Not all ESG portfolios are created equal!

Efficient implementation of different investor ESG preferences

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Tim Herzig
Portfolio Manager,
Invesco Quantitative Strategies

Erhard Radatz
Portfolio Manager,
Invesco Quantitative Strategies

Carsten Rother
Research Analyst,
Invesco Quantitative Strategies

Introduction

All eyes are on ESG and climate change – and they undisputedly represent the challenge of this generation. But addressing environmental, social and governance preferences often means different things to different investors. The lack of a clear definition has resulted in a divergence of ESG criteria and ways to implement them. Berg et al. (2022) showcase how ESG ratings differ across vendors and identify an array of reasons for that divergence, including weighting schemes, sub-categories and data sources.

Adding to the complexity, investors often have different preferences when looking for ESG investments. These can range from managing a funds' overall ESG profile, to minimizing the carbon footprint of a portfolio, to temperature alignment and more. The multitude of objectives necessitates a variety of techniques for effective ESG incorporation. While some client preferences can be effectively implemented via exclusions, as shown by Alessandrini and Jondeau (2020, 2021), others require a more targeted approach, constructing the optimal weights with specific ESG preferences in mind. For instance, Kolle et al. (2022) specifically include the individual ESG preference within the objective function, solving the problem using a 2-step optimisation. This is superior to simply limiting the universe to enhance the ESG profile, which often permits inclusion of controversial activities, or following a best-in-class approach.

The prevalence of different investor preferences calls into question how best to integrate ESG into an overall portfolio construction framework. Especially when combining ESG preferences with active management of a portfolios' overall risk-return profile, the effect of ESG implementation is often unclear. Krueger, Sautner and Starks (2020) show that most investors put a similar emphasis on their portfolio's ESG profile and an attractive risk-return profile. This results in different efficient frontiers, as shown in Pedersen, Fitzgibbons and Pomorski (2021). On a related note, Blitz and Swinkels (2021) highlight the expected loss that can result from inefficient ESG implementation and corresponding lower factor exposures, which is why we also propose a 2-step optimisation to marry the two investment objectives: Step 1 – Efficiently implement investors' ESG preferences and Step 2 – Achieve an attractive risk-return profile. This procedure resonates well with common investor preferences as outlined in Coqueret (2021).

This portfolio construction methodology helps resolve any discussion with respect to the appropriate benchmark. For instance, if an investor opts for strict exclusion of companies from the investable universe, the generic market cap weighted benchmark may no longer be appropriate. Therefore, implementing investors' ESG preferences already in portfolio construction isolates the ESG effect, allowing full transparency of the ESG impact and a clear attribution. Moreover, as most ESG characteristics are uncorrelated with factors, this step barely alters the factor profile of the resulting anchor portfolio compared to the market cap weighted benchmark.

This paper aims to summarize and exemplify an effective approach to systematic implementation of various investor preferences concerning ESG and beyond (factors).

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Striking the balance between ESG considerations and an attractive risk-return profile, we utilise a 2-step optimisation.

Portfolio construction: 2-step approach

The debate surrounding the performance effect when including ESG into an investment strategy is still ongoing. Over the short history, empirical research has found evidence that ESG leads to outperformance (De and Clayman (2015)), underperformance (Pedersen, Fitzgibbons and Pomorski (2021); Bolton, Kacperczy and Samama (2021)) and had a neutral effect on performance (Naffa and Fain (2021); Hartzmark and Sussman (2019)).

While De and Clayman (2015) find a positive relationship between ESG ratings and future risk-adjusted returns, Bolton, Kacperczy and Samama (2021) find that companies with higher carbon emissions entail a risk premium and outperform companies with lower carbon emissions. Similarly, Pedersen, Fitzgibbons and Pomorski (2021) derive an ESG-efficient frontier that indicates a (small) risk premium for sin stocks. Looking at ESG data, we do not find a significant impact of ESG ratings on future performance in line with the majority of the financial literature.

Thus, we strive for efficient implementation into the portfolio construction framework, accounting for ESG preferences without ESG being a clear driver of risk and return. Striking the balance between ESG considerations and an attractive risk-return profile, we utilise a 2-step optimisation which allows active management of a portfolios' overall factor exposure without sacrificing the possibility of implementing ESG in a risk-controlled and diversified manner. This portfolio construction methodology also fosters transparency and attributability, as it separates the ESG effect and the factor overlay.

