

Dealing with income bias in sovereign ESG scores

Sovereign ESG revisited

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Introduction

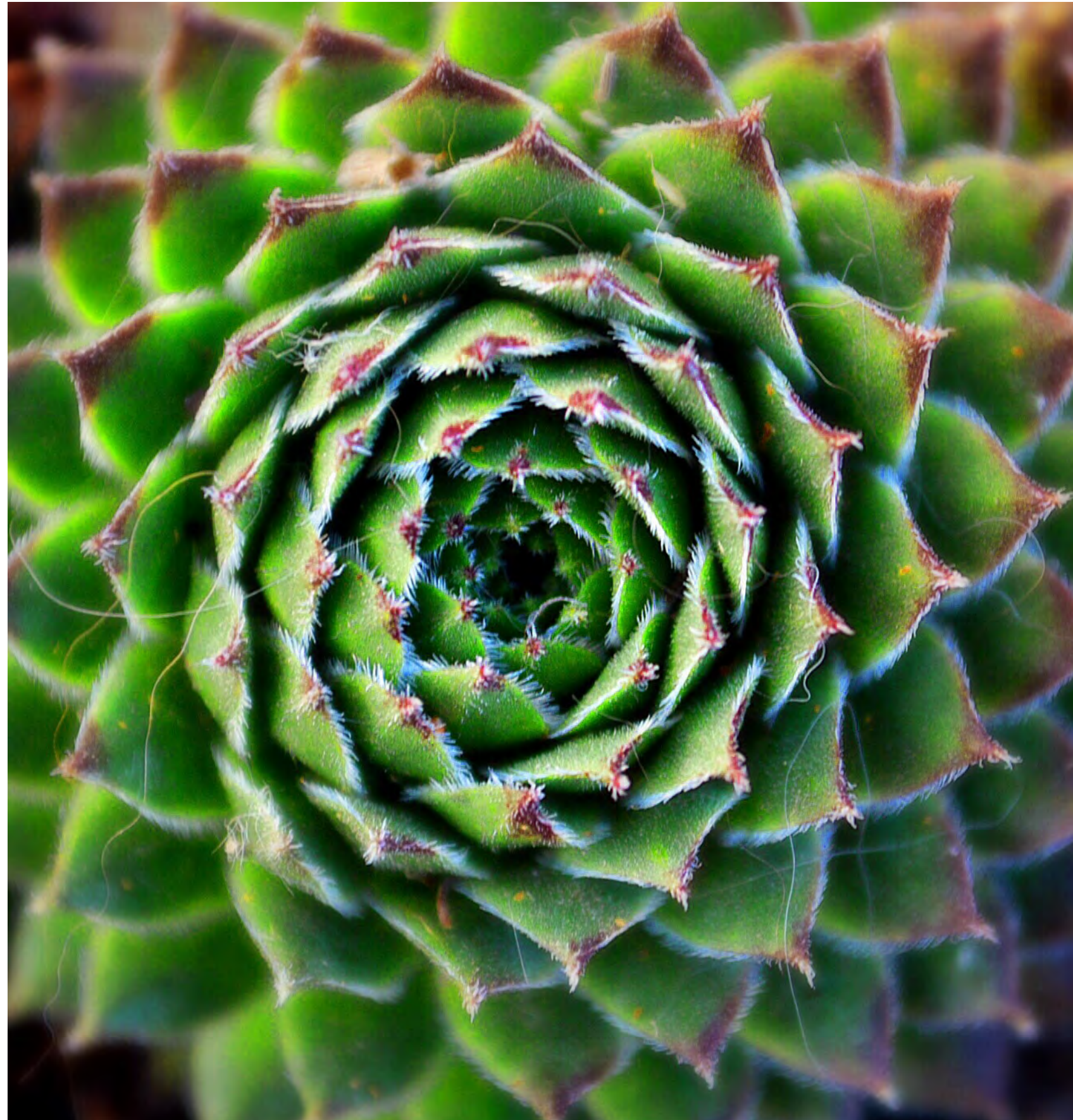
Although the use of sustainability metrics in sovereign fixed income markets is becoming more mainstream, there is a lack of consensus on how to appropriately assess countries' Environmental, Social and Governance (ESG) performance.

A particular challenge – highlighted by the World Bank and others – is how to address the income bias in ESG scores. In this report, we adjust the sovereign E, S and G scores for income bias using an *ex post* approach, enabling to differentiate between countries' ESG performance independently from their income level.

Using a simple statistical framework and our proprietary Sovereign Risk Monitor (SRM) methodology, we estimate a log-linear relationship between the income level of economies and their respective E, S and G performance assessment. Residuals are then used as income-adjusted sovereign E, S and G scores.

We find that:

- As expected, low-income economies score higher after removing income bias in each of the E, S and G pillars;
- The income bias is most pronounced for G scores, but is weaker for S and particularly E scores;
- The existing differences in ESG performance between high-income OECD and non-OECD countries are amplified after adjusting for income bias.



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The impact of income bias on ESG scores

The pace of ESG integration continues to accelerate and is increasingly spreading to all asset classes, including fixed income.

However, market participants still struggle to adapt ESG principles in sovereign fixed income investing. Their integration into sovereign bond investment analysis and decision making is currently neither systematic nor uniform. The lack of cohesion on how to incorporate ESG, but also the lack of guidelines defining it, result in a wide array of different approaches.

Moreover, the integration of ESG criteria tends to favor Advanced Economies (AEs) at the expense of low and middle-income countries such as the Emerging Markets and Developing Economies (EMDEs). For example, a recent World Bank study, *Demystifying Sovereign ESG*¹ finds a high correlation between sovereign ESG scores and economies' national income: 81% for aggregate ESG; 85% for the S pillar, 70% for the G pillar, and 51% for the E pillar.

The income bias could lead to unintended outcomes

The World Bank first coined this inherent bias as the Ingrained Income Bias³. This term refers to the bias that high-income countries (i.e., AEs) tend to have higher ESG scores than low and middle-income countries (i.e., EMDEs). While this outcome is not surprising, the ESG performance should not be biased² to this extent toward economic activity, and should include some measurements of underlying ESG risk and/or performance progress, like momentum.

Furthermore, the income bias could result in undesirable outcomes³. Tilting investment portfolios towards higher ESG scores could for example unintentionally reward AEs for their prosperity or lead to adverse policy incentives, i.e., ESG policy efforts in the short run are unlikely to affect a country's income level.

There are multiple ways of managing income bias in ESG scores. In this paper we focus on developing an *ex post* approach⁴ based on gross national income (GNI). Since we prefer to use pure income, rather than a production measure, we chose GNI per capita, which has proven to be a useful and easily available indicator that is closely correlated with non-monetary metrics such as life expectancy at birth, mortality rates of children, enrollment rates in school, etc.⁵

The income bias in charts

To better illustrate the income bias in sovereign ESG scores, we compared the average Sustainability Profile scores (i.e., ESG scores provided by our in-house developed Sovereign Risk Monitor model, see section 3.1) for 151 economies, by GNI per capita ranges of USD 2,000. The results are shown in Figure 1.

Countries can be usefully distinguished in four different groups. The first consists of economies that have a GNI per capita below USD 30,000. Within this group, we observe relatively low average ESG scores and an upward trajectory as the GNI per capita increases. The second group designates economies that have a GNI per capita between USD 30,000 and 60,000, and observe stable and high average ESG scores. The third group denotes economies that have a GNI per capita between USD 60,000 and 80,000, and includes mostly rich economies with reducing ESG scores. The fourth and last group refers to economies with a very high GNI per capita (greater than USD 80,000). Since this group is mainly made up of rentier Middle East economies, the average ESG scores are quite stable, but are globally lower than those of other AEs, e.g., Western economies.

We also find that the dispersion of ESG scores around the average (i.e., \pm one standard deviation) in each group is limited to around 10 points, making it difficult to differentiate between countries with similar income levels. The dispersion is almost null for economies with very high incomes due to the small number of economies involved.

1 Ekaterina M. Gratcheva, Teal Emery, and Dieter Wang. 2020. "Demystifying Sovereign ESG" EFI Insight-Finance. Washington, DC: World Bank.

2 See [ESG scores and beyond \(part 1/3\) - Factor control: isolating specific biases in ESG ratings | FTSE Russell](#) for more details on corporate sector ESG biases management.

3 *Ibid.*

4 An *ex ante* approach consists of dealing with income bias before building ESG scores, e.g., by separating economies by income group. See Table 1 in section 3.2 for more details on the different income groups provided by the World Bank Atlas method based on GNI per capita.

5 [Why use GNI per capita to classify economies into income groupings? – World Bank Data Help Desk.](#)

