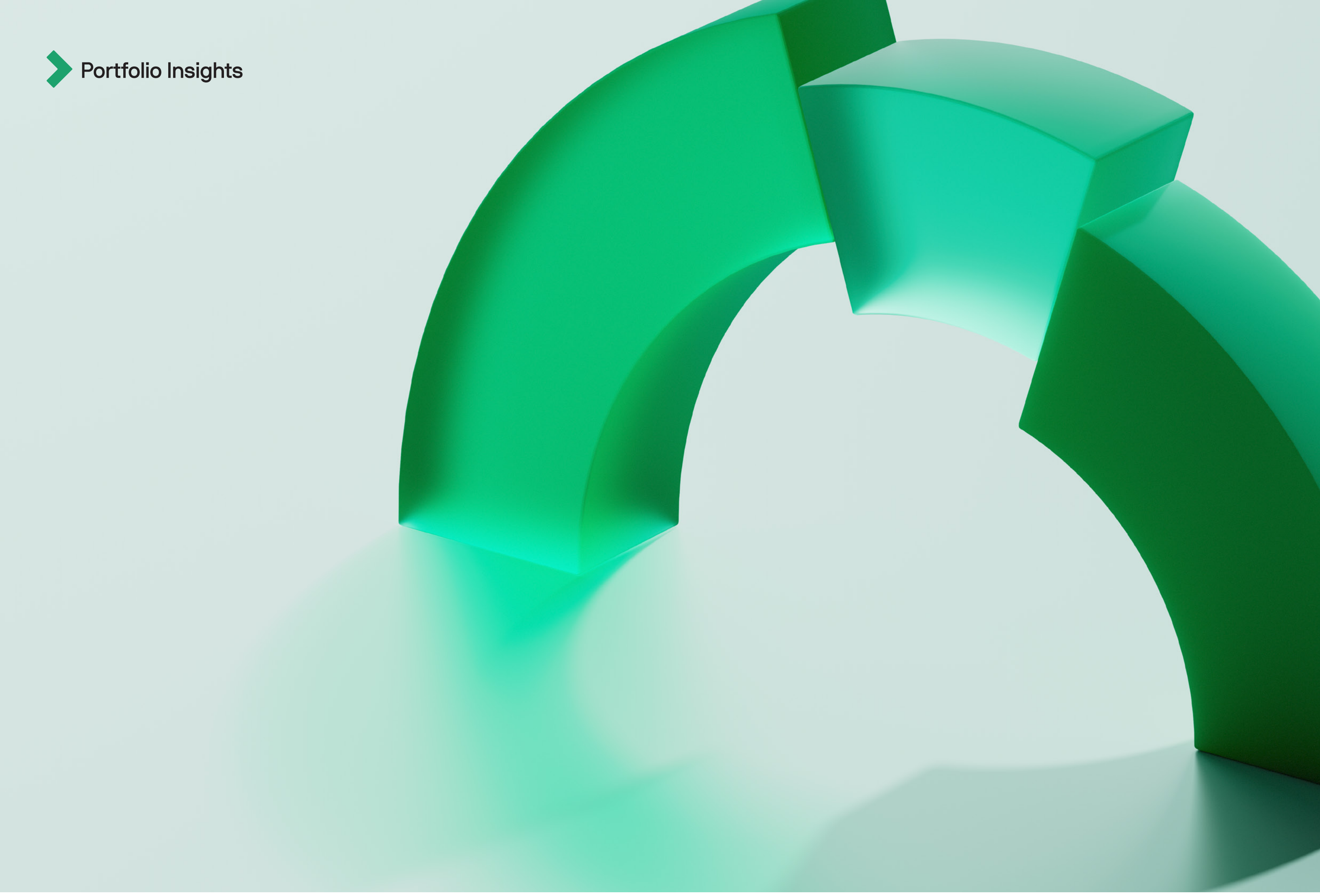
Portfolio Insights



Sovereigns and ESG

Taking a stance in a complicated world

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J.P.Morgan ASSET MANAGEMENT

Sovereigns and ESG: Taking a stance in a complicated world

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In brief

- ESG factors are important drivers for economic performance and impact financial risk and return in the sovereign debt space.
- ESG data can be more readily available than for other asset classes, but is not always timely or accurate, and may involve bias. Using an array of internationally available sources can help.
- While scoring can be useful, it doesn't provide a complete picture. Investors need to consider trajectory and use engagement for greater depth of understanding.
- At J.P. Morgan Asset Management, we use a proprietary sovereign ESG scoring framework to generate scores for our developed and emerging market investment processes.
- This consistent framework is tailored for the different data availability and drivers of developed vs. emerging markets and is built to align with our existing investment processes.
- When combined with a qualitative overlay and supplemented by engagement, we believe it provides us with a more holistic view of sovereign issuers, contributing to stronger risk-adjusted returns.

Introduction

Sovereign debt is one of the largest and most liquid markets in the world, with over USD 60 trillion outstanding.[1] Most portfolios are likely to have some allocation to sovereign debt, whether in the form of "risk-free" benchmark assets such as US Treasuries or higher yielding emerging market debt. Yet, despite the size and importance of the sovereign debt market, implementing an environmental, social and governance (ESG) framework within the space brings a unique set of challenges. To help in assessing sovereign ESG risk, various parties including rating agencies, investment managers, and third-party ESG data providers have developed sovereign ESG scores (see **Appendix 1** for the most commonly used scoring approaches). ESG scores can be very useful tools, synthesizing complex data into a simple ranking, but any score is ultimately a limited tool that needs to function within a broader ESG investing approach.

We propose a set of common principles and a shared framework to help investors assess the ESG characteristics of sovereigns with a holistic and data-oriented approach. The common principles are the foundation for our shared ESG scoring framework, through which we generate proprietary sovereign ESG scores for our developed, emerging market and currency investment processes. In this paper, we focus on the sovereign bond market. To understand our currency approach, please see our dedicated paper, Currencies through an ESG lens.[2]

Common principles

The following principles underpin our ESG scoring framework and investment approach.

