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What’s in a name: The ESG edition

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1. Introduction

A few years ago, we wrote a paper that highlighted the similarities and (in particular) the differences in risk exposures between style factor ETFs with very similar sounding names. In this paper, our goal is to show how sustainability ETF exposures to a number of *sustainability-related* factors may vary in the same way. It is eminently clear to us that investors with a view about key sustainability features cannot rely on the fund name, but instead need to do more digging into whether their fund meets the required criteria. In addition, they may want to understand the range of exposures. For example, a fund may rank well when measured from a sustainability risk score perspective but may not see a significant reduction in carbon exposure. We also look at how funds achieve their sustainability exposures and determine if this is done through broad industry divestment or through stock selection. Lastly, we look at optimized frontiers to see what levels of exposures are possible for a given level of tracking error and industry divestment.

Our study covers a number of ESG/sustainability ETFs that invest in the US and Europe. It also builds on Qontigo's open architecture platform, which contains a wide range of sustainability metrics from ISS-ESG, Sustainalytics, Clarity AI, and the SDI AOP. A brief description of the metrics is given in Figure 23 in the Appendix.

We came away with three major conclusions from this study:

1) Most funds looked good on a variety of metrics (in other words, there was no glaring evidence of greenwashing).

2) Many funds achieved their scores by eliminating complete industries or sectors. We believe that this runs counter to the idea that better *company* behavior should be rewarded despite the nature of the industry.

3) Optimization can provide balanced exposure to a number of metrics, with lower risk and better diversification than can be achieved using a simple set of heuristics.

Our underlying premise is that the objective of any sustainable investment portfolio should be to encourage companies to start to "do better" and then continue to improve. Funds should be scrutinized to ensure they are meeting investor goals for sustainability, governance, etc., but should also provide a diversified set of exposures that reflect the economy from which the holdings are drawn.

2. Methodology

We started by analyzing the characteristics of a relevant set of ETFs with substantial assets under management. This set comprised funds investing in the US and Europe that had "ESG," "sustainability," "carbon reduction" or something similar in the fund name and fund constituents available as part of Axioma's off-the-shelf data products.

Many ETFs closely follow a benchmark specifically designed for them. This means that the tracking error relative to this index is so close to zero that comparing the ETF to it is meaningless for our purpose. Instead, we aimed to compare each ETF to an appropriate traditional cap-weighted benchmark, which is the true alternative for the investor in our view. For example, the comparison for a midcap value ESG ETF would be to a midcap value benchmark. We determined the most appropriate benchmark for each ETF by considering a candidate list of traditional benchmarks, based on the fund's investment region, and computing the predicted active risk for each ETF and candidate benchmark according to the appropriate regional factor risk model[1] over a three-month period in 2021. We then selected the benchmark with the lowest average predicted active risk for each ETF as the representative benchmark for the purposes of this paper.[2] The ETFs and their benchmark selections are shown in the Appendix (Figure 25). Please note that our conclusions should still hold even though the benchmark selected may not be the official "parent" benchmark.

Each fund was evaluated for its ESG exposures (using Sustainalytics and Clarity AI scores),[3] its exposure to the UN's Sustainable Development Goals (SDGs) according to the Sustainable Development Initiative Asset Owners Platform (SDI AOP) and Clarity AI, and a few of the numerous climate metrics produced by ISS-ESG. The latter include the Carbon Risk Rating, Total Climate Emissions Intensity, and progress toward the Science-Based Targets Initiative objectives (SBTis). All fund holdings and metrics were as of the end of 2021. The funds were anonymized, since our goal was to show general trends rather than to reward or punish any particular ETF.

3. Most funds improve the sustainability metrics relative to their benchmarks

We included 17 metrics in our ETF evaluation. Figure 1 shows the number of these for which the ETF in question ranked better than its benchmark. As can be seen, all funds ranked well on at least eight out of the 17 metrics, with at least two funds at 14 or more positive scores.

Figure 2 through Figure 10 show the computed active exposures to the sustainability factors. In some cases, the metrics have not been "normalized" in the same way as for style factors in our risk models. Instead, we give the active exposure as a percentage of the benchmark value because the distribution of values varies considerably among metrics. This permits comparison across metrics as to the degree of improvement compared to the benchmark. In other cases, we use traditional active exposures.

Low scores are preferred for some metrics, such as Climate Emissions Intensity and the ESG Risk Rating, while larger scores are preferred for other metrics such as the Carbon Risk Rating. To make the charts easier to read, we have colored the bars green in the case of scores going in the preferred direction and orange for scores going in the non-preferred direction. Bar charts showing total data without expressing a value judgement are colored blue.

Please note that the values for most metrics are green in the case of all funds. This is encouraging because it means that – despite ETFs being constructed off differing metrics and the low correlations between many metrics – the sustainability ETFs improved on their underlying cap-weighted benchmark across many dimensions. In other words, most had active exposures in the "right" direction to ESG scores and their underlying components (Figures 2 and 3), at least some of the Sustainable Development Goals (Figures 4–7) and carbon metrics (Figure 8).

A couple of notable exceptions to the improvement over the benchmark are for the ESG Risk Score Momentum (Figure 2) and SBTi (Figure 10) metrics. In both these cases, the ETFs are almost evenly split regarding whether or not they improve on their benchmark. In about half of the ETFs we studied, current holdings actually had worse ESG Risk Scores than a year earlier. The split in the SBTis metric implies that only about half of the ETFs are weighted more heavily towards SBTi-committed companies than their underlying

[1] The Axioma US4 Medium-horizon Fundamental Model for US funds and the Axioma EU4 Medium-horizon Fundamental Model for European funds.

[2] In some cases, an exception was made if the ETF had a specific benchmark in its name, in which case we used the index mentioned.

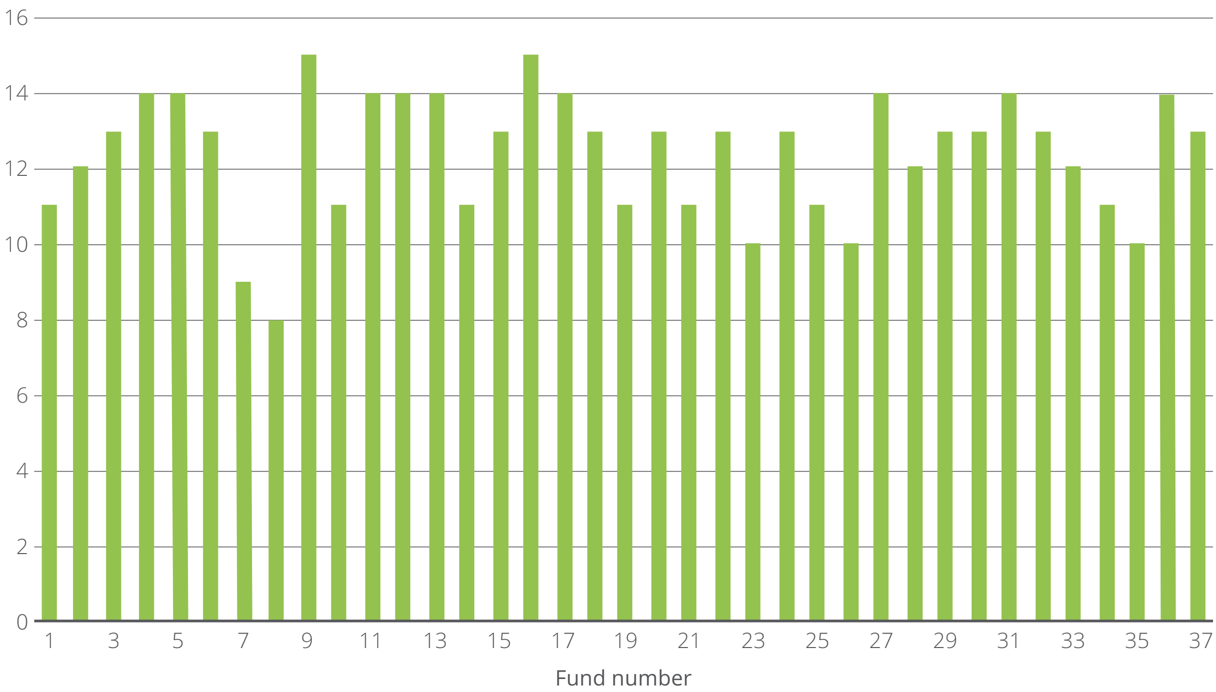
[3] See the Appendix for a detailed description of the metrics.

benchmark. We do not consider the SBTi and ESG Risk Score Momentum metrics to be related. However, the figures do indicate that those ETFs with non-preferred values for ESG Risk Score Momentum also have lower SBTi commitments.

We have also included box-and-whisker charts for the Sustainable Development Goals (Figure 5 and Figure 7). These tell us that some SDGs are "easier" to achieve than others, that funds do not outperform the index across all individual SDGs even if they do in the aggregate, and that US and European funds tend to have different areas of active improvement. Since the SDGs are a relatively new concept, achieving improvement in this dimension is probably not an explicit goal for any of the ETFs; as a result, seeing such positive exposures is a "bonus."

Lastly, Figure 8 reveals the magnitude of the active carbon metrics as a percentage of the benchmark values. The active exposure for Climate Emissions Intensity (ClimateTotalEmissionsIntUSD) is as low as approximately –90% for a few of the funds, meaning the portfolio value is only 10% of the benchmark value. Climate Emissions Intensity can be reduced significantly by adjusting the distribution of the metric across different assets. For example, reducing the weight of assets with the highest emissions intensity in the portfolio can produce a significantly lower value than the benchmark, since it replaces high emitters with companies whose emissions intensity is near to zero. In contrast, a large improvement in the ESG Risk Score, or many of the other metrics, is more difficult to achieve. This can be explained by the distribution of these scores (see Figure 11), which tend to be more concentrated around the mean. Consequently, if an asset with a high score is replaced by an asset with a lower score, the reduction (measured as a percentage of the benchmark) is far less than is the case for Climate Emissions Intensity.

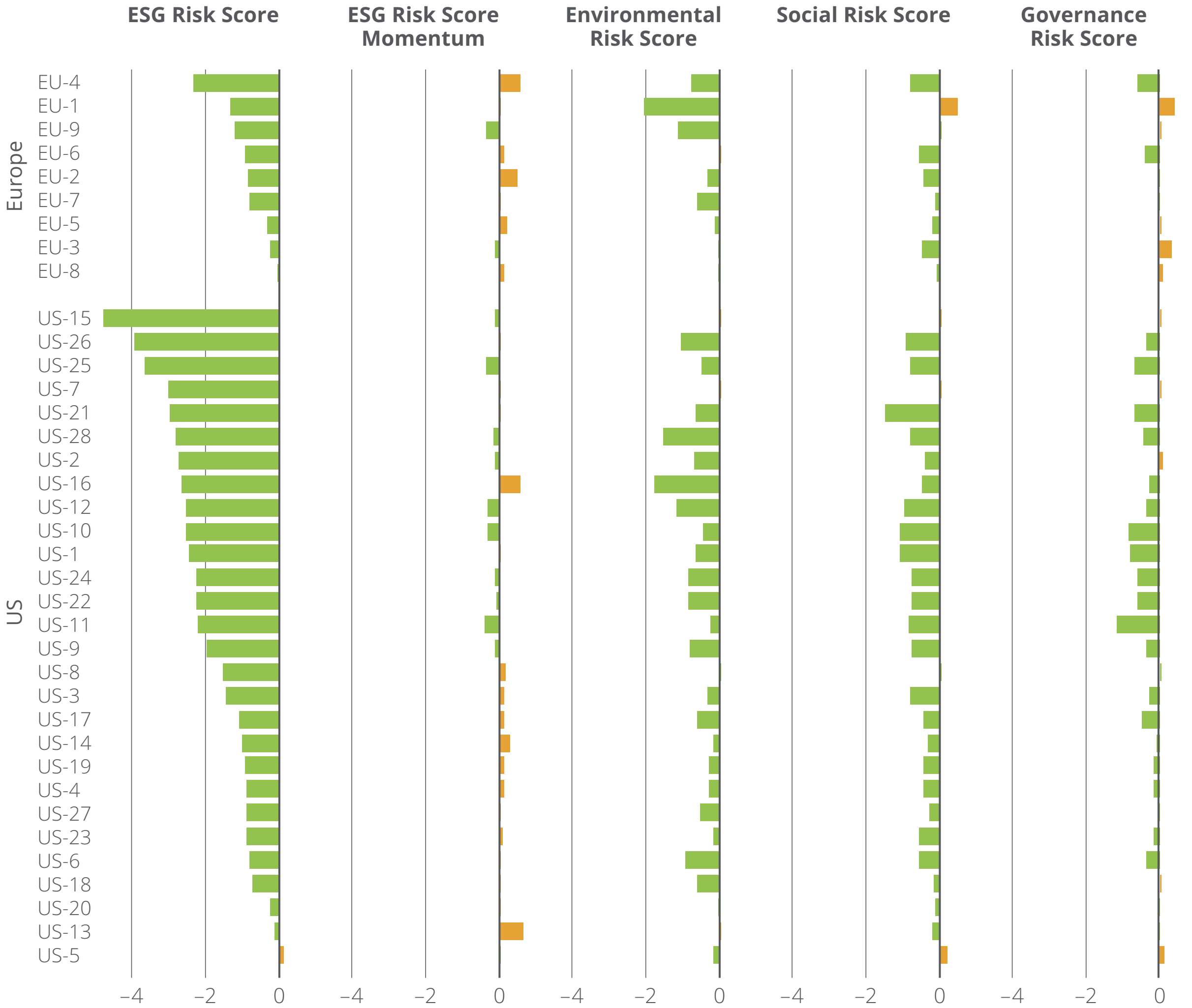
Figure 1: Number of "good" metrics



Note: "Good" is defined as a metric that was more attractive for the portfolio than for the benchmark. We evaluated each ETF's active exposure on 17 measures. Data as of December 31, 2021.

