ESG RATINGS & SOVEREIGN SUSTAINABILITY SCORES:

Are Environmental Signals Being Missed?

January 2022

About Saturna Capital

Saturna Capital, manager of the Amana, Saturna Sustainable, Sextant, and Idaho Tax-Exempt Funds, uses years of investment experience to aid investors in navigating today's volatile markets. Founded in 1989 by professionals with extensive experience, Saturna has helped individuals and institutions build wealth, earn income, and preserve capital.

We are long-term, values-based, and socially responsible investors. We view consideration of environmental, social, and governance (ESG) factors as essential in forming portfolios of high-quality companies that are better positioned to reduce risk and identify opportunities. We believe that companies proactively managing business risks related to ESG issues make better contributions to the global economy and are more resilient.

At Saturna, we believe in making your investment dollars work hard for you and that your interests always come first. Saturna strives to not only offer the best investment opportunities from mutual funds to IRAs, but to match those sound investments with superior customer service.

About Saturna Sustainable Funds

The Saturna Sustainable Funds seek to invest in sustainable and responsible issuers. The Funds' adviser, Saturna Capital, believes that companies proactively managing business risks relating to environmental, social, and governance (ESG) issues make better contributions to the global economy and are more resilient. By using a combination of negative and positive screening, along with financial analysis and an emphasis on low debt, the Funds seek issuers who outperform their peers on a variety of ESG factors.

At Saturna Capital, we view the consideration of ESG factors as essential to identifying opportunities and forming portfolios of high-quality companies better positioned to reduce risk. We believe that a thorough review of how a company addresses ESG issues provides an important indication of how that company will perform over time.

Please consider an investment's objectives, risks, charges, and expenses carefully before investing. To obtain this and other important information about the Amana, Sextant, Idaho Tax-Exempt, and Saturna Sustainable Funds in a current prospectus or summary prospectus, please visit www.saturna.com or call toll-free 1-800-728-8762. Please read the prospectus or summary prospectus carefully before investing.

Sovereign Debt: Sustainability's Final Frontier – Are the Risks Being Appropriately Considered?

When choosing investments based on their attributes, environmental, social, and governance factors (ESG) represent one of the largest sub-asset classes on the planet. Recently, ratings firms that rank securities on their ESG and sustainable characteristics have turned their attention to sovereign debt. Yields on sovereign debt issues provide a vital benchmark for all other asset classes, especially in terms of the cost of capital and risk premiums. As investors start paying greater attention to ESG and sustainable factors in their investment process, they also may face the same physical and transition risks that sovereign entities (i.e., governments and countries) do when considering environmental factors relating to climate change.

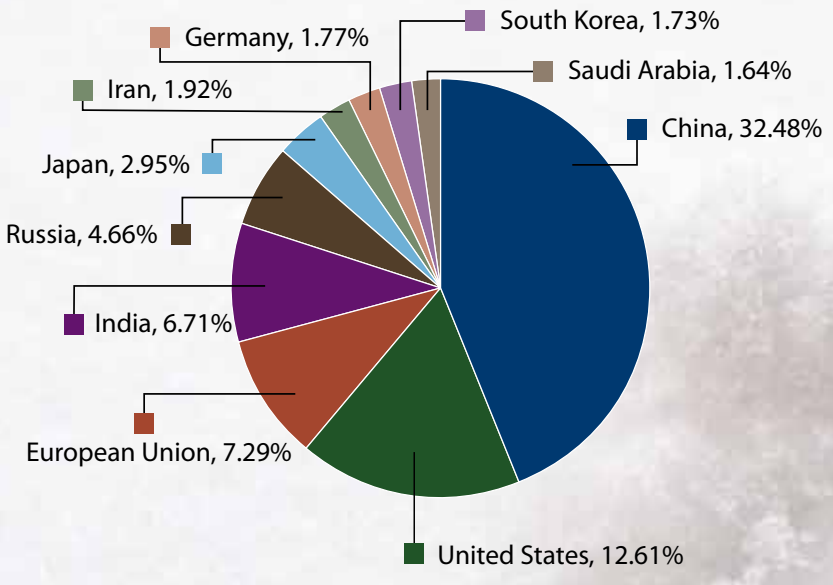
This white paper examines how effectively ESG ratings firms assess sovereign ESG factors, especially concerning the environment. We will discuss climate initiatives formed by the United Nations, and examine how sustainability regulations and investors' behavioral biases are potentially increasing risk rather than reducing it.

Conference of Parties: A Budget is Imposed

The United Nations Framework Convention on Climate Change was established in 1994, with the goal of preventing dangerous human interference with the climate system by reducing and stabilizing worldwide greenhouse gases.[1] On December 15, 2015, the 21st annual UN Climate Change Conference (COP21) was held in Paris, where the participants formalized a framework to reduce carbon emissions. This framework, widely known as the Paris Climate Agreement, was ratified on October 5, 2016, by 192 countries.[2]

The Paris Climate Agreement is a plan to combat dangerous climate change by limiting global warming to less than 2 degrees Celsius worldwide, with the further goal of limiting the rise to 1.5° C. The Agreement also seeks to support nations dealing with the effects of climate change.[3] Each country participating in the Agreement has identified its own carbon emission reduction target, or Nationally Determined Contribution (NDC). Every five-year term, participating countries report on their results compared to their original NDC target, and then re-establish a new target for the next term.[4] The first term was 2016-2020, and the second term was to begin after establishing new NDC targets at the Glasgow, Scotland Convention in 2020. However, the Convention was rescheduled to November 2021 due to the COVID-19 pandemic.

Top 10 Sovereign Carbon Emitters: 2020



Source: EDGAR - Emissions Database for Global Atmospheric Research

The Paris Climate Agreement introduced a "carbon budget," or the permissible amount of carbon a country can emit without causing a temperature increase that exceeds their 1.5° C limit. The Intergovernmental Panel on Climate Change (IPCC) estimates carbon budgets that offer 67% and 50% likelihoods of limiting global warming within the 1.5° C target to be 400 gigatons of carbon dioxide (400 $GtCO_2$) and 500 $GtCO_2$, respectively.[5]

For the most part, global annual CO_2 emissions have steadily increased. At year-end 2019, emissions had increased 0.5% from the year before; however, at year-end 2020, emissions decreased 5.1% year-over-year. In 2020, China, the United States, the European Union, India, Russia, and Japan remained the world's largest CO_2 emitters. Together they account for 49.5% of the population, 61.8% of global gross domestic product (GDP), 65.2% of total global fossil fuel consumption, and 66.7% of total global CO_2 emissions.[6]

The "Carbon Emission Trends 2014-2020 (Absolute and Year-Over-Year Metrics)" table shows that little has been accomplished during the first five-year term of the Paris Climate Agreement, outside of its proposal and subsequent ratification. The countries and regions in the table represent 73.5% of the world's total carbon emissions.[7] As of year-end 2020, global emissions have declined only 0.2% as measured by a five-year compound annual growth rate (CAGR). However, this miniscule decline reflects the negative impact of the coronavirus rather than heightened efforts among global policymakers and government leaders to reduce emissions; when removing 2020's data from the equation, the four-year CAGR from 2014 to 2019 shows that global emissions actually grew. India and China's emissions increased by 3.3% and 1.7% respectively over 2015-2019.[8]

Carbon Emission Trends 2014 - 2020 (Absolute and Year-over-Year Metrics)

	2014	2015	2016	2017	2018	2019	2020	4 year CAGR Ending 2019	5 year CAGR Ending 2020
Global Emissions	36,371	36,386	36,466	36,936	37,716	37,911	35,963	1.03%	-0.23%
China	10,761	10,722	10,732	10,922	11,260	11,504	11,680	1.77%	1.73%
United States	5,290	5,180	5,077	5,006	5,159	5,036	4,535	-0.70%	-2.62%
EU27	3,034	3,091	3,101	3,126	3,072	2,933	2,622	-1.31%	-3.24%
India	2,233	2,249	2,292	2,402	2,527	2,564	2,412	3.33%	1.41%
Russia	1,730	1,733	1,708	1,737	1,791	1,778	1,674	0.64%	-0.69%

Global Emissions	0.6%	0.0%	0.2%	1.3%	2.1%	0.5%	-5.1%
China	0.2%	-0.4%	0.1%	1.8%	3.1%	2.2%	1.5%
United States	0.4%	-2.1%	-2.0%	-1.4%	3.1%	-2.4%	-9.9%
EU27	-4.5%	1.9%	0.3%	0.8%	-1.7%	-4.5%	-10.6%
India	7.5%	0.7%	1.9%	4.8%	5.2%	1.5%	-5.9%