1. ESG factors are important drivers for economic performance and impact financial risk and return.

As investors in sovereign debt, we strongly believe that integrating ESG factors is critical for better investment outcomes – this is not just an exercise in virtue signaling. Many investors will say they have always integrated ESG factors, but maybe they were called something else, like political risk. Good governance, strong institutions and low levels of corruption have been long identified as drivers of economic growth and lower financing costs.[3] Intuitively and empirically, we understand that countries that provide better social conditions tend to see better economic outcomes. Income equality, gender balance, human development and demographics all play a role in a country's long-term growth.[4] And, even before tracking carbon emissions became commonplace, we understood that countries reliant on commodity exports tended to be vulnerable to cyclical commodity prices and rent-seeking behavior. ESG factors supplement conventional credit analysis, picking up information that is not captured by traditional credit risk analysis, with a long-term focus. Identifying a fundamental and empirical link between ESG indicators and asset prices is a foundational step in the creation of our proprietary frameworks. For both our proprietary developed and emerging market sovereign ESG scores, we can see that higher ESG scoring sovereigns generally trade at lower spreads (**Exhibit 1**).

[1] ICMA, August 2020. https://www.icmagroup.org/Regulatory-Policy-and-Market-Practice/Secondary-Markets/bond-market-size/

[2] Visit the J.P. Morgan Asset Management website and search "Currencies through an ESG lens", or speak to your usual J.P. Morgan Asset Management representative.

[3] Governance, Corruption & Economic Performance. George T. Abed and Sanjeev Gupta. https://www.researchgate.net/profile/Sanjeev-Gupta-9/publication/234791577_Governance_Corruption_Economic_Performance/links/00b7d520d3e3c53a2a000000/Governance-Corruption-Economic-Performance.pdf

[4] Trends in income inequality and its impact on economic growth. https://www.oecd.org/newsroom/inequality-hurts-economic-growth.htm

Higher ESG scoring sovereigns generally trade at lower spreads in developed and emerging markets

Exhibit 1A: Developed Markets

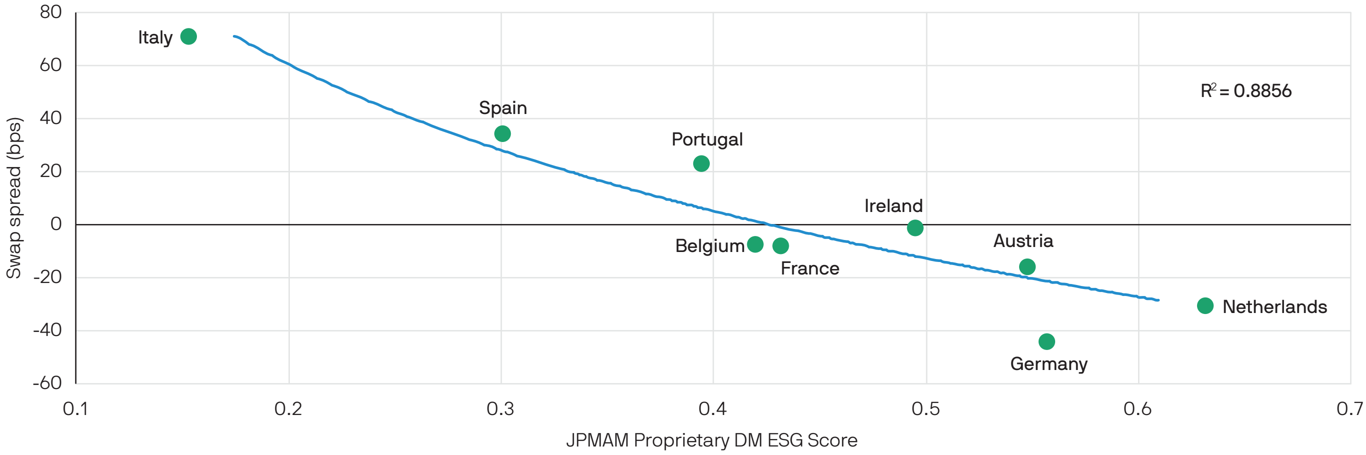
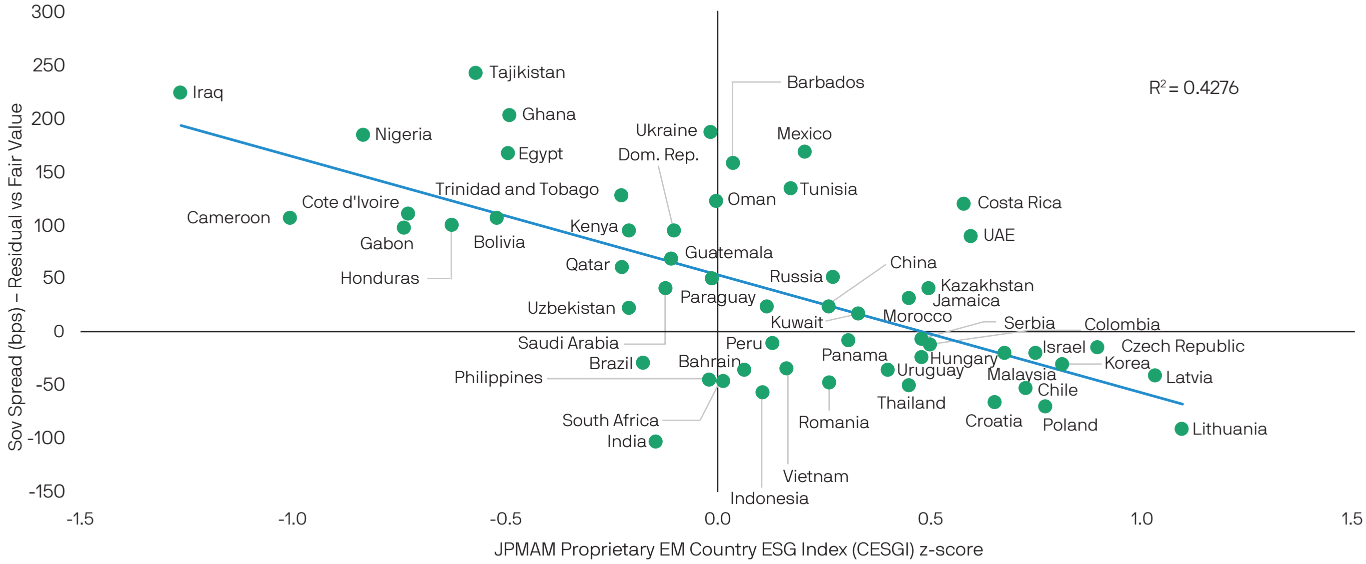


