues, which tend to materialize over longer time horizons, lapses in governance can typically have shorter term consequences on financial management, institutional effectiveness, and stability. Furthermore, weak governance could potentially also hinder a country's development in other areas, such as environmental or social progress.

2.3.2 Raw Data to Score Conversion

In order to determine the rating, we first convert the raw data point values into a 0 to 10 score.

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

- However, for **risk management** data points, 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.

To convert raw data into scored assessments, we employ standardization techniques. These standardization techniques typically rely on min-max scaling, where 0-10 scores are determined linearly between a range of two values. Through standardization, we determine the raw values associated with best-in-class and worst-in-class assessments. In certain cases, we apply winsorization techniques to help limit the impact of outliers when determining relative scores.

2.3.3 Determination of the Government ESG Score

In order to understand how these scores at the lowest level are aggregated and rating is determined at the highest level, we will use a sample country as an example (see Exhibit 7 below).

For this country, the raw value of water withdrawal is 21% and the corresponding numeric score (between 0 and 10) is **3.0**. Similarly, the numeric score for another water resource management data point, 'Water Stress' is **6.8**.

In the next step, the 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**) and Resource conservation (**6.0**), are determined the same way.

In the third step, the risk factor management score, i.e., Natural Resources Risk Management in this case, is determined as the weighted average of the management score of three sub-factors (energy resource management, water resource management and resource conservation), resulting in a score of **5.3**. Similarly, the risk factor management score of another risk factor under the Environmental Pillar, Environmental Externalities and Vulnerability Risk, is calculated (**8.3**).

In the fourth step, the Environmental risk management score of **6.1** is computed as the weighted average of the Natural Resource Risk Management score and Environmental Externalities and Vulnerability Risk score. The Social risk management score (**8.8**) and Governance risk management score (**8.4**) are determined the same way.

In the next step, the weighted average of Environmental risk management, Social risk management and Governance risk management scores is calculated to determine ESG risk management (**7.9**).

Exhibit 7: Scoring Methodology

(values are for a sample country, for illustrative purposes only)
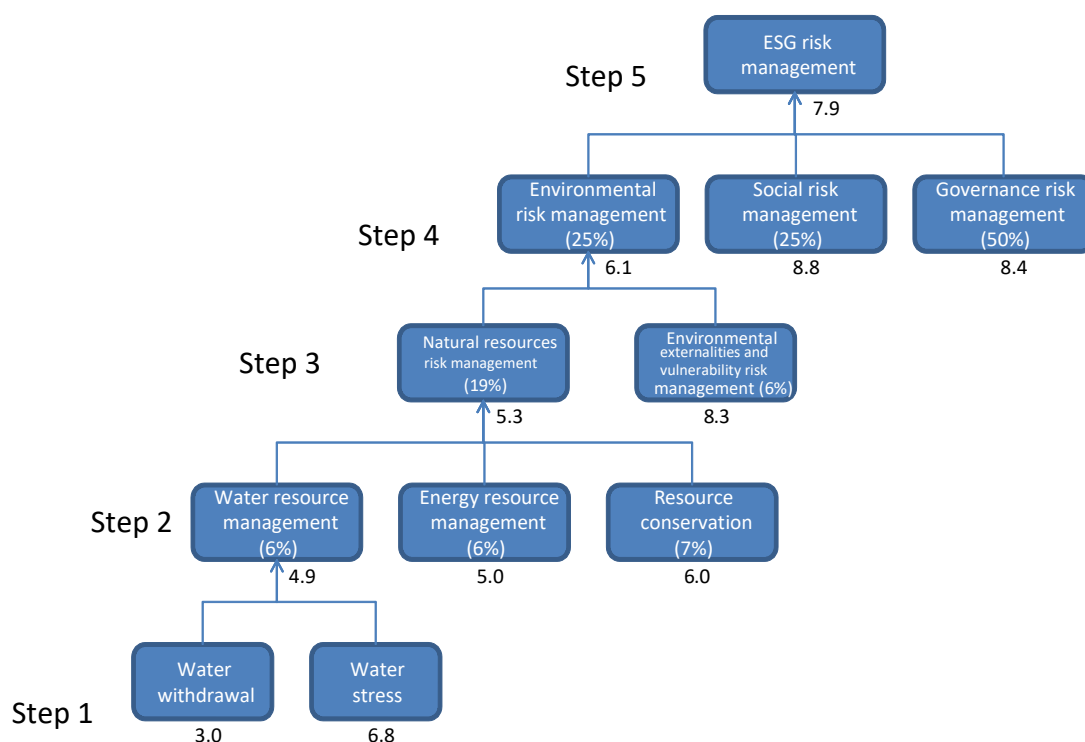
Using the same steps (step 1 to 5), the ESG Risk exposure score for this country is then calculated, which is **2.96**. In order to determine the rating, the Government ESG Score is calculated as below:

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

With this approach, a country's Government ESG Score is constrained by its risk management score if its overall risk management is weak. This formula with minimum management threshold reflects our view that a country with poor risk management may not be able to harness its available resources effectively, even if those resources are abundant.

2.3.4 Government ESG Score to Rating

We calculate the Government ESG Score for all countries and then convert them into a letter rating. The AAA rating represents the best-in-class ESG performance (i.e., lower ESG risk exposure and stronger risk management) whereas the CCC rating represents the worst-in-class ESG performance (i.e., higher ESG risk exposure and weaker risk management).

The rating transition lines used for all countries are determined through statistical analysis of the 'Government ESG Scores' each year. These lines represent the score boundaries for each rating letter, from AAA to CCC.

1. In the first step of the overall rating threshold calculation, MSCI ESG Research calculates the **average** and **standard deviation** of the current year's Government ESG Scores. [1]

2. The following method is used to determine thresholds for the Best-in-Class (**AAA**) and Worst-in-Class (**CCC**) ratings.