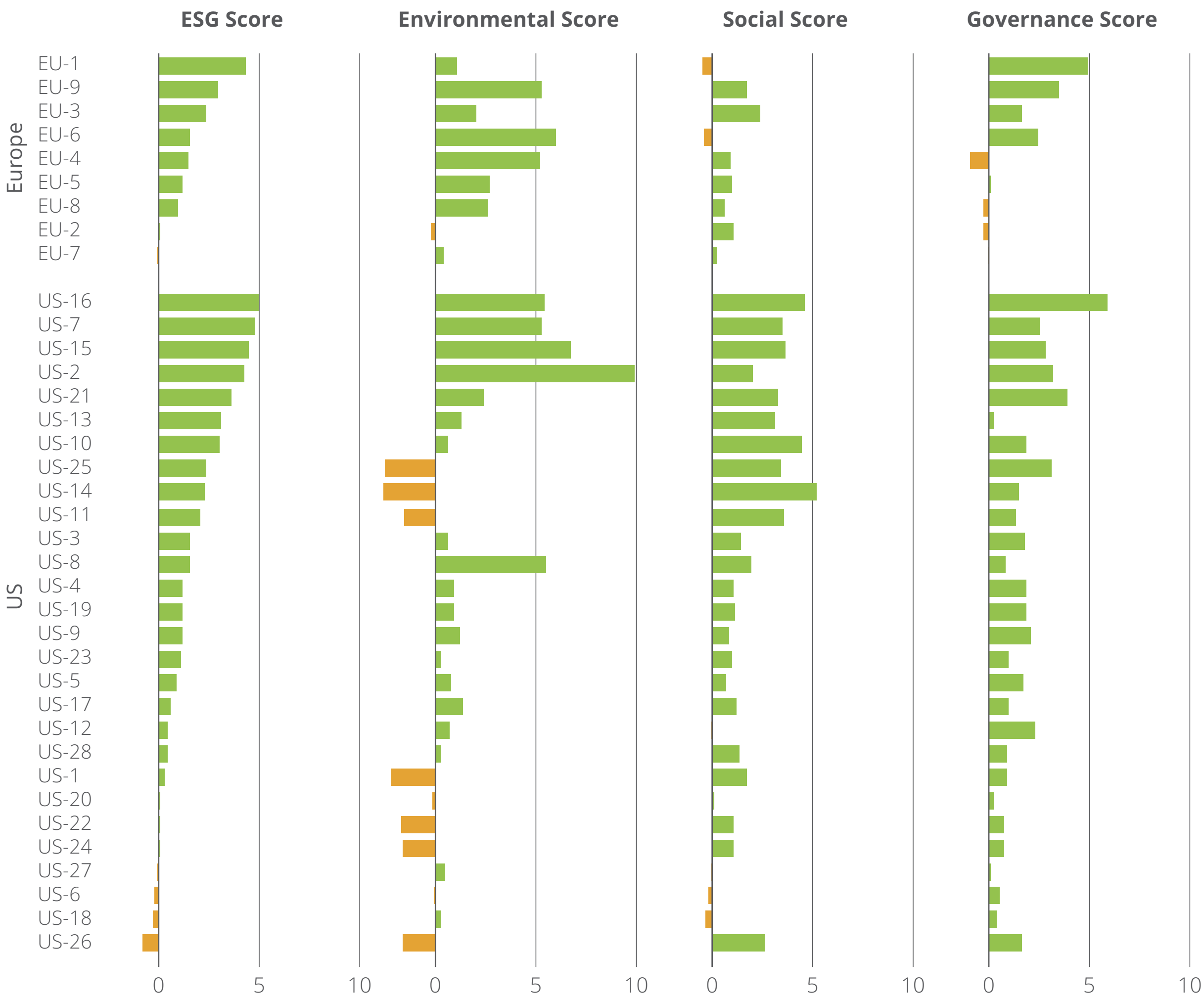
Source: Qontigo.

Figure 2: Active ESG risk metrics (Sustainalytics)



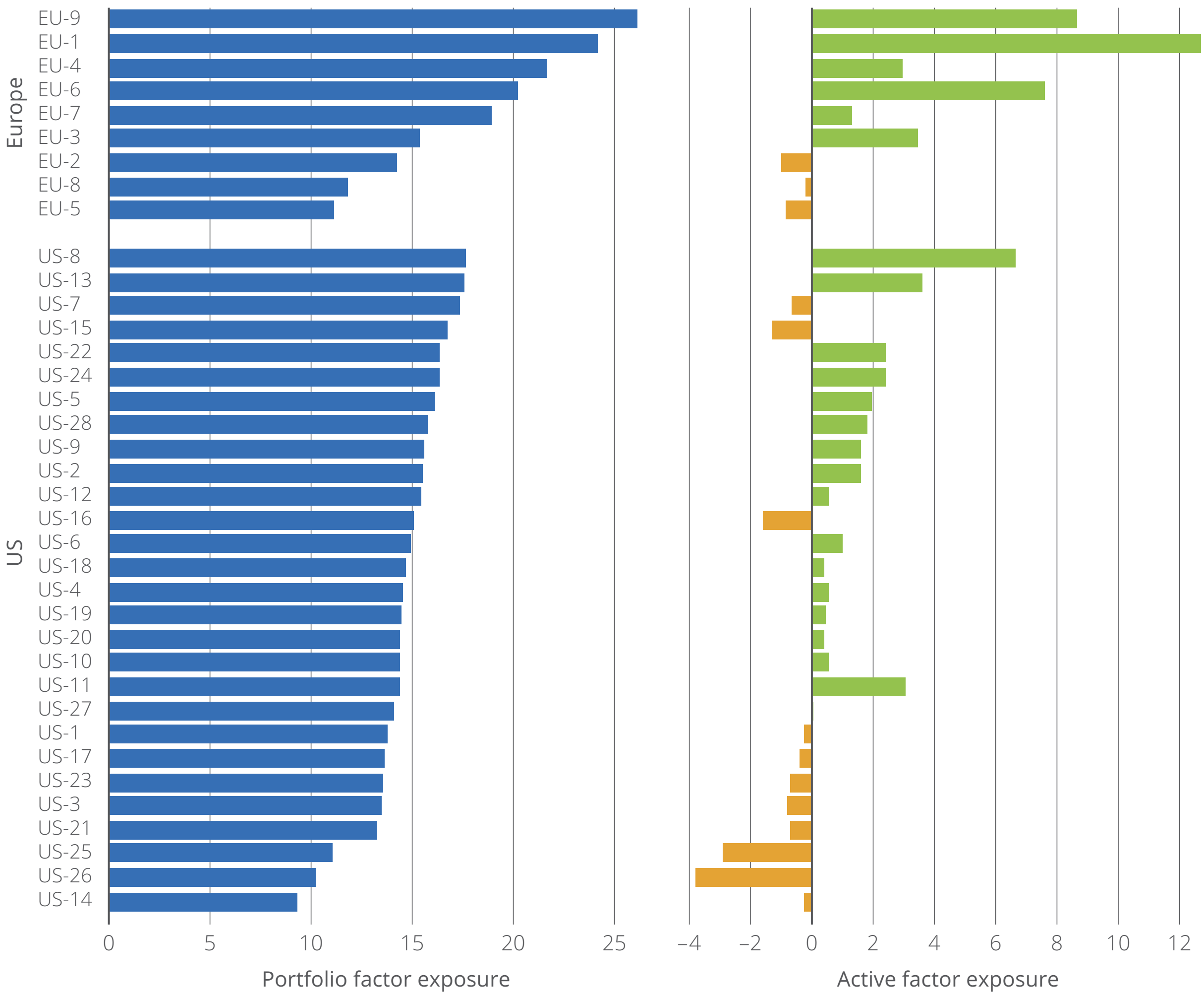
Source: Qontigo, Sustainalytics.

Figure 3: Active ESG risk metrics (Clarity AI)



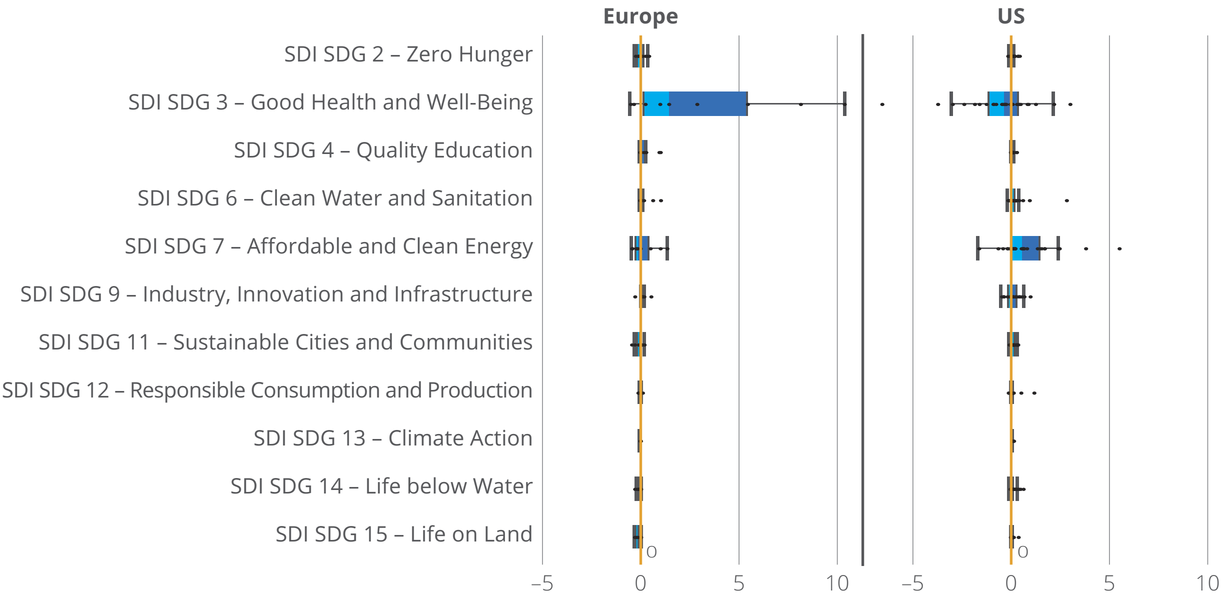
Source: Qontigo, Clarity AI.

Figure 4: Revenue allocated to SDGs for portfolio and active portfolio (SDI AOP)



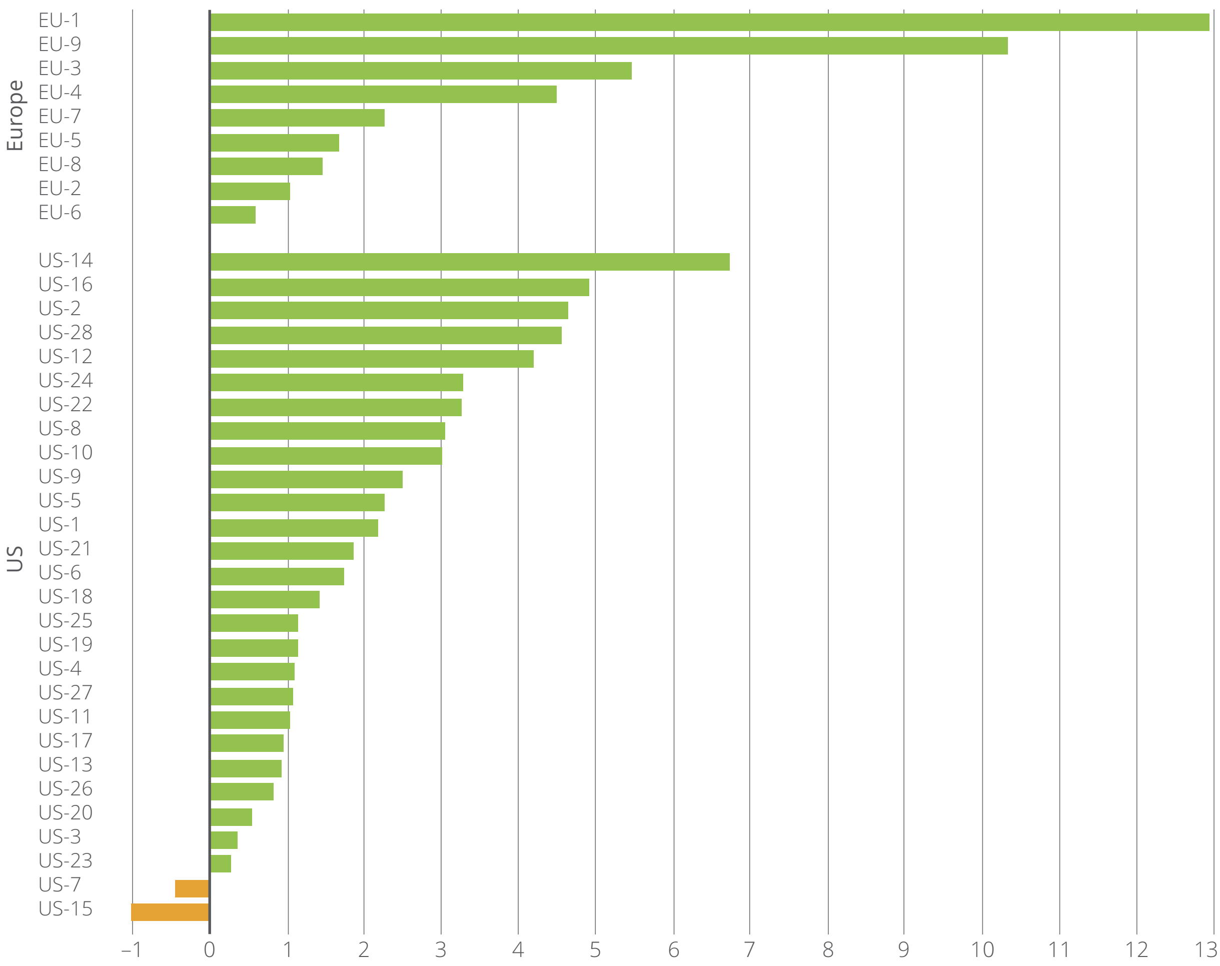
Note: In these charts we consider revenue allocated to any SDG.
Source: Qontigo, SDI AOP.