Exhibit 1B: Emerging Markets

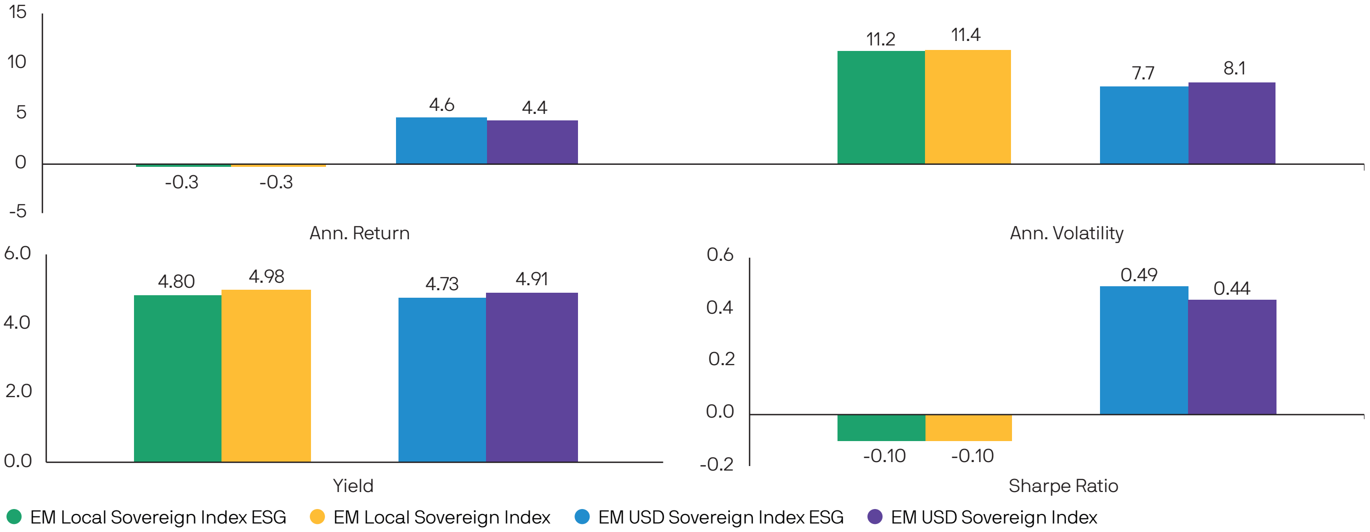


Source: J.P. Morgan Asset Management; data as of August 2021. DM swap spreads are 10-year swap spreads. EM sovereign spreads shown are the residual from a fair value implied by traditional credit metrics (Country Fundamental Index, CFI, detailed in EM Methodology section). DM ESG scores are scaled from 0 to 1, reflecting a country's percentile rank. EM Country ESG scores (CESGI) reflect a z-score (0 is average, 1 is one standard deviation better). R^2 is a statistical measure of how close the data is to the fitted regression line and demonstrates the empirical relevance of the score.

Even if one is skeptical about the relevance of ESG factors today, their importance is only growing. Governments are broadly adopting policies that will require greater disclosure on ESG metrics and penalize poor ESG practices (for example, carbon emissions taxes). Investors are reallocating capital toward issuers with stronger ESG characteristics, and demanding progress.

While it's been widely demonstrated in the equity space that ESG approaches do not come at the cost of returns,[5] fixed income investors have been more skeptical as credits with lower ESG scores tend to have higher yields. Specifically for sovereigns, we can look at the example of J.P. Morgan's suite of ESG indices compared to its traditional emerging market debt indices (**Exhibit 2**). The ESG versions of the indices have been able to demonstrate similar returns, with incrementally lower volatility. In developed markets, higher ESG scores have historically been correlated with lower drawdowns in times of market stress (**Exhibit 3**).

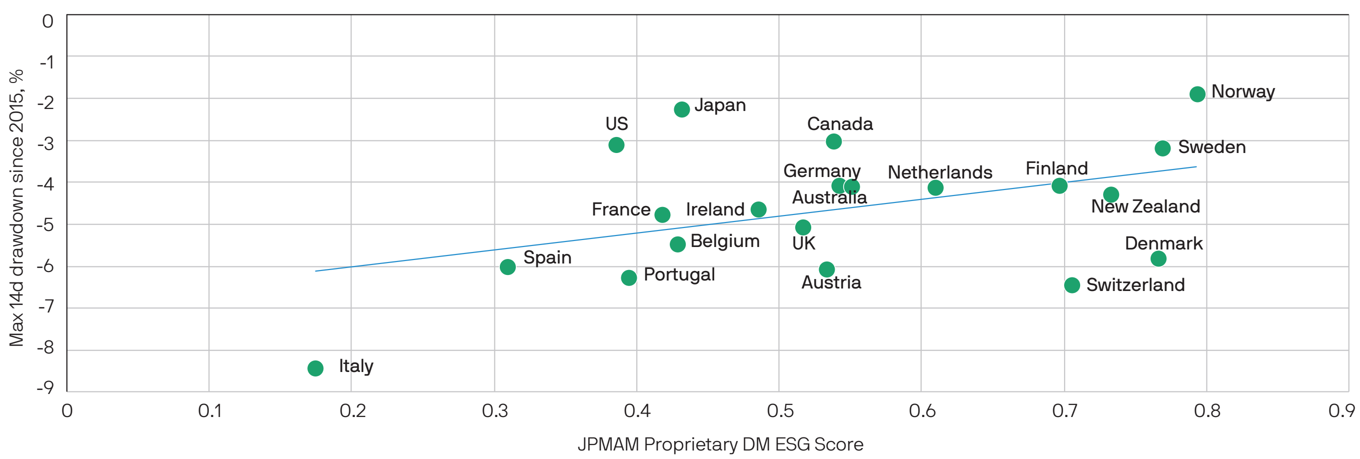
Exhibit 2: EM ESG indices have been able to demonstrate similar returns to traditional indices with lower volatility over the long run