Source: EDGAR - Emissions Database for Global Atmospheric Research

Regulating What Is Green: An Implicit Nudge to Join 'Team Green'

In March 2021, the European Union introduced a new regulatory framework called the Sustainable Finance Disclosure Regulation (SFDR) to accomplish two goals: (1) integrate sustainability considerations into the financial system, and (2) steer the flow of capital toward sustainable investments. The SFDR imposes new disclosure requirements for financial participants, both at the entity level and the product level, to provide transparency and prevent greenwashing.[9]

This legislation classified all investment products into three possible categories, or "article funds." An Article 9 investment product has the most sustainable attributes, and has sustainability included in its investment objective. An Article 8 seeks to promote ESG or sustainable attributes, but unlike an Article 9, does not have sustainable objectives. An Article 6 fund does not incorporate or promote ESG characteristics.[10] The SFDR framework requires an extensive set of ongoing disclosures by investment product providers that document and detail how these objectives are met. Interestingly, the SFDR also requires non-ESG/sustainably aligned fund providers (Article 6) to explain any sustainability risk.[11]

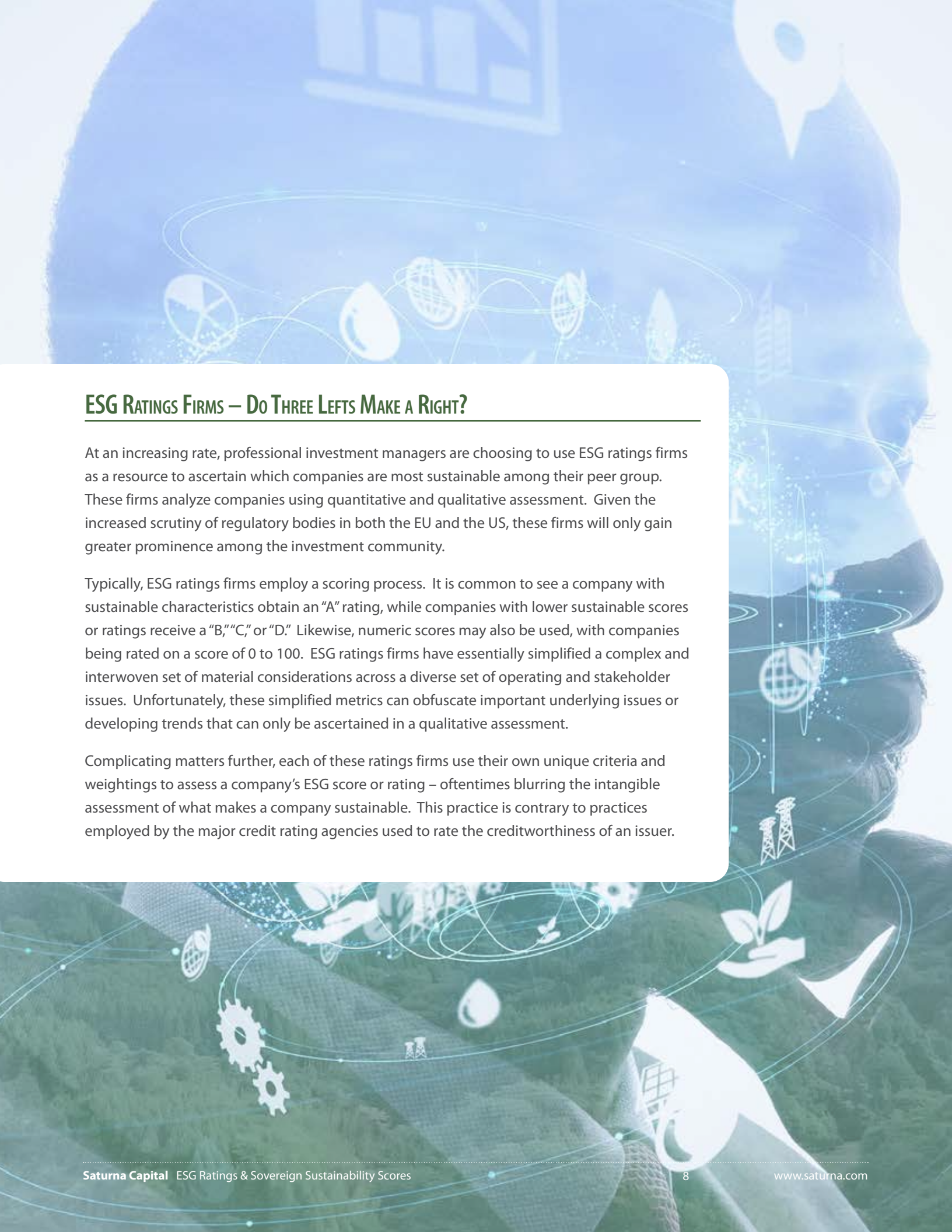
While the SFDR is EU-based and applies to its regional markets, it may have a larger influence. The SFDR has helped establish a common language around what is considered green and sustainable among issuers, investment firms, and investment product providers. If an entity wants to access the EU capital markets as an issuer, then the SFDR framework will apply.[12]

SFDR regulations have encouraged investment capital to migrate toward green-aligned issuers and ESG and sustainably affiliated investment products. The SFDR is also likely to influence non-EU investment firms and issuers of securities to adopt these standards if they want to either attract European Union investment capital or gain access to the EU's capital markets. The SFDR framework has potential influence on investor and issuer behavior, leading them to go green. According to an article featured in Reuters, the SFDR is likely to drive one trillion euros ($1.19 trillion) into green investments over the next decade.[13]

Similar environmentally minded regulations are gaining momentum in the US; the Securities Exchange Commission (SEC) Chair, Gary Gensler, announced the creation of a Climate and ESG Task Force in the Division of Enforcement on March 4, 2021. One of the agenda items of this new task force is to "develop initiatives to proactively identify ESG-related misconduct."[14] In a prepared remark, Gensler stated:

> "I think updates to fund disclosures and to naming conventions could bring needed transparency to the asset management industry, particularly in light of the significant growth in the sustainability area. This gets to the heart of the SEC's mission to protect investors and efficiently allocate capital…Based upon one estimate, there are at least 800 registered investment companies with more than $3 trillion in ESG assets last year. I think investors should be able to drill down to see what's under the hood of these funds. As there's not a standardized meaning of these sustainability-related terms, I've asked staff to consider recommendations about whether fund managers should disclose the criteria and underlying data they use."[15]

Details regarding this task force's recommendation are yet to come. However, the recent fallout due to German investment firm DWS allegedly making false claims regarding its sustainable investment practices has caught the attention of regulators and investors both in Europe and the US. DWS's shares slumped -9.4%, losing as much as 600 million euros ($703 million), on September 25, 2021.[16, 17]



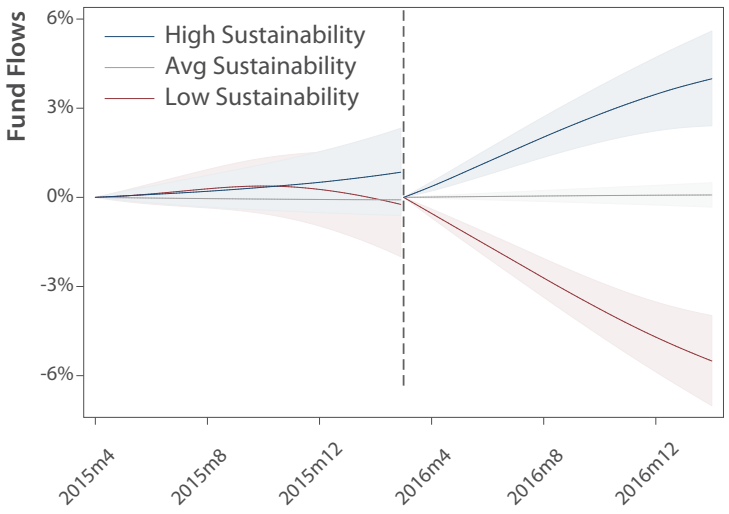
ESG Ratings Firms – Do Three Lefts Make a Right?

At an increasing rate, professional investment managers are choosing to use ESG ratings firms as a resource to ascertain which companies are most sustainable among their peer group. These firms analyze companies using quantitative and qualitative assessment. Given the increased scrutiny of regulatory bodies in both the EU and the US, these firms will only gain greater prominence among the investment community.

Typically, ESG ratings firms employ a scoring process. It is common to see a company with sustainable characteristics obtain an "A" rating, while companies with lower sustainable scores or ratings receive a "B," "C," or "D." Likewise, numeric scores may also be used, with companies being rated on a score of 0 to 100. ESG ratings firms have essentially simplified a complex and interwoven set of material considerations across a diverse set of operating and stakeholder issues. Unfortunately, these simplified metrics can obfuscate important underlying issues or developing trends that can only be ascertained in a qualitative assessment.