Figure 5: Distribution of active revenue percentages allocated to each SDG across portfolios (SDI AOP)



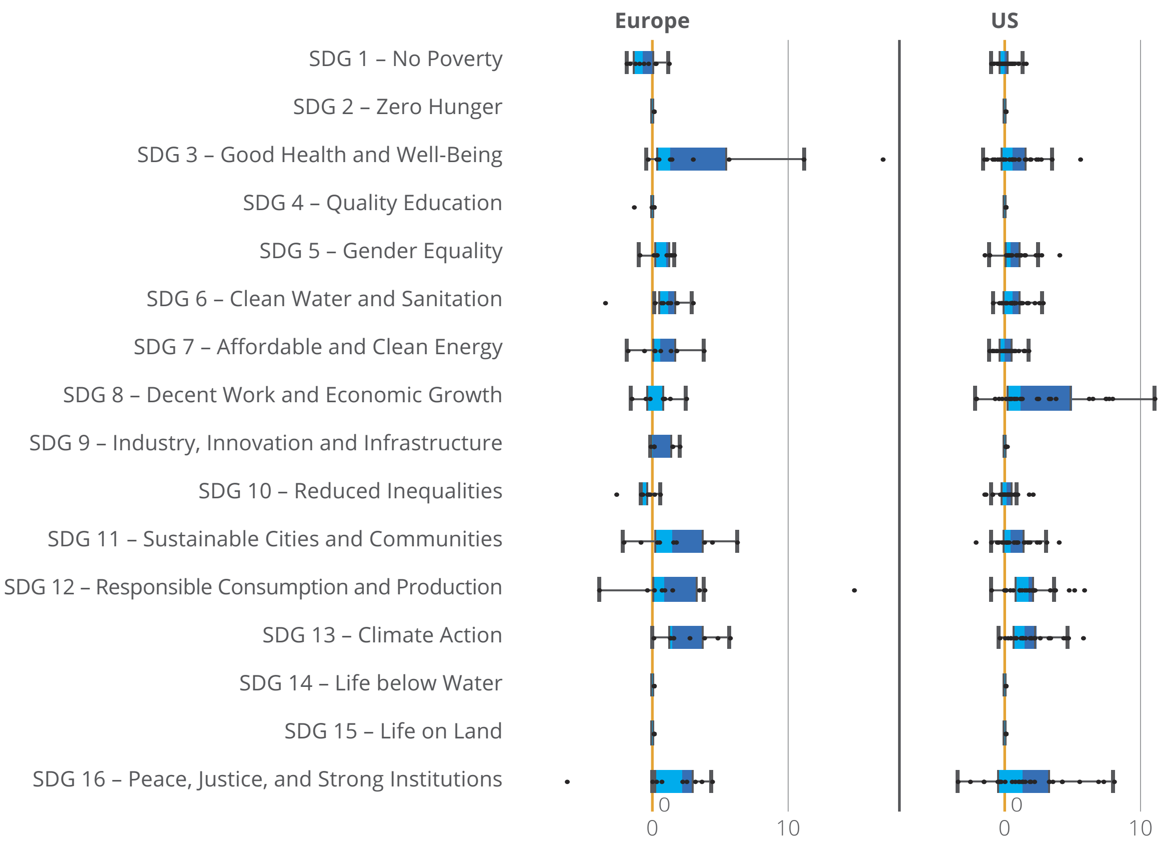
Source: Qontigo, SDI AOP.

Figure 6: Active total SDG scores (Clarity AI)



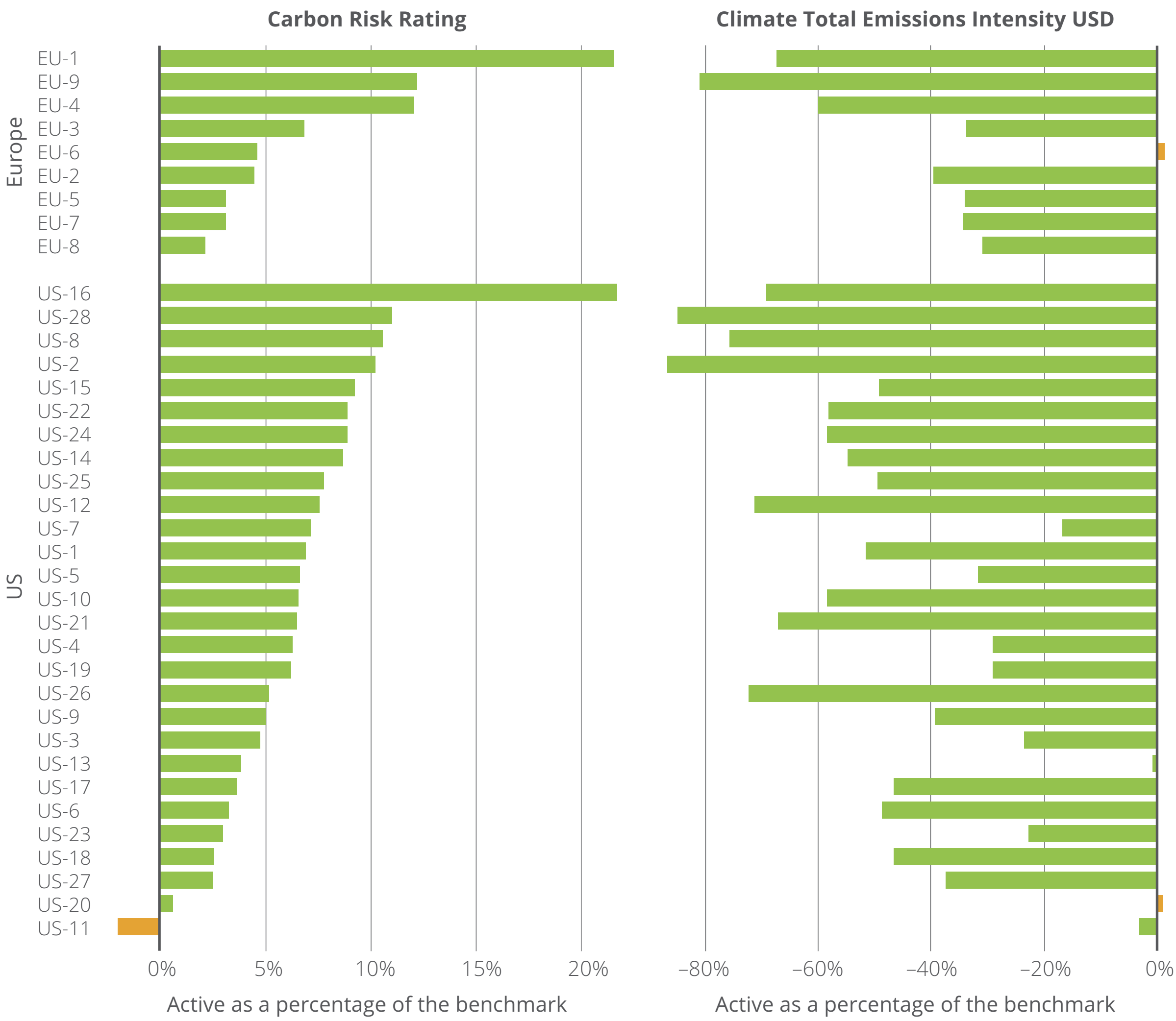
Source: Qontigo, Clarity AI.

Figure 7: Distribution of active SDG scores by SDG across portfolios (Clarity AI)



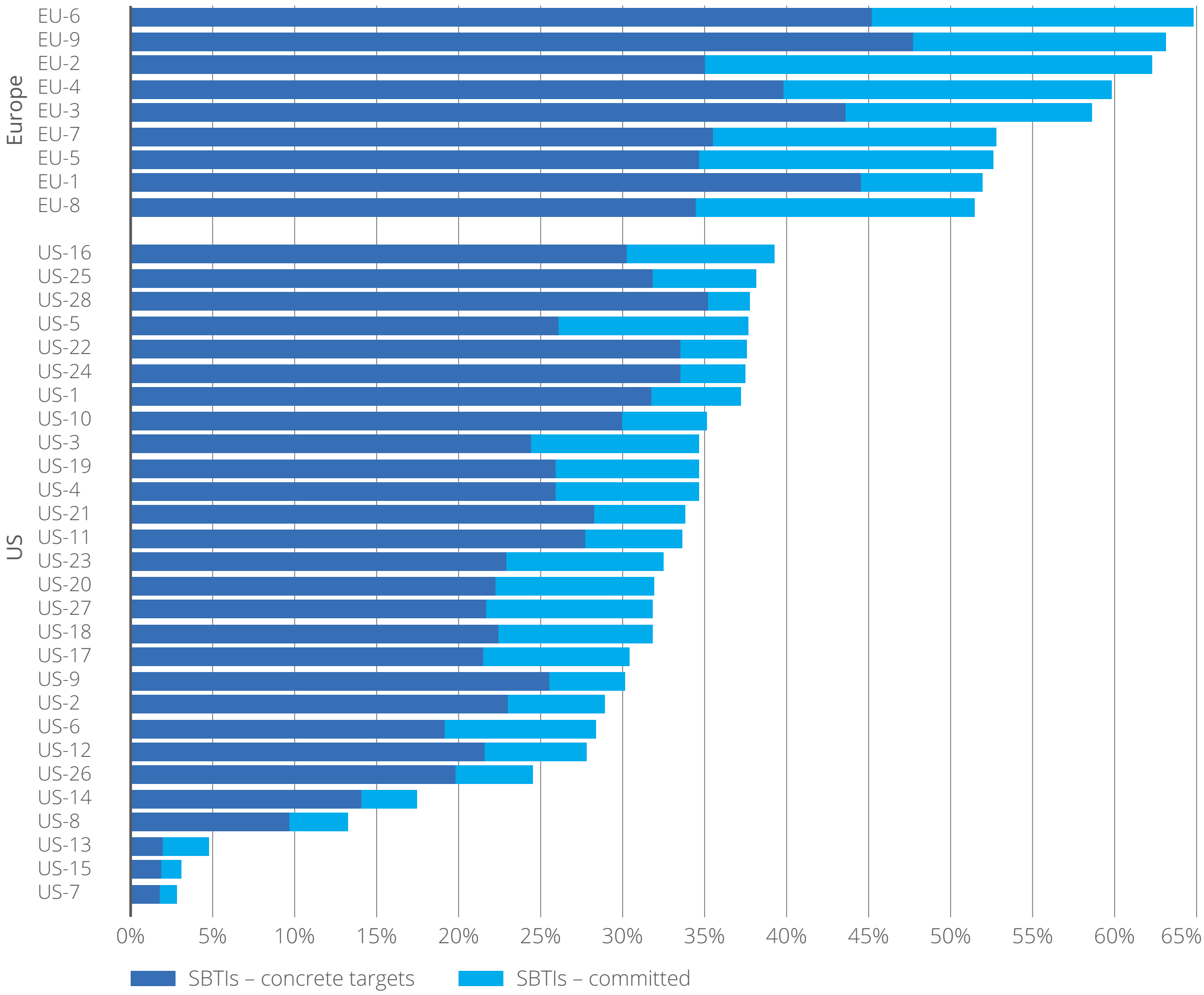
Source: Qontigo, Clarity AI.