Source: J.P. Morgan; data as of 30 June 2021. Return and volatility calculations from 31 December 2012 to 30 June 2021. EM Local Sovereign Index = GBI-EM Global Diversified. EM USD Sovereign Index = EMBI Global Diversified. ESG Index created by J.P. Morgan excludes certain sectors, low scoring ESG names and UN Global Compact violators, and increases weights to green bonds. More details provided here: https://www.jpmorgan.com/content/dam/jpm/cib/complex/content/markets/composition-docs/pdf-30.pdf

Past performance is not a reliable indicator of current and future results.

Exhibit 3: Incorporating ESG considerations for DM sovereigns helps to protect against drawdowns



Source: J.P. Morgan, Bank of America Merrill Lynch, J.P. Morgan Asset Management; data as of August 2021. Drawdown calculated based on J.P. Morgan and Bank of America Merrill Lynch country sovereign debt index.

[5] ESG factors and equity returns – a review of recent industry research. https://www.unpri.org/pri-blog/esg-factors-and-equity-returns-a-review-of-recent-industry-research/7867.article

Finally, ESG analysis in the sovereign bonds space has some unique characteristics that differ from approaches for other asset classes. Sovereign bonds are significantly influenced by central bank policies, and credit risk can vary by the level of official sector support. For example, sovereign bonds with the strong support of fully credible central banks, such as US Treasuries, will trade with little to no credit risk. Hard currency emerging market bonds, which do not have an explicit buyer of last resort, will trade primarily on credit risk. There are also many in-between cases. For example, the European Central Bank provides support to the eurozone sovereign debt market but has more restrictions on what and how much it can buy, so eurozone bonds can trade with more credit risk premium compared to other major developed market bonds. Emerging market central banks can also buy domestic debt, but often have imperfect inflation credibility and higher credit risks.

For sovereign debt that trades primarily on credit risk, the ESG lens is similar to that for equities or corporate bonds. For those that do not trade on credit risk, ESG analysis relates more to the impact of these factors on the growth and inflation outlook. For example, ESG factors that result in better growth news can be positive for sovereigns trading on credit risk, as that risk is reduced by stronger growth. However, such factors may not be positive for sovereigns trading with little credit risk if the stronger growth leads to higher inflation and tighter monetary policy.

2. Using a holistic array of internationally regarded data sources helps guard against bias.

When investing in sovereigns, it is impossible not to consider politics, which often involves bias. We believe considering a variety of perspectives and looking at a wide array of reputable, internationally regarded data sources is a good start to forming an objective view.

A common complaint about ESG analysis is that data can be difficult to source. Some sovereign data is in fact more readily available than corporate data given the multitude of multinational organizations and NGOs – including the World Bank, the IMF and the United Nations, as well as many others – that have been tracking country level data for decades. However, just because the data is available does not mean it is easy to use and interpret, or that it is accurate or unbiased. Timeliness is a common issue as most ESG data is updated at best annually and often with multi-year lags. This can make assessing progress in some areas, such as climate change policy, particularly difficult. Qualitative assessments of policy translated into quantitative rankings, such as the World Bank's Governance Indicators, can help with more timely assessments. Lastly, coverage is challenging especially for emerging and frontier countries, where more granular data can often be difficult to source. In **Appendix 2**, we look at carbon emissions data as an example of the challenges with sourcing and evaluating sovereign ESG data.

Despite the shortcomings of the data available today, we believe there is enough information for sovereign investors to assess general trends and make some cross-country comparisons. With demand growing for timely and accurate data, the next frontier for ESG analysis could be alternative data sources utilizing machine learning technologies to analyze media and policy releases, as well as geospatial data to track countries' emissions and biodiversity progress.[6]

3. Scoring is only one part of any approach – investors also need to take into account trajectory and engagement.

Scoring frameworks serve an important purpose: they provide a simple understanding of issuers as "better" or "worse". Third-party scores also provide an independent assessment for investors, similar to the role of a credit rating agency. Yet third-party scores can differ widely and, as yet, there is no industry standardization. Scores may also lack transparency and may not be aligned to a specific investor's values and objectives.

Investors should understand any score's methodology, limitations, and applications. Scoring relies on data for which there can be issues including timeliness and bias, as mentioned above. A qualitative assessment can often complement a score-based approach and incorporate higher frequency views and other considerations not well captured by data.

[6] World Bank; WWF. 2020. Spatial Finance: Challenges and Opportunities in a Changing World. https://openknowledge.worldbank.org/handle/10986/34894

Many sovereign ESG scores exhibit an income bias .e. richer countries tend to have higher ESG scores).[7] While this may be a desirable feature as sustainable investors are likely to want to invest in countries that provide a better standard of living, it can also have the harmful effect of diverting financial flows away from countries that may need them the most. Income bias can be addressed by comparing countries within their peer income groups or by looking at trajectory and momentum, not just current levels.

Scores need to fit within a broader ESG approach. ESG scores tend to apply more easily for negative screening or positive tilt approaches to sustainable investing. However, low environmental or social scores could reflect a greater opportunity for an impact approach, while strategies seeking best-in-class sustainability may focus on specific sub-scores. Strategies focused on investing in green, social and sustainable bonds may also require more security-level analysis, rather than relying solely on issuer-level scores.

Engagement is critical, but can be more nuanced for sovereigns compared to corporates. We appreciate that there are a wide range of considerations in public policymaking. However, we also believe bondholders have an important role in advocating for positive change. Engagement with sovereigns can take a variety of forms, including helping governments finance specific sustainable projects; meeting with government officials regularly to review progress on climate goals; and participating in industry groups to collectively advocate for better disclosure and improved practices from state-owned companies.