Complicating matters further, each of these ratings firms use their own unique criteria and weightings to assess a company's ESG score or rating – oftentimes blurring the intangible assessment of what makes a company sustainable. This practice is contrary to practices employed by the major credit rating agencies used to rate the creditworthiness of an issuer.

Fund Flows for Globes?



Sources: Morningstar, Hartzmark and Sussman

For example, ratings assigned by credit rating agencies S&P and Moody's are closely aligned, with a correlation of 0.9.[18] The correlations between ESG ratings firms have been much lower; MSCI and Sustainalytics correlate by 0.32, according to research by CSRHub, another ESG data provider in the sustainable industry.[19] In the same article published by the Financial Times, Philipp Aeby, the chief executive of the ESG ratings firm RepRisk, conceded that rating divergences are "a huge issue…The industry is still maturing, and we expect a convergence over time…The fundamental problem is that it is still unclear exactly what ESG should stand for."[20]

While using different approaches regarding ESG ratings is not itself an issue, it underscores the complexity of understanding each ratings firm's criteria. It is akin to what facilitates a market: a diverse set of views and approaches that permit investment professionals to exercise their judgement. ESG ratings firms influence the direction of capital flows, a critical factor in the financial industry.

Studies have shown that favorable sustainable ratings appear to influence investor behaviors and decisions. In the 2018 research paper "Do Investors Value Sustainability? A Natural Experiment Examining Ranking and Fund Flows," authors Samuel M. Hartzmark and Abigail B. Sussman suggest that funds with top-ranked sustainable attributes see investor inflows, while more poorly ranked funds experience outflows.[21] Their research found that mutual fund investors collectively treat sustainability as a positive fund attribute, allocating more money to funds ranked "High" for sustainability and less money to funds ranked "Low", both scored by the independent research firm Morningstar. Since March of 2016, Morningstar has used a "globe" rating system to assess the sustainable attributes of investment products.[22] A fund is rated "High," or five globes, as the highest possible score for sustainability, and a fund with low or no sustainable attributes is rated "Low," or one globe. Prior to the use of globe ratings, the funds were receiving similar levels of flows. After the publication of globe ratings, the funds rated five globes experienced substantial inflows of roughly 4% of fund assets over the next 11 months. On the other hand, funds rated one globe experienced outflows of about 6% of fund assets. Over the 11 months after the sustainability ratings were published, the authors estimate between $12 and $22 billion dollars in assets left one-globe funds, and between $22 and $34 billion dollars in assets entered five-globe funds.[23]

These trends have not gone unnoticed by the investment community, as noted by the proliferation of self-professed ESG/sustainable products. Morningstar reported that from 2018 to 2020, sustainable investment assets have experienced rapid growth, with Canada experiencing the largest increase in absolute terms over the past two years (48% growth), followed by the United States (42%), Japan (34%), and Australasia (25%).[24] In a separate 2020 report, global consulting firm PricewaterhouseCoopers (PwC) forecast that as much as 57% of mutual fund assets in Europe will be held in funds that consider environmental, social, and governance factors by 2025, or 7.6 trillion euros ($8.9 trillion), up from 15.1% at year-end 2019. In a survey of institutional investors conducted by PwC, 77% said they plan to stop buying non-ESG products within the next two years.[25]

The proliferation of ESG and sustainable funds, and the increase in regulations to keep up with the SFDR, is likely to drive professional investment managers to allocate capital among companies with higher ESG scores. Also, for companies issuing debt or equity, there will be greater pressure to enhance their relative ESG ranking among ESG ratings firms. There is reasonable concern regarding whether investment professionals will effectively integrate sustainable considerations into their investment process or just use sustainability as window dressing. In fact, funds that simply cite ESG considerations in their prospectuses generally score higher on the sustainability scale than funds overall. "It's hard to deny there isn't a marketing element to it," said Jon Hale, Morningstar's Global Head of Sustainability Research. "This is a way to address it without having to launch dedicated strategies and products."[26]

ESG Ratings for Sovereign Issuers: Unlikely Consensus

Recently, major ESG ratings firms launched sustainable ranking scores for sovereign issuers, allowing investors to compare ESG and sustainable characteristics for different countries. At year-end 2020, the global bond market topped $281 trillion, with government debt accounting for more than half of the year's $24 trillion in new issuance. Current estimates see another $10 trillion being added in 2021, which would drive global government debt to surpass $92 trillion outstanding.[27]

As a sub-asset class, sovereign bonds don't appear to fully account for climate-related risks or reflect the anticipated debt wave needed to address climate change mitigation. These concerning trends may have a profound impact on global markets, since these securities often act as vital benchmarks for all other asset classes when assessing the cost of capital and risk premiums. Investors may have to modify how they evaluate these securities, as sovereign debt issues typically offer liquidity and safety – both of which may be less valid in the future. In its ninth annual sovereign investors survey, Invesco Asset Management found that 57% of sovereign investors believe that the market has not yet factored in the long-term effects of climate change. This survey included 82 sovereign investors and 59 central banks, representing $19 trillion.[28]

In its latest report, the IPCC examines a hypothetical future global warming scenario in which global temperatures increase by 2° C – the exact future the Paris Climate Agreement is trying to prevent. Agricultural and ecological droughts in drying regions would be 2.4 times more likely to occur, and periods of extreme temperatures would increase by 5.6 times over a 10-year period. In the scenario in which global temperatures rise by 4° C, agricultural and ecological droughts in drying regions would be 4.1 times more likely to occur, and the frequency of extreme temperatures is projected to increase 9.4 times.[29]

Sovereign nations will need to raise additional funds to finance their transition to a low-carbon economy or help offset the costs of climate change-related scenarios. The market may evolve to the point where sovereigns issue natural disaster catastrophe bonds, similar to what is found in the municipal market.

The coronavirus pandemic taught investors important lessons regarding potential climate change-related risks. Governments around the world worked not only to stop the spread of the virus but also to provide a financial backstop that extended well beyond the scope of the damage caused by the virus itself. This included support for their economies and distressed industries, unemployment benefits for the displaced, medical resources, and social services. These so-called "second-order factors" fostered enormous fiscal spending programs which, in turn, caused a material change in their fiscal standing and motivated subsequent downgrades by rating agencies. The pandemic also exposed societal vulnerabilities in our highly integrated and interdependent global economies.

Contrary to expectations, global interest rates have largely fallen over the last decade in response to burgeoning debt loads and fiscal deficit levels not seen since World War II, all the while obscuring ominous risks. The three major credit rating agencies downgraded a fifth of the countries they rate in response to the pandemic, topping the 16% they cut at the height of the Great Financial Crisis (GFC) more than a decade ago.[30] As governments focus on their respective climate responses and investors scrutinize climate risks in sovereign debt, there are likely to be even more credit downgrades in the future.

But are ESG ratings firms taking these environmental risks, and other material, non-financial characteristics, into consideration in their assessments?

ESG ratings firms tend to disagree both on the definition of ESG and on the way various aspects of ESG are measured for corporate ESG ratings, which leads to disparate ratings for the same issue. One firm may rate an issue positively, while another rates it negatively. Unlike with corporate ESG ratings, the ESG ratings firms are in an uncanny consensus in the sustainability ratings of sovereign issuers.[31]

In a separate study, the World Bank evaluated corporate ESG scores from five different ESG providers — Sustainalytics, Robeco, VE, KLD, and ASSET4 — to find that the average correlation among their ratings was 61%, ranging from 42% to 73%. On the corporate level, environmental providers showed a slightly higher average correlation in ratings than their social and governance counterparts. However, in assessing the ESG rating score among sovereigns, the average correlation among providers is quite high at 85%.[32]

ESG scores of companies versus sovereigns (Percentage)

Provider	Corporate ESG	Sovereign ESG
ESG	61%	85%
Environmental	65%	42%
Social	49%	85%
Governance	38%	71%

Source: World Bank Group: Demystifying Sovereign ESG

This begs the question: why is consensus higher among ESG ratings for sovereign issuers?

The World Bank study found that sovereign ESG scores are dominated by one specific variable: a country's level of development, identified by its national income. Essentially, the wealthier and more developed the country, the better the ESG score or rank that sovereign issuer obtains. But is this correct? Does a country's wealth truly mean it has better ESG characteristics? Furthermore, how does wealth affect growing environmental risks?