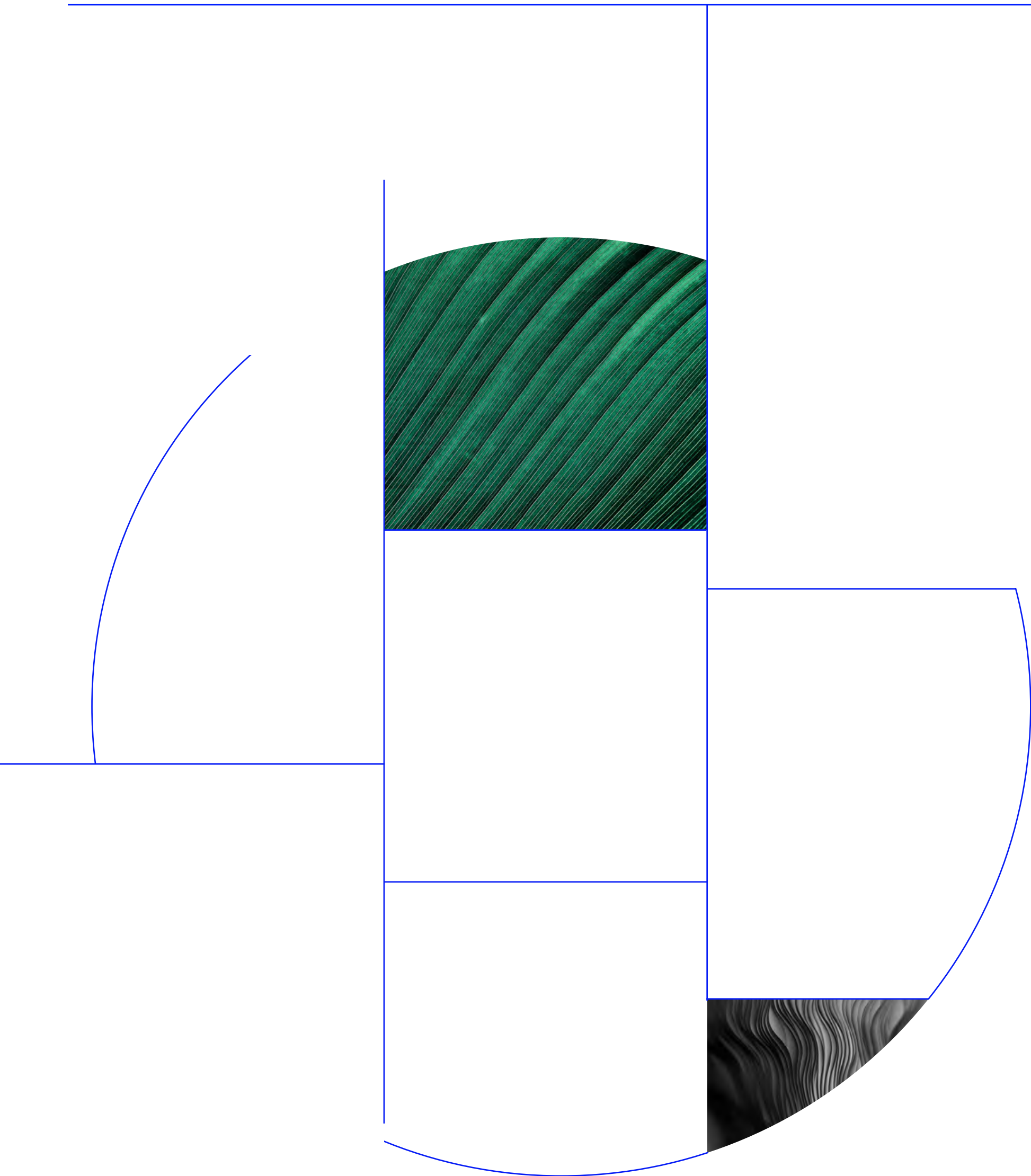
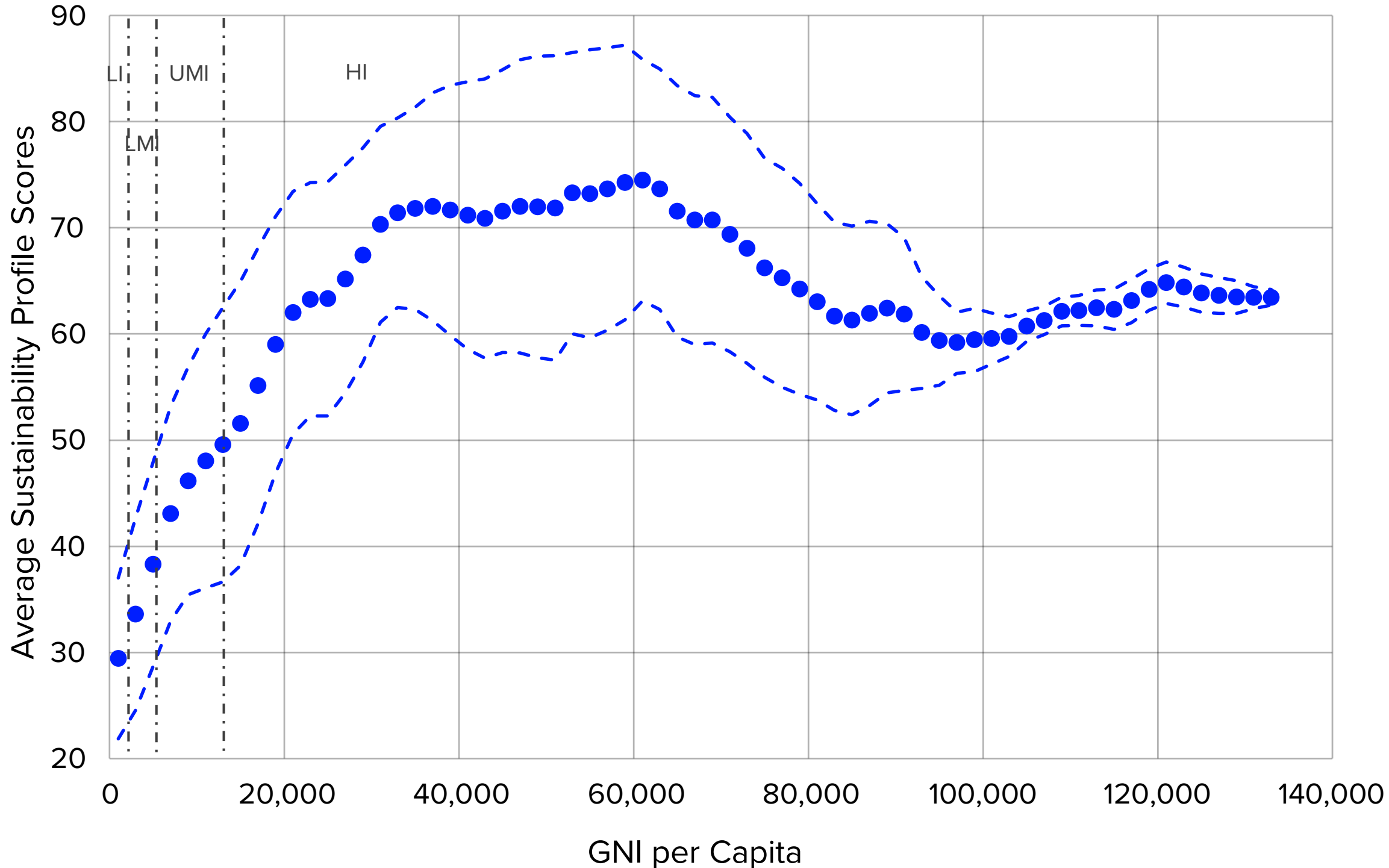


Figure 1. Average Sustainability Profile scores vs. GNI per capita



Source: Beyond Ratings, World Bank.
 Notes: Each dot denotes the average of the Sustainability Profile scores per ranges of USD 2,000 of GNI per capita on a quarterly basis, from Q4 1999 to Q3 2021 for 151 economies. Each dot is the result of a smoothing equivalent to the moving average over three ranges of USD 2,000 GNI per capita. For example, for the USD 10,000 to 12,000 range, we average the Sustainability Profile scores for each of the three ranges of USD 8,000 to 10,000, USD 10,000 to 12,000 and USD 12,000 to 14,000. Then we calculate the average of these three ranges. The dashed lines represent this same average ± one standard deviation. LI, LMI, UMI and HI denote low-income, lower middle-income, upper middle-income and high-income groups respectively.

Considering a simple way to manage the income bias in sovereign ESG scores

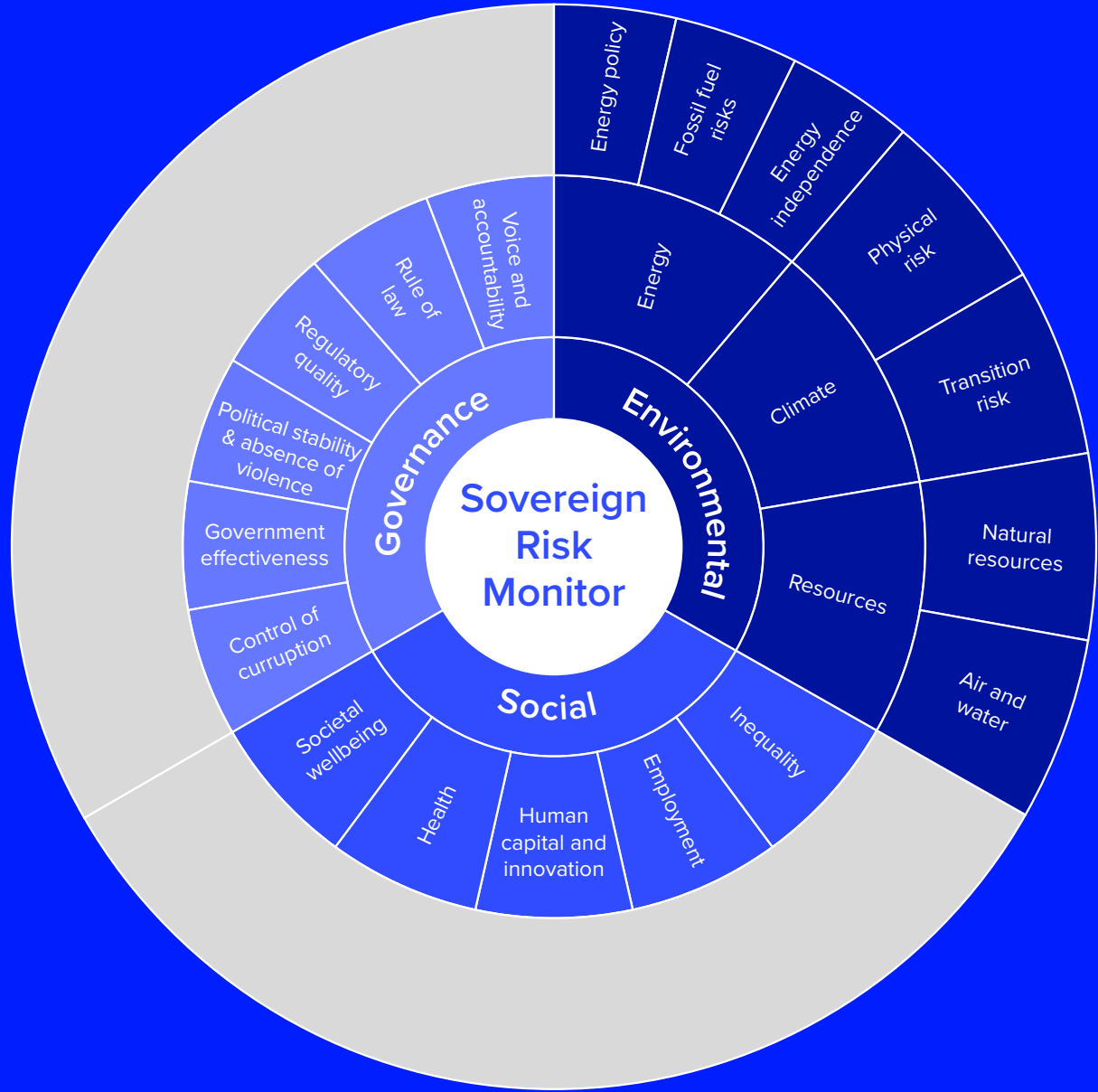
The Sovereign Risk Monitor (SRM) distinguishes between two income groups, AEs and EMDEs. This classification allows the model to account for some of the income bias *ex ante*. However, a large part of the income bias persists and can be removed with a simple econometric framework, using an *ex post* approach.

Box 1. Sovereign Risk Monitor

SRM⁶ was originally developed by Beyond Ratings as part of work leading to the granting of a financial credit rating agency license by the European Securities and Market Authority in March 2019⁷. The effectiveness of SRM in assessing the ESG risk of sovereigns has been highlighted by the World Bank^{8,9} and used to tilt the FTSE ESG Government Bond Index Series¹⁰.

6 For more information on SRM, please see [Sovereign Risk Monitor methodology | FTSE Russell](#).
 7 Subsequent to its acquisition by LSEG, Beyond Ratings renounced its CRA license in July 2019 and does not provide financial credit ratings.
 8 Gratcheva, E. M.; T. Emery and D. Wang. 2020. Demystifying Sovereign ESG. Equitable Growth, Finance and Institutions Insight; World Bank, Washington, DC: World Bank.
 9 Bouye, E and D. Menville. 2021. The Convergence of Sovereign Environmental, Social and Governance Ratings. Policy Research Working Paper; No. 9583. World Bank, Washington, DC: World Bank.
 10 Applying ESG Factors to Government Bond Indices – Toward More Sustainability, please see [Applying ESG Factor to Government Bond Indices | FTSE Russell](#).

Figure 2. From ESG to Sustainability



Source: Beyond Ratings.

SRM is a quantitative, relative and systematic approach, which is based on 69 indicators of 151 countries. Scores for each indicator are calculated on a quarterly basis, starting from 1999. Each of the 69 indicators is the outcome of several adjustments (mostly systematic), based on public, private and proprietary data. SRM relies on the quantitative assessment of two profiles characterizing sovereign creditworthiness: (i) the Economic and Financial profile, and (ii) the Sustainability profile. These two profiles are structured around seven pillars, which consist of several risk themes and their indicators.