J.P. Morgan Asset Management's sovereign ESG scoring framework

Our sovereign scoring framework applies our common principles to our dedicated investment processes for developed and emerging market bonds. We believe that a proprietary ESG score allows us to better understand data inputs and limitations, and aligns our approach with our existing investment processes.

Exhibit 4: J.P. Morgan Asset Management's Sovereign ESG scoring framework

Universe		Developed markets	Emerging markets
Environmental (15% weight DM, 20% weight EM)	Emissions Management	• Carbon emission per Energy (Global Carbon Project) • Energy Intensity per GDP (World Bank) • Renewables as % consumption (World Bank)	• CO_2 per capita (Emissions Database for Global Atmospheric Research)
	Climate Risk and Resource Management	• Notre Dame Global Adaptation Index (ND-GAIN) - Vulnerability • Natural Resource Depletion (World Bank)	• ND-GAIN - Vulnerability
Social (25% weight DM, 15% weight EM)	Socio-economic	• Gini Index (World Bank) • Labor Force Participation (World Bank) • Human Development Index (United Nations Development Program (UNDP)) • Education as % of government spending (World Bank)	• Poverty (World Bank)
	Gender	• Female to Male Labor Force Participation Rate (World Bank)	• Gender Development Index (UNDP)
Governance (60% weight DM, 65% weight EM)	Regulatory Environment	• Ease of Doing Business (World Bank)	• Ease of Doing Business (World Bank)
	Governance and Corruption	• World Bank Governance • Transparency International Corruption • Debt to GDP (IMF, J.P. Morgan Asset Management) • Fiscal Balance (IMF, J.P. Morgan Asset Management)	• World Bank Governance • Transparency International Corruption • Short-term Political Index (J.P. Morgan Asset Management)

Source: J.P. Morgan Asset Management; as of August 2021.

[7] World Bank, A New Dawn Rethinking Sovereign ESG. https://documents1.worldbank.org/curated/en/694901623100755591/pdf/A-New-Dawn-Rethinking-Sovereign-ESG.pdf

Our DM and EM score methodologies have key similarities and differences.

Each of the three pillars (environmental, social and governance) is weighted differently, reflecting the most fundamentally and empirically relevant drivers for the respective investment universes. Governance carries the largest weight of the three pillars across the scores as it is the most empirically relevant for asset prices. Philosophically, we also view good governance as a foundational pillar for positive ESG developments in other pillars. Outside of governance, environmental has a higher weight for EM, while social has a higher weight for DM. These weighting differences reflect quantitative and qualitative analyses that drive our dedicated EM and DM processes, but are also supported by fundamental reasoning. DM countries generally have greater resources to solve climate change challenges, while EM countries can be more vulnerable to environmental risks.[8] Our EM scores are also used as an overlay to a traditional fundamental model that includes GDP per capita, which is highly correlated to many social indicators. Our DM scores are used as an outright measure and therefore use a more comprehensive set of indicators, including many social variables that are of growing importance to debt vulnerability.

Within each of the three pillars, we focus on the same two themes. Within the environmental pillar, we want to understand how sovereigns are contributing to climate challenges as well as their vulnerabilities. Within the social pillar, we focus on the axes of socioeconomic and gender inequality. Within the governance pillar, we look at the regulatory environment, which is key for business activity and a strong economy, as well as governance and corruption.

Under the same two themes, we use different indicators, reflecting differences in data coverage and materiality. For example, under the social pillar, Gini coefficient[9] and labor force participation rate are material drivers for developed countries, but data quality and coverage tend to be lower for emerging market countries. In contrast, poverty is well covered and more material for emerging markets. On gender, DM scores focus more on labor market dynamics and look at female participation rate, while EM scores look at the UN Gender Development Ratio, which focuses on expected years of schooling and life expectancy.

Comparing EM and DM sovereigns separately allows us to remove some income bias. Our ESG scores are calculated on an annual basis as that is the most common frequency of the underlying data. We look to include shorter-term information either as a part of the score, in a separate quantitative analysis, or in a qualitative assessment focused on forward-looking signals. When assessing the scores we also consider trajectory, either embedded in the scores directly or as a separate analysis of indicators over time.

Our scorecard allows for sufficient flexibility to adapt to the changing emphasis investors and regulators place on each pillar of ESG. For example, we have increased the weight of environmental factors in our developed market ESG score to reflect the growing importance of climate change for sovereign spread risks.

We apply these scores primarily in the process of ESG integration, to help us see whether we are appropriately compensated for ESG risks. We also use the scores to inform sustainable investment strategies, identify alpha opportunities and manage risk.

8 PRI. 2019. A practical guide to ESG integration in sovereign debt. https://www.unpri.org/fixed-income/a-practical-guide-to-esg-integration-in-sovereign-debt/4781.article

9 Gini is a measure of statistical dispersion intended to represent the income or wealth inequality within group of people. A Gini of 0 expresses perfect equality where all people have the same wealth, while a Gini of 1 expresses maximal inequality where one person has all the wealth.

Developed markets

The breadth and quality of data for the DM sovereign space allows us to be selective while also taking into account a wide range of indicators. Our DM ESG scorecard incorporates 16 indicators going back to 2000. Each indicator is scored between 0 and 1 based on its percentile rank in the whole dataset. A score of 0 means it is at the lowest percentile, whilst a score of 1 means it is at the highest.

