QUANTITATIVE INVESTING

Mind the gap: Effectively replacing sustainability exclusions

ROBECO
The Investment Engineers

- Excluding unsustainable stocks leaves a gap that needs to be filled
- Naïve rescaling of the remaining stocks is inefficient, research shows
- We aim for better performance by using more sophisticated approaches

Sustainable investors typically exclude the least sustainable companies from their portfolios. Common examples of such exclusions include the tobacco industry, companies involved with controversial weapons and thermal coal producers. Exclusions can also be implicit, such as constraints on the carbon footprint or ESG score of the portfolio which necessitate divesting from certain stocks that score poorly on these metrics.

Exclusions result in underweight positions compared to the market portfolio, leaving a gap to be filled. In order to remain fully invested, sustainable investors must replace such underweights with overweight positions in other stocks. There are several ways to go about this, each with its own pros and cons. Since active decision making is required, sustainable investing is, by its nature, active investing; see also Blitz and de Groot (2019). The purpose of this article is to compare the financial performance of various methods used to replace excluded stocks.

The base-case approach involves rescaling the weights of the remaining stocks in proportion to their market capitalizations. This approach is sometimes considered a passive way of handling exclusions, because the resulting portfolio is how the passive market portfolio would look if the excluded stocks simply did not exist. Sustainable indices are often constructed this way.

One concern with this approach is that excluded stocks may have attractive factor characteristics, a point noted by Blitz and Fabozzi (2017) in the case of classic 'sin stocks'. In other words, exclusions may come down to a bet against proven factors.

A related concern, discussed in Blitz and Swinkels (2021), is that rescaling often leads to reinvesting most of the weight of the excluded stocks in the largest index stocks, which may have vastly different characteristics. For example, a carbon footprint constraint might lead to utilities companies being replaced predominantly with overweights in heavyweights like Apple, Microsoft, and Alphabet. While the former are typically defensive, high-income stocks, the latter are growth-oriented technology companies, causing significant tracking error. The passive approach may be too simplistic. One cannot randomly remove parts of the market index and then expect the remainder to still constitute an optimal portfolio.

Our first alternative approach aims to minimize the tracking error resulting from exclusions, striving to realign closely with the return of the market index. The second alternative uses the forced underweights from exclusions

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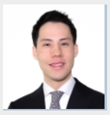
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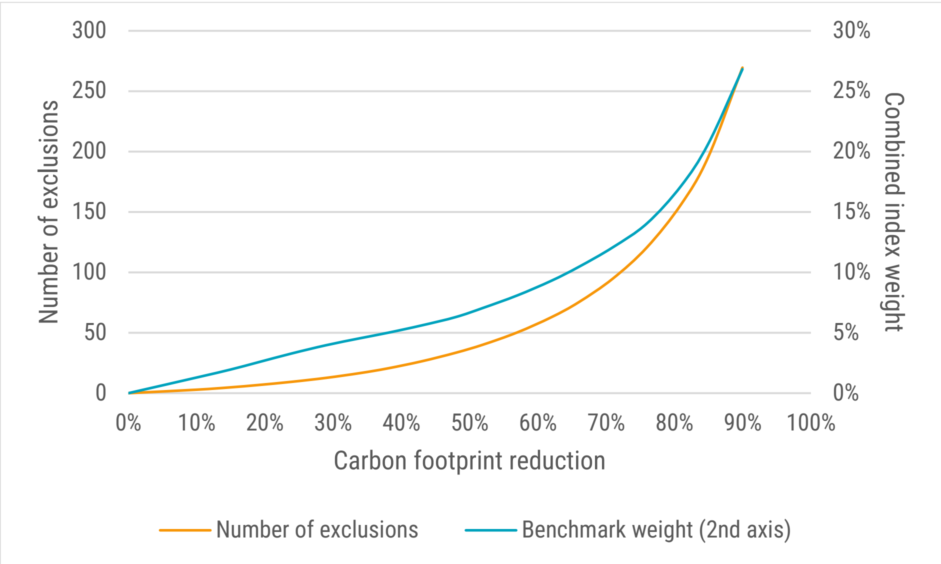
Sustainable Investing Expertise by ROBECOSAM to buy stocks with attractive factor characteristics, with the goal of maximizing risk-adjusted returns. In the appendix we also explore a third alternative, which involves replacing exclusions with highly sustainable stocks, using alternative energy stocks as a concrete example. In summary, these alternatives focus on minimizing risk, maximizing return, or maximizing sustainability. Our main finding is that these more sophisticated approaches can improve significantly upon the naïve approach.