Figure 8: Active carbon metrics (ISS-ESG) as a percentage of the benchmark value



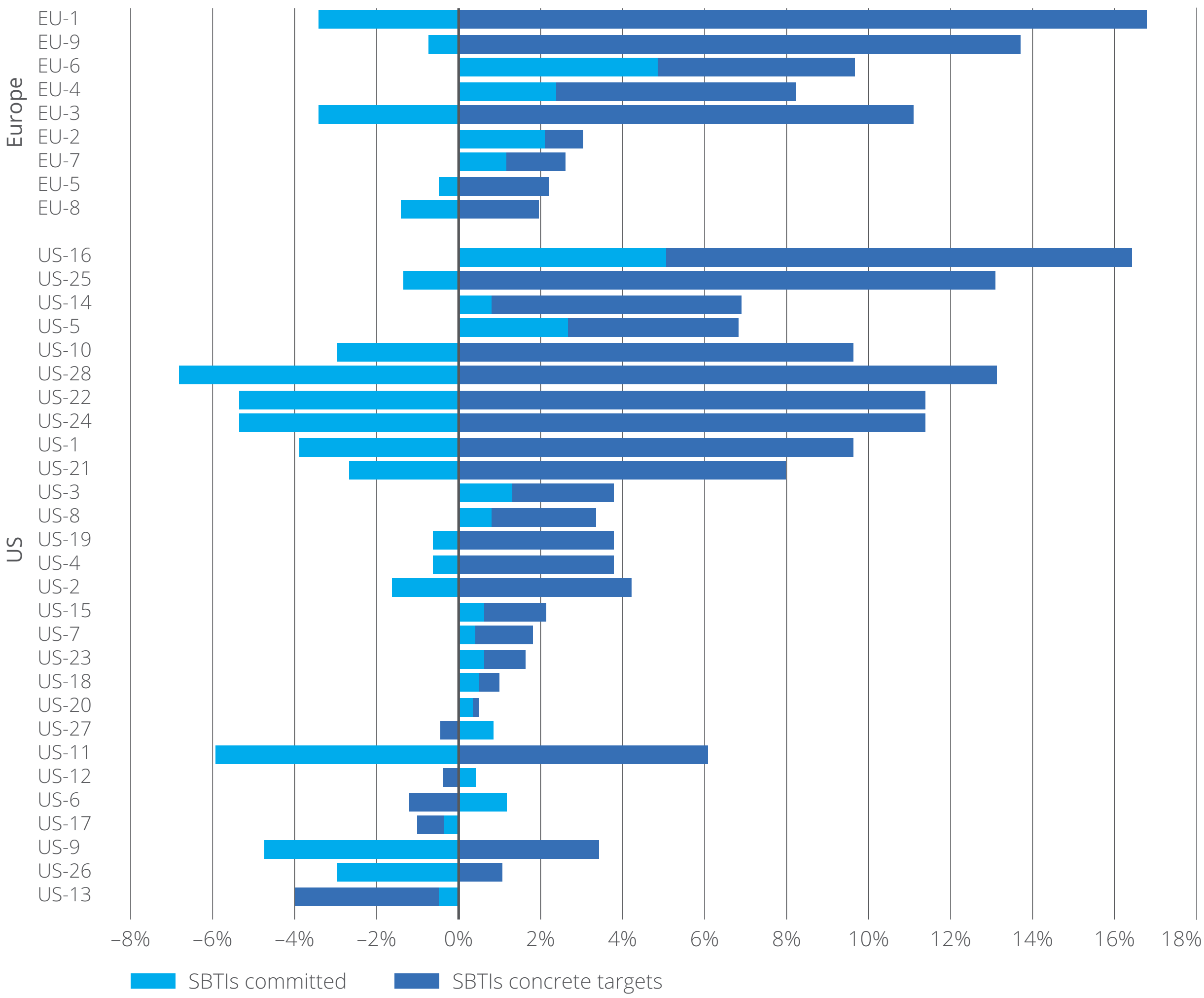
Source: Qontigo, ISS-ESG.

Figure 9: Portfolio allocations to assets having concrete targets or committments to the SBTis



Source: Qontigo, ISS-ESG.

Figure 10: Active allocations to assets having concrete targets or committments to the SBTis

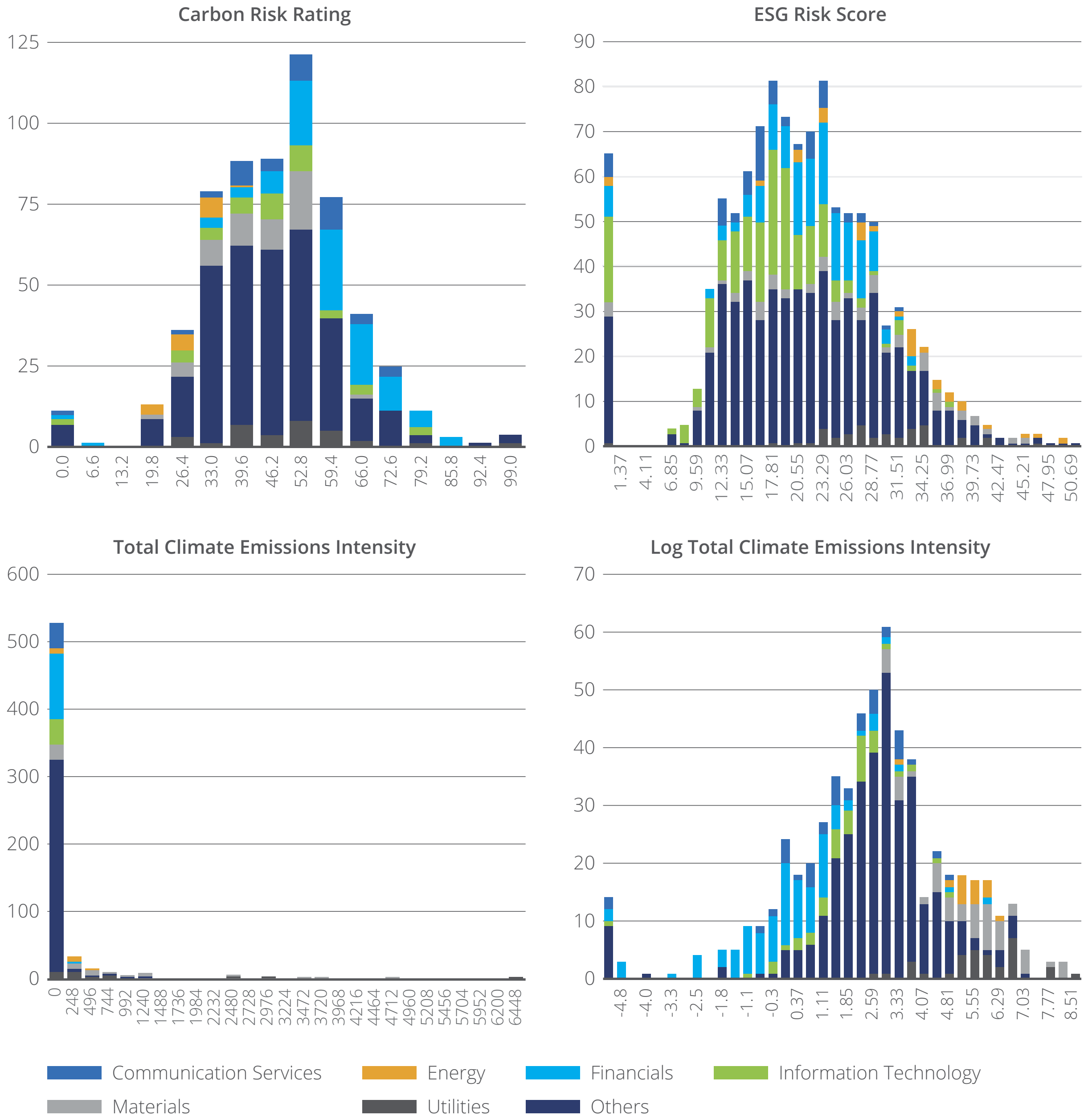


Source: Qontigo, ISS-ESG.

Histograms of a few sustainability metrics broken down further by sector can be found in Figure 11. These provide a sense of how much an ETF actually can improve on a sustainability metric. As already mentioned, an ETF can significantly reduce Climate Total Emissions Intensity by replacing a high-emitting asset by one from the majority of assets that are concentrated around zero. To get an even better sense of this opportunity, we also plot the histogram for the log (base 10) of Climate Total Emissions Intensity. This subplot shows not only the distribution but also the concentration of scores within certain sectors. For example, assets in the Utilities and Energy sectors have the greatest climate emissions intensities while the Financials and Information Technology sectors have comparatively lower emissions intensities. Consequently, a portfolio can replace a position in Utilities with one in Finance or Information Technology to significantly reduce Climate Total Emissions Intensity. Of course, this potentially leads to significant active sector exposures for some ETFs.[4]

[4] Unlike active sustainability and sector exposures, the ETFs do not appear to exhibit any trends or tilts in traditional style factors as of December 31, 2021. For completeness, we show active exposures to style factors for each ETF in Figure 24.

Figure 11: Histograms of various sustainability metrics over the STOXX® Europe 600 universe.



Note: Each vertical bar represents assets with scores ranging from the bar label given (inclusive) to the label of the bar to its right (exclusive). Note that, with the exception of Climate Total Emissions Intensity USD, the leftmost bar in each subplot consists of assets with no scores.

Source: Qontigo, ISS-ESG, Sustainalytics.

4. How do funds achieve their sustainability improvements?

A common criticism of ESG and carbon reduction funds is that they achieve their goals by simply reducing or eliminating exposure to certain sectors (e.g., Energy or Utilities), and may not actually select goal-enhancing stocks within each sector. This means they miss out on companies that are trying to improve their sustainability. In general, we believe funds should take a diversified approach to achieving sustainability goals, rather than just completely eliminating an industry or sector. There are several reasons for this: Once a sector has been eliminated it becomes difficult for funds to achieve further improvement, while shedding sectors also does not encourage companies – especially those in "brown" industries – to improve, and prevents investors from engaging with companies. From an end-user perspective, such an approach may also impair full representation of the economy and create additional tracking error, making funds potentially less suitable for asset allocation. By contrast, we show the extent to which existing ETFs can improve their metrics by divesting from industries that largely consist of companies with poor scores. We break down the active exposure into an allocation and selection effect using the Brinson attribution approach to determine how sustainability ETFs improve their sustainability metrics. See the Appendix for more details on the methodology.

Figure 12 shows a breakdown of the active exposure for the Climate Total Emissions Intensity USD and ESG Risk Score metrics (measured as a percentage of the benchmark exposure) into allocation and selection effects using the Active Exposure equation. GICS sectors were used for grouping here. This analysis helps to understand the drivers of active exposure to a sustainability metric. The goal is to answer two questions: "Which of the items below drove the preferable sustainability metric, and in what proportion?"

- Underweighting sectors or industries with a poor score and overweighting sectors or industries with a good score, or
- Underweighting assets *within* a sector or industry with a poor score and overweighting assets in a sector or industry with a good score, while not having active exposures to the sectors or industries.

As an example, consider the breakdown of the active exposure to the ESG Risk Score for US-1. This fund's score is about 12% lower (better) than that of the benchmark. Approximately 6.5% of this came from the allocation effect, i.e., from its active sector exposures. The remaining 5.2% of the lower active exposure came from its selection effect, i.e., from its active weights at the asset level after adjustment for the active sector weights.

The bars for the ESG Risk Score are largely negative because funds have negative exposures to the ESG Risk Score (remember, the lower the ESG risk, the better). The relative attribution of the active exposure between the two effects varies considerably. This means that some funds are predominantly improving their ESG Risk Score by divesting from certain sectors, while others are relying more heavily on asset selection within sectors to improve their sustainability scores. For example, EU-1, US-26 and US-16 achieve much of the reduction in their ESG Risk Score from allocation effects, whereas US-10 and EU-4 achieve the majority of theirs from selection effects, i.e., by choosing appropriate stocks within the sectors.[5]

To us, the most interesting column is the one showing the breakdown of the active exposure for Climate Emissions Intensity. First, as noted earlier, the improvement in emissions intensity as a percentage of the benchmark exposure is substantially greater than the improvement in the ESG Risk Score. Second, the proportion of darker blue in most bars is much greater than for the ESG Risk Score; this shows that

[5] Although we include results for ESG_SCORE and TOTAL_SDG_SCORE here, it should be noted that in nearly all ETFs the improvement in these metrics came from selection effects as opposed to allocation effects.

the improvement in emissions intensity is driven more by the allocation effect than is the case for other metrics. We do not find this surprising given the discussion of the histograms of Climate Emissions Intensity in Figure 11.