In the World Bank Group's report, they state:

> "Our results further highlight that there is little agreement on how to measure the sovereign 'E' pillar among ESG providers. In contrast to the relatively high level of correlation for aggregate ESG scores, there is a markedly lower level of correlation among 'E' pillar scores. The E pillar has an average correlation of 42 percent with aggregate ESG scores and ranges from -14 percent to 88 percent."[34]

They found the approaches employed included significant lags on the metrics. Social and governance data had a three-year median lag, and environmental data had a five-year median lag. The authors do note that:

> "The academic literature on the financial materiality of environmental factors on sovereign debt is nascent, and studies tend to use different data, making them difficult to compare… studies such as these use data sources that are likely to be affected by ingrained income bias, predominantly reflecting countries' level of development, or national income, rather than underlying materiality of ESG-related factors."[35]

Sustainalytics' Top 20 Most Sustainable Country Rankings[33]

Rank	Country	Sovereign Region	Risk Score (/100)	Risk Category
1	Norway	Europe and Central Asia	8.82	Negligible
2	Switzerland	Europe and Central Asia	9.31	Negligible
3	Luxembourg	Europe and Central Asia	9.51	Negligible
4	Sweden	Europe and Central Asia	10.61	Low
5	Australia	East Asia and Pacific	10.69	Low
6	Iceland	Europe and Central Asia	10.98	Low
7	Denmark	Europe and Central Asia	11.32	Low
8	Canada	North America	11.59	Low
9	Finland	Europe and Central Asia	12.23	Low
10	Austria	Europe and Central Asia	12.41	Low
11	New Zealand	East Asia and Pacific	12.42	Low
12	United States	North America	12.46	Low
13	Netherlands	Europe and Central Asia	12.75	Low
14	Germany	Europe and Central Asia	12.76	Low
15	Ireland	Europe and Central Asia	12.84	Low
16	United Kingdom	Europe and Central Asia	12.89	Low
17	France	Europe and Central Asia	13.49	Low
18	Singapore	East Asia and Pacific	13.89	Low
19	Belgium	Europe and Central Asia	14.42	Low
20	Japan	East Asia and Pacific	14.44	Low

Source: Sustainalytics.com

Essentially, ESG ratings firms focus on a country's income and wealth status rather than considering underlying ESG characteristics, particularly as they relate to the environment. Arguably, there may be merits to this approach, as these sovereign nations may have the capacity to finance the transition to a low-carbon economy and offset impairment costs to physical assets due to climate-related natural disasters. But such an approach may not fully incorporate the underlying material ESG risks. It's akin to ranking the best race car by measuring the size of the tires to endure the wear and tear of the racetrack, but not the capability of the driver who habitually wears the rubber down more quickly than their opponents do.

Nonetheless, ESG ratings firms have established their criteria and respective ranks and scores. These ratings, in turn, are likely to encourage investors to allocate capital among the higher ESG-rated sovereign nations, which also aligns with the EU's preference that investment managers go green. The potentially disappointing outcome is that global capital will likely be redirected away from the regions of the world that desperately need financing to transition to a low-carbon economy. While more than 85% of the world's population lives outside of North America and Europe,[36] with the United States only representing 4.25% of the world's population, the US has the largest share of debt outstanding at $41.2 trillion, 38.9% of global fixed-income securities outstanding as of year-end 2019.[37]

THE POTENTIALLY DISAPPOINTING OUTCOME IS THAT GLOBAL CAPITAL WILL LIKELY BE REDIRECTED AWAY FROM THE REGIONS OF THE WORLD THAT DESPERATELY NEED FINANCING TO TRANSITION TO A LOW-CARBON ECONOMY.

Emerging markets may offer a more favorable risk-return profile concerning climate transition risks, given their low carbon emissions and more time remaining on their respective carbon budgets. Furthermore, these countries are likely to benefit from being solutions providers for developed countries, as these regions of the world retain vast natural assets that the developed regions do not have. Emerging markets may offer carbon sinks and other mitigation solutions that the developed world needs to achieve their net-zero targets.

The global economy is dependent upon natural assets. Research by the World Economic Forum shows that $44 trillion of economic value generation – more than half of the world's total GDP – is moderately or highly dependent on nature and its services.[38] Turning to the emerging markets for solutions may help achieve the Paris Climate Agreement's goals. In fact, the New York Stock Exchange recently announced it is developing a new class of publicly traded assets called Natural Asset Companies (NACs) – sustainable enterprises that hold the rights to ecosystem services produced by land, such as carbon sequestration, biodiversity, and clean water.[39]

Is such an allocation among sovereigns with high ESG ratings really reducing investors' exposure to anticipated climate-related risks? Will market participants be willing buyers of their debt to finance the enormous amount of capital to pay for their transition to a low-carbon economy? Do these developed countries provide the appropriate risk-return profiles, given their excessive levels of indebtedness at these current historically low yields?

Financing Sovereign Issuers' Transition Toward a Low-Carbon Economy: A Risky Proposition?

The table "Debt Characteristics of Selected Sovereign Countries" shows that developed countries exhibit some of the highest levels of indebtedness as measured by debt-to-GDP.

Debt Characteristics of Selected Sovereign Countries

Country	Total Debt (USD $ Millions)	Debt to GDP	Total GDP (USD $ Millions)	Population	% of World's Population	Debt per Capita (in USD)	GDP per Capita (in USD)	GDP v Debt per Capita	Margin of Safety per Capita
Australia	648,926	46.6%	1,359,370	25,687,041	0.33%	25,390	52,905	27,515	52.0%
Canada	1,935,423	117.5%	1,644,040	38,005,238	0.49%	50,912	43,295	-7,617	-17.6%
United States	27,980,860	133.9%	20,893,700	329,484,123	4.25%	84,850	63,358	-21,492	-33.9%
Qatar	105,098	72.1%	145,450	2,881,060	0.04%	39,157	54,185	15,028	27.7%
Indonesia	388,925	36.6%	1,059,640	273,523,621	3.53%	1,439	3,922	2,483	63.3%
Malaysia	227,768	67.4%	337,008	32,365,998	0.42%	6,951	10,231	3,280	32.1%
Mexico	656,877	61.0%	1,073,920	128,932,753	1.66%	5,140	8,404	3,264	38.8%
UAE	113,012	27.1%	358,869	9,890,400	0.13%	11,891	38,661	26,770	69.2%
Uruguay	38,591	68.1%	56,577	3,473,727	0.04%	11,109	16,287	5,178	31.8%
Global			**7,752,840,547**						

Debt Source: CountryEconomy.com. Population Source: The World Bank

For more information about how we chose the list of countries in this table and those that follow, please see page 32.

Developed countries appear more indebted when measured on a per capita basis. As of year-end 2020, US total debt was $84,800 per capita while its GDP was $63,400, reflecting a per capita deficit of $21,500. Canada also has a similar profile, although not as indebted as its neighbor to the south. Margin of safety measures the excess earnings that remain after taking the country's GDP into consideration. Emerging market countries retain a much larger margin of safety when compared to their developed market peers. While Qatar is not considered a developed country, it is included in this analysis because Sustainalytics rated the country at number 16 among its Top 20 "most sustainable countries" in July of 2021.

We provide carbon emission information at the country level, as well as on a per capita basis, in the "Carbon Emission Characteristics of Selected Sovereigns" table to further examine potential ESG risks, specifically under the environmental pillar. Developed countries report much higher carbon emissions when measured on a per capita basis. For example, Australia emits 5.1 times more carbon than Mexico and 7.2 times more than Indonesia. Australia also generates 4.9 times the GDP of Mexico and 17.6 times the GDP of Indonesia. However, developed economies have a potential weakness; it is unlikely they would be able to transition their infrastructure network and economic ecosystem toward a low-carbon economy in a timely fashion relative to emerging market economies. Developed countries will face higher costs and complexity in the transition to a low-carbon economy, compared to emerging market countries.

If we integrate the Paris Climate Agreement's goal of limiting global temperature increases to 2° C by staying under 1.5° C, we can use the carbon budget in our analysis. Here, we will find that environmental considerations should be a much larger priority for ESG ratings firms.