The Sustainability Profile (see Figure 2), key for the analysis of the income bias, has three pillars: Environmental risk (E scores), Social risk (S scores) and Governance Risk (G scores). The final scores are based on 41 indicators, including a number of proprietary Beyond Ratings indicators.

In a first step, we classify countries in smaller income groups, which gives the model the ability to more accurately compare countries with their peers. We use the four income groups provided by the World Bank Atlas method: (i) low-income, (ii) lower middle-income, (iii) upper middle-income and (iv) high-income. However, to better distinguish between various high-income economies, we further divide this category into two new groups: one from the Organization for Economic Co-operation and Development (OECD)¹¹, and the other from high-income non-OECD members¹². We show in Table 1 how countries are classified based on GNI per capita in current USD.

Table 1. Adapted World Bank country classification based on GNI per capita (current USD)

Group		GNI per Capita (current USD)
Low-income		< 1,046
Lower middle-income		1,046 – 4,095
Upper middle-income		4,096 – 12,695
High-income	OECD*	> 12,695
	Non-OECD*	> 12,695

Source: World Bank Atlas method and *Beyond Ratings.

Notes: a) These figures are for fiscal year 2022 and based on 2020 GNI per capita. b) the thresholds used by the World Bank for its classification reflect diverse economic development stages, where the conditions to sustain public debt markets (taken into account for SRM) are not always met.

¹¹ OECD Members are the following countries: Austria, Australia, Belgium, Canada, Chile, Colombia, Costa Rica, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.

¹² The World Bank updates data for all OECD member countries classified as high-income as well as for the group formed by these economies. Please see [High income: OECD | Data \(worldbank.org\)](https://data.worldbank.org/High-income:OECD) for more details.

In a second step, we use a simple econometric framework to construct income-adjusted sovereign ESG scores. To neutralize information related to income bias from SRM's E, S and G scores, we use a univariate pooled ordinary least square (OLS) regression for 149 economies, on a quarterly basis, between Q4 1999 and Q2 2019.

We regress the response variables E, S and G from SRM on the explanatory variable that is the natural logarithm of the *GNI per capita* (at PPP in constant USD) for each economy *i* at time *t*. The three estimated equations are below:

$$E_{it} = \alpha_E + \beta_E * LN(GNI \text{ per capita}_{it}) + e_{it}$$

$$S_{it} = \alpha_S + \beta_S * LN(GNI \text{ per capita}_{it}) + s_{it}$$

$$G_{it} = \alpha_G + \beta_G * LN(GNI \text{ per capita}_{it}) + g_{it}$$

The results of these three estimates are in Table 2. All the coefficients are statistically significant and display the expected sign (i.e., the β should be positive). We can see that $\beta_G > \beta_S > \beta_E$, meaning that **the income bias plays a more important role for G scores, than for S and E**. The relative weakness of β_E is in line with the results of the World Bank regarding the lower overall correlation between income and Environmental Performance scores. Moreover, the R-Squared associated with the Social Performance model is higher than that of the other two models. This leads us to infer that the GNI per capita explains well the heterogeneity of Social Performance.

Table 2. Pooled ordinary least squares regression estimates

Variable	Environmental	Social	Governance
α	-3.16*** (0.50)	-54.41*** (0.71)	-115.51*** (1.34)
β	5.97*** (0.05)	11.12*** (0.08)	18.04*** (0.14)
Number of Observations	11,746	11,746	11,746
R-Squared	0.51	0.64	0.57

Source: Beyond Ratings.

Notes: The table presents the coefficient of the POLS $E_{it} = \alpha_e + \beta_e * LN(GNI\ per\ capita_{it}) + e_{it}$ for Environmental Performance pillar, $S_{it} = \alpha_s + \beta_s * LN(GNI\ per\ capita_{it}) + s_{it}$ for Social Performance pillar and $G_{it} = \alpha_g + \beta_g * LN(GNI\ per\ capita_{it}) + g_{it}$ for Governance Performance pillar. Standard errors are in parentheses. *, ** and *** denote statistical significance at the 10%, 5% and 1% level of confidence, respectively.

13 The residuals represent the portion unexplained by the income level of the initial E, S, and G scores. As such, this information appears to be important for the in-depth assessment of sovereign ESG performance. Indeed, the residuals allow a better understanding of the sustainability of a sovereign with respect to its level of income versus its peers.

14 For a variable denoted X_{it} for economy i at date t , $z\text{-score}_{X_{it}} = \frac{X_{it} - \bar{X}_t}{\sigma_{X_t}}$ with $\bar{X}_t = n^{-1} \sum_{j=1}^n X_{jt}$ and $\sigma_{X_t} = \sqrt{(n-1)^{-1} \sum_{j=1}^n (X_{jt} - \bar{X}_t)^2}$.

15 The cumulative distribution function of a standard normal distribution provides a value between 0 and 1 for a given z-score. This value is then multiplied by 100 for display purposes.

16 In the initial version of SRM, the weights are 30% for the Environmental Performance, 30% for the Social Performance and 40% for the Governance Performance. However, other weighting sets can be used *in fine*, notably to better fit different investment horizons.

We then retrieve the residuals¹³ from these three regressions (e_{it} , s_{it} and g_{it}) which represent the share of the initial E, S, and G scores that is not explained by the income level to calculate the income-adjusted sovereign E, S and G scores. To do this, we transform these residuals into z-scores¹⁴ for each score and economy on a quarterly basis. Then, the z-scores are transformed into continuous scores based on an interval, ranging from 0 to 100¹⁵, in accordance with the cumulative distribution function of a standard normal distribution – 0 representing the worst score, and 100 the best. Finally, we can aggregate the E, S, and G scores to calculate overall income-adjusted sovereign ESG scores¹⁶.

What do we learn from income-adjusted sovereign ESG scores?

We can interpret income-adjusted sovereign ESG scores as how well economies use their financial resources (here approximated by the GNI per capita) to improve their ESG characteristics or fulfill their Sustainable Development Goals. Specifically, we look at how well a country compares to peers with similar GNI per capita at each level of development¹⁷.

The income-adjusted sovereign ESG scores are more widespread

Figures 3, 4 and 5 show the distributions of income-adjusted sovereign E, S and G scores respectively, and by income group. The overall score distributions are much more dispersed than their initial unadjusted counterparts. By sorting the scores in descending order, and by income group, we can better identify the differences between countries within each income group. Moreover, and as expected, the income-adjusted rankings of economies within their income group are broadly in line with those of the same economies with the original E, S, and G scores (see next section for more comparisons).

Within the E pillar (see Figure 3), we find two main observations: (i) the distribution of scores decreases in a roughly linear fashion for the high-income OECD countries and the upper and lower middle-income groups, while (ii) it follows almost a decreasing exponential distribution for the high-income non-OECD countries and the low-income group, where environmental considerations may perhaps be less of a priority.

¹⁷ A recent World Bank study on economic and social rights sheds light on the interpretation of income adjustment: Wang, D., Gurhy, B., Gratcheva, E., Brook, A.-M., Randolph, S., and Clay, K. C. 2022, forthcoming. The Implications of Economic and Social Rights for Sovereign Debt Investing [EFI Note]. World Bank Group.

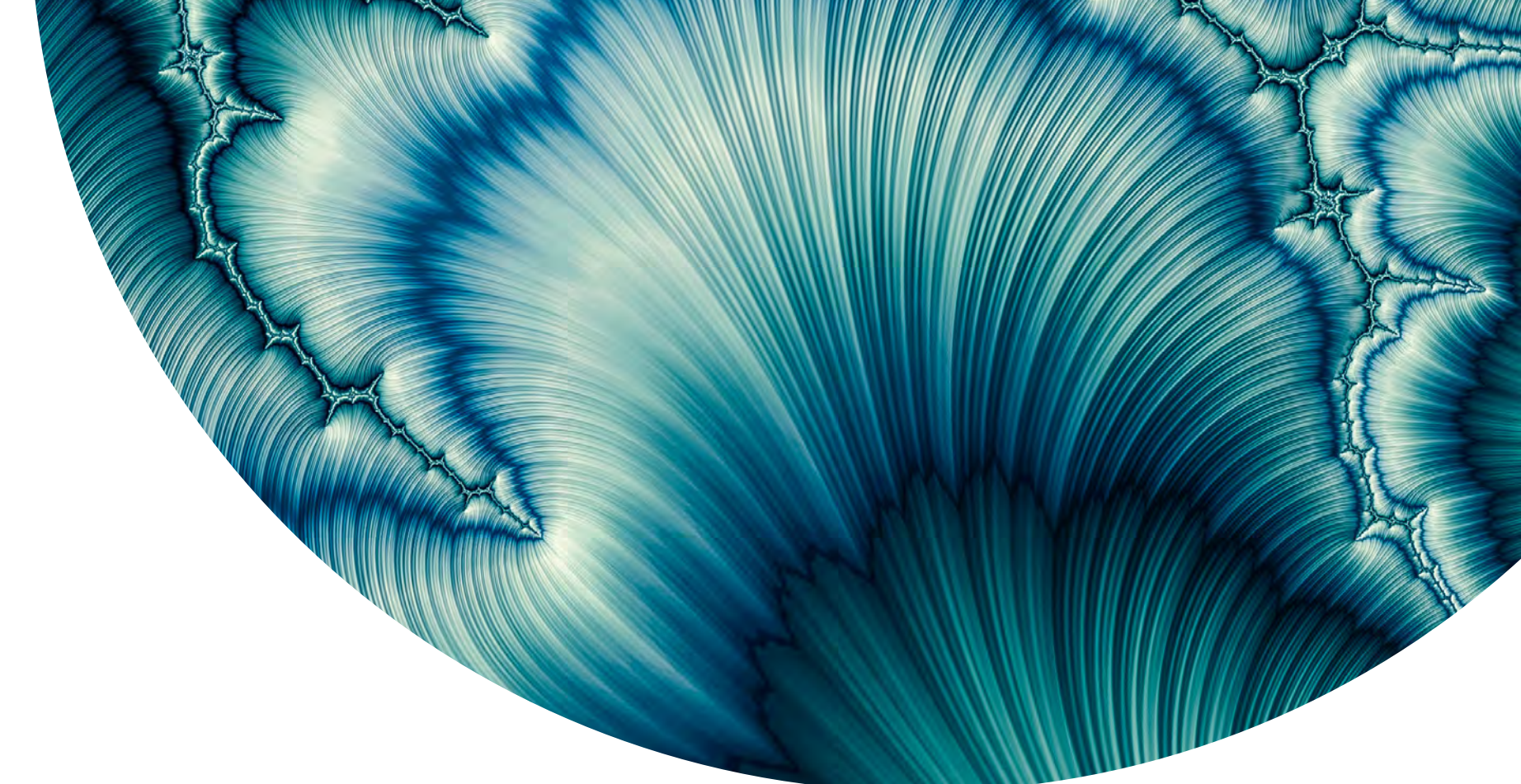
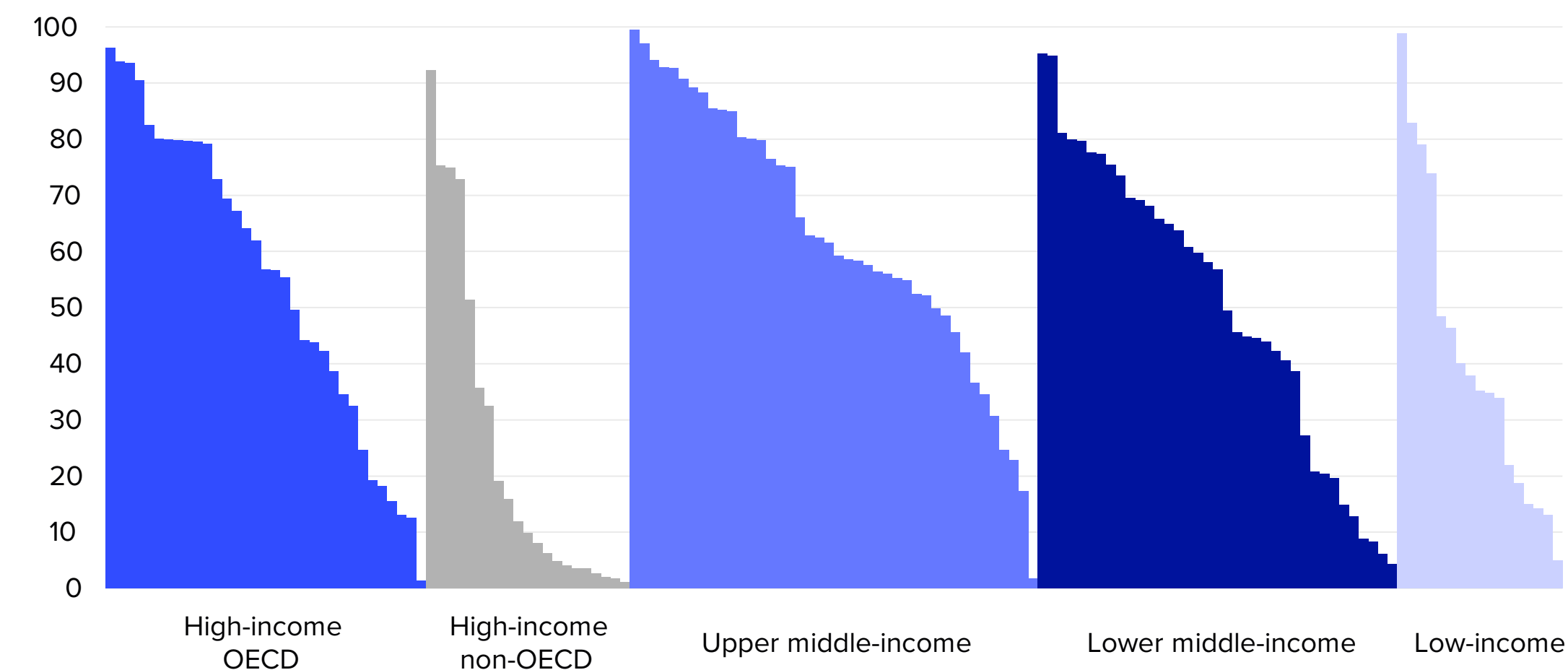