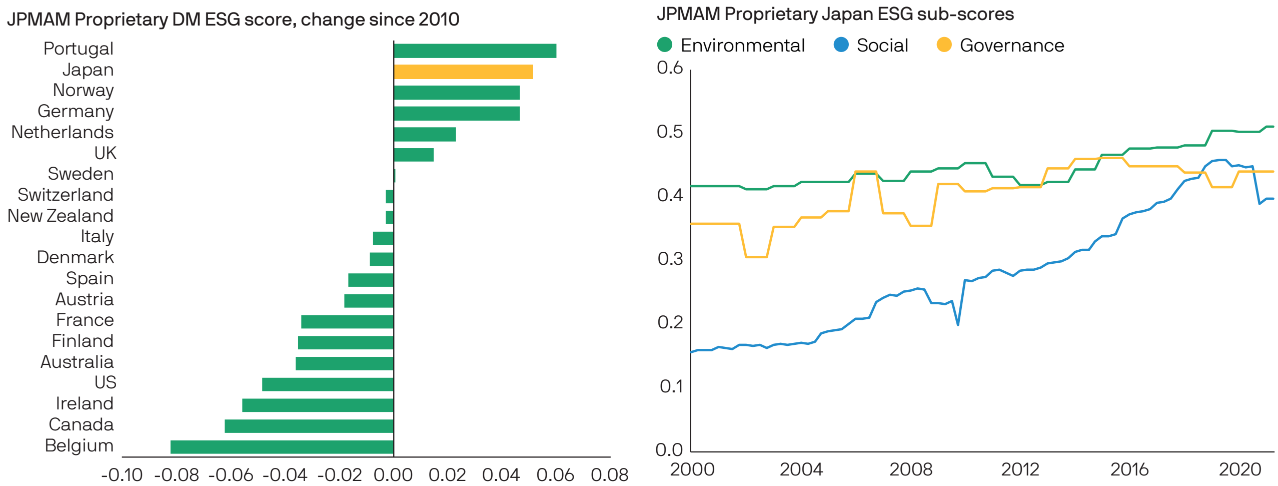
Our ESG approach is embedded in our investment process through our broader fundamental, quantitative and technical research framework. As a key part of the quantitative research process, the ESG scorecard is used both as a standalone assessment of a country's ESG profile and as a valuation tool. As a standalone fundamental analysis tool, the ESG score helps to highlight sovereign performance and respective drivers. As a valuation tool, the ESG score is used alongside our proprietary sovereign fundamental score for fair value analysis. When assessing the scores, we focus not only on the absolute level, to identify relative attractiveness of sovereign spreads, but also the momentum, to identify structural opportunities. The signals generated from these quantitative tools are then used in conjunction with our qualitative analysis, supplemented by independent, third-party research, to inform our investment decisions

Developed markets case study: Japan

Our ESG analysis starts with differentiating how ESG factors impact sovereigns' credit outlook and growth/inflation outlook. We consider ESG factors to be less material for Japan's credit outlook, primarily due to the Bank of Japan's ability to provide critical support to the government bond market. We consider ESG factors to be a more material driver of Japan's growth/inflation outlook.

One of the key growth challenges Japan faces is demographics. A low fertility rate and rising old age dependency rate will limit labor supply growth and drag on potential growth, meaning social factors will be the most important driver for Japan's long-term growth. Amid these challenges, our ESG scorecard has identified substantial progresses in Japan: it ranks top in social improvement and second place in overall ESG improvement in the last decade. The driver for such improvement is broad based, but rising labor force participation, especially female participation, has been a key offset for declines in working age population. This will support potential growth while also keeping wages and inflation low – favorable conditions for Japan's sovereign debt. Outside of social factors, government efforts to stabilize fiscal trajectory have contributed positively to the governance score and progress has also been made on environmental metrics. Overall, improving ESG performance contributes to our positive view on Japanese government bonds (**Exhibit 5**).

Exhibit 5: Japan's improving ESG metrics



Source: J.P. Morgan Asset Management; data as of August 2021.

Emerging markets

Our analysis of EM sovereign debt consists of several proprietary tools to assess a country's ability and willingness to repay its debt, including our Country Fundamental Index (CFI) and Country ESG Index (CESGI).

The CFI provides an independent, objective measure of creditworthiness by incorporating fundamental indicators spanning solvency, liquidity and structural factors. These include debt and fiscal deficit ratios, debt service ratios, reserves, current account balance, GDP per capita and commodity export exposure. The CFI is used to calculate a fair value sovereign spread based on these traditional fundamental indicators (CFI implied fair value).

The CESGI provides a holistic quantitative assessment of ESG factors and is used to calculate an ESG-adjusted fair value spread. We considered over 30 ESG indicators in constructing the index, narrowing down to indicators with the appropriate country coverage and timeliness. As the CESGI was designed as an overlay to our traditional fundamental index (CFI), we did not repeat indicators such as debt and fiscal ratios. Instead, we focused on new indicators that would help explain the difference between our CFI implied fair value and actual spreads. All indicators were converted into z-scores, where 0 represented the average EM country in our universe for a given indicator. We conducted a cross-country regression analysis to determine a weighted combination of indicators that had reasonable explanatory power without unnecessary redundancy. We ended up with eight indicators that we believe have a strong fundamental and empirical link to sovereign spreads.

The output of these quantitative tools is used in conjunction with our analysts' qualitative research assessments, informed by regular meetings with central bankers, government officials and local analysts. Analysts also conduct periodic thematic research, related to ESG themes such as decarbonization/climate risk and political instability risks, on a cross-country basis.