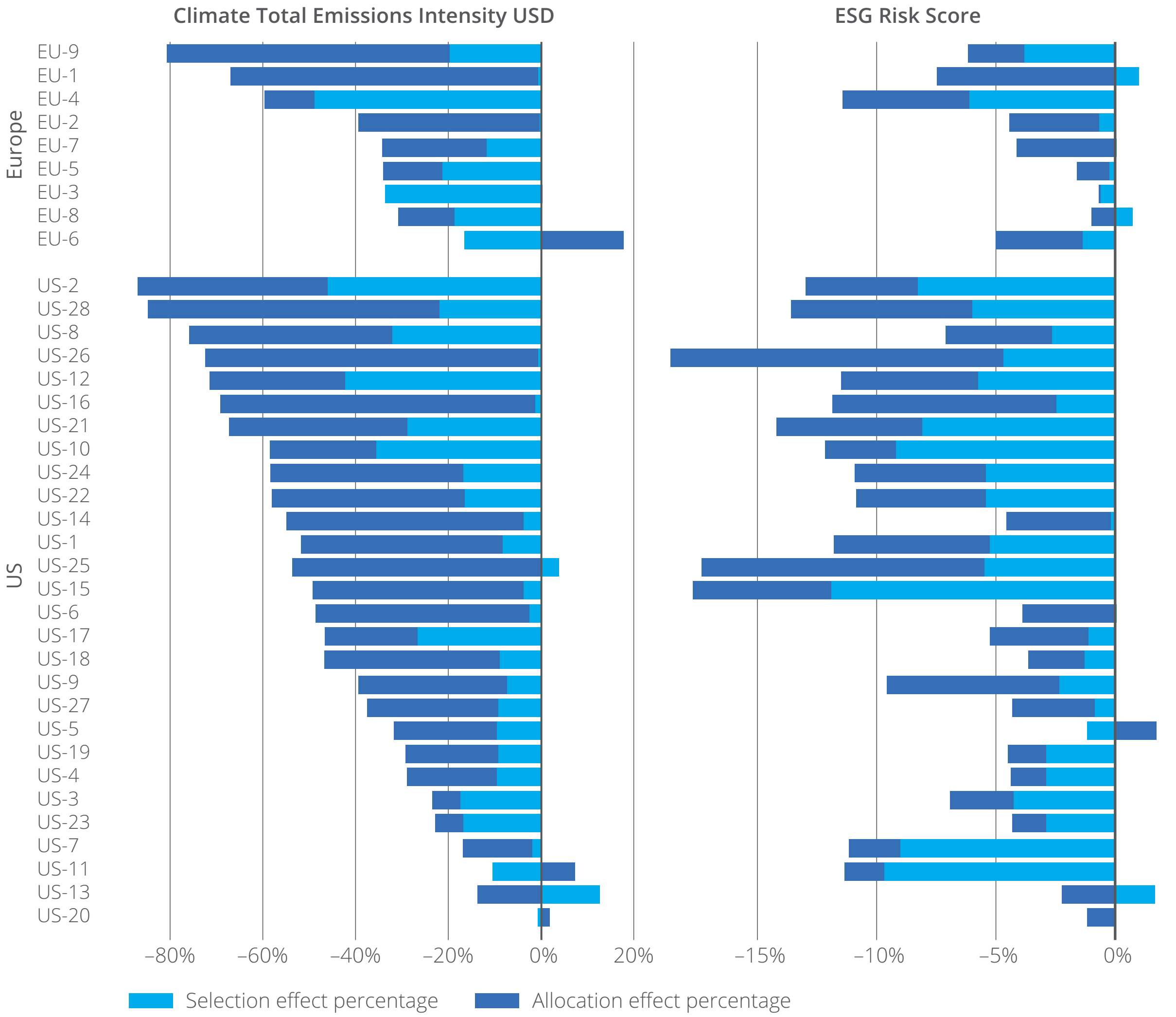
It is still possible that funds have not divested from entire sectors, but only from specific industries within some sectors. The breakdown described above would not show this, since the allocation effect was measured at the sector level. We examined this possibility by conducting the same analysis using GICS industries as the asset grouping. Figure 13 shows the allocation effects at two different GICS levels along with the corresponding selection effects for Climate Emissions Intensity. Some funds have much larger allocation effects using the industry grouping than the sector grouping. The US-14 ETF is an example: In the sector grouping, approximately –35.3% of the active exposure was attributed to the selection effect while only –19.7% was attributed to allocation effects. However, using the industry grouping, –3.7% was attributed to selection effects and –51.2% was attributed to allocation effects. The difference between sector and industry allocation effects shows that the fund reduced its emissions intensity exposure almost entirely by divesting from certain industries.

Figure 14 and Figure 15 drill deeper into this hypothesis to fully illustrate exactly how the fund is reducing its exposure to emissions intensity. Figure 14 shows the allocation and selection effects for each sector when the active exposure of emissions intensity for US-14 is broken down. The dark blue and grey bars show the portfolio and benchmark weights respectively. The two lighter blue areas show the allocation and selection effects. Clearly, the majority of the reduction in emissions intensity is coming from the Utilities sector. Within the latter, approximately 23.5% of the reduction came from the selection effect, while only about 14.8% came from the allocation effect. Now, compare this to Figure 15, where we perform the same analysis using the industry grouping and focus solely on the industries in the Utilities sector. This industry-based breakdown shows that, within the Utilities sector, the reduction in emissions intensity exposure was almost entirely driven by underweights in certain industries, and particularly Electric Utilities. This particular fund went so far as to divest entirely from certain industries. It even divested from Independent Power and Renewable Electricity Producers – presumably an industry containing assets that are trying to provide zero-emissions energy!

To demonstrate that this one cherry-picked example is not an anomaly, Figure 16 shows the allocation effect (only) for Climate Emissions Int USD, broken down by sector. For each ETF, the size of the colored sections represents the sector's contribution to the allocation effect. Sections of the individual bars that appear on the negative side indicate a negative contribution, while those on the positive side indicate a positive contribution. Note the large negative contributions made to most ETFs by the Utilities, Energy and Materials sectors. This supports the claim that much of the reduction in climate emissions intensity for individual ETFs is derived from divestments from sectors with high emissions.

However, the negative contribution made by the Information Technology sector should be noted. This is counterintuitive given the argument just made. The reason is that divesting from high carbon-emitting sectors is in fact only half the story. It is possible to reduce climate emissions in two ways: by reducing exposure to high-emitting sectors as we have already seen or by achieving a negative allocation effect from overweights in sectors with low emissions intensity (again, it should be remembered that a negative is what we are looking for in this context). In order to truly understand the reduction in climate emissions, we need to also consider allocation weights. These are shown for each sector in Figure 17. By combining the information in Figure 16 and Figure 17, we can tell that the negative allocation effect from the Information Technology sector is indeed caused by the latter's very large overweight. It is also instructive to understand the relative sizes of the areas in the two figures representing Utilities and Information Technology. In Figure 16, the Utilities areas are generally the largest, while in Figure 17 the Information Technology areas are often the largest. Once again, this is due to the distribution of carbon emissions intensities. The extremely large intensities from the Utilities areas can be reduced by even a small decrease in exposure to the sector, while a very large overweight in Information Technology is required given the relatively small carbon emissions intensities in the sector.

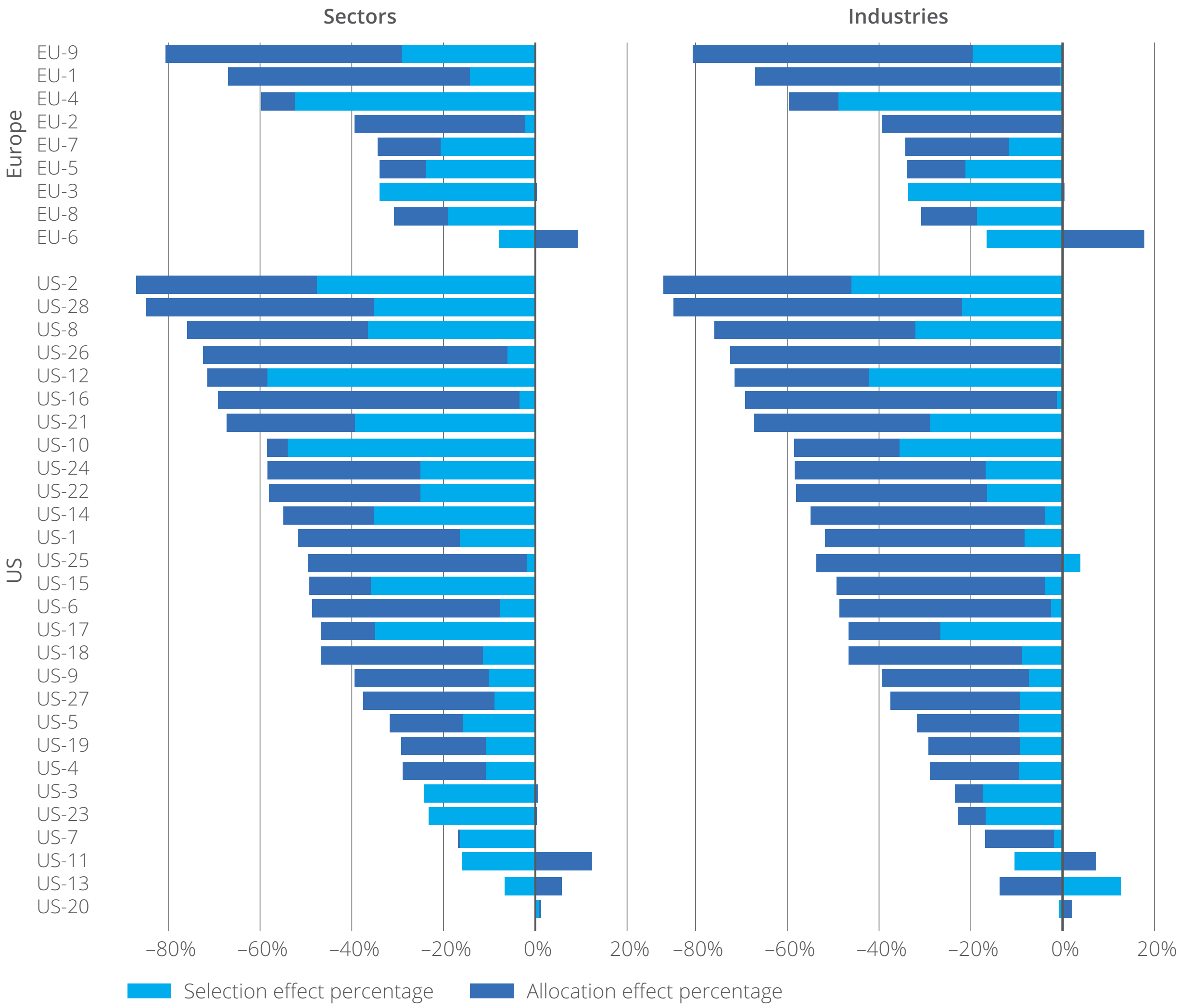
Figure 12: Breakdown of the active exposure of the Climate Total Emissions Intensity USD and ESG Risk Score as a percentage of the benchmark exposure.



Note: Exposures have been computed as of December 31, 2021. Active exposures are broken down into an allocation effect based on GICS sectors and a selection effect.

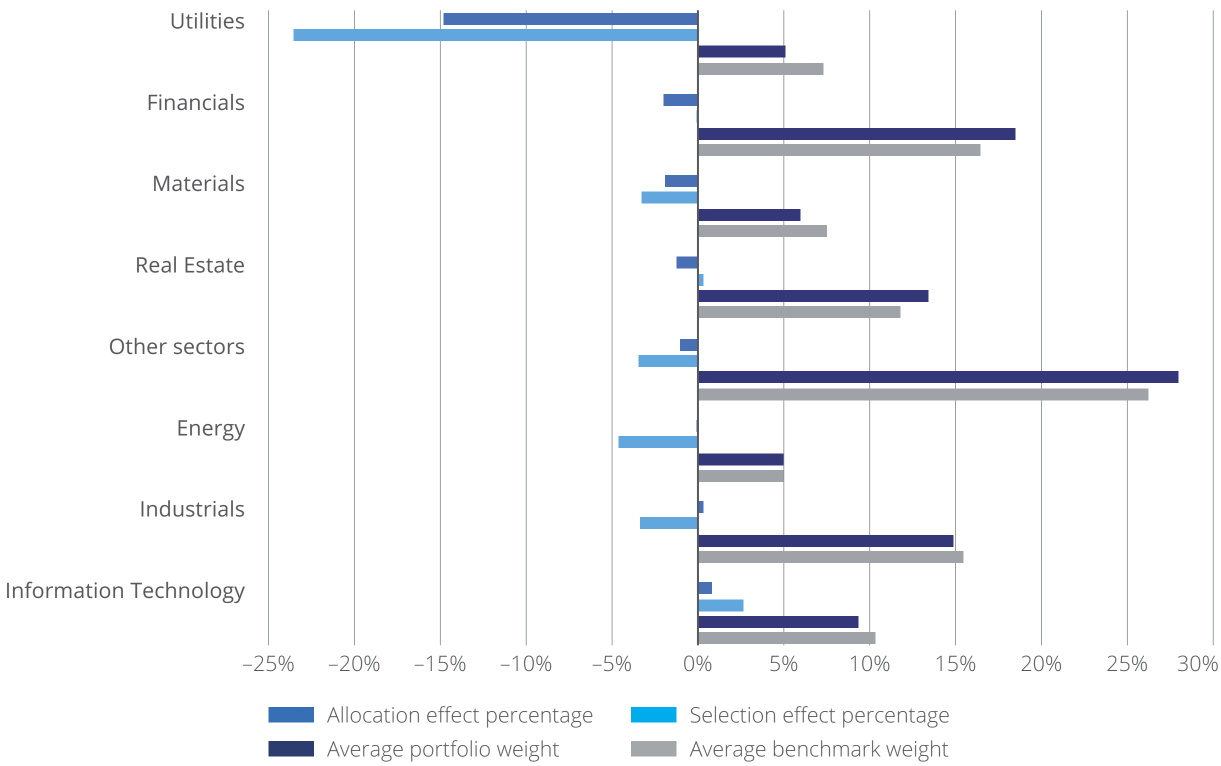
Source: Qontigo, ISS-ESG, Sustainalytics.

Figure 13: Breakdown of active exposures to Climate Total Emissions Intensity USD as a percentage of the benchmark exposure for allocation effects made at the sector and industry levels.



Source: Qontigo, ISS-ESG.