Figure 3. Income-adjusted E scores, Q4 2020

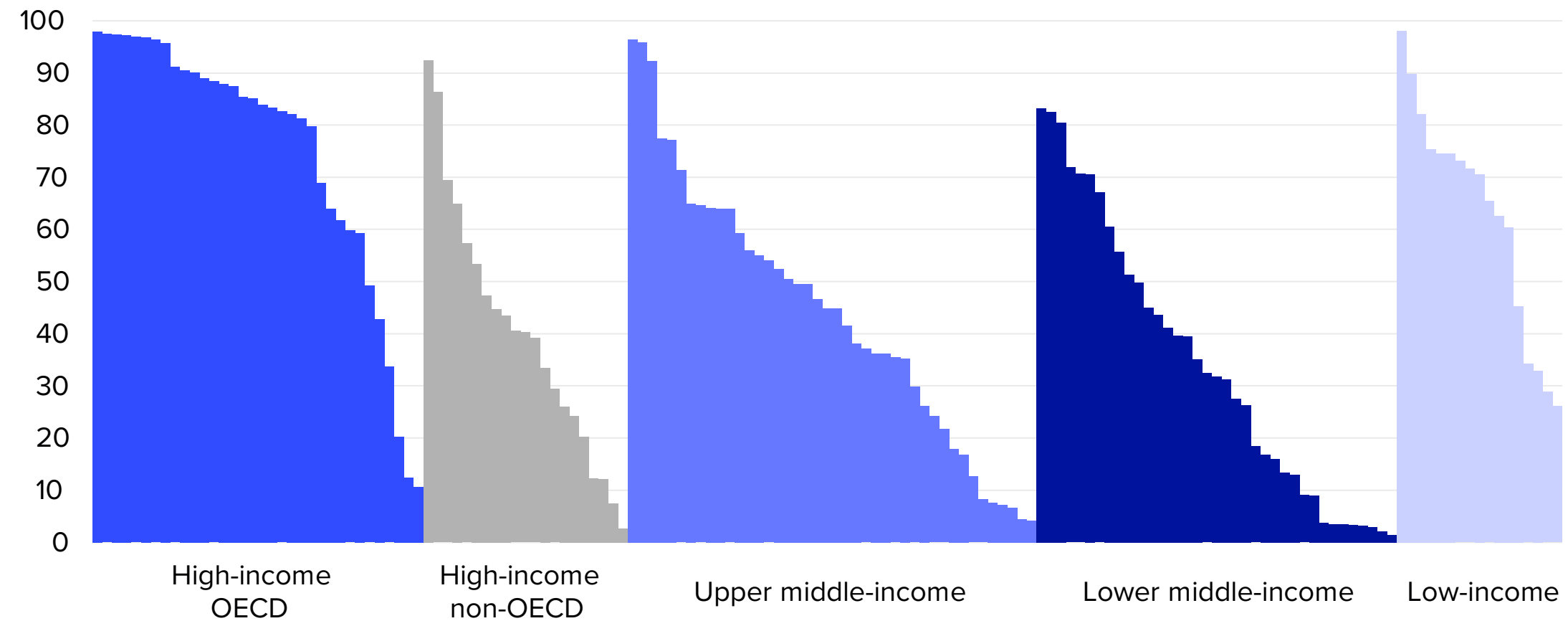


Source: Beyond Ratings.

Turning to the S pillar (see Figure 4), it appears that the distribution of scores shows little differentiation for the high-income OECD group, while the distribution decreases almost linearly for all the other income groups, suggesting that the Social risk and/or performance of an economy is not solely a matter of the level of economic development.

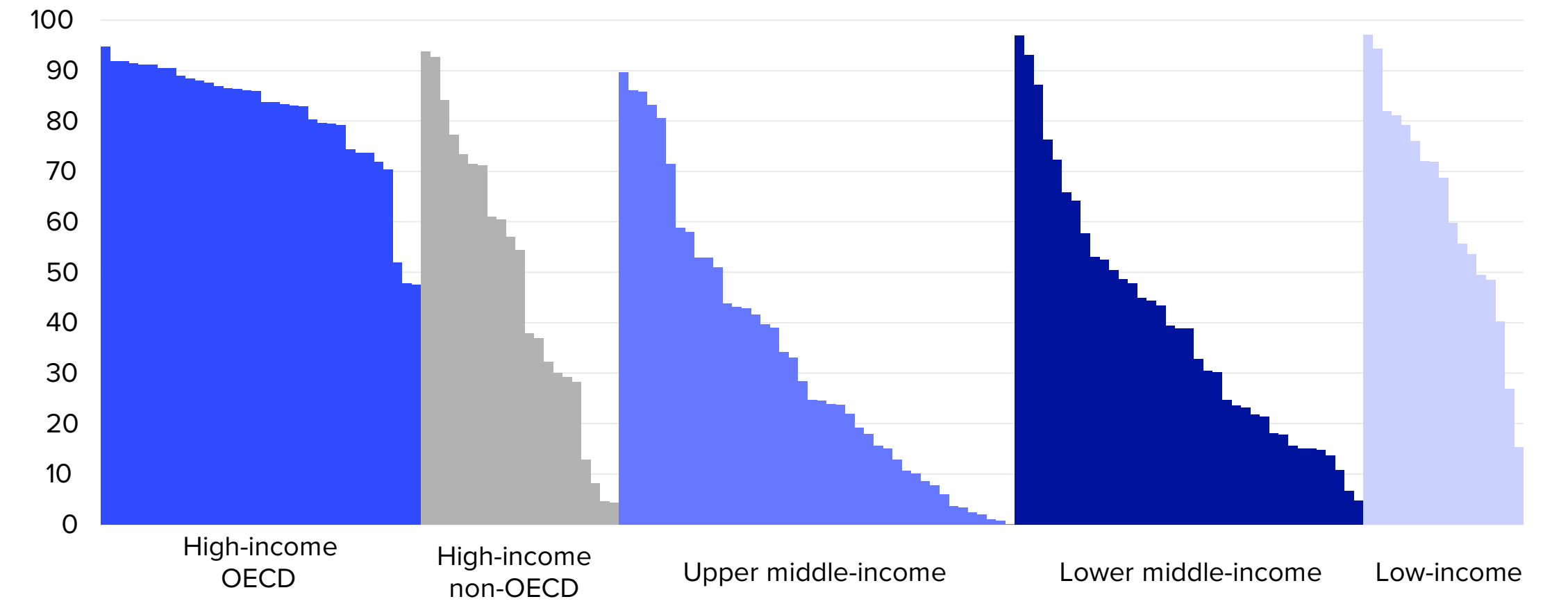
Lastly, for the G pillar (see Figure 5), the distribution of scores does not differentiate for High-income OECD economies as income-adjusted G scores are highly homogeneous. However, the distribution decreases almost linearly for all the other income groups. We can, therefore, better distinguish between EMDEs and assess Governance performance within, and between, income groups.

Figure 4. Income-adjusted S scores, Q4 2020



Source: Beyond Ratings.

Figure 5. Income-adjusted G scores, Q4 2020



Source: Beyond Ratings.