Exhibit 8: Computation of Best-in-Class (AAA) and Worst-in-Class (CCC) Rating Thresholds

Government ESG 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

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[1] 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 either downward or 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.

Other rating thresholds (for **AA, A, BBB, BB and B**) are determined by **dividing the zone** between Best-in-Class (AAA) and Worst-in-Class (CCC) ratings into **five equal zones**.

The exact values for rating thresholds vary slightly each year as these are calculated based on each year's ESG Government Ratings score distribution. They are available upon request from MSCI ESG Research.

Exhibit 9 shows an example of these rating threshold values in a hypothetical year, but is **for illustrative purposes only**, and does **not** represent the current year's rating threshold values.

Exhibit 9: ESG Rating Zones for ESG Government Ratings

This table is for **illustrative purposes only**, and does **not** represent the values for the latest/current year (see explanation above)

ESG Rating	Minimum Government ESG Score	Maximum Government ESG Score
AAA	***8.19***	*10.00*
AA	*7.15*	*8.19*
A	*6.12*	*7.15*
BBB	*5.08*	*6.12*
BB	*4.04*	*5.08*
B	*3.00*	*4.04*
CCC	*0.00*	***3.00***

Average Government ESG Score: 5.60
Standard Deviation of Government ESG Score: 1.30

Rating thresholds and ratings 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 Government ESG Rating and another. The exhibit shows that, below a certain management level, the ESG Risk Exposure Score does not affect the Government ESG Rating, which is solely determined by the ESG Risk Management Score.

Exhibit 10: Rating Thresholds and Rating Zones by ESG Risk Exposure and ESG Risk Management Scores
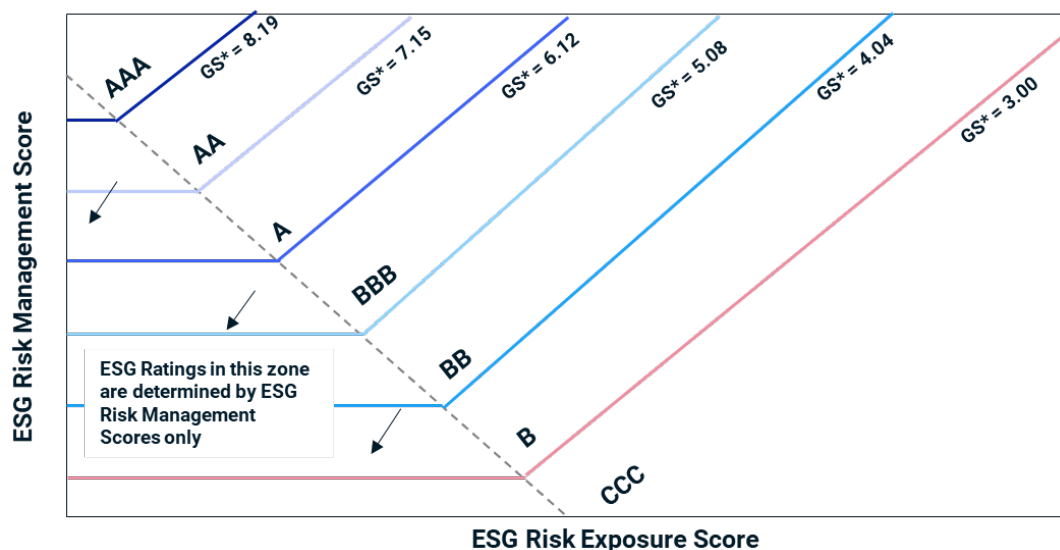
*GS = Government ESG Score

2.3.5 Determining Outlooks

An Outlook is assessed for each country that describes the direction of movement of its Government ESG Score within the rating zones. It is also determined by reference to its position in relation to buffer zones around the rating thresholds between the rating zones.

Buffer Zones

In cases where a country's Government ESG 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 Government ESG Rating change. In order to address such potential rating volatility, we use a buffer zone of 0.2-point score range around each rating threshold. Any country with a Government ESG Score within the buffer zone around a rating threshold retains its previous year's Government ESG Rating, even if its Government ESG 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 Without and After Accounting for Buffer Zone

Scenario	Country A	Country B
Government ESG Rating – without Buffer Zone	BB	A
Government ESG Rating – with Buffer Zone	BBB	BBB
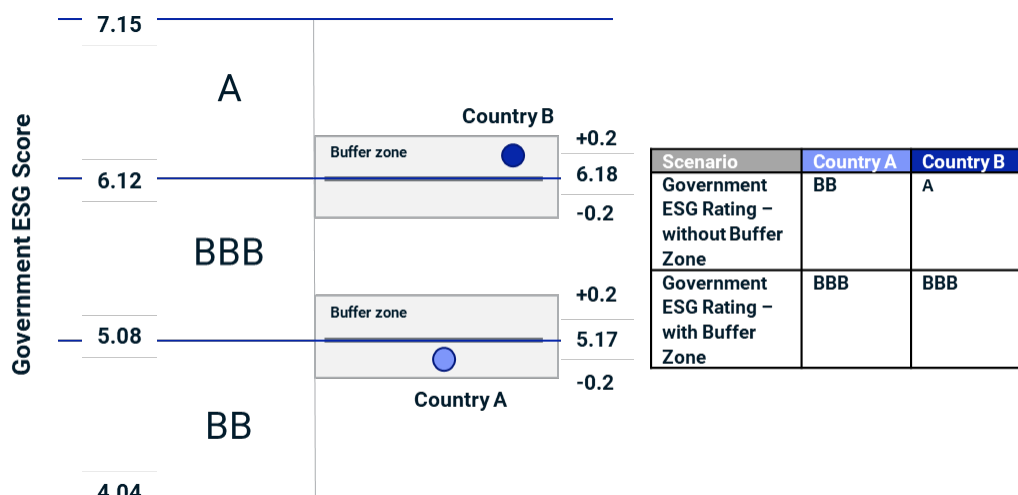
However, this logic is not applicable when a Government ESG Score jumps from one buffer zone to another buffer zone, in which case we retain the rating as originally calculated.