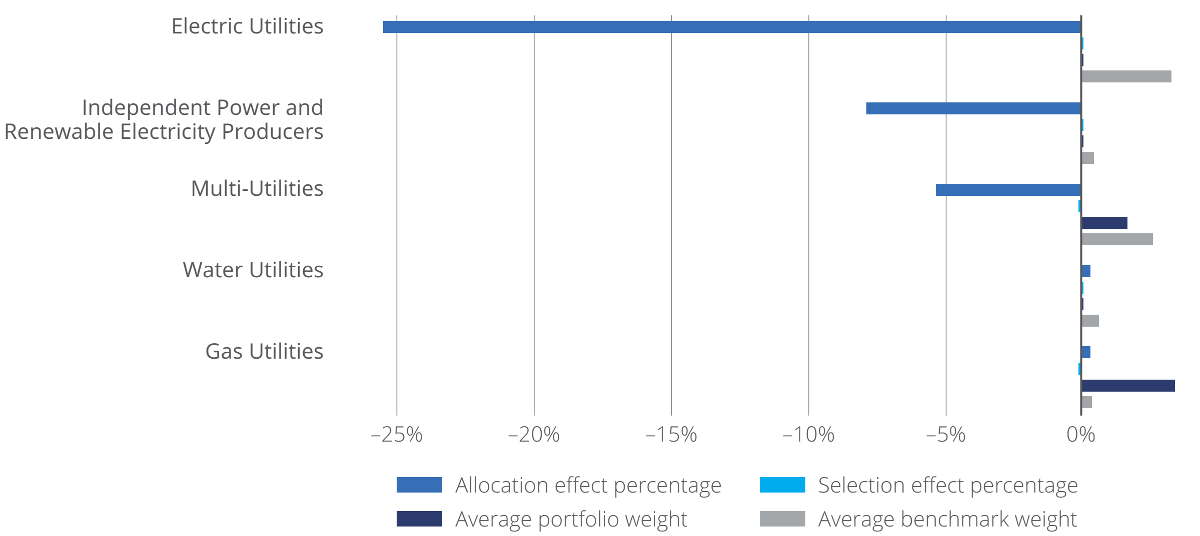
Figure 14: Allocation and selection effects to emissions intensity as percentage of benchmark exposures by sector, US-14.



Note: The effects are computed using GICS sectors for grouping. The dark blue and grey bars show the portfolio and benchmark weights respectively. Please note that the majority of the reduction in emissions intensity came from the Utilities sector. Within the latter, approximately 23.5% of the reduction came from the selection effect while only about 14.8% came from the allocation effect.

Source: Qontigo, ISS-ESG.

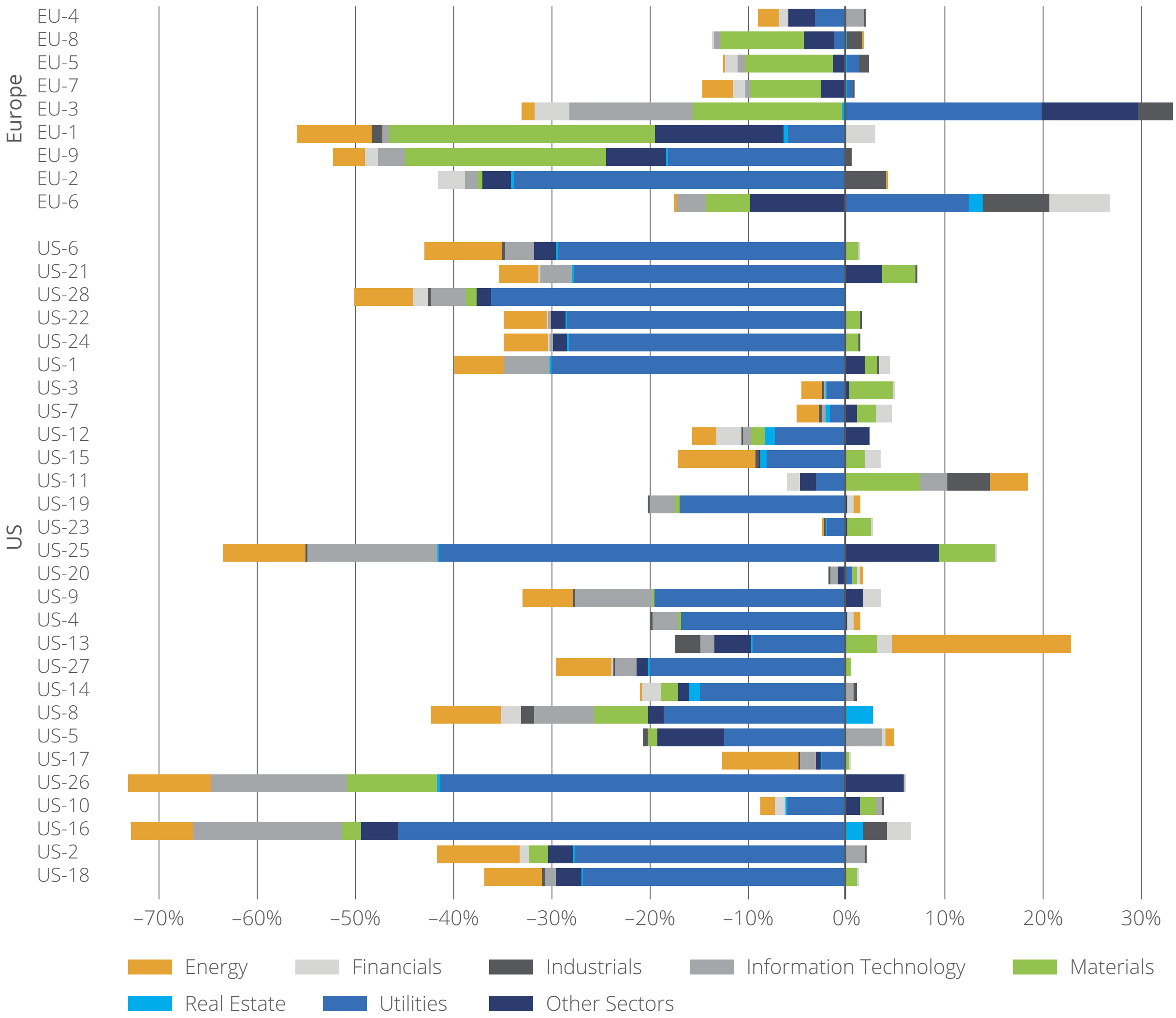
Figure 15: Allocation and selection effects to emissions intensity as percentage of benchmark exposures for selected industries, US-14.



Note: The effects are computed using GICS industries for grouping. The dark blue and grey bars show the portfolio and benchmark weights respectively. Due to the number of industries, we have restricted the chart to the ones in the Utilities sector. The industry-based breakdown shows that, within the Utilities sector, the reduction in emissions intensity exposure was almost entirely driven by underweights in certain industries, and particularly Electric Utilities.

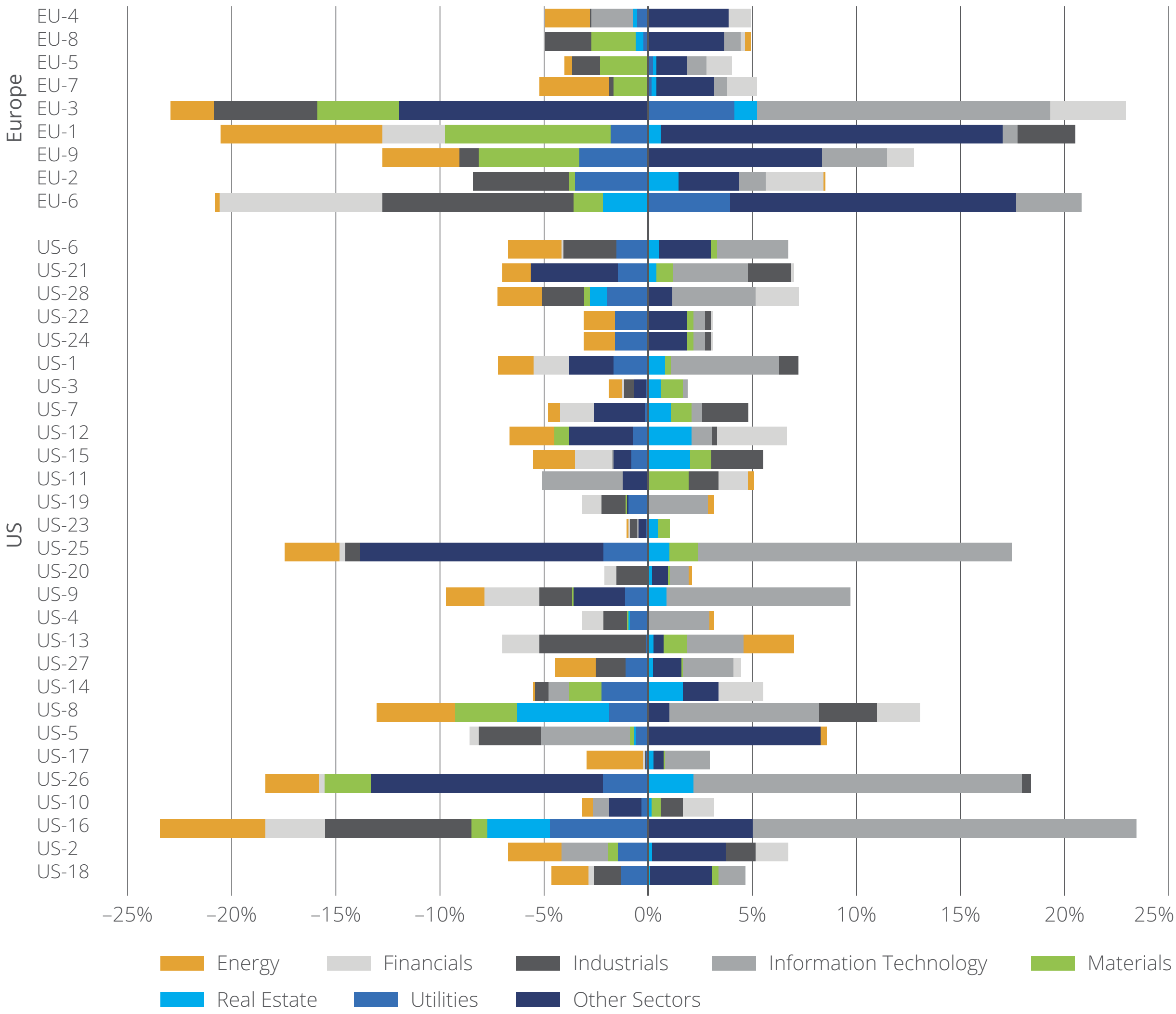
Source: Qontigo, ISS-ESG.

Figure 16: Allocation effects only (no selection effects) for Climate Total Emissions Intensity USD as a percentage of the benchmark exposures broken down by sector.



Source: Qontigo, ISS-ESG.

Figure 17: Allocation weights for Climate Total Emissions Intensity USD as a percentage of the benchmark exposures broken down by sector.



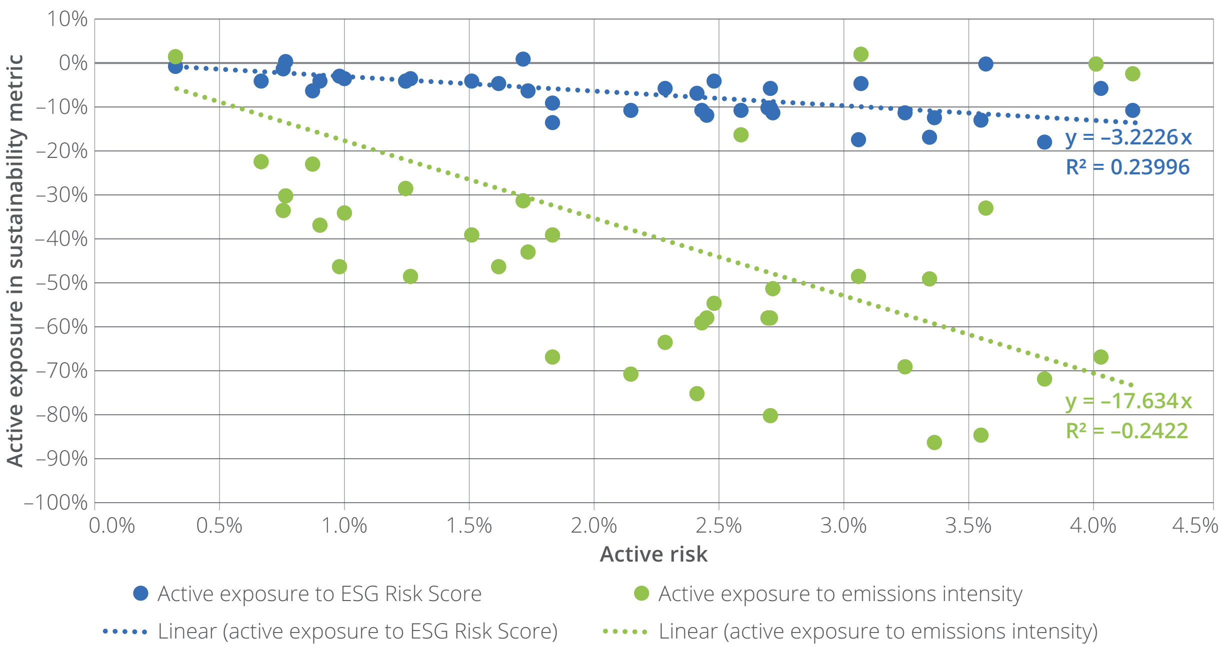
Source: Qontigo, ISS-ESG

5. How do improved sustainability metrics relate to active risk?

Yet another consideration is how sustainability metrics relate to active risk. To construct portfolios that improve on the sustainability metrics of classic cap-weighted indices, a portfolio must deviate from its parent index. In other words, the portfolio must have some active risk or tracking error. Optimized portfolios can clearly achieve better sustainability metrics per unit of tracking error if that is their underlying objective. But what about the much more common type of ETFs based on rule-based exclusion indices or "leaders" indices that do not perform any optimization? Do these portfolios improve sustainability metrics in proportion to their active risk?