Emerging markets case study: Jamaica and Honduras

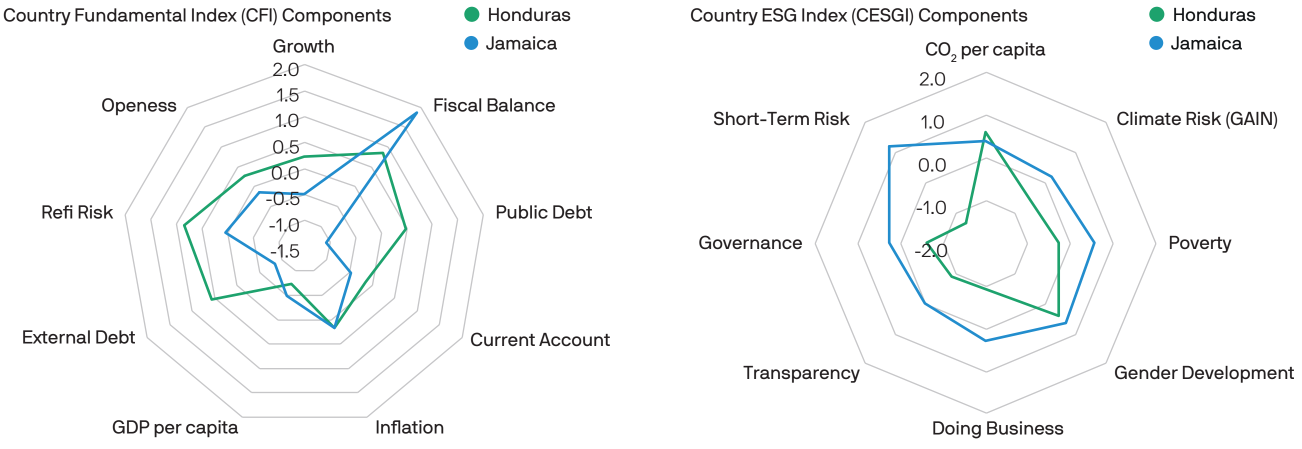
Jamaica and Honduras are two sovereigns for which ESG factors significantly change our views beyond traditional credit metrics (**Exhibits 6 & 7**).

Jamaica is a credit that trades rich relative to its traditional credit metrics and credit rating, which we believe is at least partially explained by positive ESG characteristics. Traditional credit metrics such as public debt to GDP are high relative to peers and spreads are tight relative to other single-B names. However, Jamaica ranks above average on ESG factors including carbon emissions per capita, gender development and ease of doing business. Climate vulnerability is an issue for Jamaica as an island nation, but this indicator is actually about average once adjusted for GDP per capita and is relatively better than for regional peers such as Honduras. In addition, Jamaica has been on an improving path through positive policy changes following its successful completion of IMF programs in recent years. These policy changes include diversification of its energy matrix and related fiscal savings; providing social transfers for vulnerable populations; and maintaining fiscal discipline over multiple government administrations. While the pace of tourism recovery remains a relevant risk in the near term, we believe positive policy direction will anchor lower spreads over the medium term.

Honduras is a credit for which we do not believe we are compensated for ESG risks. Traditional credit metrics are strong, with low debt levels and tight fiscal policy. However, climate risk and poverty are worse than average. Honduras has high exposure to natural hazards, which impact the agricultural sector and hit critical infrastructure. While this situation makes Honduras a potential good candidate for impact investment, low governance indicators could limit the effectiveness of an impact or engagement strategy. Corruption remains a persistent issue, with the country ranking consistently poorly (currently 157th out of 180 countries) in the Transparency International Corruption Perceptions Index. The current president, Juan Orlando Hernández, won a narrowly contested election in 2017 and since then has been alleged by US courts to have accepted bribes from drug traffickers. The mandate of the Organization of American States-backed Mission to Support the Fight against Corruption and Impunity was allowed to expire in early 2020, increasing concern from international agencies about the monitoring of corruption in the country. President Biden's new campaign to tie US aid in Central America to corruption reform could result in significant changes, as could elections in Honduras in November 2021, but we will have to continue to follow the story closely.

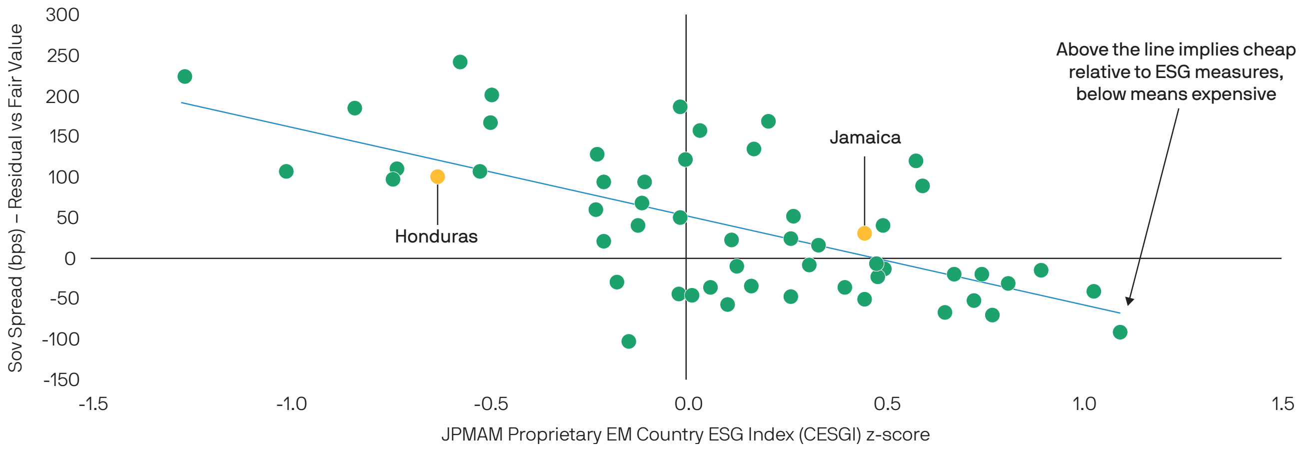
Emerging markets case study: Jamaica and Honduras continued

Exhibit 6: ESG analysis complements traditional fundamental analysis: Our proprietary country ESG index (CESGI) shows a stronger score for Jamaica than Honduras



Source: J.P. Morgan Asset Management. Scores represent z-scores across dimensions, where positive scores correspond to positive characteristics. For example, a score of 1 on Climate Risk means that a country is one standard deviation better (less vulnerable) than the average EM country in the universe on this characteristic.

Exhibit 7: Translating to valuation: Honduras trades cheaper to its implied fair value, but considering ESG metrics Jamaica would be more attractive



Source: J.P. Morgan Asset Management, data as of August 2021. Y-axis is the residual of market spreads from a fair value implied by traditional credit metrics (Country Fundamental Index, CFI). Fitted line reflects power of ESG factors (Country ESG Index, CESGI) in explaining that residual.