When there are changes to the methodology and model framework, the buffer zone can be increased to limit rating turnover driven purely by methodology changes. Prior to 2014, the buffer zone was set at 0.1 (on a 0–10-point scale) but was subsequently increased to 0.2 and has remained at 0.2 since 2014. The buffer zone is reassessed each year.

Outlook

Positive or Negative Outlooks are assigned to countries with Government ESG Scores in buffer zones to highlight the upward or downward movements, respectively, of their Government ESG Scores from one year to the next. Outlook is assessed based on the direction of movement of a Government ESG Score, regardless of whether or not the score crossed a rating threshold from one rating zone to another. If a country's Government ESG Score has upward movement and lies in a buffer zone, it is assigned a Positive Outlook. Similarly, if a country's Government ESG Score has downward movement and lies in a buffer zone, it is assigned a Negative Outlook. A country with a Government ESG Score that lies outside any buffer zone is assigned a Neutral Outlook, regardless of downward or upward movement, even if it crossed a rating threshold. Different score movement scenarios and their resulting Outlooks are shown in Exhibit 12.

Exhibit 12: Government ESG Score Movements and Resulting Outlooks and Government ESG Ratings
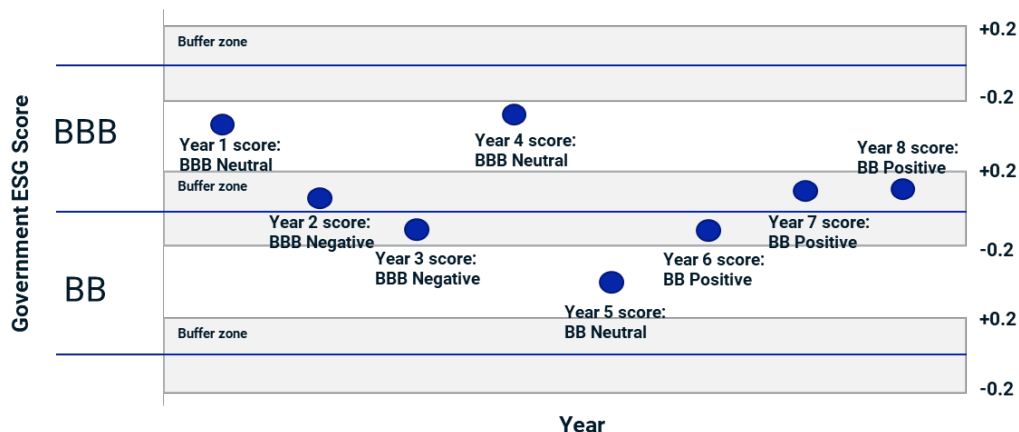
2.4 Sovereign Watch

Sovereign Watch is a scoring mechanism that MSCI ESG Research may use in order to reflect the impact of exceptional events on a country's ESG assessment. This process enables us to become more responsive to exceptional events that have a material impact on a country's ESG profile without waiting for data updates by data providers (e.g., World Bank, UN etc.) or the MSCI ESG Government Rating annual update cycle.

The process compares the severity of the event against the existing score in the model for the affected topic, and applies a deduction to the relevant risk factor score, accordingly, as explained in this section.

In the context of exceptional events, the historical data used to compute the rating may not provide an accurate representation of forward-looking risks and opportunities and relevant factors must be adjusted. Examples of such events may include (but are not limited to):

- The outbreak of war affecting several parts of a country

- International sanctions imposed on the leadership or economic sectors of a country, where the motivation of the sanction stems from action/policies taken by a country's government

- Widespread violent civil unrest (e.g., involving 10% of a country's population), where the destabilizing effect appears systematic in nature for the affected country

The assessment process is presented in Exhibit 16.

Exhibit 16: Sovereign Watch: Assessment Process

Step 1: Severity assessment of event

Step 2: Comparison with existing assessment in the model

Step 3: In case of any discrepancy, make appropriate adjustment in the country's scores and ratings.
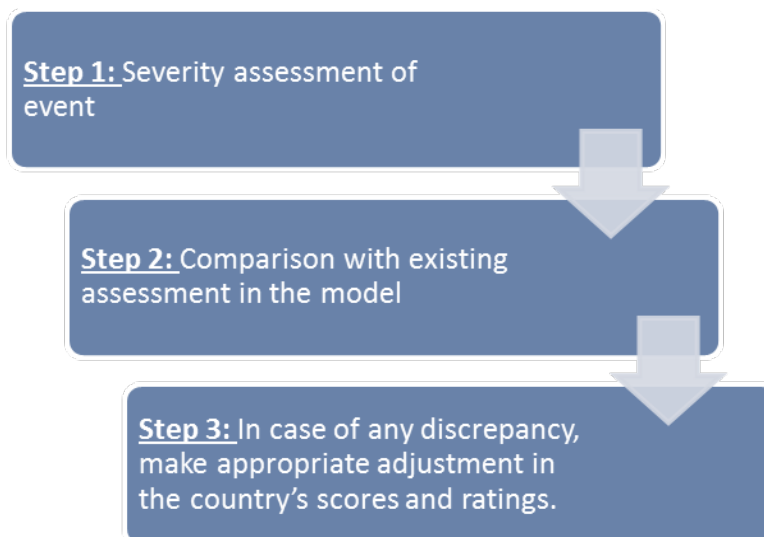
Step 1: Severity Assessment of Event

The event is first categorized into the most relevant Sub-Factor(s) and Risk Factor(s) within the MSCI ESG Government Ratings framework:

After identifying the relevant 'Sub-Factor', the nature of harm and scale of impact are assessed to determine the severity of an event within one of four categories as mentioned below:
- Very Severe
- Severe
- Moderate
- Minor

Examples:

