



Along the ESG Path: Environmental Issues Ahead

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Introduction

The acronym ESG, which stands for environmental, social, and governance, was given little attention only five years ago among sovereign bond investors. ESG factors and their potential impact are now a central part of discussions about the economic outlook and in investment research. The initiative to integrate these critical factors into investment management has been led by the United Nations-supported Principles of Responsible Investing (PRI). Signatories to the PRI, like Brandywine Global, commit to responsible investment by adhering to the six principles of responsible investing, including incorporation of ESG factors in investment research. While our research has led to a greater appreciation of the importance of these factors and their influence on assets—both financial and real—behavior, economies, and policy responses, our sovereign bond analysis has focused largely on governance factors. However, given the global push to reverse climate change, we see the growing importance of E; we believe environmental factors and risks are not fully reflected in sovereign bond prices or credit ratings.

The Brandywine Global Path

Brandywine Global became a PRI signatory in 2016 and began developing a systematic process to identify the ESG risk for sovereign bonds across all countries for which there is data available. At the time we began our process, the focus on ESG and sovereign bonds was just developing, but we were able to identify and begin working with Verisk Maplecroft. Verisk Maplecroft gives us access to a comprehensive ESG data catalogue from which we calculate a proprietary ESG score for almost 200 countries. As part of this analysis, we also split countries' ESG scores into quintiles and identify the top underperforming and outperforming ESG factors of each country relative to its quintile's ESG average. This categorization gives us insight into both negative and positive risk factors that could affect a nation's growth and funding cost, among other things. We also trace the historic performance of the overall score and the time path of each individual factor for each country. Put simply, the score only tells us the ESG ranking at a specific point in time. The historic review tells us the direction of the change, negative or positive. [Charts 1 and 2](#) are examples of that factor identification process for India, which is categorized in the fourth quintile based on its ESG Score. Relative to its quintile, India exhibits burgeoning negative environmental risks, but, positively, it has biodiversity protections in place and appears to be progressing toward reducing its greenhouse gas (GHG) emissions.

1

India ESG Risk Factor vs. 4th Quintile Average

ESG Score (0=extreme risk; 10=low risk), As of 6/22/2021






4 th Quintile	D
Quintile's Average ESG Risk Factor	4.44
India's ESG Risk Factor	4.37






Source: Brandywine Global, Verisk Maplecroft

2

India Factor Analysis Relative to Quintile's Average ESG Scores

ESG Score (0=extreme risk; 10=low risk), As of 6/22/2021

India: Top 5 Underperforming Factors	Category	Risk Level	Difference from Quintile Average	2-Yr Change
Air Quality	E	Extreme	-4.36	 0.00
Climate Change Sensitivity	E	Extreme	-3.80	 0.19
Water Pollution	E	Extreme	-3.71	 -0.02
Healthcare Capacity	S	Extreme	-3.58	 0.06
Total GHG Emissions	E	Extreme	-3.52	 -0.03

India: Top 5 Outperforming Factors	Category	Risk Level	Difference from Quintile Average	2-Yr Change
Trade Sanctions	G	Low	5.56	 0.00
Government Stability	G	Low	5.28	 0.28
Biodiversity and Protected Areas (Marine)	E	Low	4.71	 0.01
GHG Emissions Reduction: Progress Towards Targets	E	Low	4.21	 0.12
Biodiversity and Protected Areas (Terrestrial)	E	Low	3.92	 0.36