Figure 18 plots the active exposure to two of our metrics, the Sustainalytics ESG Risk Score and ISS-ESG Emissions Intensity, versus predicted active risk for each ETF on December 31, 2021. Visually, there appears to be a strong relationship between increased active risk and improved sustainability metrics. The figure also shows a best-fit linear function for each sustainability metric as a function of active risk. The negative slopes of –3.2 and –17.6 for the ESG Risk Score and Emissions Intensity respectively provide visual support for a relationship. The relationship between Emissions Intensity and active risk would be stronger if the three outliers with virtually no active exposure were removed. Nevertheless, it is encouraging that, generally speaking, funds with larger deviations from a cap-weighted index are achieving a commensurate improvement in sustainability metrics. That having been said, we find many instances of funds with very similar levels of active risk but significantly different exposures to selected sustainability metrics. To be fair, the funds concerned may not be explicitly targeting those particular metrics, but it is still instructive to see how their exposures differ.

Figure 18: Active exposure to sustainability metric as percentage of benchmark exposure versus active risk.



Note: The active risk is the estimated active risk of each portfolio relative to the most appropriate benchmark among a set of popular candidate indices. The estimated active risk is computed using either the AXUS4-MH or AXEU4-MH Model, depending on which is most appropriate. The dotted line shows the estimated linear fit of the active exposure as a function of active risk. The equations are estimated while forcing a zero intercept, since we must have some active risk in order to get active exposure. The two lines show that funds generally demonstrate increasing improvements in sustainability metrics as their tracking error increases.

Source: Qontigo, ISS-ESG, Sustainalytics.

6. Optimized sustainability frontiers

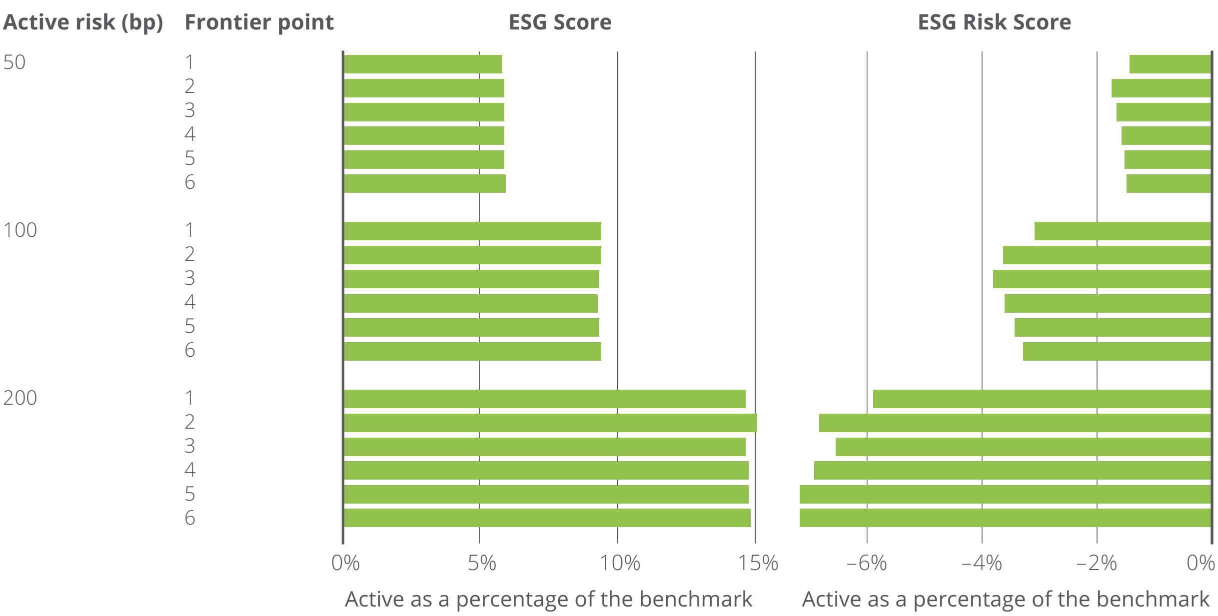
Finally, we posited that using an optimizer to trade off risk versus sustainability exposure would yield a more efficient portfolio. We also wanted to measure the impact of tracking error and industry constraints on our ability to achieve a more sustainable investment strategy, as well as the impact of constraining industry exposures.

We ran a series of optimizations with the following parameters:

- Long only, fully invested
- Objective: to maximize a weighted combination of normalized scores using the ESG Risk Score, ESG Score, Total SDG Score, Carbon Risk Rating and Climate Total Emissions Intensity
- Benchmark: STOXX Europe 600
- Universe: STOXX Europe 600 with scores on each of the metrics listed above
- Allocation to the SDI AOP revenue percentage at least as large as the benchmark allocation for each SDG
- Active risk limits (50 bp, 100 bp, 200 bp)
- Minimum industry weight as a percentage of the benchmark weight (0, –10%, –20%, –30%, –40%, –50%) noted as points 1–6 respectively in the charts

This means that we ran 18 point-in-time optimizations in total. The results allowed us to compare the impact of a tighter versus a looser tracking error along with progressively higher industry constraints. Figure 19 shows the results of optimizing for the ESG Score and the ESG Risk Score. It is clear that the ability to produce better active exposure increases as we go up the tracking error scale. A portfolio with 200 basis points of tracking error, regardless of industry constraints, has about twice the exposure of a 50 basis point portfolio, and about three times the exposure to the ESG Risk Score. Loosening the industry constraint seems to have little impact on either ESG score.

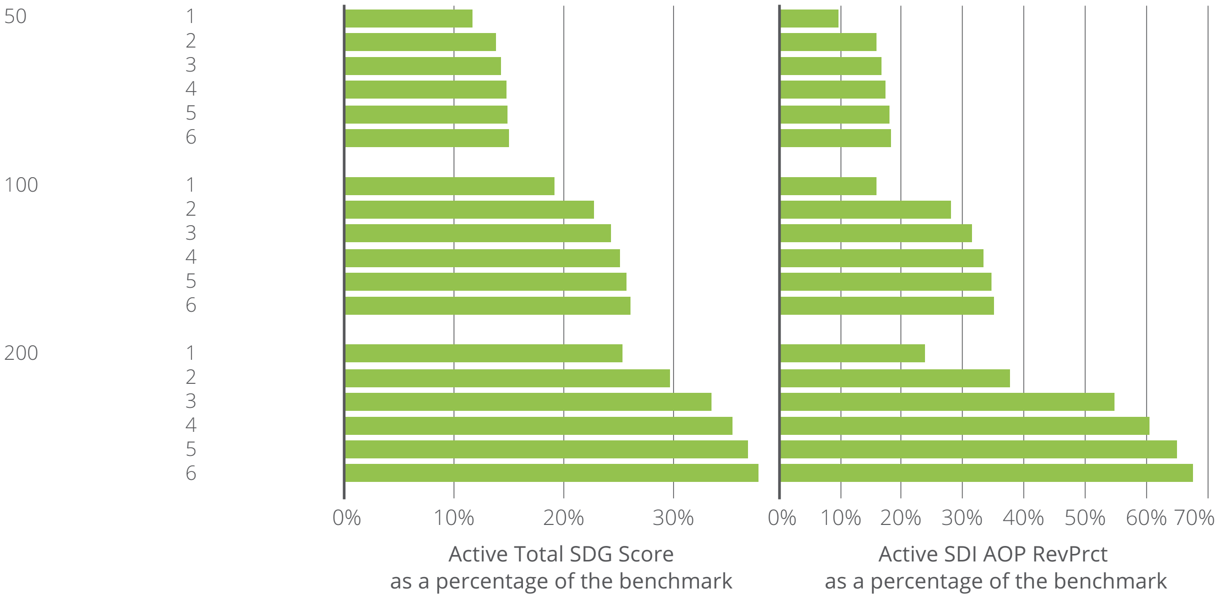
Figure 19: ESG metrics of frontiers as percentage of benchmark values (STOXX Europe 600)



Source: Qontigo, Clarity AI, Sustainalytics.

As noted earlier, SDG scores tend to be concentrated in certain industries. Figure 20 shows that looser industry constraints, along with higher tracking error levels, result in better SDG scores, especially at the highest tracking error level tested.

Figure 20: Active total SDG scores (Clarity AI) and SDG-aligned revenue percentages (SDI AOP) as a percentage of the benchmark values (STOXX Europe 600)



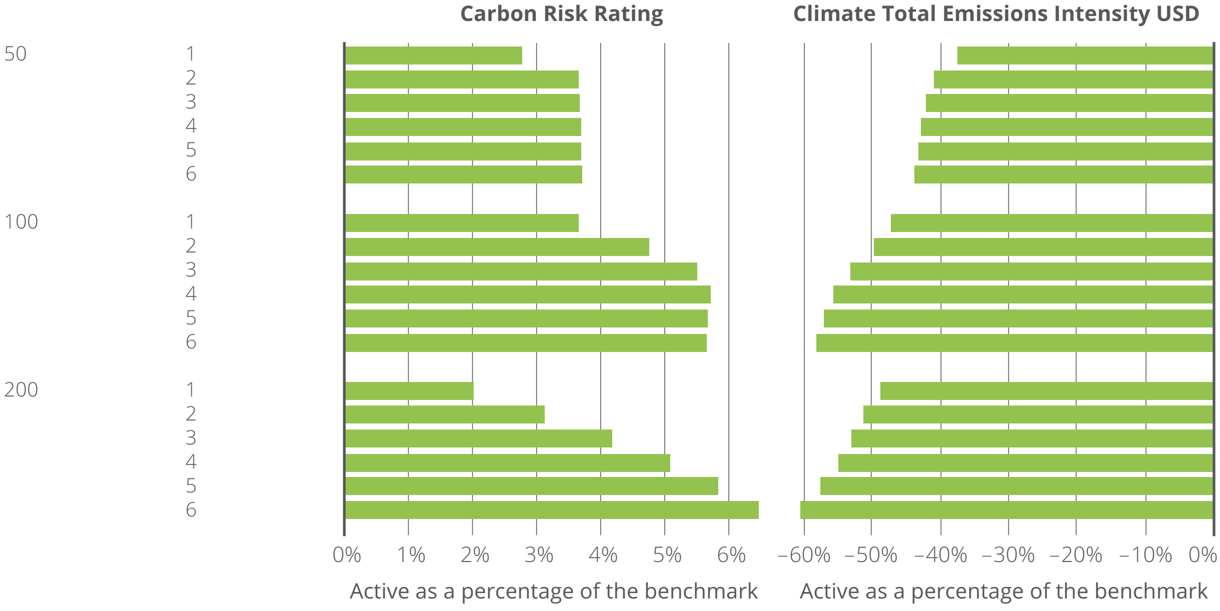
Source: Qontigo, Clarity AI, SDI AOP.

The results for carbon metrics were also interesting (see Figure 21). Whereas looser industry constraints meant better exposure both to the carbon risk rating and to total emissions, the improvement was most evident at the 200-basis point tracking error level. At the same time, however, a higher tracking error did not necessarily lead to better exposure percentages, especially when industries were tightly constrained. This is probably due to the relatively low weight of the metrics in the objective function.

Finally, we performed the same Brinson analysis that we applied earlier to our optimized portfolios (see Figure 22). By definition, we would expect little to no allocation effect where industry deviations were not allowed.[6] In most cases higher allocation effects are seen at higher levels of industry deviation, although these are not as high as one might expect, especially for the ESG Risk Scores.

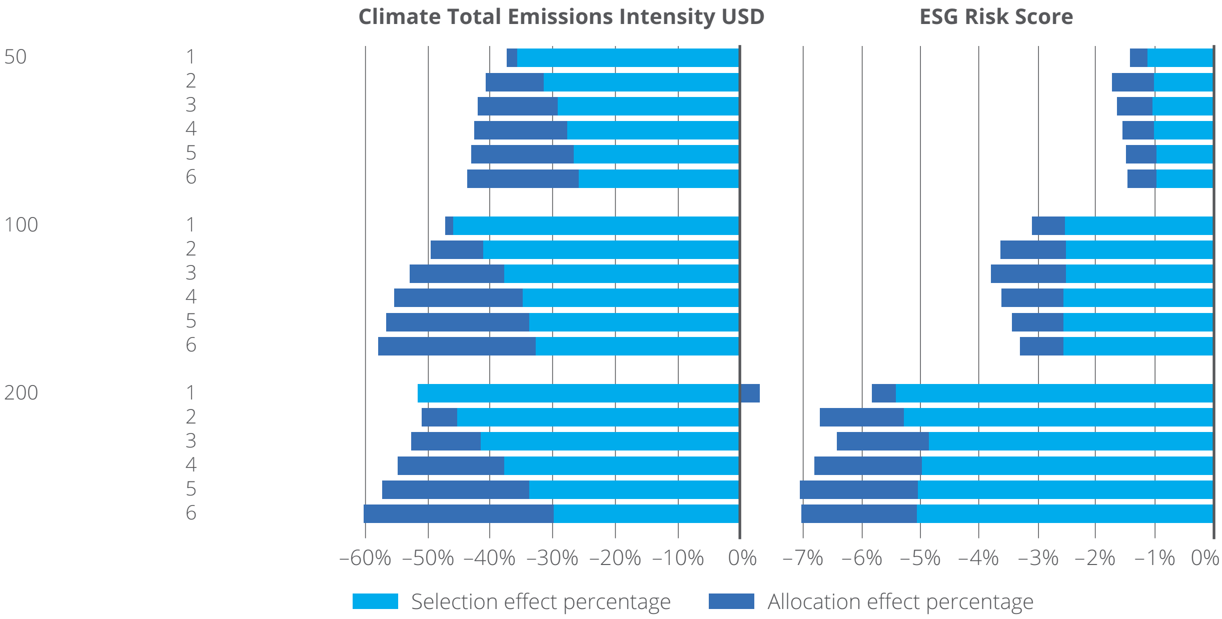
[6] Any minor effect is the result of unclassified assets in the portfolio.