Event: 2022 Ukraine-Russia war
- **Country of Assessment**: Russia
- **Event details**: Widespread international sanctions, financial isolation
- **Sub-Factors**: Economic Environment, Financial Capital & Trade Vulnerability
- **Related Risk-Factors**: Economic Environment Risk, Financial Management
- **Severity**: Very Severe

Event: 2022 Ukraine-Russia war
- **Country of Assessment**: Ukraine

- **Event details**: Widespread infrastructure damage
- **Possible Sub-Factors**: Economic Environment, Financial Capital & Trade Vulnerability
- **Related Risk-Factors**: Economic Environment Risk, Financial Management
- **Severity**: Very Severe

Event: 2021 Military Coup in Myanmar
- **Country of Assessment**: Myanmar
- **Event details**: EU sanctions, noting reported use of force on protesters
- **Possible Sub-Factors**: Political Rights & Civil Liberties
- **Related Risk-Factors**: Political Governance Risk
- **Severity**: Very Severe

Step 2: Comparison with Existing Assessment in the Model

In the second step, the severity assessment of the event is compared to the existing assessment of the country on the relevant sub-factor (see Exhibit 17). Where there is a mismatch between existing scores and the event assessment, an appropriate score adjustment is made to reflect the impact of the event on the country's overall ESG assessment.

Exhibit 17: Comparison against existing assessment

Severity assessment	Existing Assessment[2]			
	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	Adjustment possible*	No adjustment needed	No adjustment needed	No adjustment needed
Moderate	Adjustment possible*	Adjustment possible*	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

* In the cases of 'Minor' and 'Moderate' events, adjustment is made only for events that are structural in nature.

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[2] 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

Step 3: Scores and Rating Adjustment

In case of any adjustment required as per step 2, the following values (Exhibit 18) are used to make appropriate adjustments in the risk factor scores.

Exhibit 18: Adjustment factors

Severity assessment of the event	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	1	0	0	0
Moderate	2	1	0	0
Severe	3	2	1	0
Very severe	4	3	2	1

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

In the case of management sub-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 country's derived scores are re-calculated, which could result in a downgrade to the country's rating and/or outlook.

Step 4: Conclusion of Sovereign Watch Events

From 2019, a Sovereign Watch event may be considered concluded after three years, if there is evidence that the event is no longer ongoing and if similar incidents have not occurred in the country following the initiation of the Sovereign Watch event. If a Sovereign Watch event is concluded, the severity of the case would be upgraded by one level at each subsequent annual update, and the adjustment factor is recalculated again based on the metrics in Exhibit 18, along with any rating or outlook impact.

If an event is not considered concluded after three years, the status and severity would be reassessed each year thereafter.

Appendix 1: MSCI ESG Government Rating Data

1.1 Environmental Pillar Risk Exposure

Risk sub-factors	Data point	Description
Energy Security Risk Score	Proven fossil and nuclear fuel reserves	This indicator describes the extent of proven reserves of coal, oil, natural gas, and nuclear fuel (uranium). Represented in terajoules (TJ) per capita. Data sources: EIA, World Nuclear Association, World Bank, CIA.
	Net energy imports	This indicator describes energy imports as a percentage of total energy use. Net energy imports are estimated as energy use less production, both measured in oil equivalents. Data sources: EIA, World Bank.
Productive Land and Mineral Resources Score	Agricultural and forest land	This indicator assesses the availability of agricultural and forest land. Represented in square km per 1,000 people. Data source: World Bank.
	Mineral wealth	This indicator describes the value of tin, gold, lead, zinc, iron ore, copper, nickel, silver, aluminum, phosphate, potash, and platinum group metals per capita in USD terms. We use a 15-year average price to determine a country's mineral wealth. Data sources: MSCI ESG Research, USGS, World Bank.
Water Resources Score	Internal renewable water resources	This indicator assesses the availability of internal renewable water resources (internal river flows and groundwater from rainfall). Represented in thousand cubic meters per capita. Data source: World Bank.
Vulnerability to Environmental Events Score	Environmental Vulnerability Index	This indicator describes the extent to which the natural environment of a country is prone to damage and degradation due to climate and natural disasters, geology and geography. Values range from 180 (best) to 430 (worst). Data sources: SOPAC, UNEP.
	Endangered species	This indicator assesses the biodiversity potential in a country by describing the 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. Data source: HDR.
	National Biodiversity Index	This indicator assesses the biodiversity potential in a country based on estimates of its richness and endemism in four terrestrial vertebrate classes and vascular plants. Values range from 1 (best) to 0 (worst). Data source: Convention on Biological Diversity.

Risk sub-factors	Data point	Description
	GEF Benefits Index for Biodiversity	This indicator assesses the biodiversity potential in a country based on the species represented in each country, their threat status, and the diversity of habitat types. Values range from 100 (best) to 0 (worst). Data source: World Bank.
	GHG emissions per capita	This indicator describes Scope 1 emissions intensity of greenhouse gases. GHG emissions arise from the following activities: power industry, other industrial combustion, buildings, transport and other sectors (agriculture and waste). Values exclude land use, land-use change and forestry (LULUCF). GHG emissions data are estimated based on the latest CO_2 emissions data. Represented in tons of CO_2e per capita. Data sources: MSCI ESG Research, EDGAR, World Bank.
	CO_2 emissions per capita	This indicator describes CO_2 emissions intensity. CO_2 emissions include sources from fossil fuel use (combustion, flaring), industrial processes (cement, steel, chemicals and urea) and product use. Values exclude land use, land-use change and forestry (LULUCF). Represented in tons of CO_2 per capita. Data sources: EDGAR, World Bank.
	GHG emissions (% of world total)	This indicator describes Scope 1 emissions of greenhouse gases as a percentage of world total. Values exclude land use, land-use change and forestry (LULUCF). GHG emissions data are estimated based on the latest CO_2 emissions data. Data source: MSCI ESG Research, EDGAR.
Environmental Externalities Score	Fine particulate matter concentrations	This indicator describes the annual mean levels of fine particulate matter of PM2.5 in urban and rural areas weighted by population. Represented in micrograms per cubic meter. Data source: WHO.
	Nitrogen oxide emissions	This indicator assesses nitrogen oxides emissions by land area. Represented in Gg per 1,000 square km. Data sources: MSCI ESG Research, EDGAR, World Bank.
	Sulfur dioxide emissions	This indicator assesses sulfur dioxide emissions by land area. Represented in Gg per 1,000 square km. Data sources: MSCI ESG Research, EDGAR, World Bank.
	Non-methane volatile organic compound emissions	This indicator assesses non-methane volatile organic compound emissions by land area. Represented in Gg per 1,000 square km. Data sources: MSCI ESG Research, EDGAR, World Bank.