Source: Brandywine Global, Verisk Maplecroft

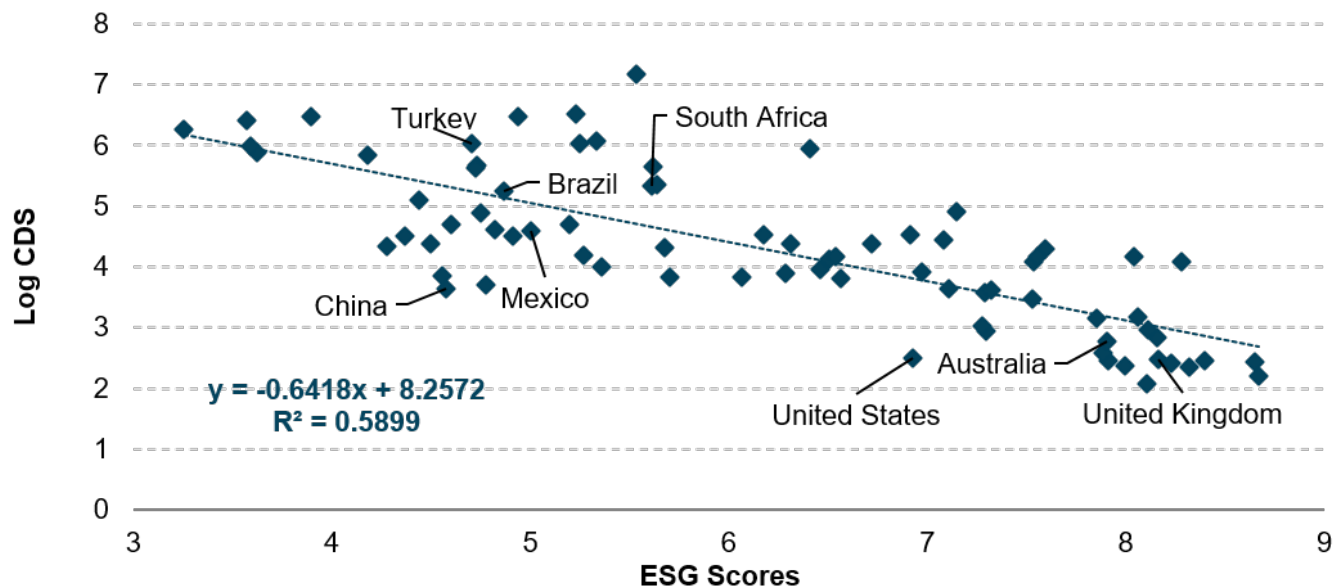
We also think our proprietary scoring model provides us with economic insights that are important to sovereign bond analysts and investors. Arguably, one incorporates ESG scores and factors into sovereign analysis because this data can help explain a country's financing cost, economic growth per capita, or credit default swaps (CDS), as examples. Let us illustrate our thinking using a country's CDS to evaluate whether there is a relationship between a country's ESG score and its CDS, a measure of a sovereign bond's credit risk. A low CDS would equate to reduced credit risk while a high CDS raises the red flag of elevated credit risk. Our statistical analysis of that

hypothesized relationship appears in the chart below (see [Chart 3](#)).

3

World: ESG Scores versus Sovereign Credit Default Swaps

ESG Score (0=extreme risk; 10=low risk), As of 6/22/2021



Source: Bloomberg (© 2021, Bloomberg Finance LP), Brandywine Global, Verisk Maplecroft

In evaluating the chart above, we look to see if the results equate to what theory would tell us to expect. Our assumed relationship is that a higher ESG score, *i.e.*, lessened risk from ESG factors, should reward a country with a lower credit risk or a lower risk of a default. That is exactly what we see. The slope of the fitted line is negative, the coefficient is negative, and the R^2 is relatively strong for cross-sectional data. Low-risk countries exhibit a lower credit risk, validating our theory. Furthermore, a valuation anomaly could be posited. For example, the greater distance a country lies from the fitted line could identify an exploitable anomaly. Countries plotting above the line could indicate a too-high credit risk, based on their ESG scores. We can also deconstruct the data for a similar analysis of each individual factor. However, in our example we will limit our analysis to E and its ability to identify credit risk.

The E Factor: An Underappreciated Risk

With respect to sovereign bonds, Brandywine Global, like many asset managers, has largely concentrated on the G factor. However, we have been focused increasingly on E under the belief that it will become a more important influence on economies and asset prices. Why? Countries have decided to address the deleterious effects of climate change resulting from GHG emissions. As signers or soon to be signers of the Paris Agreement, countries agree to address global warming by reducing GHG emissions, the main cause of global warming. The agreement's goal is to constrain global warming to two degrees centigrade or significantly less relative to pre-industrial levels. The required governmental actions will have to be aggressive. They will be costly. And, the actions by governments will affect economic growth across countries. Those actions will call for a radical shift to cleaner technologies to produce electricity and reduce GHG and away from fossil fuels. The ESG framework helps us identify countries that are both at extreme E risk and those with very low risk.