The first step in the 2-step optimisation results in an ESG-aligned anchor portfolio, respecting the ESG characteristic best suited to achieve the investor preference. Depending on the ESG objectives, this can be implemented either via a tracking error minimisation vis-à-vis the benchmark or through an optimisation – whichever leads to a more efficient implementation and a more targeted approach towards the investment objective.

We therefore either minimise active risk vs. the benchmark using

$$min\,(h_P - h_B)'\,\Sigma(h_P - h_B)$$
$$s.t. ESG\ objectives$$

or, alternatively, optimise using

$$max\ h'\alpha - \frac{\lambda}{2} h'\Sigma h$$

where α is the ESG objective we want to maximize, λ is a risk aversion parameter and Σ is the covariance matrix. Specifically, Σ is governed by a linear factor structure:

$$\Sigma = \boldsymbol{F}'\,\Omega\,\boldsymbol{F} + \varepsilon$$

where Ω is the estimated factor covariance matrix, $\boldsymbol{F}$ denotes the factor score matrix (displaying all factor scores for each asset) and ε denotes the specific risk portion. As this ESG-aligned anchor portfolio is driven purely by the ESG objective, the difference between the benchmark and the ESG-aligned anchor portfolio can be attributed fully to the ESG objective.

The second step in the 2-step process integrates active management of the portfolios' factor characteristics without diminishing the ESG impact. It aims to actively position the portfolio towards the salient drivers of risk and return, and we focus on the classic factors: quality, momentum and value. A risk-controlled factor overlay allows adherence to both investor objectives, ESG alignment and attractive risk-return characteristics. This step always solves

$$max\ h'\alpha - \frac{\lambda}{2} h'\Sigma h$$

where α is derived from a linear factor model such as

$$S_i^t = w_1 \times F_{1,i}^t + \ldots + w_K \times F_{K,i}^t$$

deriving the aggregate multi-factor score S_i of stock i at time t as a linear combination of the K number of factors F.

Tailored portfolios for different ESG preferences

In the following section, we present four case studies to highlight different potential investor ESG preferences. Dealing with a dual objective problem, we broadly characterise the preferences by the tilts the investor wants to represent in the portfolio. These focus either on ESG (what we term a 'non-financial objective') or a financial objective, which is best represented by the active factor overlay. They range from minimal ESG inclusion (in terms of impact as well as active risk budget) and consequently a strong focus on financial objectives, to dedicated ESG strategies where financial objectives play a minor role. We begin with strategies that focus on the financial objective and a limited impact on overall ESG (case study 1) before highlighting ways to implement ESG efficiently alongside an active factor strategy (case studies 2 and 3). Case study 4 highlights how to efficiently construct a portfolio with the main focus on ESG and only minor financial objectives.

Case study 1: Carbon footprint reduction

The most discussed and implemented preference among academics and practitioners is carbon reduction. Reducing carbon intensity of the overall portfolio is a key step towards a net zero framework. Bender, He, Ooi and Sun (2020) find that significantly reducing carbon intensity preserves key investment objectives. As carbon intensity data is highly skewed towards a few high emitters, Andersson, Bolton and Samama (2016) highlight the low risk required to substantially reduce the carbon footprint of a given portfolio. For a substantial decrease in overall carbon intensity, it is often enough to simply divest from those high emitters. Only extreme reductions in carbon intensity were found to be related to adverse impacts on sector allocations.