1.2 Environmental Pillar Risk Management

Risk sub-factors	Data point	Description
Energy Resource Management Score	Energy productivity	This indicator assesses energy intensity defined as energy consumption per unit of GDP. Represented in kg of oil equivalent per PPP-adjusted GDP in constant 2017 international USD. Data sources: EIA, World Bank, IMF.
	Renewable energy	This indicator describes renewable energy as a percentage of total final energy consumption. Renewable energy is defined as energy derived from the following sources: hydro, geothermal, biofuels, renewable waste, solar, wind, biogas, and marine. Data source: World Bank.
	Energy consumption	This indicator describes the 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. Represented in kg of oil equivalent per capita. Data sources: MSCI ESG Research, World Bank, EIA.
	Energy resource depletion rate	This indicator assesses the depletion rate of energy resources. Energy depletion is a ratio of the value of the stock of coal, crude oil and natural gas to the remaining reserve lifetime (capped at 25 years). Represented as a percentage of GNI. Data source: World Bank.
Resource Conservation Score	Net agricultural product exports	This indicator assesses the difference in the values of exports and imports of all food items (SITC 0 + 1 + 22 + 4) and agricultural raw materials (SITC 2 less 22, 27 and 28). Represented as a percentage of GDP. Data sources: MSCI ESG Research, UNCTAD, World Bank, IMF.
	Mineral resource depletion rate	This indicator assesses the depletion rate of mineral resources. Mineral depletion is 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). Represented as a percentage of GNI. Data source: World Bank.
	Net forest depletion rate	This indicator assesses the depletion rate of forest resources calculated as the product of unit resource rents and the excess of roundwood harvest over natural growth. Represented as a percentage of GNI. Data source: World Bank.

Risk sub-factors	Data point	Description
Water Resource Management Score	Water withdrawal (% of internal renewable resources)	This indicator assesses total annual water withdrawals that comprise water consumption for agriculture, industry and domestic use. They include withdrawals from desalination plants in countries where they are a significant source but exclude evaporation losses from storage basins. Represented as a percentage of internal renewable water resources (internal river flows and groundwater from rainfall). Data source: World Bank.
	Water withdrawal per capita	This indicator describes total annual water withdrawals relative to the size of a country's population. Withdrawals comprise water consumption for agriculture, industry and domestic uses. They include withdrawals from desalination plants in countries where they are a significant source but exclude evaporation losses from storage basins. Represented in cubic meters per capita. Data sources: MSCI ESG Research, World Bank.
	Water stress	This indicator assesses the exposure to baseline water stress by measuring the 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 Aqueduct.
Environmental Performance Score	Forest cover change	This indicator assesses the biodiversity loss by describing the 3-year 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.
	CO_2 intensity trend	This indicator assesses the 3-year CAGR of the percentage change in CO_2 emissions intensity. CO_2 emissions include sources from fossil fuel use (combustion, flaring), industrial processes (cement, steel, chemicals and urea) and product use. Values exclude land use, land-use change and forestry (LULUCF). Intensity is calculated in kg of CO_2 per PPP-adjusted GDP in constant 2017 international USD. Data sources: EDGAR, World Bank, IMF.
	Population affected by natural disasters	This indicator describes the average number of people per year per million population requiring immediate assistance during a period of emergency as a result of a natural disaster (drought, extreme temperature, flood, mass movement, wet storm and wildfire), including displaced, evacuated, homeless and injured people. Data sources: World Bank, HDR.

Risk sub-factors	Data point	Description
Management of Environmental Externalities Score	Deaths due to indoor and outdoor air and water pollution	This indicator assesses the death rate due to indoor and outdoor air and water pollution per 100,000 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 source: WHO.
	Fine particulate emissions damage	This indicator assesses the damage due to exposure of a country's population to ambient PM2.5 and ozone pollution, and household air pollution. Represented as a percentage of GNI. Data source: World Bank.
	Fine particulate matter emissions trend	This indicator describes the 3-year CAGR of the percentage change in PM2.5 emissions concentration. Data sources: MSCI ESG Research, WHO.
	Nitrogen oxide emissions trend	This indicator describes the 3-year CAGR of the percentage change in nitrogen oxides emissions concentration. Data sources: MSCI ESG Research, EDGAR, World Bank.
	Sulfur dioxide emissions trend	This indicator describes the 3-year CAGR of the percentage change in sulfur dioxide emissions concentration. Data sources: MSCI ESG Research, EDGAR, World Bank.
	Non-methane volatile organic compound emissions trend	This indicator describes the 3-year CAGR of the percentage change in non-methane volatile organic compound emissions concentration. Data sources: MSCI ESG Research, EDGAR, World Bank.

2.1 Social Pillar Risk Exposure

Risk sub-factors	Data Point	Description
Basic Human Capital Score	Old-age dependency ratio	This indicator assesses the ratio of people older than 65 years to the total labor force (those aged 15 years and above). Data sources: MSCI ESG Research, World Bank, CIA.
	Gender Inequality Index	This indicator describes whether a country has large gender inequalities in reproductive health, political empowerment, educational attainment and labor market participation. Values range from 0 (best) to 1 (worst). Data source: HDR.
	Adult literacy levels	This indicator describes the number of people aged 15 and above who are literate. Represented as a percentage of total population. Data source: World Bank.