Making sense of the data

For our empirical analyses, we consider two types of exclusions: carbon footprint constraints and exclusions based on Sustainable Development Goal (SDG) scores. For the carbon footprint constraint, we explore reductions of 50%, 60%, 70%, or 80% compared to the benchmark index, using TruCost scope 1 and 2 emissions scaled by EVIC or enterprise value including cash. The SDG data is drawn from Robeco's proprietary SDG framework, with scores ranging from -3 (worst) to +3 (best). We consider the exclusion of stocks with SDG -3 scores only, -3 and -2 scores, all negative scores (-3, -2, and -1), or all non-positive scores (-3, -2, -1, and 0). Our sample encompasses the MSCI World (developed markets) universe from January 2006 to December 2022.

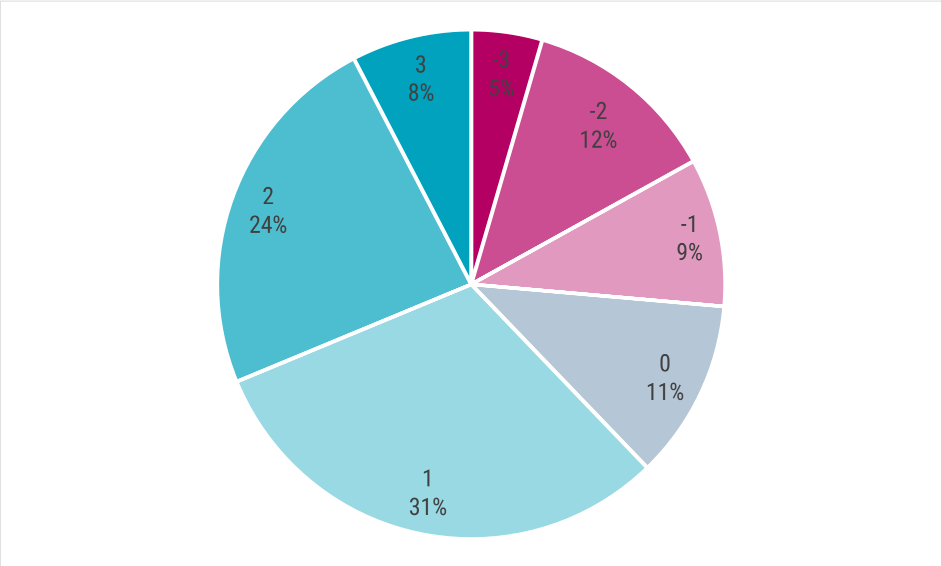
To illustrate, Figure 1 shows the number of stocks that need to be removed and their combined weight in the benchmark index for a given level of carbon footprint reduction. For this approach, we first remove the stock with the highest carbon footprint and then continue down the list until the desired reduction level is reached. The graph shows that 50% carbon footprint reduction requires excluding around 40 stocks with 7% benchmark weight, while in case of an 80% reduction, this jumps to over 150 stocks with nearly 20% benchmark weight. Figure 2 illustrates the distribution of SDG scores, with slightly more than a quarter of the stocks having negative SDG scores, and an additional 11% having neutral scores.