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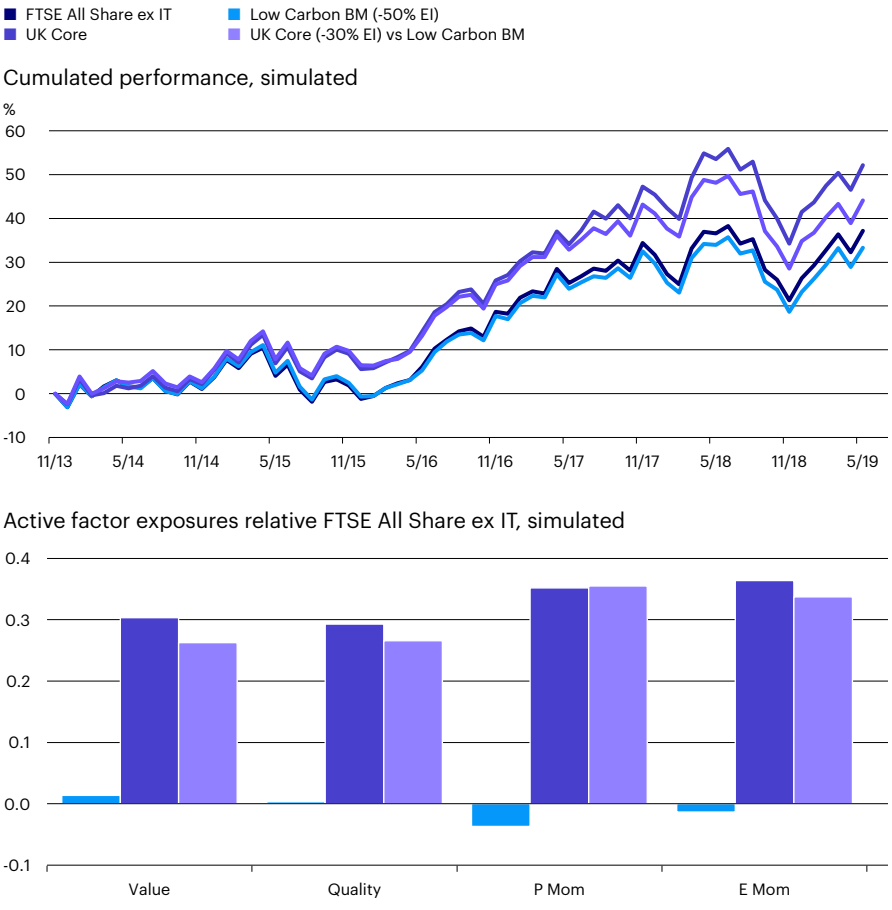
We construct a low carbon strategy while maintaining overall portfolio characteristics.

Focusing on one of the carbon-heaviest regions, the UK, we construct a low carbon strategy while maintaining overall portfolio characteristics. To better control the carbon reduction and the subsequent factor overlay, and to allow for a clearer attribution, we first construct a low carbon anchor portfolio. We minimise the tracking error relative to the benchmark while adding a constraint to reduce carbon intensity by at least 50%. Figure 1 shows that the performance impact is muted, which is also showcased in the active factor exposures. As the carbon reduction comes with a small active risk of 50 bps and the carbon risk is nearly uncorrelated to the risk taken by an active factor overlay, a 3% active risk budget in the second step relative to the anchor portfolio will result in an overall active risk budget of roughly 3% relative to the market cap weighted benchmark.

Figure 1

Performance and active exposures for a simulated carbon reduction strategy highlighting the effects in a 2-step optimisation



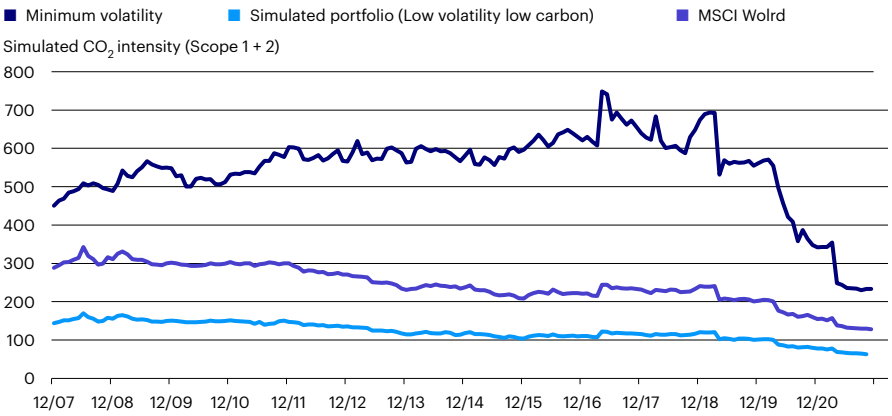
Source: Invesco. Period: Dec. 2013 – Oct. 2019. There is no guarantee that the simulated performance will be achieved in the future.

Capturing the low volatility premium utilising a minimum variance portfolio often comes with a substantial increase in carbon intensity.