Risk sub-factors	Data Point	Description
	Health levels	This indicator assesses the health of the population based on average incidence rates of diseases like tuberculosis, HIV, obesity and diabetes. Data are estimated as an average of disease incidence rates. Values range from 0 (best) to 10 (worst). Data sources: MSCI ESG Research, World Bank, CIA.
Higher Education and Technology Readiness Score	Higher education levels	This indicator assesses the ratio of the labor force with advanced education to 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 source: World Bank.
	Technological readiness	This indicator assesses the prevalence of technology based on broadband availability, internet users and mobile phone users. Broadband availability and mobile usage are determined based on fixed broadband subscriptions and mobile cellular subscriptions per 100 people. Internet usage is determined based on a percentage of total population. Data are estimated as an average of prevalence rates. Values range from 0 (best) to 10 (worst). Data sources: MSCI ESG Research, World Bank.
Knowledge Capital Score	High-tech exports	This indicator assesses the value of exports of high-technology products such as aircraft, computers, pharmaceuticals, scientific instruments, and electrical machinery. Represented in USD per capita. Data source: World Bank.
	Journal articles	This indicator assesses 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 source: World Bank.
	Patent applications	This indicator assesses the average number of patent applications by residents per million people. 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 source: World Bank.
Economic Environment Score	Infrastructure	This indicator assesses the quality of trade and transport-related infrastructure, the quality of power, the number of fixed telephone subscriptions per 100 people, and the number of mobile phone users per 100 people. Quality of power is determined as the percentage of annual sales lost due to power outages. Quality of trade and transport-related

Risk sub-factors	Data Point	Description
		infrastructure is based on surveys for logistics professionals' perceptions. Values range from 0 (best) to 10 (worst). Data sources: MSCI ESG Research, World Bank.
	Macroeconomic environment	This indicator assesses the 3-year average of the fiscal balance and savings rate, and the 3-year CAGR of the GDP growth rate and the inflation rate. Values range from 0 (best) to 10 (worst). Data source: MSCI ESG Research, IMF, World Bank, CIA.

2.2 Social Pillar Risk Management

Risk sub-factors	Data Point	Description
Basic Needs Score	Prevalence of food insecurity	This indicator assesses the percentage of the 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	This indicator assesses the percentage of the population with access to electricity. Data source: World Bank.
	Primary education enrolment rate	This indicator assesses the percentage of primary-school-age children enrolled in primary education or higher. Data sources: UNESCO, UNICEF, World Bank.
	Access to basic water services	This indicator assesses the percentage of the 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	This indicator assesses the percentage of the population using at least basic and improved sanitation services (pit latrines with slabs at a minimum). Data source: World Bank.
Human Capital Performance Score	Life expectancy	This indicator assesses the average number of years a newborn is expected to live if mortality patterns at the time of its birth remain constant in the future. Data sources: World Bank, CIA, UNESCO.

Risk sub-factors	Data Point	Description
	Higher-education enrolment rate	This indicator describes 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.
	Youth literacy rate	This indicator assesses 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, CIA.
	Infant mortality rate	This indicator assesses the number of infants dying before reaching one year of age per 1,000 live births in a given year. Data sources: World Bank, CIA.
	Maternal mortality rate	This indicator assesses the number of maternal deaths from pregnancy-related causes (excluding accidental or incidental causes) per 100,000 live births. Data sources: CIA, UNICEF.
Human Capital Infrastructure Score	Pupil-teacher ratio (primary level)	This indicator assesses 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.
	Pupil-teacher ratio (secondary level)	This indicator assesses the ratio of students in secondary school to teachers in secondary school. The regional and income-classification average is assumed for missing values. Data sources: MSCI ESG Research, World Bank.
	Nurses and midwives	This indicator assesses the number of professional, auxiliary and enrolled nurses and midwives, and other associated personnel such as dental nurses and primary case nurses. Regional and income classification average is assumed for missing values. Represented per 1,000 people. Data sources: MSCI ESG Research, World Bank.
	Hospital beds	This indicator assesses the number of inpatient beds available in public, private, general and specialized hospitals and rehabilitation centers. The regional and income-classification average is assumed for missing values. Represented per 1,000 people. Data sources: MSCI ESG Research, World Bank.
	Physicians	This indicator assesses the number of generalist and specialist medical practitioners. The regional and income classification average is assumed for missing values. Represented per 1,000 people. Data sources: MSCI ESG Research, World Bank.

Risk sub-factors	Data Point	Description
Knowledge Capital Management Score	Researchers in R&D	This indicator assesses 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 (ISCED2011 level 7 or 8). The regional and income classification average is assumed for missing values. Represented per million people. Data sources: MSCI ESG Research, World Bank.
	Technicians in R&D	This indicator assesses the number of people whose main tasks require technical knowledge and experience in engineering, physical and life sciences or social sciences and humanities. 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. The regional and income classification average is assumed for missing values. Represented per million people. Data sources: MSCI ESG Research, World Bank.
	R&D expenditure	This indicator assesses current and capital expenditures (both public and private) on creative work undertaken on a systemic basis in order to increase the stock of knowledge and use it to devise new applications. Represented as a percentage of GDP. Data source: World Bank.
Wellness Score	Vulnerable employment	This indicator assesses unpaid family workers and own-account workers. The regional and income classification average is assumed for missing values. Represented as a percentage of total employment. Data sources: MSCI ESG Research, World Bank.
	Poverty headcount ratio	This indicator assesses the number of people living on less than $2.15 a day at 2017 PPP-adjusted prices. The regional and income classification average is assumed for missing values. Represented as a percentage of total population. Data sources: MSCI ESG Research, World Bank.
	Gini Index	This indicator assesses the equality of income distribution within the population. Values range from 0 (best) to 100 (worst). Data sources: World Bank, HDR, CIA.
	Unemployment	This indicator assesses the share of the total labor force that is without work but available for and seeking employment. Data sources: World Bank, CIA, ILO.
	Youth unemployment	This indicator assesses the 5-year average share of the labor force aged 15-24 without work but available for and seeking employment. Data source: World Bank.