Figure 21: Active carbon metrics (ISS-ESG) as percentage of benchmark values (STOXX Europe 600)



Source: Qontigo, ISS-ESG.

Figure 22: Industry allocation and selection contributions to active exposures of sustainability metrics as a percentage of the benchmark exposure (STOXX Europe 600)



Source: Qontigo, ISS-ESG, Sustainalytics.

7. Conclusions

Sustainability-focused funds will have different goals and targets, selection universes, portfolio construction methodologies, etc., and we therefore would not expect uniform exposures across a set of funds. Despite the accusations of greenwashing leveled at the industry, however, we were pleased to see that most funds looked good on a variety of metrics, even where these were probably not their primary goal. This was particularly true for exposures to the Sustainable Development Goals, which are highly unlikely to have been part of the stock selection process but were generally positive.

For some metrics, such as meeting SBTi goals, the fund tilts were positive yet no better than the benchmark. This suggests that what looked like a positive for the fund was in fact driven solely by the companies in the benchmark, and not by the manager.

We also found that in many cases attractive metrics were achieved by eliminating whole industries or sectors, some of which (such as renewable energy) were puzzling. We believe that excluding entire sectors has a number of drawbacks in the long run. These include making further improvement difficult, generating higher risk (especially as sector weightings change, as we have seen this year with the resurgence of Energy stocks) and perhaps most importantly failing to reward companies that are trying to do better even though they are in "brown" industries.

Finally, we demonstrated that we can offer a better approach by considering many different dimensions of sustainability and using optimization to achieve the most efficient trade-off between sustainability and risk. We believe this is a better way to meet long-term sustainability goals than just incorporating simple heuristic rules and focusing on only one metric.

8. Appendix

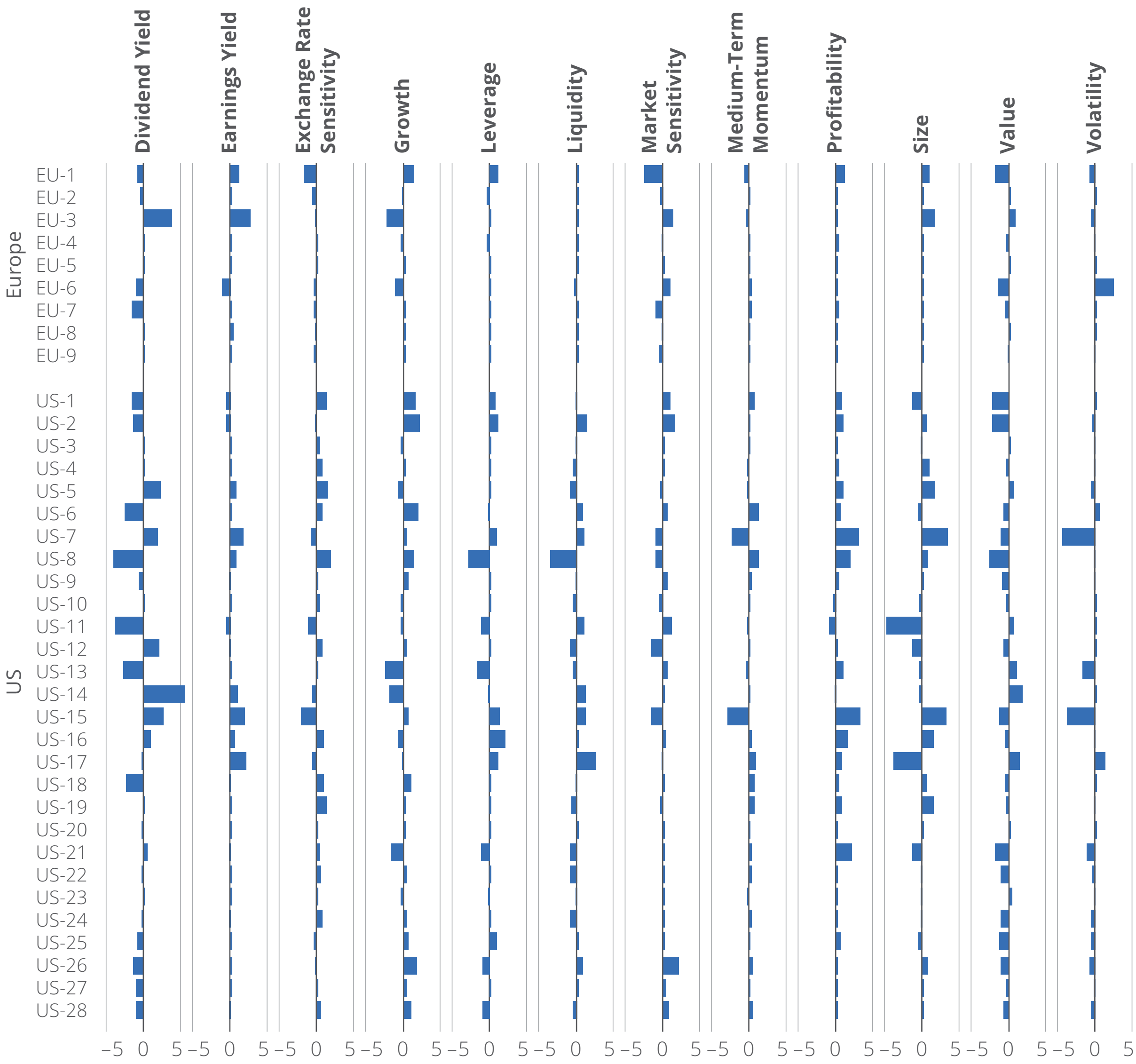
Figure 23: Definitions, source, desired direction, range and descriptions for metrics used in the analysis.

Sustainability Metric	Provider	Higher or Lower is Better	Range	Description
CarbonRiskRating	ISS-ESG[7]	Higher is better	0–100	This factor provides a numeric score from 0 to 100 for the rated entity's overall carbon risk based on an assessment of over 100 industry-specific indicators and a carbon risk classification at the industry and sub-industry levels.
ClimateTotalEmissionsIntUSD	ISS-ESG	Lower is better	0–Unbounded	This factor identifies the issuer's total (Scope 1 + Scope 2) carbon emissions intensity. Carbon intensity is expressed as the issuer's total carbon emissions per million USD of revenue as a proxy of the carbon efficiency per unit of output.
ESG Risk Score	Sustainalytics	Lower is better	0–100	Overall unmanaged risk score for a company.
ESG Risk Score-Momentum	Sustainalytics	Lower is better	-100–100	One year change in ESG Risk Score.
ESG_SCORE	ClarityAI	Higher is better	1–100	ESG Risk score of a company is the factor-weighted average of its Environmental, Social and Governance Pillar scores. Each pillar score is made up of quantitative metrics, policies, and controversies associated with the pillar.
ENVIRONMENTAL_SCORE	Clarity AI	Higher is better	1–100	Environmental pillar of ESG Score.
GOVERNANCE_SCORE	Clarity AI	Higher is better	1–100	Governance pillar of ESG Score.
SOCIAL_SCORE	Clarity AI	Higher is better	1–100	Social pillar of ESG Score.
TOTAL_SDG_SCORE	Clarity AI	Higher is better	1–100	The Total SDG Score is an impact score that measures the impact of a company across the SDGs, in a way that enables comparison across companies, within and across industries and across SDGs. It focuses on quantifying and monetizing the impact a company makes in real world terms.
SBTi_Committed_or_Concrete Target	ISS-ESG	Higher is better	0–100	Derived from categorical metric. If a company is either committed to SBTi or already set concrete targets, the weight of asset in the portfolio counts towards the aggregate metric.
SdiStatus_MajorityOrDecisive	SDI AOP	Higher is better	0–100	Derived from categorical metric. If a company is either categorized as having Decisive or Majority status, the weight of asset in the portfolio counts towards the aggregate metric.

Source: Qontigo.

[7] For a more comprehensive perspective on a portfolio's climate impact, investors should refer to the ISS-ESG Climate Impact Report.

Figure 24: Active style exposures for individual ETFs.



Note: Exposures to style factors are based on the region for the ETF and the associated risk model. The Axioma US4 MH Model was used for the US region and the Axioma EU4 MH Model was used for ETFs in Europe.

Source: Qontigo.

8.1 ETFs and their benchmarks

Figure 25: Traditional benchmarks used for active risk and active exposure analysis for each ETF.

ETF Ticker	Benchmark
DBXZ	FTSE All-Share
DSI	S&P 500
ECOZ	STOXX USA Total Market
EDMU	STOXX USA 500
EFIV	S&P 500
ESG	STOXX USA 500
ESGV	Russell 1000
ESML	Russell 2000
ETHO	Russell Midcap
EXIA	DAX
EXXV	EURO STOXX
IESE	STOXX Europe 600 ex UK
IQSU	S&P 500
MFED	EURO STOXX
MVEE	STOXX Europe 600 Ax Low Risk
NULC	Russell 1000
NULG	Russell 1000 Growth
NULV	S&P 500 Value
NUMG	Russell Midcap Growth
NUMV	Russell Midcap Value
NUSC	Russell 2000
RAFE	Russell 1000 Value
RESP	S&P 500
RIEU	STOXX Europe 600
RIUS	STOXX USA 500
SLMA	EURO STOXX
SNPE	S&P 500
SPPY	S&P 500
SUSA	Russell 1000
SUSL	S&P 500
USA	STOXX USA 500
USSG	S&P 500
USXF	STOXX USA Total Market
VEGN	STOXX USA Total Market
XVV	S&P 500
XZMU	S&P 500
ZPDX	STOXX Europe 600

Source: Qontigo.

8.2 How we compute allocation and selection effects

We divide the universe of assets into disjoint groupings such as sectors. For grouping i, let

w_i^p be the weight of the portfolio,

w_i^b be the weight of the benchmark,

x_i^p be the exposure of the portfolio,

x_i^b be the exposure of the benchmark.

We also define x^b as the exposure of the entire benchmark. Then we can decompose the active exposures as

$$Active\ exposure = \sum_i (w_i^p - w_i^b)\left(x_i^b - x^b\right) + \sum_i w_i^p \left(x_i^p - x_i^b\right).$$

The first and second summation terms are referred to as the allocation effect and selection effect, respectively.

9. Contacts and further information

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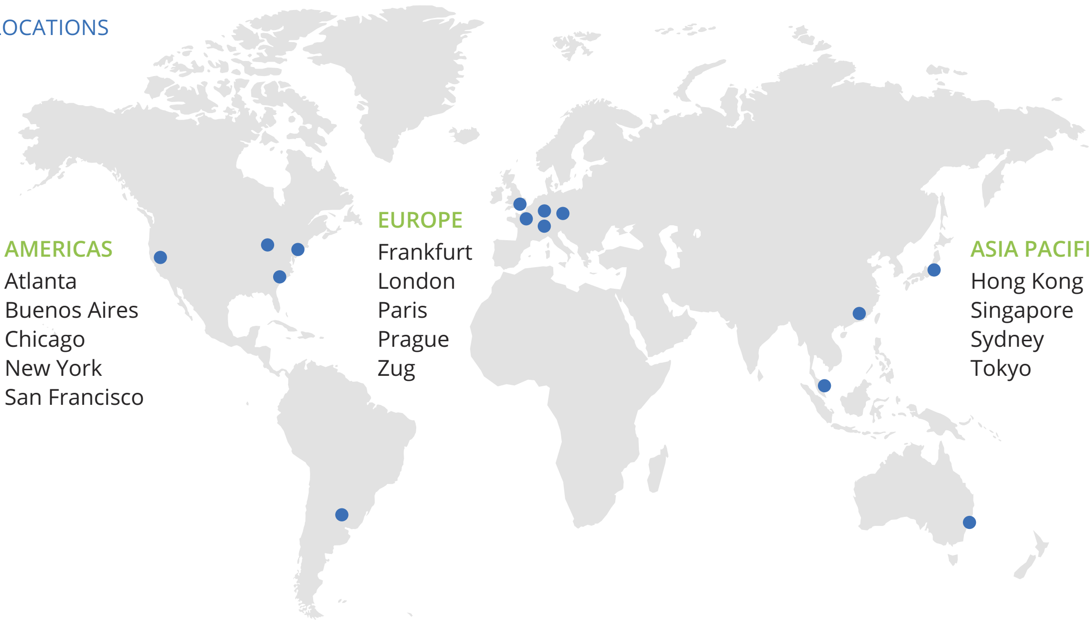
LOCATIONS



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