Carbon Emission Characteristics of Selected Sovereigns

Country	Amt. of Carbon Emitted (Gt CO_2 in 2020)	Contributor to Global Carbon Emissions (as a %)	Contributor to Global Carbon (3-yr Avg.)	Amt of Carbon Emitted per Capita	Amt of Carbon Emitted per Capita (3-yr Avg.)
Australia	386.4	1.07%	1.09%	15.2	16.1
Canada	542.8	1.51%	1.57%	14.4	15.5
United States	4,535.3	12.61%	13.50%	13.7	14.9
Qatar	99.5	0.28%	0.27%	35.6	37.6
Indonesia	568.3	1.58%	1.61%	2.1	2.3
Malaysia	262.2	0.73%	0.68%	8.0	8.1
Mexico	407.7	1.13%	1.33%	3.0	3.5
UAE	203.1	0.56%	0.58%	20.7	21.7
Uruguay	5.9	0.02%	0.02%	1.7	1.9
Global	**35,962.9**			**4.6**	**4.8**

Source: European Commission - EDGAR - Emissions Database for Global Atmospheric Research

The IPCC estimates the remaining carbon budget offers 67% and 50% likelihoods of keeping global warming under 1.5° C to be 400 $GtCO_2$ and 500 $GtCO_2$ respectively. The IPCC's estimated carbon budgets were as of the beginning of 2020, while this analysis incorporates carbon emission metrics as of year-end of 2020. Note that the information provided may underestimate the time left for each country's carbon budget; the data only includes carbon emissions from fossil fuels and cement, which means it excludes emissions due to land changes, which at this time lacks reliable data for our use. Lastly, carbon budgets are typically calculated on a per capita basis rather than on how much of its allocation a country uses. Developed countries could view this as incentive to raise their emissions, dismissing climate justice-related arguments. Emerging countries have claimed that the high-carbon emissions of developed world economies are a prime factor behind the need to reduce the world's carbon budget.

In the "Projected Carbon Budget Under Different Emission Targets for Selected Sovereigns" table, there are two different carbon budgets; the 67% chance of success if emissions stay under 400 $GtCO_2$ (in green) and the 50% chance of success if emissions remain under 500 $GtCO_2$ (in blue). The table shows that developed countries have much less time remaining on their carbon budget. Under the 67% scenario, Australia has 3.4 years remaining on their carbon budget, and Canada and the US are estimated to have 3.6 and 3.7 years remaining, respectively. This implies that climate-related transition risks should be anticipated in the short- or medium-term, rather than in the long-term future.

Under the 50% scenario, the timeline extends only one additional year on average. This does not add much wiggle room for developed countries. However, regarding the carbon budgets for the emerging market countries, we see that they have a much greater amount of time before they consume their respective carbon budgets. Under the 67% scenario, Malaysia has 6.4 years and Indonesia has 24.8 years. Under the 50% scenario, Malaysia has 8 years and Indonesia has 31 years.

Projected Carbon Budget Under Different Emission Targets for Selected Sovereigns

Country	1.5C WITH 67% CHANCE (400 GT CO_2)			1.5C with 50% Chance (500 Gt CO_2)		
	Remaining Carbon Budget	Years Remaining	Calendar Year Ending Carbon Budget	Remaining Carbon Budget	Years Remaining	Calendar Year Ending Carbon Budget
Australia	1.3	3.4	2025	1.7	4.3	2026
Canada	2.0	3.6	2025	2.5	4.5	2026
United States	17.0	3.7	2025	21.2	4.7	2026
Qatar	0.1	1.5	2023	0.2	1.9	2023
Indonesia	14.1	24.8	2046	17.6	31.0	2052
Malaysia	1.7	6.4	2028	2.1	8.0	2029
Mexico	6.7	16.3	2038	8.3	20.4	2042
UAE	0.5	2.5	2024	0.6	3.1	2024
Uruguay	0.2	30.5	2052	0.2	38.1	2059
Global	**400.0**	**11.1**	**2032**	**500.0**	**13.9**	**2035**

Source: Intergovernmental Panel on Climate Change (IPCC)

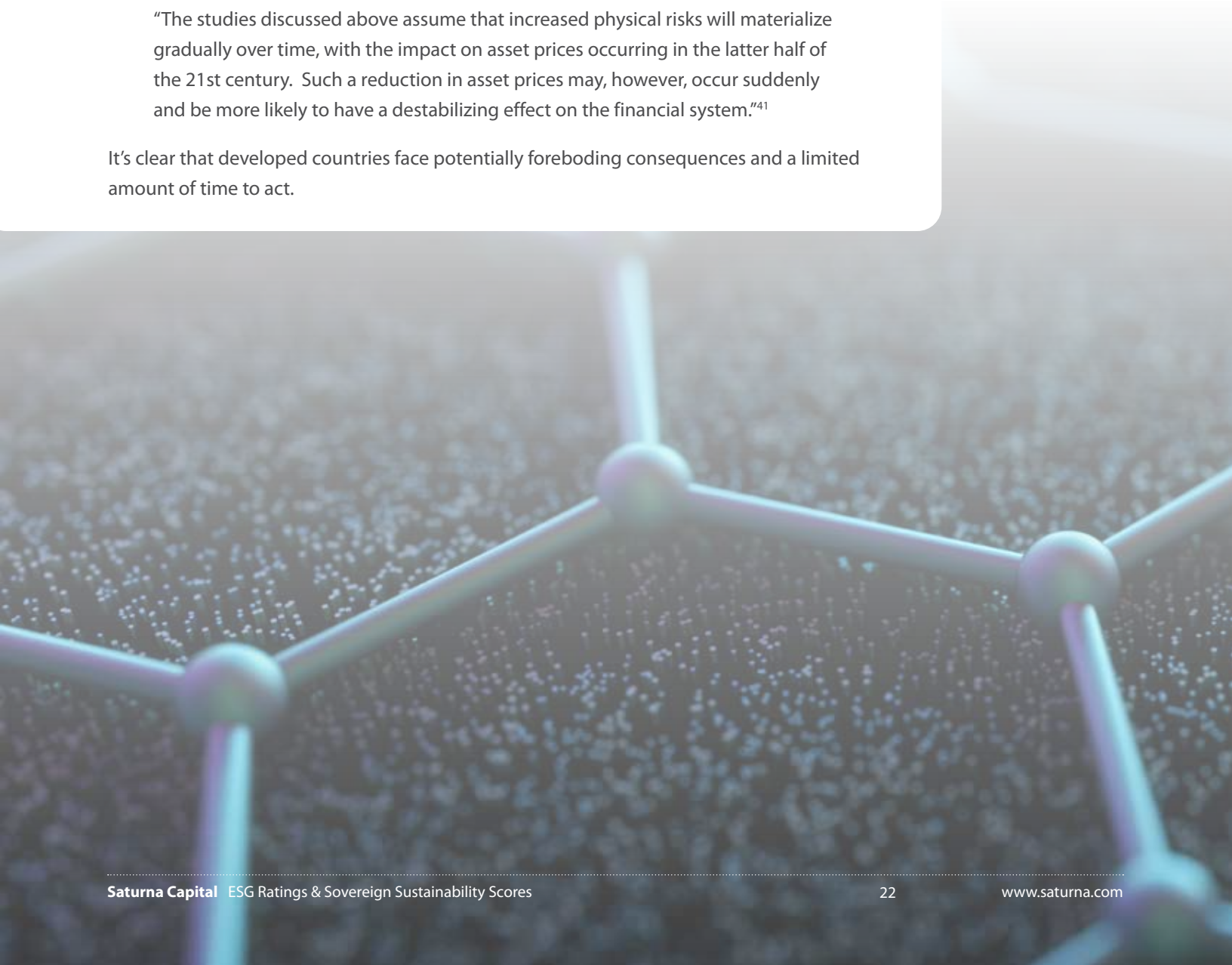
This is what is known as a "disorderly transition," a term used among the climate science community. In a report by the Financial Stability Board titled "The Implications of Climate Change for Financial Stability, a disorderly transition to a low-carbon economy:

> "… could therefore leave banks and other investors bearing large losses on fossil fuel-related assets (i.e., credit and market risk). It could also have a broader impact on government revenues and creditworthiness, particularly in those countries whose governments rely heavily on revenues from fossil fuels. At the same time, some [emerging market and developing economies] are expanding their reliance on fossil fuel assets, which could also expose those who finance these activities to transition risks."[40]