Risk sub-factors	Data Point	Description
	Workers' rights	This indicator assesses whether the labor laws are in basic conformity with ILO standards and effectively enforced, whether independent unions and authentic collective-bargaining contracts exist and have reached sufficient size and number to give workers a significant degree of bargaining power, and whether unions have broad freedom to participate in electoral politics and advocate for the adoption of laws and policies. Data source: Freedom House.

3.1 Governance Pillar Risk Exposure

Risk sub-factors	Data Point	Description
Financial Capital Score	Public debt	This indicator assesses the 3-year average of public debt as a percentage of GDP. Public debt is the cumulative total of all government borrowings less repayments that are denominated in a country's home currency. Data sources: IMF, CIA.
	Trade vulnerability	This indicator assesses 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. Data sources: MSCI ESG Research, UNCTAD, World Bank, CIA.
	Net international investment position	This indicator assesses the 3-year average of foreign assets and liabilities position of a country. Represented as a percentage of GDP. Data sources: MSCI ESG Research, IMF, World Bank.
Institutions Score	Democracy Index	This indicator describes the level of democracy based on the assessment of electoral process and pluralism, functioning of government, political participation, political culture, and civil liberties. Values range from 10 (best) to 0 (worst). Data source: EIU.
	World Press Freedom Index	This indicator describes the ability of journalists as individuals and collectives to select, produce and disseminate news in the public interest independent of political, economic, legal and social interference, and in the absence of threats to their physical and mental safety. Values range from 100 (best) to 0 (worst). Data source: Reporters Without Borders.

Risk sub-factors	Data Point	Description
Judicial and Penal System Score	Rule of law	This indicator describes 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. Data source: World Bank.
Governance Effectiveness Score	Government effectiveness	This indicator describes perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Data source: World Bank.
	Regulatory quality	This indicator describes perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Data source: World Bank.

3.2 Governance Pillar Risk Management

Risk sub-factors	Data Point	Description
Political Rights and Civil Liberties Score	Political rights	This indicator assesses the level of political rights, including electoral process, political pluralism and participation, and functioning of government. Values range from 1 (best) to 7 (worst). Data source: Freedom House.
	Civil liberties	This indicator assesses 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 1 (best) to 7 (worst). Data source: Freedom House.
	Voice and accountability	This indicator describes 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. Data source: World Bank.
Stability and Peace Score	Global Peace Index	This indicator assesses 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. Values range from 1 (best) to 5 (worst). Data source: Vision of Humanity.

Risk sub-factors	Data Point	Description
	Political stability and absence of violence or terrorism	This indicator describes perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Data source: World Bank.
Corruption Control Score	Corruption Perceptions Index	This indicator describes 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. Values range from 100 (best) to 0 (worst). Data source: Transparency International.
	Control of corruption	This indicator describes 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. Data source: World Bank.
Financial Management Score	Current account balance	This indicator assesses the 3-year average of the current account balance, which covers the exports and imports of goods and services, payments of income, and current transfers between residents of a country and nonresidents. Represented as a percentage of GDP. Data sources: MSCI ESG Research, IMF, World Bank, CIA.
	Fiscal balance	This indicator assesses the 3-year average of general government net lending or borrowing, 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 nonresidents (net lending), or utilizing the financial resources generated by other sectors and nonresidents (net borrowing). Represented as a percentage of GDP. Data source: IMF.
	Open Budget Index	This indicator assesses the 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 range from 100 (best) to 0 (worst). Data source: International Budget Partnership.
	Resource Governance Index	This indicator assesses countries deriving revenues from the oil, gas and mining sectors on the quality of governance including institutional and legal setting, reporting practices, safeguards and quality controls, and enabling environment. Values range from 100 (best) to 0 (worst). Data source: NRGI.

Risk sub-factors	Data Point	Description
	Geographic concentration of exports trend	This indicator assesses the change in the geographic concentration of a country'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. Data sources: MSCI ESG Research, CIA.
	Merchandise export concentration trend	This indicator assesses the change in the merchandise export concentration of a country by product group based on the Herfindahl-Hirshman index. Data sources: MSCI ESG Research, UNCTAD.
	Commercial services export concentration trend	This indicator assesses the change in the commercial services export concentration of a country. 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. Data sources: MSCI ESG Research, World Bank.

Appendix 2: Non-Sovereign Government Ratings

Local Authorities

Sub-national local authorities are exposed to similar ESG risk factors as countries. These ESG risk factors may affect the performance and competitiveness of local authorities in the medium to long-term. Hence, we have adapted the MSCI ESG Government Ratings framework and methodology to rate Local Authorities such as states, provinces, cities, and municipalities. These modifications fall into the following categories:

- Under the six risk factors, we collect additional local entity specific data, sourced manually from individual national and sub-national sources (up to 14 local datapoints that include, but are not limited to, renewable energy consumption, GHG emissions, income inequality and public debt, dependent on data availability fields).

- To compute risk factor scores for a Local Authority, we assign 50% weight to country level risk factor scores and the remaining 50% weight to local entity specific data.

- To calculate political governance scores for local authorities, we use the country-level political governance score as a base score for local authorities. Sovereign Watch events may also be applied if they are specific to the local authority.

Joint Local Authority Issuers

Selected joint local authority issuers such as the German Laender issuers were assessed by calculating the weighted average scores and ratings of the underlying local authority entities, weighted by the proceeds going to each individual entity.