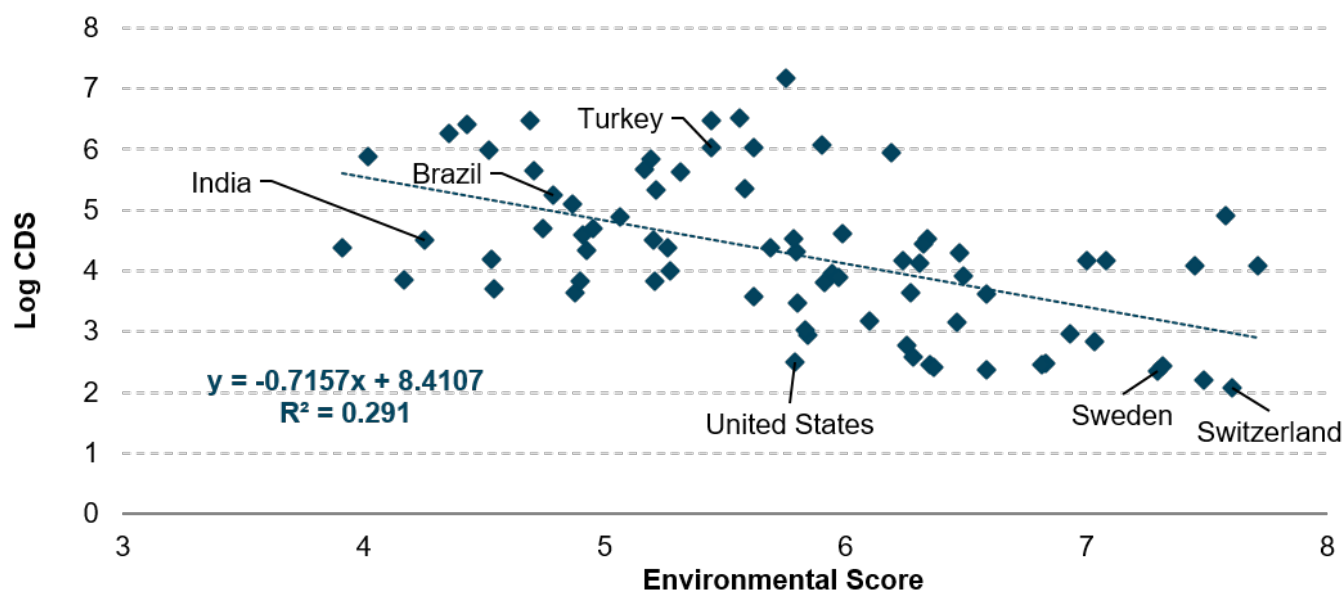
In the following example, we will maintain a country's CDS as the independent variable while the E factor is the specified explanatory variable. Does the E factor provide any insight into the credit risk of a sovereign? We know that credit rating agencies analyze the effect of E on a country's credit rating, *i.e.*, E is incorporated into a credit rating agency's rating decision. More countries adopting emission reduction targets could send strong price

signals to related sectors. Central banks also are increasingly focused on environmental risks. For example, the Bank of England launched a climate stress test for insurers. The European Central Bank has been urged to “decarbonize” its corporate credit holdings. Those movements should trigger a sovereign analyst’s interest in a country’s sensitivity to—or efforts to curb—climate change. As governments try to comply with the Paris Agreement, climate mitigation efforts can affect budget policy. Meanwhile, extreme weather events can affect economic activity.

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Environmental (E) Score versus Sovereign CDS

Environmental Score (0=extreme risk; 10=low risk), As of 6/22/2021



Source: Bloomberg (© 2021, Bloomberg Finance LP), Brandywine Global, Verisk Maplecroft

In the above scatter diagram (see [Chart 4](#)), we isolate the cross-sectional relationship between a country’s CDS and its environmental score as calculated by Brandywine Global utilizing the Verisk Maplecroft database, the source for our ESG calculations. Our environmental risk calculation utilizes 22 environmental risk factors that include climate change exposure, carbon footprint, and GHG reduction progress. CDS is again the dependent variable in this analysis. The results conform with our expectation that environmental factors are significant to country credit risk. The fitted line has an obvious downward slope and the coefficient is negative, which indicates that a negative relationship exists between a country’s CDS and our calculated E score. On the positive side, a country with a high E score exhibits a lower credit risk. Other things being equal, this lowered credit risk should be positively reflected in a country’s cost of financing its debt and, potentially, be positively reflected in its sovereign bond credit rating. Finally, the R^2 is 29%, indicating the E score explains about 30% of the variance in the CDS, a more than adequate result for cross-sectional data.