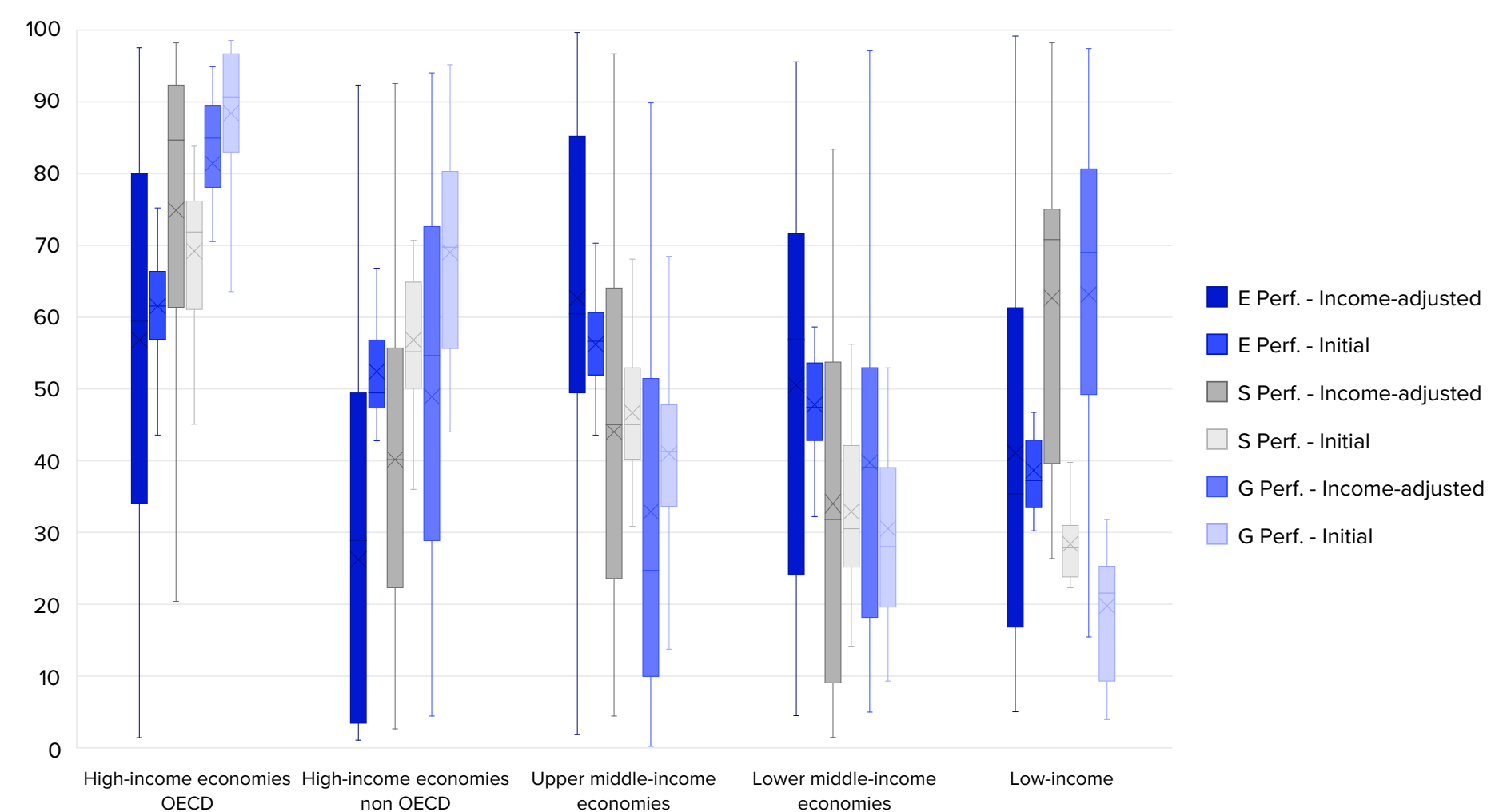


Comparison of initial and income-adjusted sovereign ESG scores

In order to compare E, S and G income-adjusted scores with their initial counterparts, we first explore the descriptive statistics, i.e., minimums, lower quartiles, medians, averages, upper quartiles and maximums, by income group. The analysis shows the following in Figure 6:

- Averages and medians of income-adjusted E, S and G scores are more heterogeneous and less correlated to income than those from the initial scores.
- Interquartile ranges Q1-Q3 of income-adjusted E, S and G scores are systematically higher than the initial scores.
- Dispersion ranges, i.e., difference between the maximum and minimum, of income-adjusted E scores are higher than for their S and G counterparts.

Figure 6. Box plot of E, S and G income-adjusted vs. initial scores, by income group, Q4 2020



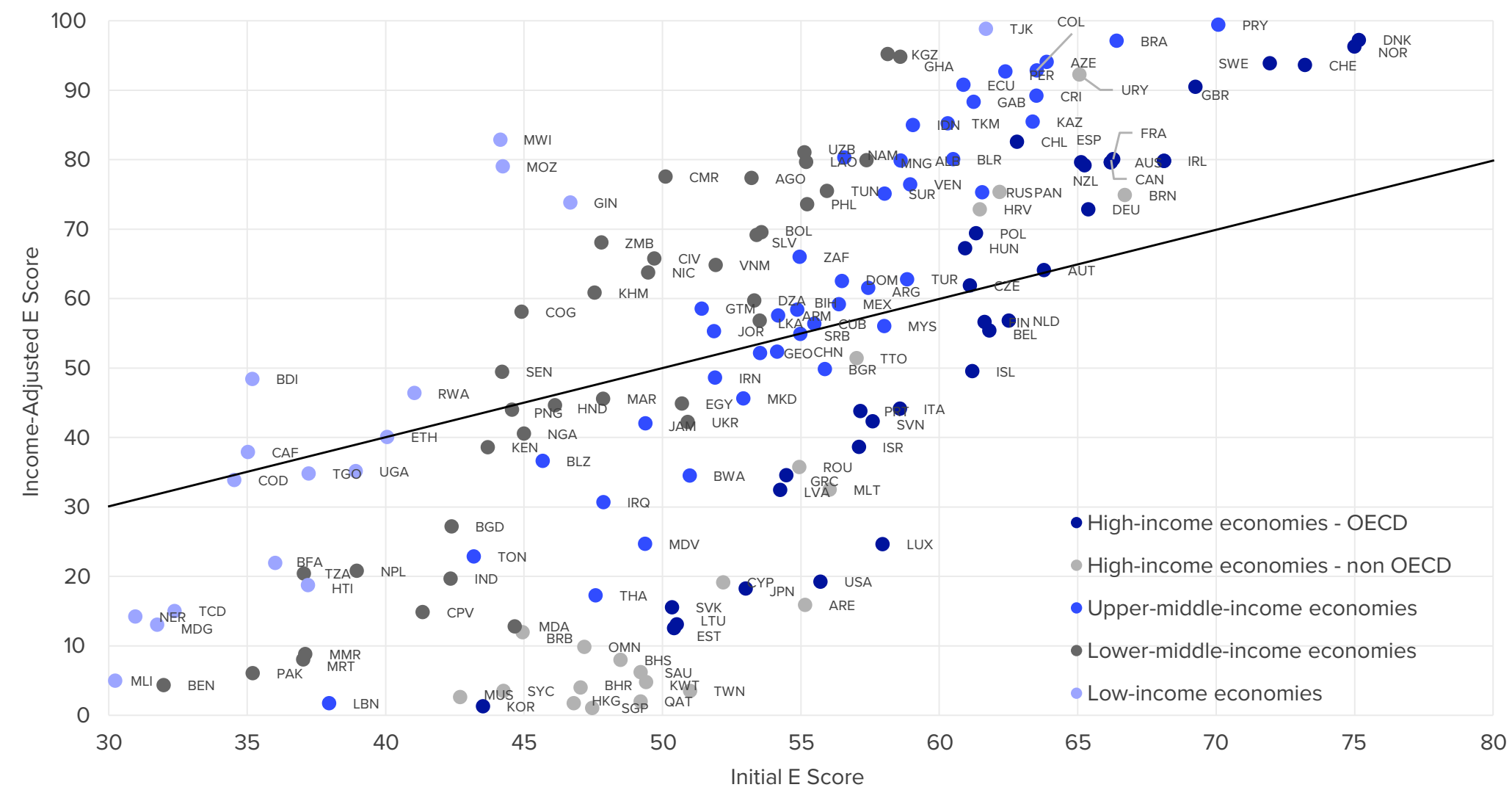
Source: Beyond Ratings

Notes: The box plot shows the descriptive statistics, i.e., minimums, lower quartiles (Q1), medians (represented by a horizontal line in the interquartile range Q1-Q3), averages (represented by a cross in the interquartile range Q1-Q3), upper quartiles (Q3) and maximums for income-adjusted and initial E, S and G scores, and by income group.

Globally, adjusting for income bias allows sovereign E, S and G scores to provide some degree of differentiation as the resulting scores are more heterogeneous, bringing more contrasts between countries. While the interquartile ranges of income-adjusted scores are relatively similar for E, S and G performance across income groups, it appears that the standard deviation gaps versus the original distributions vary widely. However, very large confidence intervals, after the income adjustment, should not hide the relatively strong inertia linked (i) to sovereign ESG features and (ii) to GNI per capita, which both evolve over the long term. As a result, sustainable asset allocation strategies should not be greatly impacted over time.

Figures 7, 8 and 9 show the scatter plot of income-adjusted sovereign E, S and G scores (y axis) vs initial sovereign E, S and G scores (x axis) respectively, and by income group. The rising straight line represents the first bisector, i.e., $y = x$. If an economy is above the first bisector, the income-adjusted E, S or G scores are higher than their initial respective counterparts, and *vice versa*.

Figure 7. E scores comparison, Q4 2020



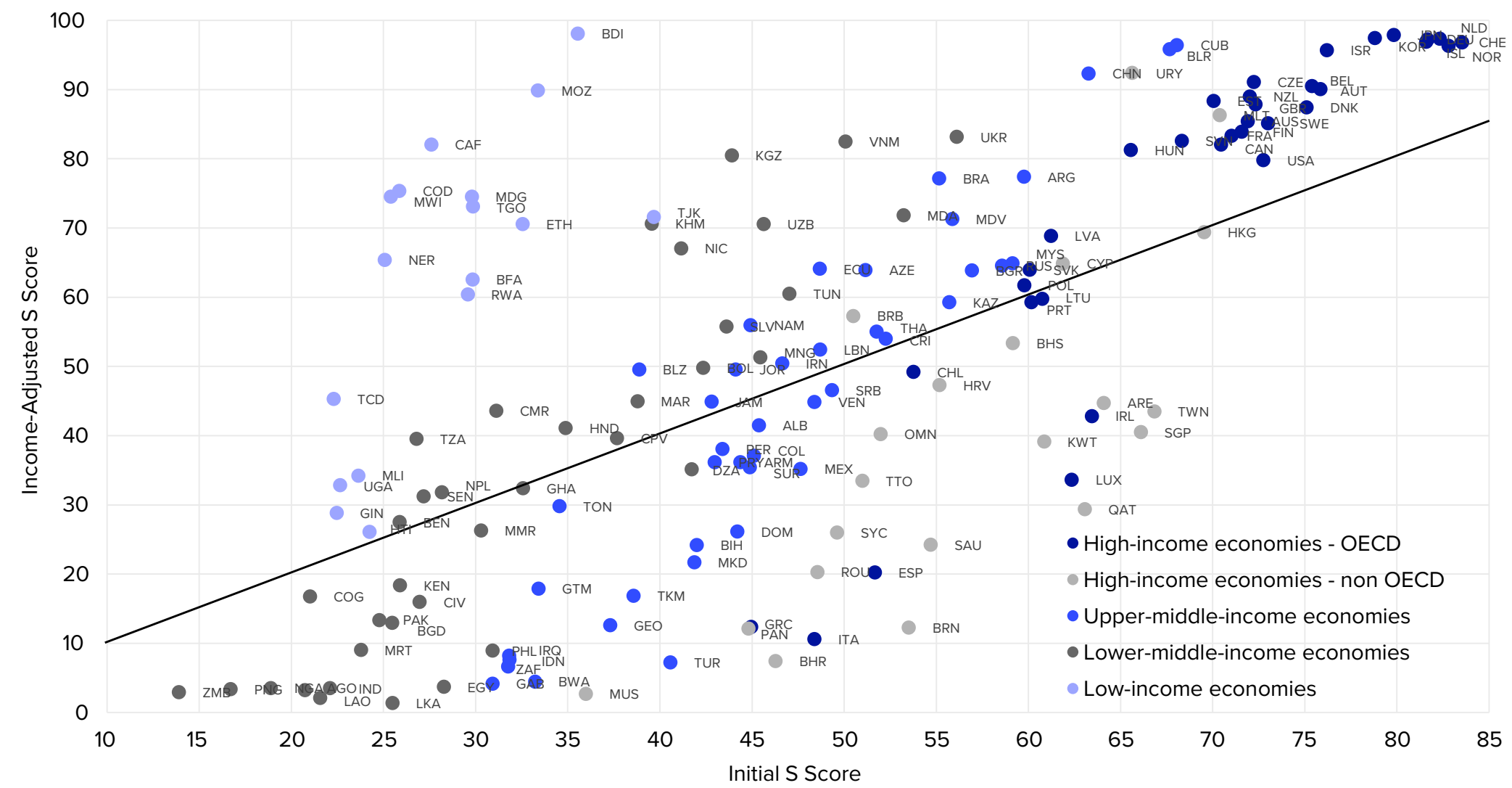
Source: Beyond Ratings.