Case study 2: Multiple factor preferences with ESG considerations

As presented in the first case study, carbon intensity does not necessarily interact with active factor exposures. While this observation holds true for quality, momentum and value, the picture looks different when considering low volatility. Capturing the low volatility premium utilising a minimum variance portfolio often comes with a substantial increase in carbon intensity, as shown in figure 2.

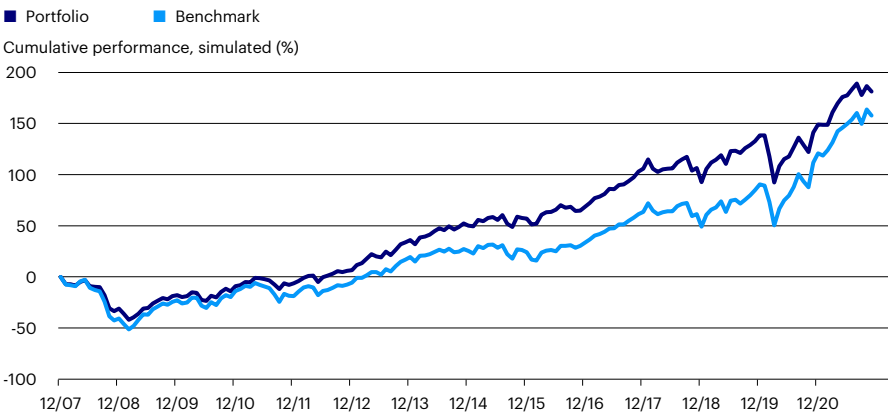
Figure 2
Carbon intensity for a simulated minimum volatility portfolio as well as a market capitalisation weighted benchmark and a carbon intensity-aware strategy



Source: Invesco. Period: December 2007 – November 2020. There is no guarantee that the simulated performance will be achieved in the future.

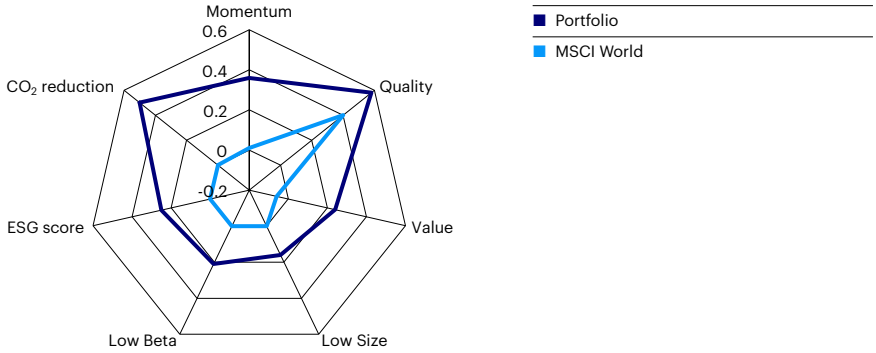
Importantly, carbon reduction again comes with very low active risk relative to a non-carbon-integrated approach and leaves behind a perfectly suitable anchor portfolio for a subsequent factor overlay. To investigate the integration of stricter ESG exclusions and an increase in ESG exposure, we utilise the proposed 2-step portfolio construction methodology to integrate the ESG considerations, constructing an ESG-aligned anchor portfolio integrating all the exclusions, ESG exposure targets and carbon reductions. Afterwards, we actively manage factor characteristics of the overall portfolio, which results in a diversified portfolio with a minimal impact of the ESG alignment on our ability to achieve an attractive risk-return profile. Looking at the performance highlighted in figure 3, we see that the ESG-aware strategy performs in line with other factor strategies that do not consider ESG characteristics. Figure 4 indicates that the overall portfolio achieves attractive characteristics from a factor as well as an ESG perspective.

Figure 3
Cumulative performance for a simulated carbon-aware multi-factor strategy including low volatility



Source: Invesco. Period: December 2007 – November 2020. There is no guarantee that the simulated performance will be achieved in the future.