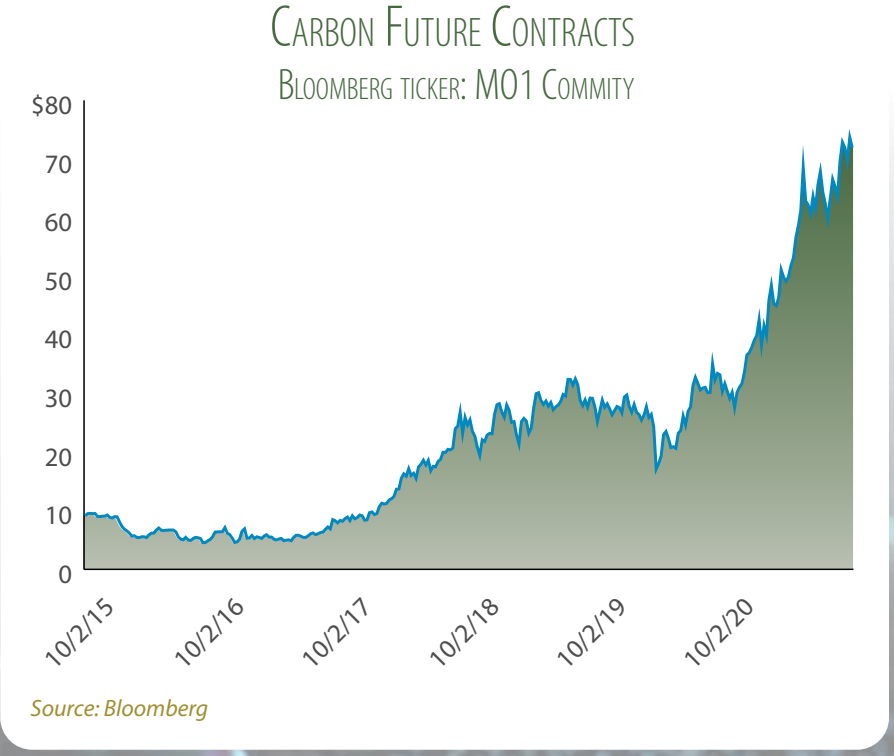
The report also notes:

> "The studies discussed above assume that increased physical risks will materialize gradually over time, with the impact on asset prices occurring in the latter half of the 21st century. Such a reduction in asset prices may, however, occur suddenly and be more likely to have a destabilizing effect on the financial system."[41]

It's clear that developed countries face potentially foreboding consequences and a limited amount of time to act.



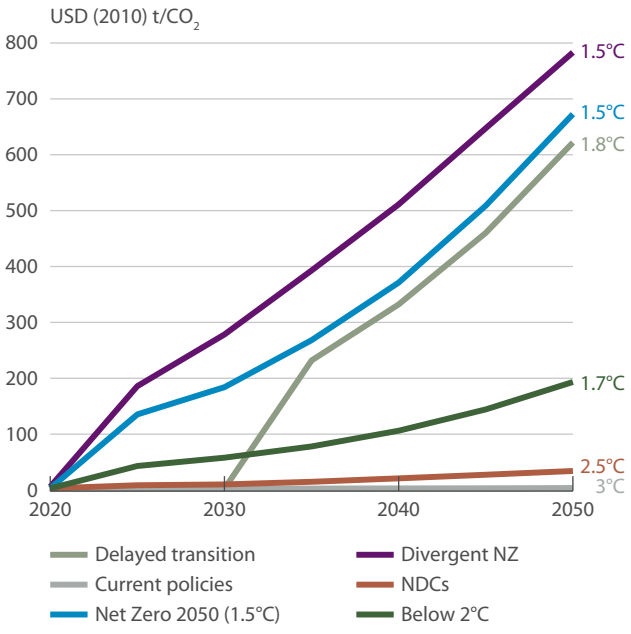
Expanding upon this exercise, carbon price offsets are included to measure potential changes in a country's debt-to-GDP metrics. This market provides buyers the ability to purchase unused carbon emissions from companies that retain a carbon budget surplus to offset their carbon budget deficit. Typically, one contract represents 1.0 million tons of carbon emissions. Currently, Europe is the primary carbon offsets market. According to Refinitiv, the global carbon market increased in value by 20% in 2020 to a total of 229 billion euros ($272 billion).[42] As of third quarter-end in 2020, the price of carbon futures closed at $73.67, the highest price over the last year and for the previous five-year period.



Source: Bloomberg

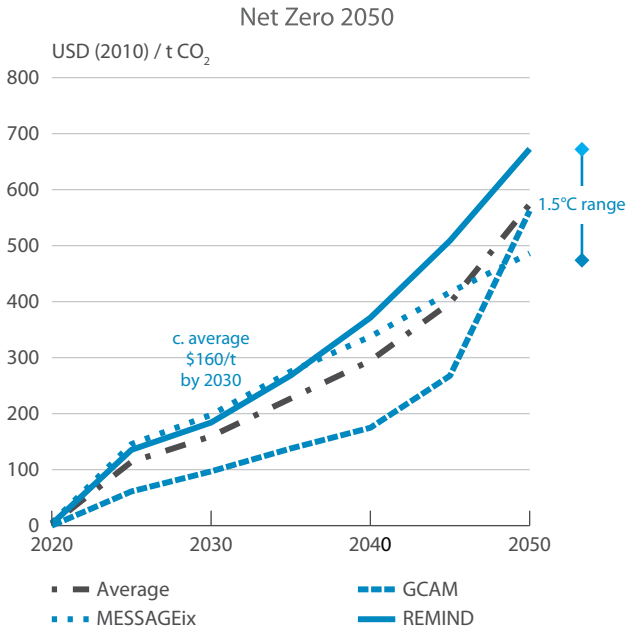
A report from the Network for Greening the Financial System (NGFS), an organization of 100 member central banks and 16 supervisory observers with its secretariat hosted by the Banque de France, can help determine what carbon prices will be in the future. The NGFS was created in 2017 with a mission to accelerate the growth of green finance and develop recommendations for central banks' role in climate change.[43] The report identifies that a "carbon price of around $160/ tonne would be needed by the end of the decade to incentivize a transition toward net zero by 2050."[44] $160 per tonne represents a 117% increase in the price of carbon since September 30, 2021. There are many other scenarios that point to a much higher carbon price, but this information is highly dependent upon a host of assumptions.

Carbon price development



Source: IIASA NGFS Climate Scenarios Database, REMIND model. Carbon prices are weighted global averages.

Carbon prices across models



Source: IIASA NGFS Climate Scenarios Database.

By assessing the financial value of a country's remaining carbon budget and its potential impact on its debt-to-GDP, we can see how climate change could affect a sovereign's fiscal standing under a disorderly transition. In the "Equitable Carbon Budget Examples" table, we can see how debt levels could possibly increase for all the listed countries. In the United States' case, the incremental value of these carbon offsets adds $1.2 trillion in debt when carbon is priced as of September 30, 2021, and $1.7 trillion in debt at the $160/tonne marker.

Equitable Carbon Budget Examples

Country	Equitable Carbon Budget at 1.5C for 67% (400 $GtCO_2$)	Debt to GDP (FY 2020)	Revised Debt-to-GDP Carbon Price as of 3Q 2021	Revised Debt-to-GDP Carbon Price at $160/$tCO_2$	Equitable Carbon Budget at 1.5C for 50% (500 $GtCO_2$)	Revised Debt-to-GDP Carbon Price as of 3Q 2021	Revised Debt-to-GDP Carbon Price at $160/$tCO_2$
Australia	1.33	46.6%	53.4%	61.8%	1.66	55.1%	65.6%
Canada	1.96	117.5%	126.0%	136.5%	2.45	128.1%	141.3%
United States	17.00	133.9%	139.7%	146.9%	21.25	141.2%	150.2%
Qatar	0.15	72.1%	79.4%	88.4%	0.19	81.2%	92.5%
Indonesia	14.11	36.6%	131.5%	249.2%	17.64	155.3%	302.4%
Malaysia	1.67	67.4%	102.7%	146.5%	2.09	111.6%	166.3%
Mexico	6.65	61.0%	105.2%	159.9%	8.32	116.2%	184.6%
UAE	0.51	27.1%	35.8%	46.7%	0.64	38.0%	51.6%
Uruguay	0.18	68.1%	90.6%	118.6%	0.22	96.3%	131.3%

Source: CountryEconomy.com and Saturna Capital

We can also observe that emerging market countries experience a much more pronounced increase, particularly Indonesia. The US, and other developed nations, face the challenging objective to reduce their large emission output in a much shorter period. *As a result, it is reasonable for investors to place greater weight on environmental considerations in their ESG/ sustainable framework than what is being employed by ESG ratings firms.*

If we were to go back to measuring the revised debt metrics on a per capita basis, we see that the margins of safety for the US and Canada, both in a deficit at year-end of 2020, exhibit a much steeper decline under both scenarios.

This hypothetical exercise is meant to show that a country's environmental considerations relate to its debt profile and potential trajectory. These trajectories can also adversely weaken a country's fiscal standing in other environmental situations, such as physical damage from climate change. In 2020, natural disasters caused $76 billion in insured losses in the US, representing over 90% of the $83 billion in total industry losses, a large rise from the $54 billion reported in 2019.[45] Given these staggering rates, it's hard to see the insurance industry continuing to operate under the existing business model, and those seeking flood insurance will instead have to rely on the US government through its National Flood Insurance Program.