Figure 1: Impact of carbon footprint constraint



Source: Robeco, January 2006 to December 2022

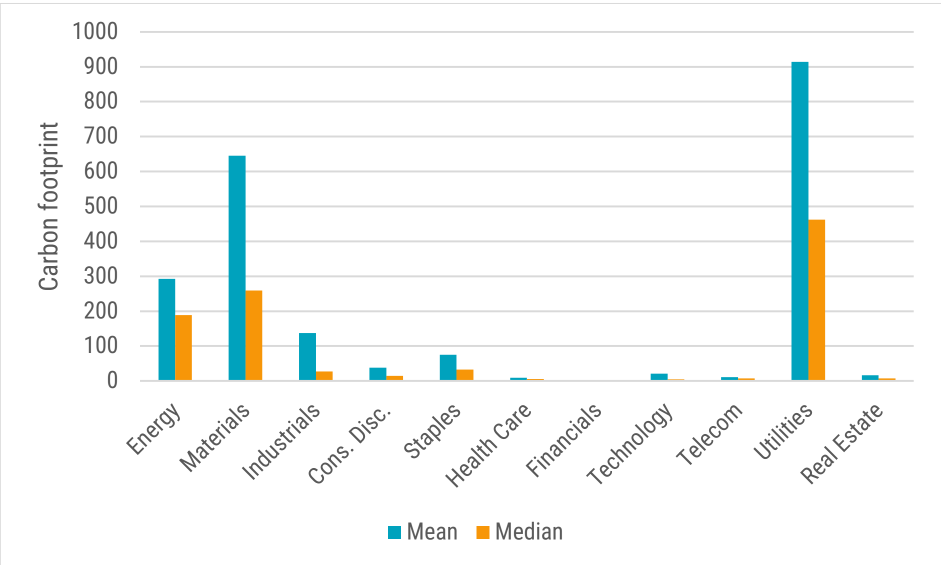
Figure 2: Distribution of SDG scores



Source: Robeco, January 2006 to December 2022

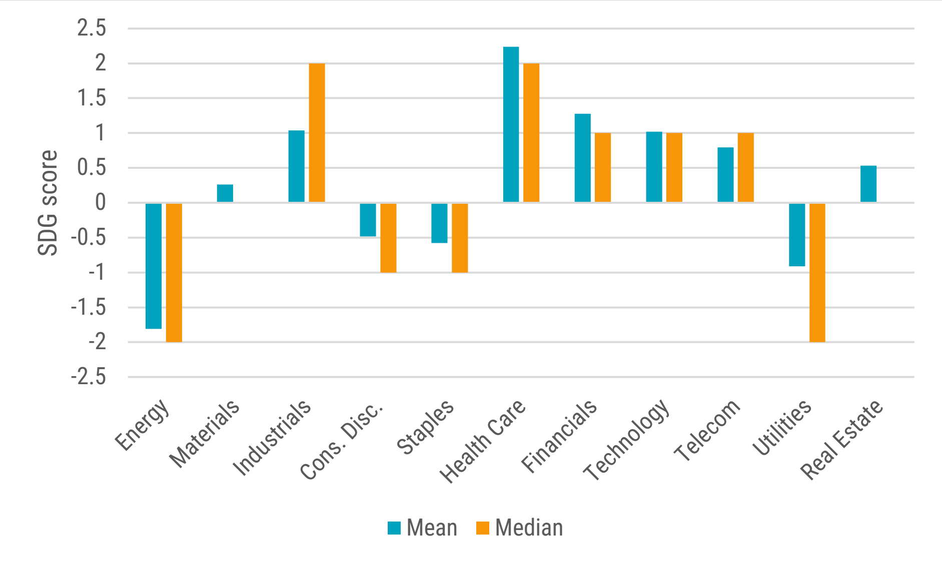
Figures 3 and 4 show the sustainability scores at the sector level. The sectors with the highest carbon footprints are energy, materials and utilities. Additionally, the energy and utilities sectors also register the lowest average SDG scores, with consumer discretionary and staples sectors following suit. It's worth noting that the consumer staples sector contains the tobacco and alcoholic beverage industries.