Figure 4
Simulated factor exposures



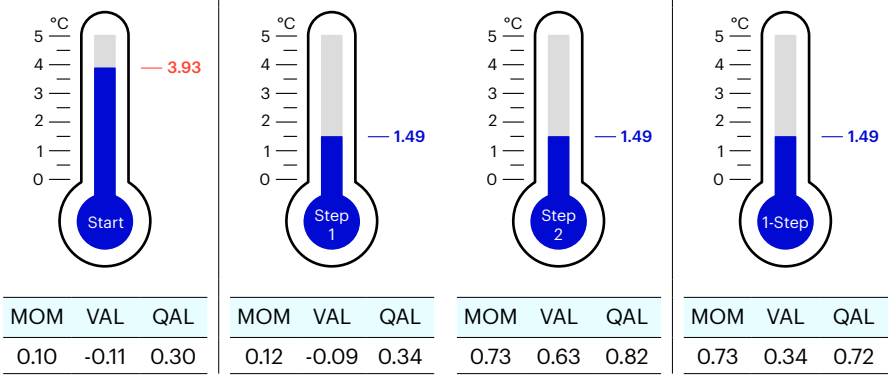
Source: Invesco. Period: November 2020. There is no guarantee that the simulated performance will be achieved in the future.

> Investors may strive for a temperature alignment coupled with active management of their portfolio characteristics.

Case study 3: Lower carbon footprint with temperature alignment and enhanced performance

The 2015 Paris Agreement is a landmark in limiting emissions and targeting global warming well below 2°C (preferably 1.5°C) compared to pre-industrial levels. In light of this, investors may strive for a temperature alignment coupled with active management of their portfolio characteristics. To actually achieve the temperature alignment, it is not sufficient to simply follow a 1-step process, applying regulatory constraints while otherwise cohering as closely as possible to a market capitalisation weighted benchmark. Compared to this simple approach, including the temperature alignment objective directly in the creation of the anchor portfolio leads to a better temperature alignment and preserves diversification and factor characteristics. In a second step, the active factor overlay achieves a better positioning towards the salient drivers of risk and return, as seen in figure 5.

Figure 5
Temperature alignment calculated as the carbon intensity weighted temperature score



MSCI World			2-step optimization						1-step optimization		
			Temperature-aligned portfolio			Multi-factor overlay					
MOM	VAL	QAL	MOM	VAL	QAL	MOM	VAL	QAL	MOM	VAL	QAL
0.10	-0.11	0.30	0.12	-0.09	0.34	0.73	0.63	0.82	0.73	0.34	0.72

Source: Invesco. Period: August 2021.

The proposed 2-step optimisation does not materially underperform an in-sample, optimal 1-step optimisation, while it delivers the benefit of a clearer attribution and potentially more stable out-of-sample performance. Using the methodology discussed in Kolle, Lohre, Radatz and Rother (2022) to calculate portfolio temperature alignment, there is a balance between current carbon intensity and the forward-looking temperature trajectory. This balance is key to constructing a portfolio fitted for the challenges of temperature alignment.

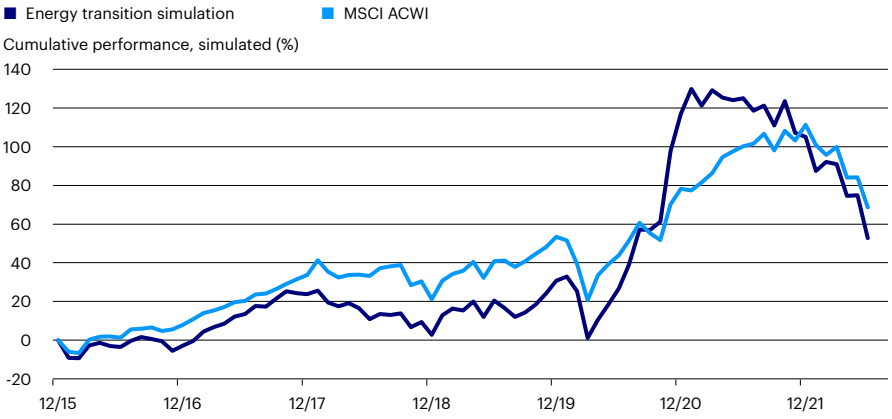
Global crises have also brought focus to a component often overlooked when considering ESG – Social.