Supranational Bodies

Selected supranationals classified as **Supranational Administrative Bodies** receive the weighted average scores and ratings of their underlying sovereign shareholders, weighted by the contribution or ownership of each sovereign to the underlying supranational. Unrated sovereigns contributing less than 5% to the overall entity are excluded from consideration.

Supranationals categorized as **Multilateral Development Banks** are evaluated according to the MSCI ESG Ratings methodology rather than under the MSCI ESG Government Ratings Methodology. Country-level assessments are considered in the overall assessment of the institution alongside institution-level assessments of issues such as governance, transparency, accountability, and the environmental impact of financing.

Appendix 3: MSCI ESG Government Ratings Data Sources

- Convention on Biological Diversity, United Nations
- Economist Intelligence Unit (EIU)
- Emission Database for Global Atmospheric Research (EDGAR), European Commission
- Environmental Vulnerability Index (EVI). Developed by the South Pacific Applied Geoscience Commission (SOPAC), the United Nations Environment Program (UNEP) and their partners.
- Freedom House
- Human Development Report (HDR), UN Development Programme
- International Budget Partnership
- International Labor Organization (ILO)
- International Monetary Fund (IMF)
- Natural Resource Governance Institute (NRGI)
- Reporters Without Borders (RSF)
- South Pacific Applied Geoscience Commission (SOPAC)
- Transparency International
- United Nations Conference on Trade and Development (UNCTAD)
- United Nations Educational, Scientific and Cultural Organization (UNESCO)
- United Nations Environment Programme (UNEP)
- United Nations International Children's Emergency Fund (UNICEF)
- US Central Intelligence Agency (CIA)
- US Energy Information Administration (EIA)
- US Geological Survey (USGS)
- Vision of Humanity
- World Bank
- World Health Organization (WHO)
- World Resource Institute (WRI) Aqueduct

Appendix 4: Determining the Government Adjusted ESG Scores

Government ESG 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 13. In this example, the Industry-Adjusted Company Score threshold values for AAA and CCC Company ESG Rating are 8.57 and 1.43, respectively. We follow the method described in this section to derive an equivalently scaled Government Adjusted ESG Score for each country that can be used for comparison with companies. Government Adjusted ESG Scores can be used to enable multi-asset-class portfolio-level analytics.

Exhibit 13: Example Rating Thresholds for Corporate ESG Ratings

Rating	Minimum final score	Maximum final score
AAA	***8.57*****	*10.00*
AA	*7.14*	*8.57*
A	*5.71*	*7.14*
BBB	*4.29*	*5.71*
BB	*2.86*	*4.29*
B	*1.43*	*2.86*
CCC	*0.00*	***1.43***

*Appearance of overlap in the score ranges is due to rounding.

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

1. We calculate the Government ESG Scores corresponding to the best-in-class threshold and the worst-in-class threshold on the corporate ESG Ratings thresholds (Exhibit 14). Linear interpolation is used to fill in all the remaining values.

Exhibit 14: Translation to Equivalent Government Adjusted ESG Scores

Government ESG Score (formula)	Equivalent Government Adjusted ESG Score	Rationale
Average + 2 x standard deviation	*8.57*	Threshold for AAA rating
Average	*5.00*	Midpoint of BBB rating
Average - 2 x standard deviation	*1.43*	Threshold for CCC rating

2. For countries that are in a buffer zone of an adjacent rating band, but retaining the prior Government ESG Rating, the Government Adjusted ESG Score is constrained to the minimum and maximum range associated with the same prior corporate ESG Rating. Countries that meet this criteria will have Government Adjusted ESG Scores that are +/- 0.01 away from the transition point in corporate ESG Ratings scale in Exhibit 13. For example, a country with a Government ESG Rating of BBB that is in the buffer zone of the 'BBB-A' Government ESG Rating band, will have a maximum Government Adjusted ESG 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 Government Adjusted ESG Score (equation 2). Importantly, this translation does not alter the Government ESG Ratings of countries – it is simply a linear translation of scores.

$$
\begin{aligned}
&\textit{Government Adjusted ESG Score} \\
&:= Max \left\{ Min \left\{ \begin{array}{c} \textit{Linear Factor x Government ESG Sore + Linear Intercept,} \\ \textit{Max score on corp. ESG Ratings scale for the country's} \\ \textit{Government ESG Ratings} \end{array} \right\}, \right. \\
&\qquad\qquad \left. \begin{array}{c} \textit{Min. score on corp. ESG Ratings scale for the country's} \\ \textit{Government ESG Ratings} \end{array} \right\} \dots (2) \\
&\qquad\qquad\qquad\qquad\qquad\qquad \textbf{constrained between 0 and 10}
\end{aligned}
$$

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

Calculation of the Government ESG Score, Government Adjusted ESG Score, and Government ESG Rating is explained using following example (Exhibit 15).

Exhibit 15: Example Calculation of Government ESG Score, Government Adjusted ESG Score and Government ESG Rating

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Example Country:

ESG Risk Management Score = 7.031; ESG Risk Exposure Score = 2.091.

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

$Government\ ESG\ Score = Min\ \{(7.031 + 1), Average(10 - 2.091, 7.031)\}$

$Government\ ESG\ Score = Min\{8.031, Average(7.909, 7.031)\}$

$Government\ ESG\ Score = Min(8.031, 7.470)$

$Government\ ESG\ Score = 7.470$

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

The Government ESG Score of 7.470 lies above the lower rating threshold (7.15) and below the upper rating threshold (8.19) defining the rating zone corresponding to a Government ESG Rating of **AA.** The Government ESG Score is not in the buffer zone (+/-0.2 on either side of lower and upper rating threshold), and so will retain the rating as originally calculated - **AA**

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

In this particular hypothetical year, the Linear Factor = 1.374, and the Linear Intercept = -2.686

$Government\ Adjusted\ ESG\ Score = Max\ \{\ Min\ \{\ 1.374\ x\ 7.470 - 2.686, 8.56\}, 7.15\} = \mathbf{7.578}$

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