Notes: The rising straight line represents the first bisector, i.e., $y = x$. If an economy is above the first bisector, the income-adjusted E score is higher than its initial counterpart, and *vice versa*.

As we can see in Figure 7, there is no income group that lies exclusively either above, or below, the first bisector. This is good news because, as expected, it demonstrates that the E risk and/or performance is not affected uniquely by the level of development. On the other hand, it appears that some economies in the high-income non-OECD and low-income groups tend to have lower income-adjusted E scores than their initial E scores. This finding reflects the sharpened consideration and assessment of environmental issues when adjusting for the income bias, e.g., the United Kingdom income-adjusted E score is in the same range as that of some Latin American countries such as Peru Colombia (around 90 over 100). Furthermore, high-income non-OECD countries tend to have very low scores.



Figure 8. S scores comparison, Q4 2020



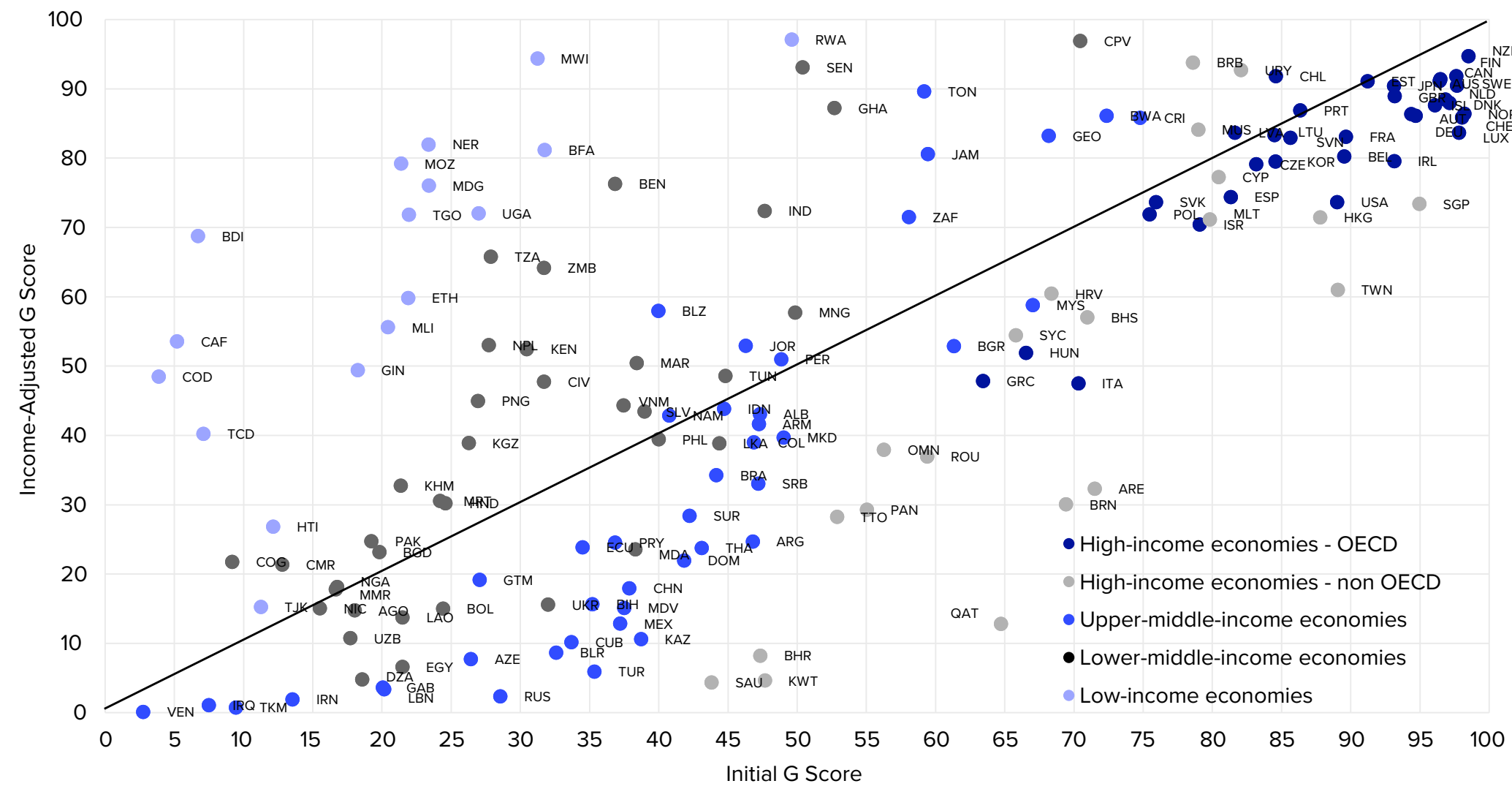
Source: Beyond Ratings.

Notes: The rising straight line represents the first bisector, i.e., $y = x$. If an economy is above the first bisector, the income-adjusted S score is higher than its initial counterpart, and vice versa.

For Figure 8, the low-income group and high-income OECD group lie almost exclusively above the first bisector, while the high-income non-OECD group lies almost exclusively below. For these three income groups, the adjustment of income bias leads to a very different assessment of S risk and/or performance. In other words, the S risk of high-income OECD and low-income groups are more favorably assessed when dealing with the income bias, rather than without, while the opposite is true for the high-income non-OECD group. The results for middle-income economies (i.e., upper and lower) are more balanced. Here, we see that the linear relationship put forward in this research may not be the most appropriate. Indeed, as discussed in *Demystifying Sovereign ESG*, this relationship may result in a U-shaped curve.



Figure 9. G scores comparison, Q4 2020



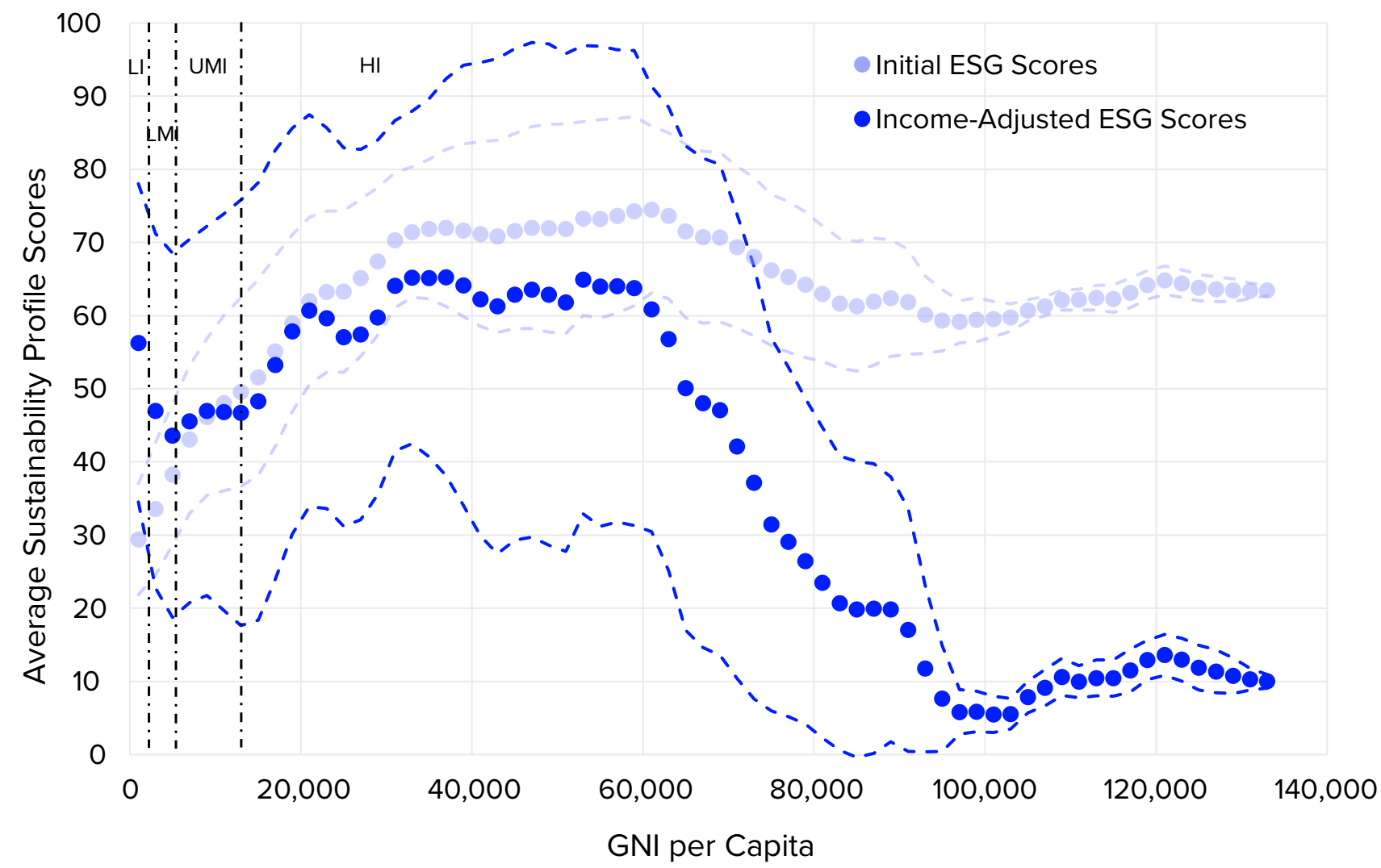
Source: Beyond Ratings.

Notes: The rising straight line represents the first bisector, i.e., $y = x$. If an economy is above the first bisector, the income-adjusted G score is higher than its initial counterpart, and vice versa.

Turning to Figure 9, the low-income group lies exclusively above the first bisector, meaning that the assessment of the performance risk and/or performance with the income-bias adjustment is much better than without. While the results for other income groups are more mixed, it appears that AEs, represented by the two high-income groups (i.e., OECD and non-OECD) have among the best income-adjusted G scores and are broadly in line with their initial counterparts. However, the rentier Middle East economies display significantly lower income-adjusted G scores, e.g., Saudi Arabia, Kuwait, Bahrain and Qatar have very low income-adjusted G scores (between 4 and 13 over 100).



Figure 10. Average income-adjusted Sustainability Profile scores vs. GNI per capita



Source: Beyond Ratings, World Bank.