Case Study 4: ESG theme strategies – energy transition and social impact

According to a survey conducted in 2021 by EDHEC among European investment professionals, the main reason given by respondents to incorporate ESG into investment decisions was to facilitate a positive impact on society. Herzig, Radatz and Stein (2022) analysed how global conflicts and crises, like the war in Ukraine, have thrown the issue of energy security into sharp focus. They indicated fears that the nascent transition to clean energy and a sustainable future could be delayed or even derailed by the crisis. To avoid detrimental tipping points due to global warming, there is an increased focus on green and sustainable energy. Similarly, these global crises have also brought focus to a component often overlooked when considering ESG – Social. Recent events, regulation and consumer demand will push a greater emphasis on social matters going forward.

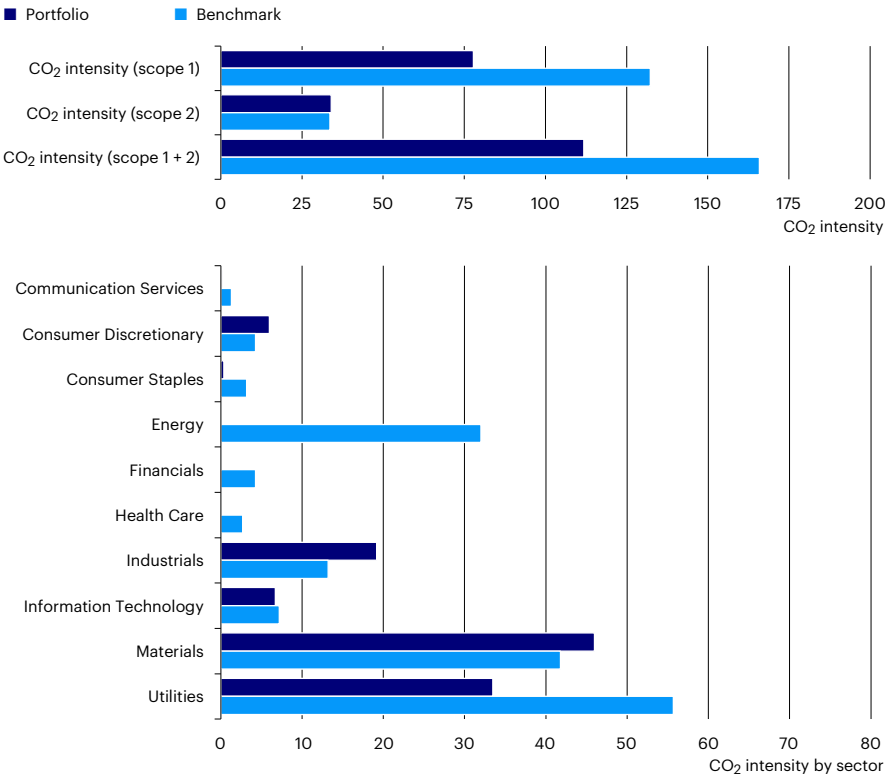
Looking first at energy transition, we use our proprietary NLP approach to identify companies related to the topic of energy transition and collect substantial news media relating to that theme. We use this news coverage to design an anchor portfolio integrating investor preference toward energy transition. As this theme is quite narrow, to avoid

Figure 6
Performance overview of the simulated Energy Transition strategy and its benchmark



Source: Invesco. Period: December 2015 – March 2022. There is no guarantee that the simulated performance will be achieved in the future.

Figure 7
Carbon reduction for overall portfolio simulation and breakdown by sector



Source: Invesco. Period: March 2022. There is no guarantee that the simulated performance will be achieved in the future.

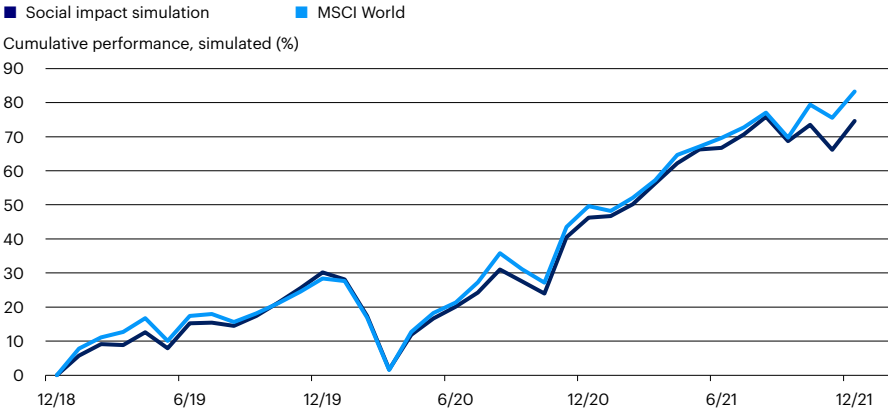
eroding the energy transition characteristics we do not include a factor overlay. From a performance perspective, the strategy exhibits a higher active risk relative to the cap-weighted benchmark, as shown in figure 6.