Climate-related exogenous shocks or transitions are likely to encompass a much broader scope, further raising debt and deficit trajectories and subsequently increasing risk premiums. This may adversely affect a country's relative wealth status, which ESG ratings firms use as a primary metric. These shocks or transitions also raise additional considerations about a country's debt sustainability and the willingness of investors to remain active buyers, particularly at these historically low interest rates.

Debt per Capita Metrics Under a 1.5° C Scenario with a 50% Chance of Success

Country	GDP per capita (in USD)	Debt-to-GDP (FY 2020) (in USD)	GDP less Debt per Capita (in USD)	Margin of Safety per Capita	Debt per Capita (3Q 2021 carbon Price) for 1.5C and 50% Probability (in USD)	Margin of Safety per Capita	Debt per Capita ($160/tonnes carbon Price) for 1.5C and 50% Probability (in USD)	Margin of Safety per Capita
Australia	52,905	25,390	27,515	52.0%	23,035	43.5%	17,323	32.7%
Canada	43,295	50,912	-7,617	-17.6%	-12,237	-28.3%	-17,949	-41.5%
United States	63,358	84,850	-21,492	-33.9%	-26,173	-41.3%	-31,884	-50.3%
Qatar	54,185	39,157	15,028	27.7%	13,099	24.2%	7,387	13.6%
Indonesia	3,922	1,439	2,483	63.3%	-2,107	-53.7%	-7,819	-199.4%
Malaysia	10,231	6,951	3,280	32.1%	-1,414	-13.8%	-7,125	-69.6%
Mexico	8,404	5,140	3,264	38.8%	-1,298	-15.4%	-7,010	-83.4%
UAE	38,661	11,891	26,770	69.2%	22,627	58.5%	16,916	43.8%
Uruguay	16,287	11,109	5,178	31.8%	570	3.5%	-5,141	-31.6%

Source: CountryEconomy.com

Debt per Capita Metrics Under a 1.5° C Scenario with a 67% Chance of Success

Country	GDP per capita (in USD)	Debt-to-GDP (FY 2020) (in USD)	GDP less Debt per Capita (in USD)	Margin of Safety per Capita	Debt per Capita (3Q 2021 Carbon Price) for 1.5C and 67% Probability (in USD)	Margin of Safety per Capita	Debt per Capita ($160/Tonnes Carbon Price) for 1.5C and 67% Probability (in USD)	Margin of Safety per Capita
Australia	52,905	25,390	27,515	52.0%	23,956	45.3%	19,387	36.6%
Canada	43,295	50,912	-7,617	-17.6%	-11,316	-26.1%	-15,885	-36.7%
United States	63,358	84,850	-21,492	-33.9%	-25,251	-39.9%	-29,820	-47.1%
Qatar	54,185	39,157	15,028	27.7%	14,020	25.9%	9,451	17.4%
Indonesia	3,922	1,439	2,483	63.3%	-1,186	-30.2%	-5,755	-146.7%
Malaysia	10,231	6,951	3,280	32.1%	-492	-4.8%	-5,061	-49.5%
Mexico	8,404	5,140	3,264	38.8%	-377	-4.5%	-4,946	-58.9%
UAE	38,661	11,891	26,770	69.2%	23,549	60.9%	18,980	49.1%
Uruguay	16,287	11,109	5,178	31.8%	1,492	9.2%	-3,077	-18.9%

Source: CountryEconomy.com

Market participants are beginning to assess ESG considerations in market assets, such as sovereign credit default swaps – a financial derivative used to offer insurance for bondholders. In his research paper titled "Do Markets Value ESG Risks in Sovereign Credit Curves?" Benjamin Hübel finds that a market relationship exists after taking income and wealth-related data, or macro-variables, into account. Hübel writes,

> "Our empirical results suggest a significant and negative relationship between ESG and sovereign credit spreads, pointing toward CDS markets pricing a risk-mitigating effect of ESG improvements. Interestingly, the risk-reducing effects of the E- and G-pillars remain significant even after controlling for S&P credit ratings. Markets and credit rating agencies therefore seem to largely agree on how to value the social components of credit spreads, while markets assign additional spread premia for environmental and governance risks compared to credit ratings"[46]

Hübel noted that between 2007 and 2017, one standard deviation improvement in ESG performance corresponded to a 6% decrease in CDS spreads over one year.

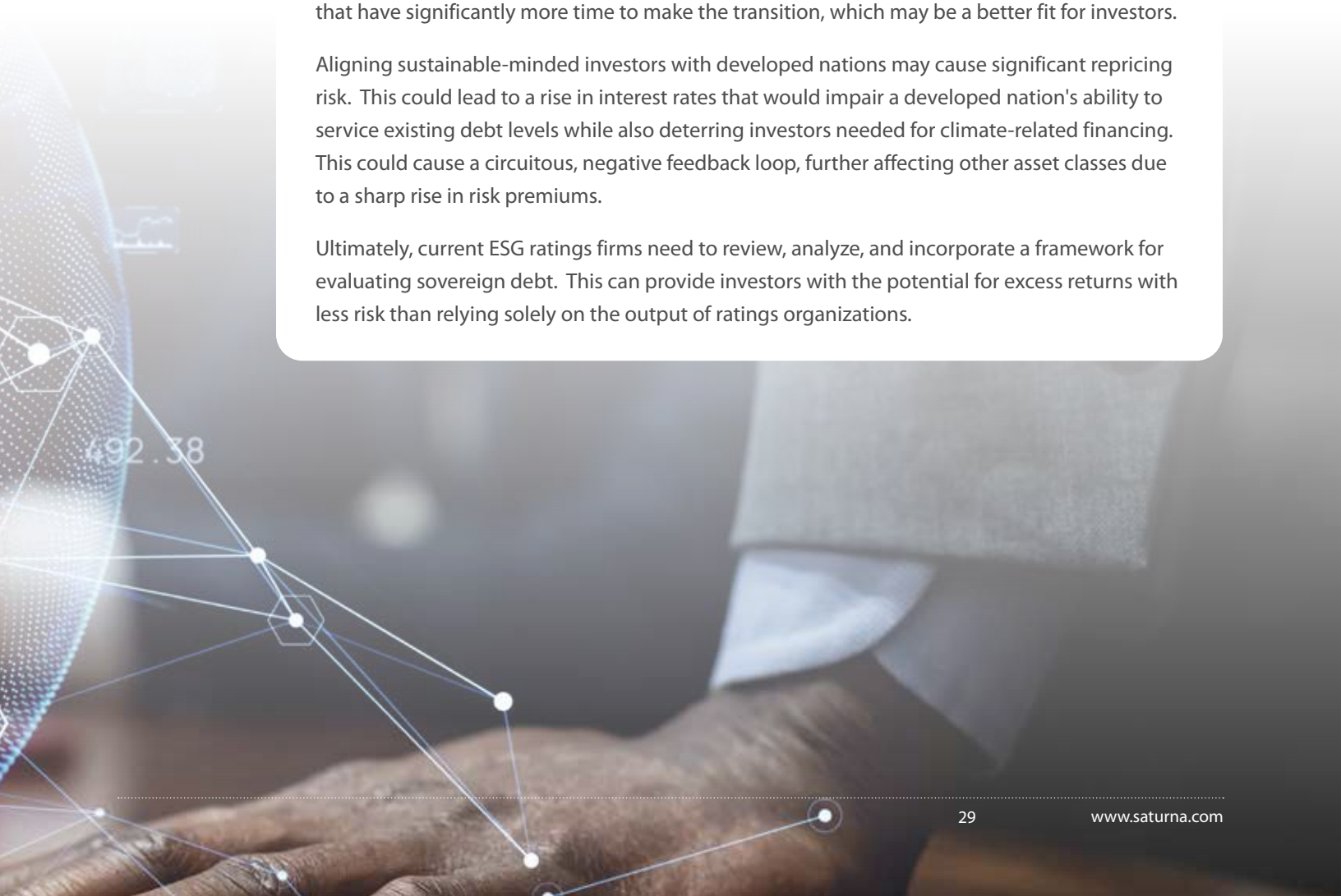
Hübel found that all three ESG pillars contributed risk-mitigating effects, particularly the E and G pillars. Hübel concluded "this suggests that CDS markets incorporate ESG risks differently than credit rating agencies. More specifically, CDS markets seem to assign an additional spread premium for high ESG risks beyond of what is already reflected in credit ratings."[47]

ESG Ratings firms' Sovereign Ratings Are Likely to Increase Sovereign Risk Rather Than Mitigate

The current sovereign ESG/sustainable framework employed by ESG ratings firms, emphasizing a country's income and wealth status, is not the best benchmark to use because it doesn't capture material ESG considerations. As a result, asset managers wanting to appear green and attract investors' capital may unknowingly increase their risk profile. The current sustainable framework aligns investors with sovereign nations that face the greatest challenges and costs in transitioning to a low-carbon economy, while redirecting capital away from other countries that have significantly more time to make the transition, which may be a better fit for investors.