Figure 3: Carbon footprint at the sector level



Source: Robeco, January 2006 to December 2022

Figure 4: SDG scores at the sector level

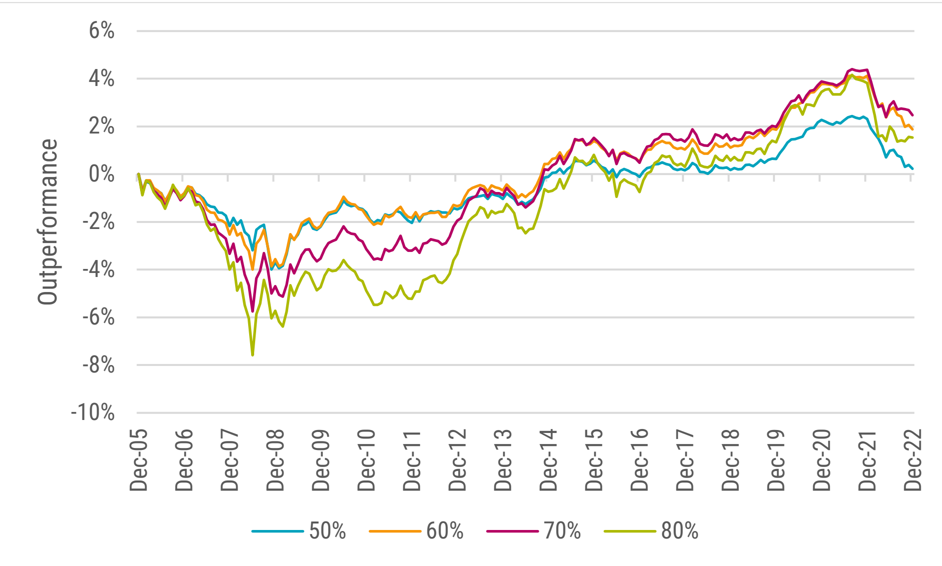


Source: Robeco, January 2006 to December 2022

Exploring the naïve rescaling approach

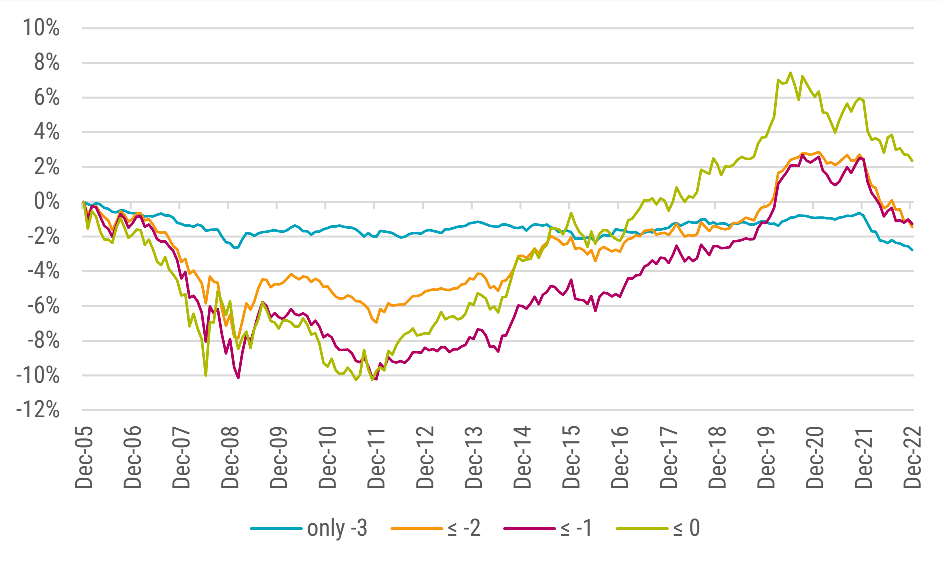
Our initial analysis focuses on the naïve rescaling approach, where the weight of excluded stocks is reallocated to the remaining stocks based on their market capitalizations. The cumulative market-relative performance of the naïve strategies is shown in Figures 5 and 6. We observe that the effect of carbon constraints and SDG exclusions on long-term performance is largely neutral, with slight outperformance at the end of the sample in some cases and slight underperformance in others.