A consequence of the strict focus on energy transition is the subsequent reduction in carbon intensity (see figure 7). The strategy ultimately combines a backward-looking approach (reducing carbon reduction) with a forward-looking approach focusing on companies' capability in terms of energy transition.

Looking at the social impact strategy, we apply the same portfolio construction technique: First, we use the Social Goods & Services revenue score to identify companies that generate a social impact. We optimize an anchor portfolio by striving for a maximisation of that score while maintaining diversification. In the second step, we add a risk-controlled factor overlay to actively manage the portfolios' factor characteristics. While the focus is on the social impact generated by the portfolio, the factor overlay corrects factor tilts and ensures the strategy is not positioned against well-known drivers of risk and return, e.g. quality, momentum and value.

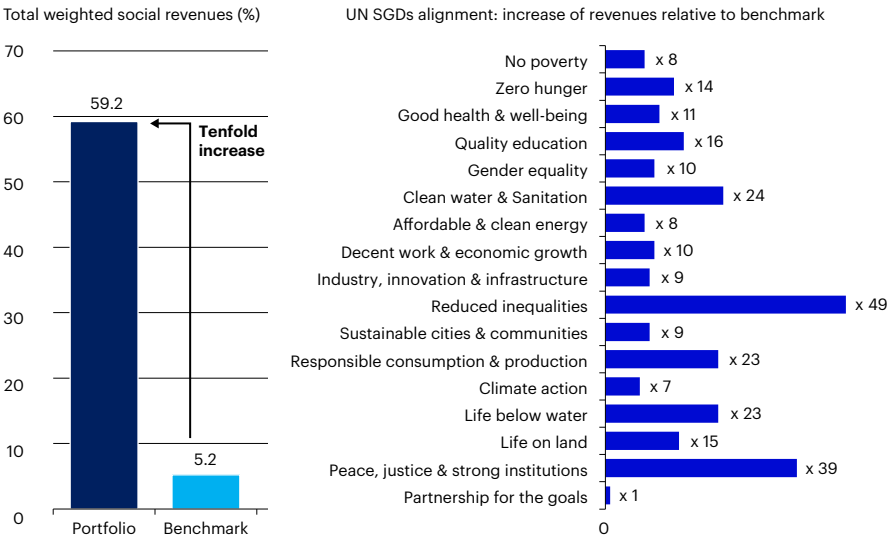
As seen in Figure 8, the social impact simulation performs in line with the overall market and features a limited active risk budget. This benchmark-like performance is achieved while maximising revenues towards social impact and vis-à-vis increased exposure to the UN Social Development Goals (SGD). Additionally, the strategy also actively manages factor characteristics with a controlled active risk budget and is well positioned for the short-term by managing the financial characteristics of the strategy – but also for the long-term by positioning itself towards social impact and a more sustainable society.

Figure 8
Cumulative simulated performance of the Social Impact simulation and the MSCI World



Source: Invesco. Period: December 2018 – December 2021. There is no guarantee that the simulated performance will be achieved in the future.

Figure 9
'Social Revenues' of the fund and the benchmark (left side) and the SDG alignment, including the increase relative to the benchmark



Source: Invesco. Period: December 2021.

Conclusions

ESG preferences can be different for every investor. Providing a flexible framework to efficiently incorporate these diverging preferences is key to successfully tackling the hurdles every investor sees along the way towards a more sustainable portfolio. Incorporating ESG does not need to harm the risk-return characteristics of the portfolio. Rather, it is a straightforward matter to actively manage factor characteristics alongside ESG characteristics. Providing a clear attribution throughout the investment process helps to transparently disentangle the effects of the non-financial ESG integration from the factor overlay.

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