Notes: Each dot denotes the average of the (income-adjusted) Sustainability Profile scores per ranges of USD 2,000 of GNI per capita on a quarterly basis, from Q4 1999 to Q3 2021 for 151 economies. Each dot is the result of a smoothing equivalent to the moving average over three ranges of USD 2,000 GNI per capita. For example, for the USD 10,000 to 12,000 range, we average the (income-adjusted) Sustainability Profile scores for each of the three ranges of USD 8,000 to 10,000, USD 10,000 to 12,000 and USD 12,000 to 14,000. Then we calculate the average of these three ranges. The dashed lines represent this same average \pm one standard deviation. LI, LMI, UMI and HI denote low-income, lower middle-income, upper middle-income and high-income groups respectively. Last, we add the income bias illustration from Figure 1 as a watermark for comparison.

Ultimately as can be seen in Figure 10, it appears that the average Sustainability Profile scores curve always has a concave shape once the income bias is corrected. However, this stylized fact hides significant disparities that *in fine* allow us to differentiate between sovereigns more clearly on their ESG policies and commitments regarding the expectations linked to their income level. The dispersion around the average (i.e., \pm one standard deviation) is more than twice as large after correcting for income bias. As an illustrative example of the right-hand side of Figure 10, we can cite the marked heterogeneity between countries such as Sweden, Singapore and Qatar, which with 2018 per capita GNIs of USD 71,510, USD 91,395 and USD 91,375 respectively, have very mixed E, S and G scores.



Conclusion

Through this study, we set up a simple statistical framework in which we estimate a log-linear relationship between the income level of an economy and its E, S and G risk assessments, using Beyond Ratings' Sovereign Risk Monitor methodology. As stated by the World Bank, the ingrained income bias exerts an exaggerated influence on sovereign ESG scores, and this study provides one possible approach to deal with the income bias ex post, using residuals from the regressions as income-adjusted sovereign E, S and G scores.

A first main result is that the income bias plays a more important role for G than for S scores. Turning to the E pillar, we demonstrate a lower overall correlation between income and E scores, meaning that the risk and/or performance is not solely affected by the level of development.

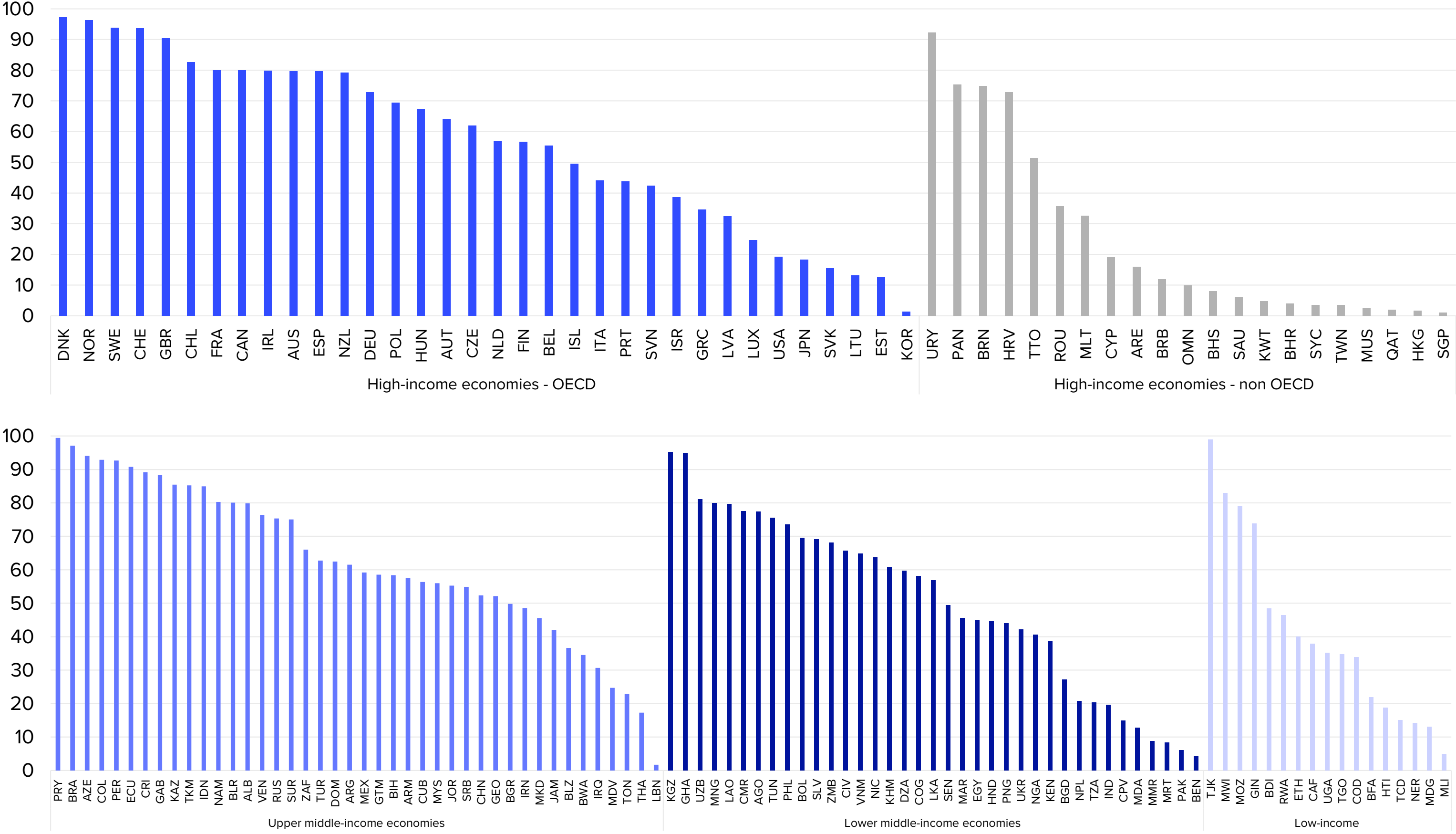
A second important result is that the dichotomy between high-income OECD and non-OECD economies is amplified after adjusting for the income bias, perhaps reflecting that most countries in the latter group can be characterized as rentier economies. These economies generate very high income from their rents, but have comparatively lower ESG considerations and commitments, both of which are noticeably reflected in the income-adjusted sovereign ESG scores.

A third finding is that low-income economies score significantly better after taking into account the income bias in the E, S and G pillars. This suggests that, despite lower income levels, some of these economies can establish strong adjusted ESG performance, in particular in the S and G pillars, which are important drivers of future economic prosperity.

By adjusting sovereign E, S and G scores for income bias, the findings can help to assess in more details differences between economies, based on their ESG risk and/or performance, and avoid unintended investment outcomes. Refinements such as the addition of income group fixed-effects could help to enhance our approach of the potentially non-linear relationship between income and ESG characteristics¹⁸. Further research is also needed to better understand how income-adjusted sovereign ESG scores could be used in a forward-looking assessment.

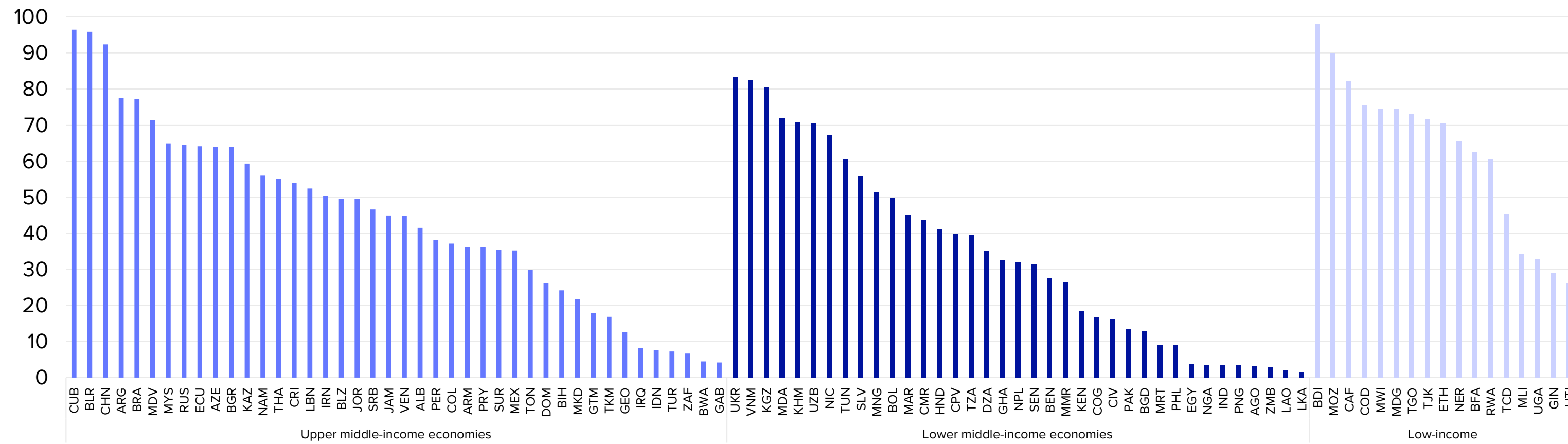
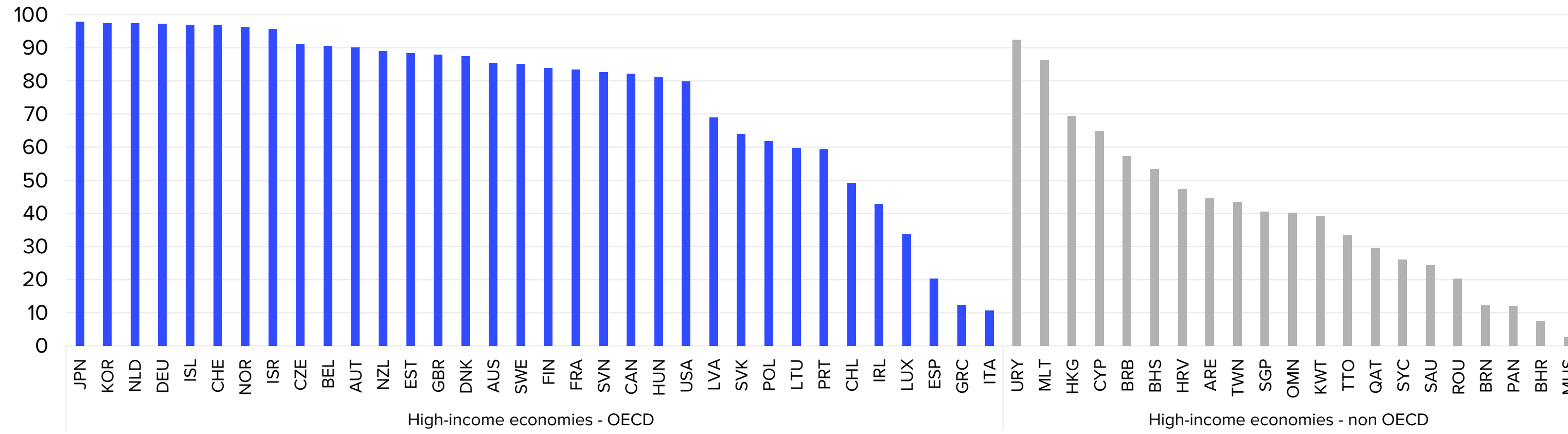
Appendix

Figure A-1. Income-adjusted Environmental Performance scores, Q4 2020



Source: Beyond Ratings.

Figure A-2. Income-adjusted Social Performance scores, Q4 2020



Source: Beyond Ratings.