Aligning sustainable-minded investors with developed nations may cause significant repricing risk. This could lead to a rise in interest rates that would impair a developed nation's ability to service existing debt levels while also deterring investors needed for climate-related financing. This could cause a circuitous, negative feedback loop, further affecting other asset classes due to a sharp rise in risk premiums.

Ultimately, current ESG ratings firms need to review, analyze, and incorporate a framework for evaluating sovereign debt. This can provide investors with the potential for excess returns with less risk than relying solely on the output of ratings organizations.



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Country Selection Rationalization

Regarding the debt characterization charts on pages 18, 19, 21, 25, and 27, the countries presented were selected based on a number of criteria, including markets in which Saturna participates, developed markets deemed "low risk" by ESG ratings firm Sustainalytics, economies dependent upon hydrocarbons, geographic diversification, and susceptibility to climate change risks. Further information on each country follows.

- **Australia:** In addition to ranking highly on Sustainalytics' "most sustainable countries" list with a risk level of "low," Australia's dependence on hydrocarbons provides a relevant comparison to the US.
- **Canada:** One of the US's largest trading partners, Canada's dependence on hydrocarbons provides a contrast to the US, particularly as the Canadian government ranks among the most progressive in terms of addressing climate-related risks outside of the EU member countries.
- **United States:** In addition to being Saturna's primary market, the US is a hydrocarbon-dependent economy facing significant risks from climate change.
- **Qatar:** As of July 2021, Qatar ranked among Sustainalytics' Top 20 "most sustainable countries" with a risk level of "low" – a most curious inclusion given their inhospitably hot summers, lack of arable land, and relatively high risk of sea-level rises (with the highest point in the country being 338 feet (103 meters) above sea level). As of December 2021, Sustainalytics removed Qatar from the list.
- **Indonesia:** In selecting emerging markets to include, we sought to first include countries where we have strong business relationships, which includes Indonesia.
- **Malaysia:** Saturna's asset management and research subsidiary, Saturna Sdn. Bhd., operates in Malaysia, making it one of our home markets.
- **Mexico:** Similar to Canada, Mexico is a large trading partner with the US and has a hydrocarbon-dependent economy.
- **UAE:** As a counterpoint to Qatar, the UAE is one of the more progressive governments in the Gulf Cooperation Council (GCC) region when it comes to policies related to climate change.
- **Uruguay:** While Uruguay is generally not on the radar for most investors, it perhaps offers a means to expand the universe of favorably positioned countries. Uruguay exhibits positive ESG characteristics; ranking in the 2nd quintile of MSCI's ratings and in the 1st quintile of Sustainalytics' ratings.

About The Author

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Patrick T. Drum, Senior Investment Analyst and Portfolio Manager, joined Saturna Capital in October 2014. He is a former adjunct professor of finance for the Sustainable MBA Program at the Bainbridge Graduate Institute (BGI), currently known as Presidio Graduate School. Mr. Drum holds a BA in Economics from Western Washington University and an MBA from Seattle University Albers School of Business. He is a Chartered Financial Analyst (CFA) charterholder and a Certified Financial Planner®.

Prior to joining Saturna Capital, Mr. Drum led environmental, social, and governance (ESG) research and was director of fixed income portfolio management since 2007 with a private account group at UBS Institutional Consulting Services, specializing in investment management for global conservation and national wildlife park endowments as well as sustainable-social screened client portfolios. He is a former Chair of the United Nation's Principles for Investment (UNPRI) Fixed Income Outreach Subcommittee and a current member of the UNPRI's Bondholder Engagement Working Group (BEWG), an advisory committee working to elevate important ESG considerations and best practices among issuers and investors. Mr. Drum's past experience also includes business valuation at Moss Adams and portfolio management at Washington Mutual Bank.

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Diversification does not assure a profit or protect against a loss in a declining market.

A Few Words About Risk

Investing involves risk, including possible loss of principal. Generally, an investment that offers a higher potential return will have a higher risk of loss. Stock prices fluctuate, sometimes quickly and significantly, for a broad range of reasons that may affect individual companies, industries, or sectors. When interest rates rise, bond prices fall. When interest rates fall, bond prices go up. A bond fund's price will typically follow the same pattern. Investments in high-yield securities can be speculative in nature. High-yield bonds may have low or no ratings, and may be considered "junk bonds."

Fund share prices, yields, and total returns will change with market fluctuations as well as the fortunes of the countries, industries, and companies in which it invests. Foreign investing involves risks not normally associated with investing solely in US securities. These include fluctuations in currency exchange rates; less public information about securities; less governmental market supervision; and the lack of uniform financial, social, and political standards. Foreign investing heightens the risk of confiscatory taxation, seizure or nationalization of assets, establishment of currency controls, or adverse political or social developments that affect investments.

The Saturna Sustainable Funds limit the securities they purchase to those consistent with sustainable principles. This limits opportunities and may affect performance.

While diversification does not guarantee against a loss in a declining market, it can help minimize the risk of the decline of a single market.

Principal Risks of Investing in the Sustainable Funds

Credit risk: *Investing in bonds includes the risk that an issuer will not pay interest or principal when due, or the issuer may default altogether. If an issuer's credit quality is perceived to decline, the value and liquidity of the issuer's bonds may also decline.*

Emerging markets risk: *In emerging markets and less developed countries, the risks of investing in foreign securities can be magnified by less mature political systems and weaker corporate governance standards than typically found in the developed world.*

Equity securities risk: *Equity securities may experience significant volatility in response to economic or market conditions or adverse events that affect a particular industry, sector, or company. Larger companies may have slower rates of growth as compared to smaller, faster-growing companies. Smaller companies may have more limited financial resources, products, or services, and tend to be more sensitive to changing economic or market conditions.*

Financials sector risk*: Performance of companies in the Financials sector may be materially impacted by many factors, including but not limited to, government regulations and intervention, economic conditions, credit rating downgrades, changes in interest rates and decreased liquidity in credit markets. Profitability of these companies is largely dependent on the availability and cost of capital and can fluctuate significantly when interest rates change. Credit losses resulting from financial difficulties of borrowers also can negatively impact the sector. The impact of more stringent capital requirements, or recent or future regulation in various countries on any individual financial company, or of the Financials sector as a whole, cannot be predicted. The Financials sector is also a target for cyber attacks and may experience technology malfunctions and disruptions.*

Foreign investing risk: *Foreign investing involves risks not normally associated with US securities. These risks include fluctuations in currency exchange rates; less public information about securities; less governmental market supervision; and lack of uniform financial, social, and political standards. Foreign investing heightens the risk of confiscatory taxation, seizure or nationalization of assets, currency controls, or adverse political or social developments that affect investments.*

Growth investing risk: *The Fund may invest in growth stocks, which may be more volatile than slower-growing value stocks, especially when market expectations are not met.*

High-yield risk: *Investing in bonds that are unrated or rated below investment grade, which are known as "junk bonds," typically offer higher yields to compensate investors for increased credit risk. Issuers of high-yield securities generally are not as strong financially and are more vulnerable to changes that could affect their ability to make interest and principal payments. High-yield securities generally are more volatile and less liquid (harder to sell), which may make such securities more difficult to value.*

Interest rate risk: *Investing in bonds includes the risk that as interest rates rise, bond prices will fall. Conversely, during periods of declining interest rates bond prices generally rise, but bond issuers may call or prepay the bond and reissue debt at lower interest rates. The longer a bond's maturity, the more sensitive the bond is to interest rate changes.*

Investment strategy risk: *The adviser believes that sustainable investing may mitigate security-specific risk, but the screens used in connection with sustainable investing reduce the investable universe, which limits opportunities and may increase the risk of loss during market declines. In addition, the Fund has a relatively limited operating history, having commenced investment operations in March 2015, and its limited performance history does not provide extensive information on how the Fund may perform in different market conditions.*

Liquidity risk: *Liquidity risk exists when particular investments are difficult to sell and may be more difficult to value. If the Fund is forced to sell these investments during unfavorable conditions to meet redemptions or for other cash needs, the Fund may lose money on its investments. As a result, the Fund may be unable to achieve its objective.*

Market risk: *The value of the Fund's shares rises and falls as the market value of the securities in which the Fund invests goes up and down. The market value of securities will fluctuate, sometimes significantly and unpredictably, with stocks generally being more volatile than bonds. When you redeem your shares, they may be worth more or less than what you paid for them. Only consider investing in the Fund if you are willing to accept the risk that you may lose money.*

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