We can draw similar conclusions for both G and S, which have coefficients of determination that are a bit higher than those for E. For us, overall ESG scores as well as individual factor scores can provide partial explanations for a number of relationships, including, but not limited to, credit risk.

Our belief is that the importance of the E factor will grow. The increased focus of clients, consultants, and investment managers on sustainable development has led to growing attention on the environment and a country’s stewardship of the environment. For example, the investment community has been near-unanimous in its criticism of Brazil and the deforestation of the Amazon rainforest. Countries, as part of the Paris Agreement, are committing to achieving net zero emissions by 2050. That goal is going to require aggressive reductions of fossil fuel usage to generate electricity. These efforts introduce transition risk, or the cost to transition to cleaner technologies, which may affect both short- and long-term economic growth.

Growing Pains: The Impact of Transition Risk

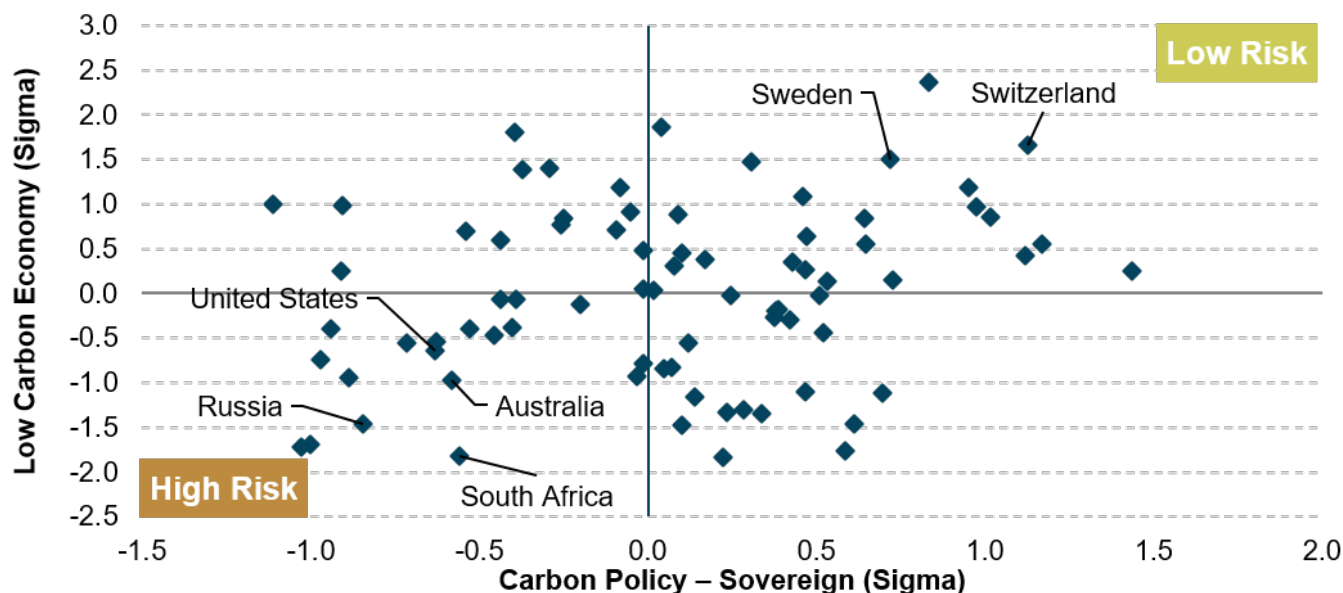
We noted earlier our belief that environmental risks are not fully reflected in asset prices as their impact occurs over longer periods of time. When evaluating environmental risk, we conduct analyses like the one above but also look at a country's carbon footprint based on its carbon dioxide (CO₂) production as a percent of gross domestic product (GDP); a country's physical risk; and, a country's transition risk. Physical costs are those that occur if a country continues along its current path. The physical costs would reflect a country's inability or unwillingness to reduce its GHG, subjecting the economy to continued warming temperatures, extreme climate events, and economic losses. On the other hand, transition risk assesses the cost of moving to a net-zero world.