Dealing with income bias in sovereign ESG scores

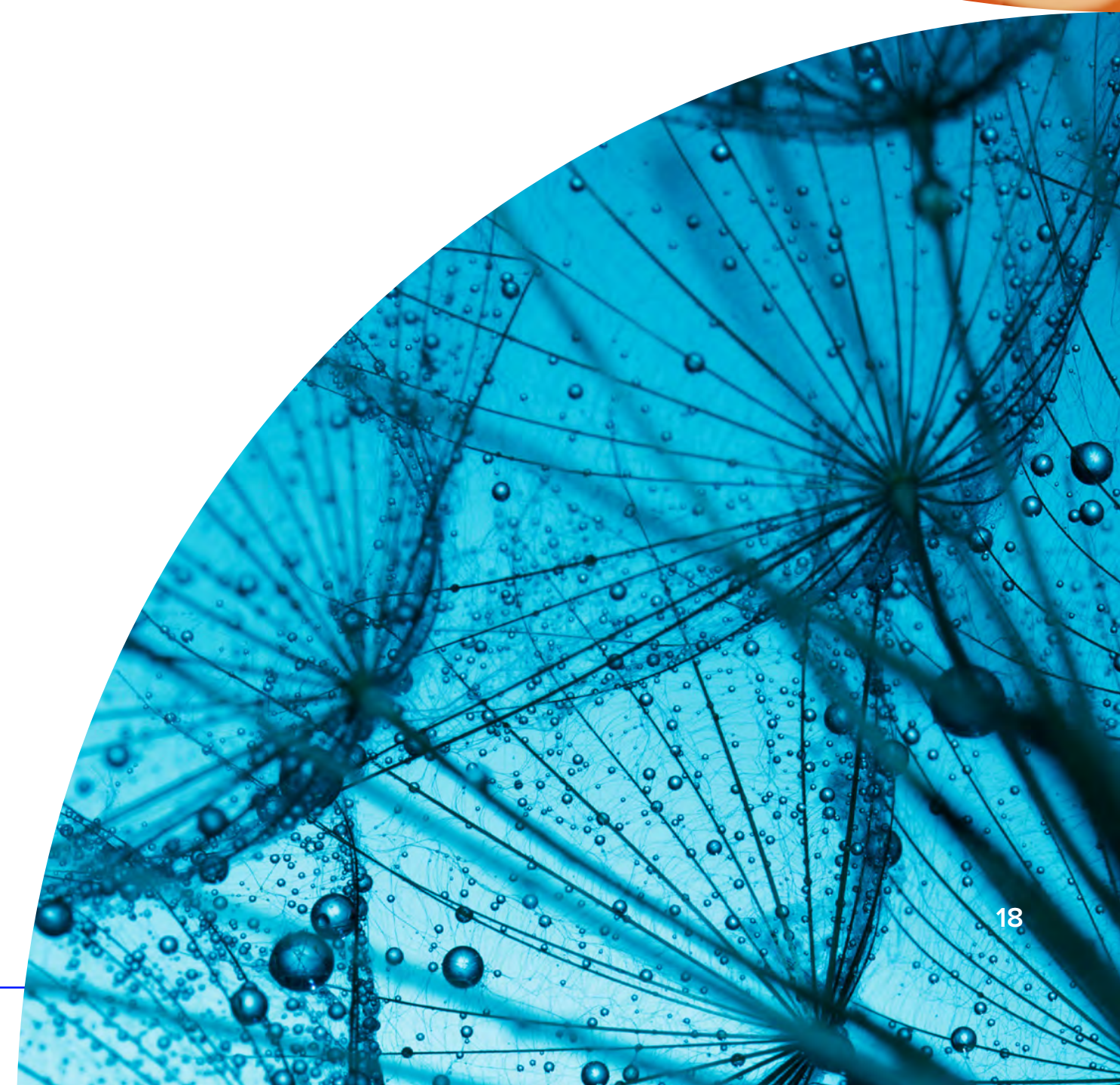
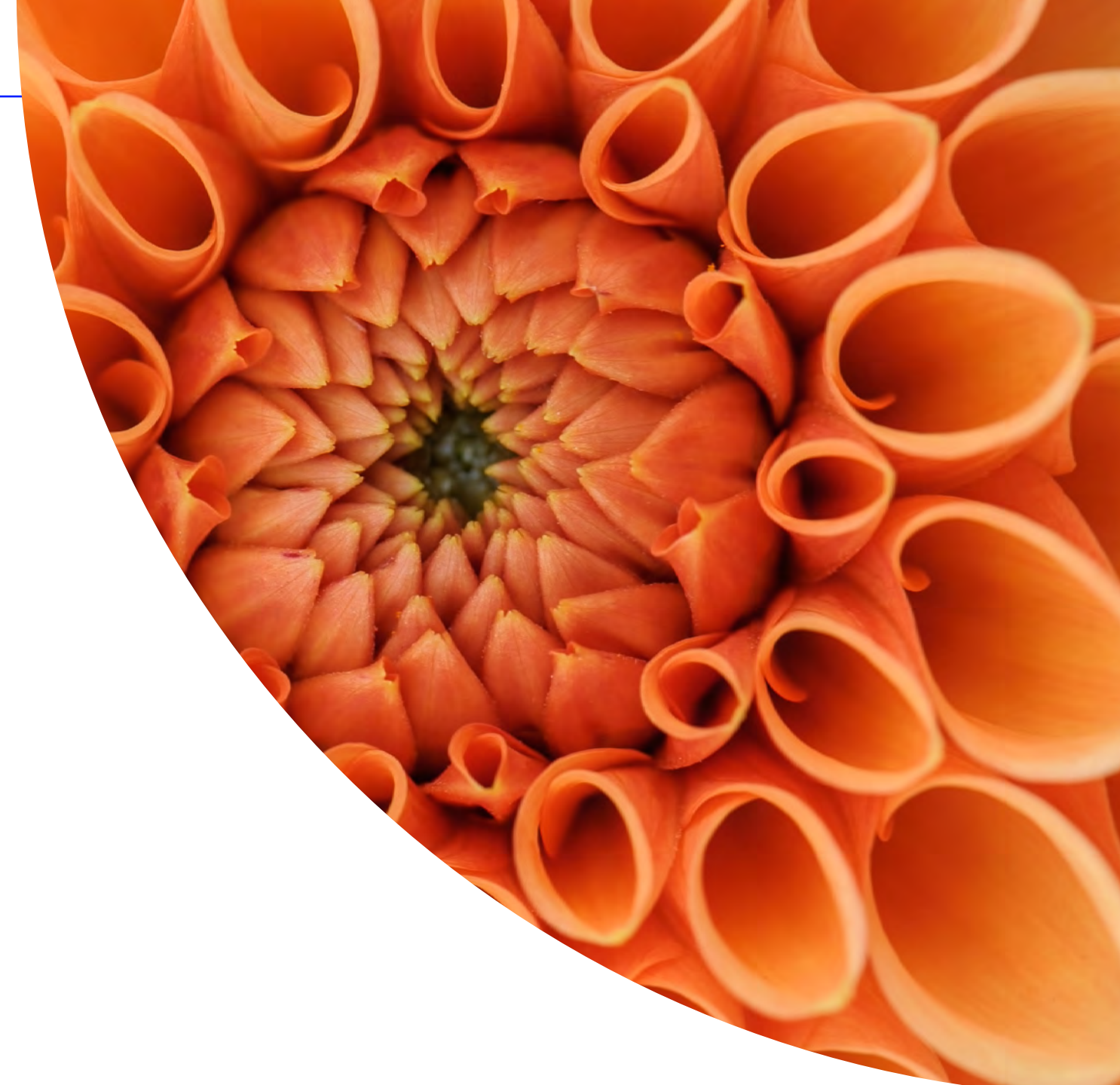
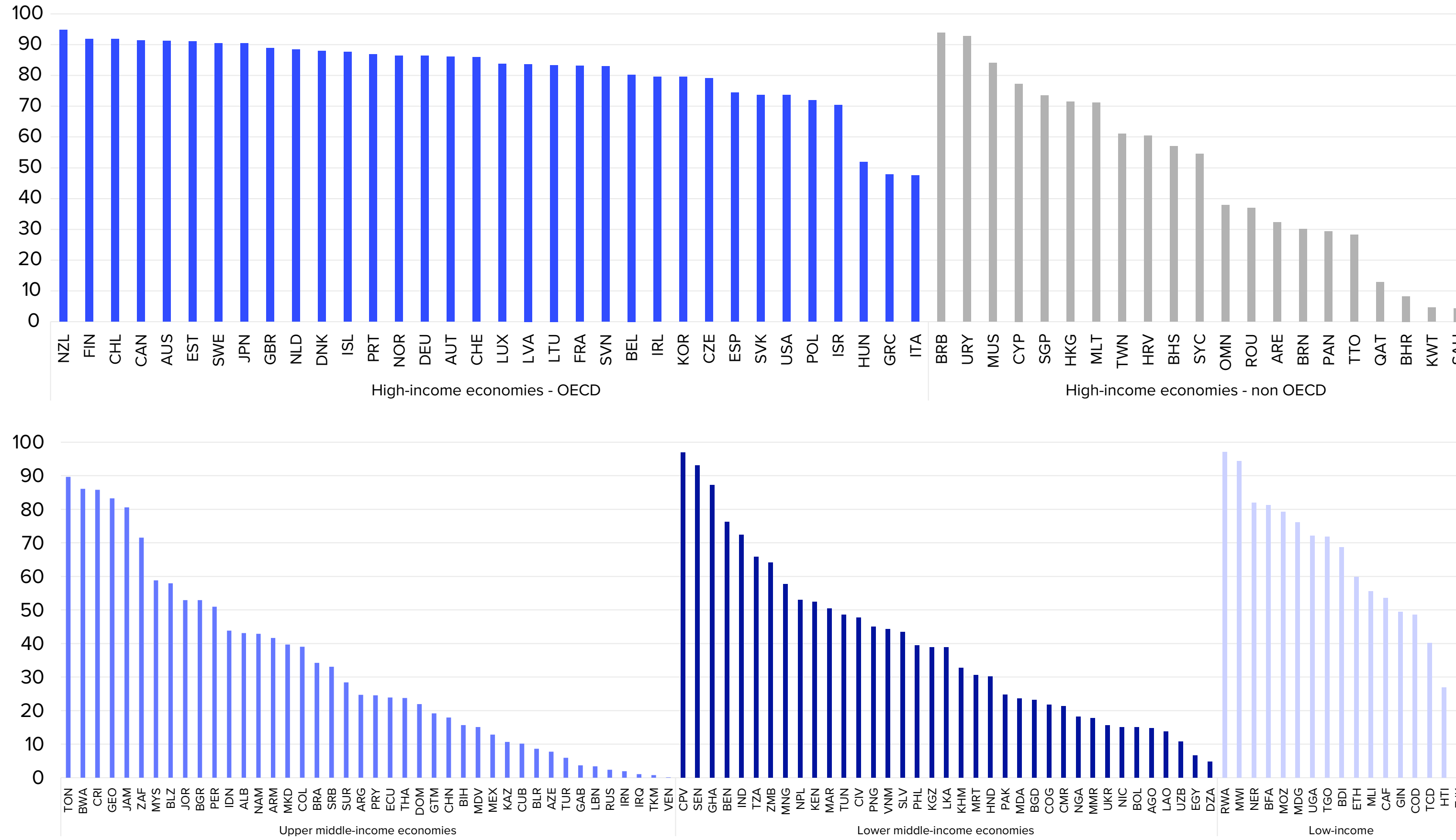


Figure A-3. Income-adjusted Governance Performance, Q4 2020



Source: Beyond Ratings.

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