Figure 5: Cumulative relative performance naïve strategy with carbon constraints



Source: Robeco, December 2005 to December 2022

Figure 6: Cumulative relative performance naïve strategy with SDG exclusions



Source: Robeco, December 2005 to December 2022

While these return differences are statistically insignificant (essentially indistinguishable from random noise), the short-term effects are sizable. For instance, the portfolios with exclusions underperformed by 2 to 4% in 2022 alone. Over periods of two to five years, such exclusions can even lead to return differences of more than 10%, both negative and positive. In short, exclusions can involve a significant amount of tracking error and present a risk of significant underperformance in the short to medium term. In the next section we will show that these large return fluctuations arise from pronounced exposures to systematic risk factors inherent from naïve exclusion approach.

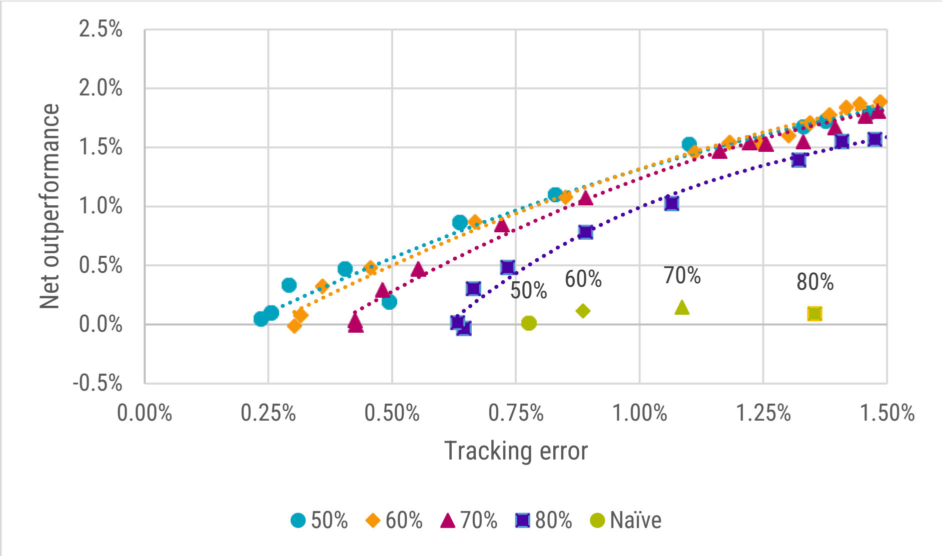
Enhanced approach: Minimizing tracking error or maximizing return

We next examine potential improvements on the naïve approach through either tracking error minimization or return maximization. For these approaches we use Robeco's proprietary risk model and core alpha model. We do not constrain the underweights to just the exclusions, meaning we allow the optimizer to create additional underweights if this helps to improve the expected risk-adjusted performance of the portfolio. Figures 7 and 8 show the efficient frontiers that can be obtained by varying the weights given to alpha and tracking error during portfolio optimization.

The graphs show that substantial tracking error reductions can be achieved. Compared to the naïve approach, the strategies optimized for the lowest ex-ante tracking error (on the far left of the efficient frontiers) exhibit ex-post tracking error reductions in the range of 50-70% for the carbon constraint and 30-50% for the SDG exclusions. The carbon constraint offers more room for improvement because it is less restrictive than the SDG exclusions. For context, the entire fossil fuel industry is effectively inaccessible when stocks with negative SDG scores are excluded, while the carbon constraint still allows positions in stocks that are best-in-class within their industry.