We address briefly the transition risk. Governments would have to create a portfolio of policies during the transition to a low-carbon future that drive the economy's productive capacity away from fossil fuel and toward renewable sources of energy. Economically, the cost of polluting has to rise relative to the cost of shifting to new, cleaner technologies. Right now, globally, over 60% of the electricity produced comes from fossil fuels, while just 26% comes from renewables. How does a government compensate the economic losses that occur during the transition? Is there a willingness to sacrifice a short-term hit to economic activity and employment for longer-term gains? For sovereign bond investors like Brandywine Global, we want to identify countries at high and low risk from this energy transition. To do this identification, we evaluate a country's progress toward a low-carbon economy, allowing us to discern the country's movement toward energy efficiency. Next, we compare the low-carbon progress with the country's carbon policy, using Verisk Maplecroft's Carbon Policy Index. This index measures how well countries are implementing their GHG reduction policies. Our "model" results are depicted in the chart below (see [Chart 5](#)).

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Measuring Transition Risk (Cost)

Standard Deviation, As of 6/22/2021



Source: Brandywine Global, Verisk Maplecroft

Progress to a low-carbon economy is measured on the y-axis while carbon policy is measured across the x-axis. Low scores would indicate a higher risk, i.e., less progress, as measured by high CO₂ to GDP and possible more intense utilization of fossil fuel. The countries that reside in upper right quadrant would be those with lower transition costs. In this quadrant we would find countries like Norway, Sweden, and Switzerland. The lower left quadrant would be populated by high-risk countries expected to experience higher transition costs in the movement to a net-zero world. The countries in this quadrant would have a high transition risk in terms of both the move to a low-carbon state and in their policies to reach their emission goals. Countries to be highlighted are: Australia, Russia, South Africa, and the U.S. These are countries that could face economic

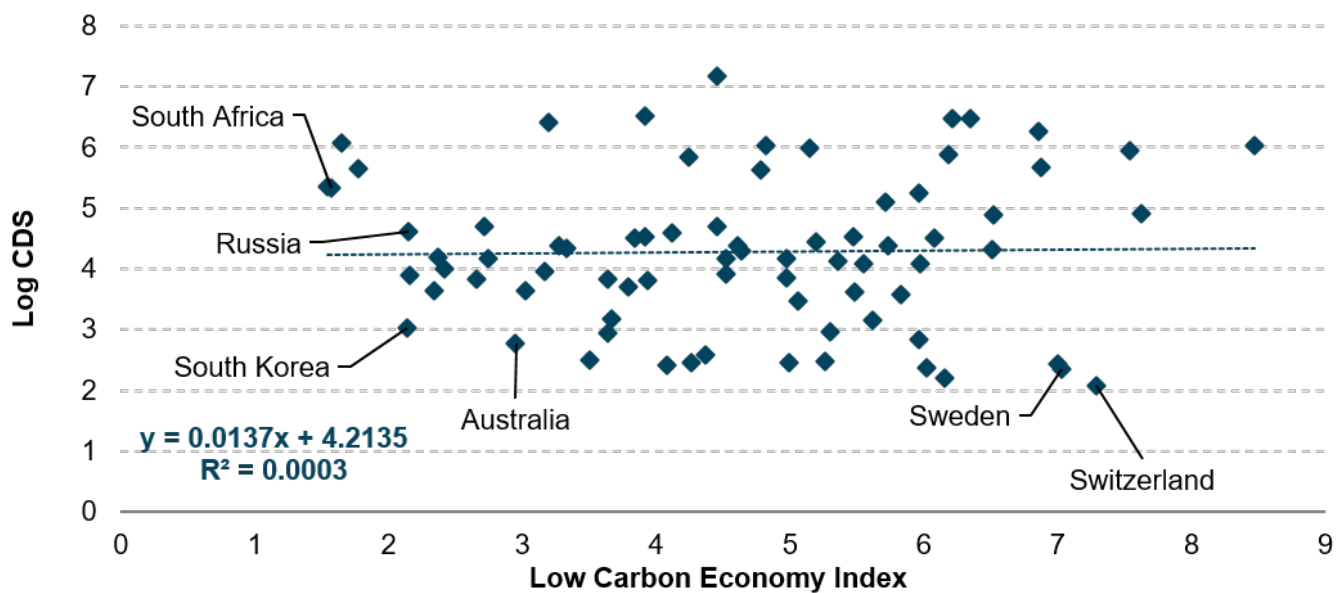
disruption in the transition. Furthermore, they still require aggressive policy actions that may include carbon pricing, renewables subsidies, and income transfers. Fiscal policy is likely to become stimulative to support a policy package to facilitate the road to net zero.