Conclusion

Although a wide range of sovereign ESG data is available, it can be patchy, biased and challenging to interpret. Third-party scoring can help to provide a simple understanding of a country's ESG characteristics, but may lack transparency – and there is, as yet, no industry standard. We believe our proprietary framework provides us with more complete information and therefore higher conviction. The approach is multifaceted and transparent, takes into account a broad range of information, and can be combined with a qualitative overlay and supplemented with engagement. It has been developed to align with and inform our existing investment processes and, by providing us with a more holistic view of sovereign issuers, we believe it contributes to stronger risk-adjusted returns.

Appendix 1: Commonly used third-party sovereign ESG score providers

Provider	Product	Score Description	Countries Covered	Weights (%) E	S	G
MSCI	MSCI ESG Government Ratings	Identifies exposure to and management of ESG risk factors and explains how these factors might impact long-term economic sustainability. Ratings aim to complement traditional government debt analysis for analysing a country's creditworthiness.	198	25	25	50
ISS	ISS ESG Country Ratings	Assesses extent to which a sovereign issuer is positioned to manage ESG risks, providing investors with forward-looking information on sustainability risks, adverse impacts, and opportunities for investments. Complement to traditional financial ratings.	121	50	15	35
Beyond Ratings	Beyond Ratings Sovereign Credit Risk Scores	Augmented credit risk analysis with systematic integration of ESG factors. Based on the provider's analysis, Credit Scores have increased correlation with CDS, FX and yields and can be used to anticipate changes in financial ratings.	146	30	30	40
Sustainlytics	Sustainalytics Country Risk Ratings	Assesses countries' prosperity by considering its access to and management of natural, human, and institutional wealth. Input to J.P. Morgan JESG sovereign debt indices.	172	15	35	50
RepRisk	RepRisk Country ESG Risk Index (RRI)	Quantifies reputational exposure to ESG and business conduct risks. Not back-engineered to predict the return of securities. Input to J.P. Morgan JESG sovereign debt indices.	225	N/A		
UN SDG	SDG Index and Rankings	The UN's Sustainable Development Goals (SDGs) are 17 interlinked global goals to achieve a better and more sustainable future for all. SDGs have become a part of many issuers' sustainable bond frameworks in recent years. The SDG Index aims to track countries' progress toward the goals, help identify gaps in data and complement other policymaking tools.	193	N/A		

Source: World Bank, score providers, J.P. Morgan Asset Management.

Different scores, different goals. The above table presents commonly used third-party ESG scores that consider E, S, and G pillars. Most scores tend to place the highest weight on the governance pillar, although ISS has the highest weight on the environmental pillar. Providers generally use a wide array of data inputs, with over 100 underlying indicators for some scores. Nearly all the scores use some qualitative elements to fill in gaps in data or provide a view on less quantifiable factors. Importantly, every score has a specific purpose. Some scores were designed to be complements to traditional credit ratings (MSCI, ISS) while others target relevance for financial indicators, a country's wealth, or business risk. Traditional credit rating agencies have also started to provide ESG scores, but mostly with the purpose of explaining how ESG considerations are integrated into credit ratings (for example, Moody's ESG Credit Impact Score and Fitch's ESG Relevance Score).

Roadblocks to standardization. It's not clear if there will ever be a single industry standard for measuring sovereign ESG risk. In addition to the fact that different scores are trying to meet different goals, most scores are not publicly available. Of those shown in the table above, only the UN SDG Index is publicly available for free. This could potentially limit broader adoption and a transparent understanding of methodology.

Appendix 2: Sovereign emissions data

Sovereign emissions data sources reflect trade-offs between timeliness, coverage and methodology preferences. The UN Framework Convention on Climate Change (UNFCCC) evaluates countries' progress toward the Paris Agreement using data submitted by governments. UNFCCC data is more readily available for developed countries (in particular the 43 Annex I countries) than emerging countries. Some analysts have also noted concerns about difference in methodology and potential bias in self-reported emissions data. For broader country coverage using independent non-governmental sources, EDGAR and CAIT are two well-established databases. Ideally, data should cover broad greenhouse gas (GHG) emissions, but this usually entails an additional time lag and potential data quality issues compared to more narrowly defined carbon emissions (CO_2).

Production versus consumption. Most widely available emissions data is from a production or territorial perspective – measuring emissions that take place within a country's borders. A consumption-based approach attempts to measure emissions where they are consumed by accounting for international trade. Global Carbon Project estimates consumption-based emissions, but with lower coverage and a greater time lag.

Select sovereign emissions data sources

Source	EDGAR	CAIT	Global Carbon Project
Organization	European Commission	World Resources Institute/ Climate Watch	Future Earth and World Climate Research Programme
Perspective	Production	Production	Production + consumption
Scope	CO_2 + GHG	CO_2 + GHG	CO_2
Years	1970-2019	1990-2018	1990-2018
Countries	208	186	118
Methodology Summary	• Independent estimate using IPCC Guidelines. Includes fossil fuel use (IEA), industrial processes and product use. Extended from 2015 to 2019 with estimation. Excludes land-use change and forestry. • GHG data only through 2018. Reports CO_2, CH4, N20, and F-gases separately.	• Independent estimate. Uses IEA for fossil fuel data through 2013, then uses other sources including CDIAC, US EPA and FAO. All data with three year lag. • GHG data includes CO_2, CH4, N20, and F-gases. Includes land use change and forestry.	• CO_2 emissions adjusted for international trade using estimations from a global supply chain model. Consumption-based data has an additional one-year lag.

Ultimately, these sources have similar data and will show the overwhelming majority of global emissions attributable to China, the US and the EU. There is notable variation in a few countries. Looking at GHG vs. CO_2 will show relatively higher emissions from agriculture and land-use change in countries such as Brazil and Indonesia. Looking at consumption instead of production will show greater emissions for developed countries such as the US and Germany and lower emissions for emerging exporters such as China and Russia.

Beyond choosing a source, investors also need to interpret emissions data with some normalization (e.g. per GDP or per capita) and complement that with a view on the country's vulnerability to climate change and climate policy.

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