Australia is worth highlighting. It scores poorly in CO2 emissions from energy use and progress to a low-carbon economy compared to its developed country peers. Australia's GHG targets have been labeled "modest," and it abandoned its carbon-pricing mechanism in 2014, despite the importance of a carbon tax to reduce its GHG. Surprisingly, the country appears to be eschewing renewable sources of energy and targeting a gas-led recovery in an apparent move to pursue short-term economic growth in the post-COVID world. Australia could suffer reputation risk as its international peers pressure the country to adopt more stringent climate mitigation policies. In all, countries that find themselves in quadrant four could face rising costs of mitigation and a higher cost of issuing their debt.

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World: Transition Cost

ESG Score (0=extreme risk; 10=low risk), As of 6/22/2021



Source: Brandywine Global, Verisk Maplecroft

Lastly, we explore the relationship between transition risk, measured by Maplecroft's Low Carbon Economy Index. We believe more carbon-intensive economic activities will face higher costs and could experience reduced investment opportunities. Higher inflation might result. We created the above scatter plot with the Low Carbon Economy Index on the x-axis and the CDS on the y-axis (see [Chart 6](#)). As in other analyses, we are looking for the explanatory power of the Low Carbon Economy Index. However, we see little evidence, *i.e.*, the correlation is weak, of how transition risk affects a country's CDS. Admittedly, we do not observe a strong relationship. We do note that countries like Australia, China, South Africa, and South Korea face high transition costs but the influence on the CDS is low. Sweden and Switzerland are at the other end of the low-carbon spectrum. We are not deterred by this result. Instead, we believe that environmental risk is not priced into the CDS and there may be a different effect on developing versus developed countries.

Conclusions

1. Brandywine Global has developed a systematic ESG process that is well integrated in sovereign bond analysis. That process continues to evolve, and the research has led to fascinating insights into the importance of ESG in sovereign investment analysis. One of those insights was the significance of

Brandywine Global's ESG score in "explaining" a country's credit risk.

2. The ESG team at Brandywine Global recognizes the growing importance of E to investment analysis. The effect of global warming due to GHG emissions on a country's economy has been well documented. GHG emissions have been blamed for extreme weather events, rising sea levels, droughts, floods, and reduced economic growth for some countries. Extreme weather has caused billions of dollars of damage, only some of which is insured. Climate risk is a financial risk, according to central bankers.
3. Our E score appears to partially explain the variance of a country's CDS. Its explanatory power is not limited to credit risk but includes other financial indicators, like interest rates and bond spreads.
4. E has also garnered the attention of many countries, particularly those that have become signatories to the Paris Agreement. The agreement requires countries to take action to achieve climate goals with the primary aim of attaining net-zero emissions. Success could mean major overhauls of how goods are produced in an economy. Some countries could incur significant costs in the transition to a low-carbon economy. We discovered there are several countries that likely will incur significant costs in the transition. Australia is one country we identified. Our analysis of transition risk and its impact on CDS yielded a disappointing result, but we think this finding simply means the costs of transition are not yet reflected in CDS.
5. This overview only scratched the surface. Many topics remain to be explored. Future articles will address physical risk and the effect on growth, productivity, income inequality, food security, water stress, and foreign direct investment.

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