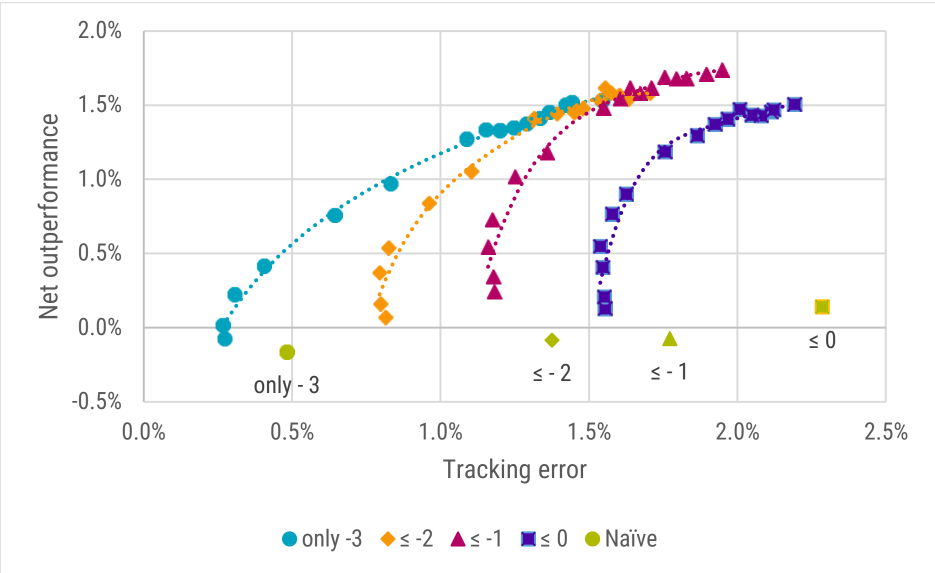
The far right of the efficient frontiers shows that taking the active share arising from exclusions as an opportunity to maximize factor exposure can lead to substantial improvements in expected return. Historical simulations yield net information ratios of about 1, signifying outperformances roughly equal to tracking error magnitude. While slightly trailing fully fledged quantitative enhanced indexing strategies, where the underweights can be concentrated in stocks with the worst factor exposures, this is still a very decent result.

Figure 7: Risk-return combinations with carbon constraints



Source: Robeco, January 2006 to December 2022

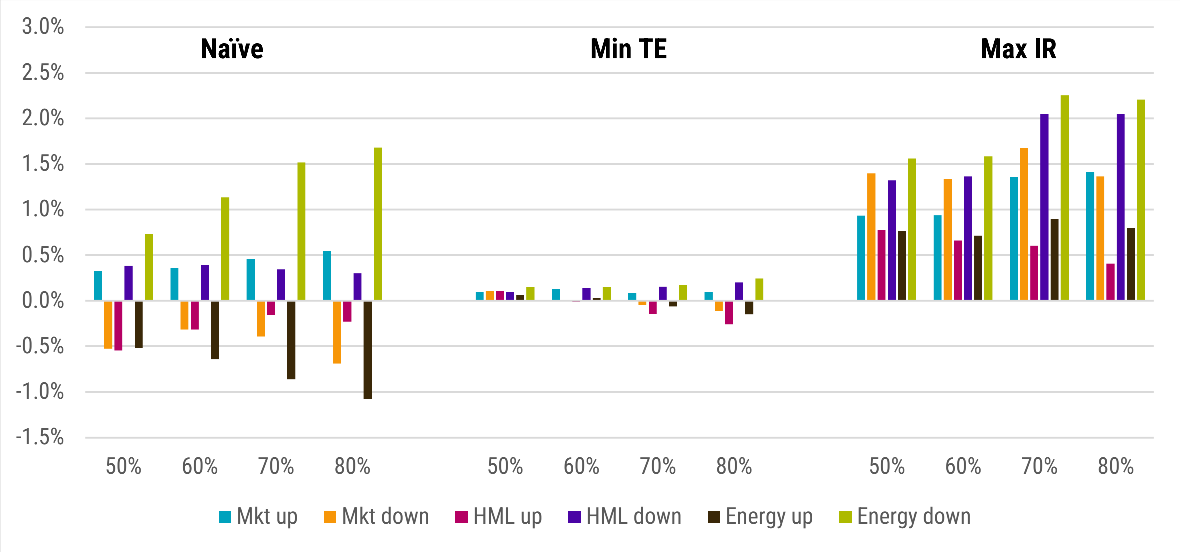
Figure 8: Risk-return combinations with SDG exclusions



Source: Robeco, January 2006 to December 2022

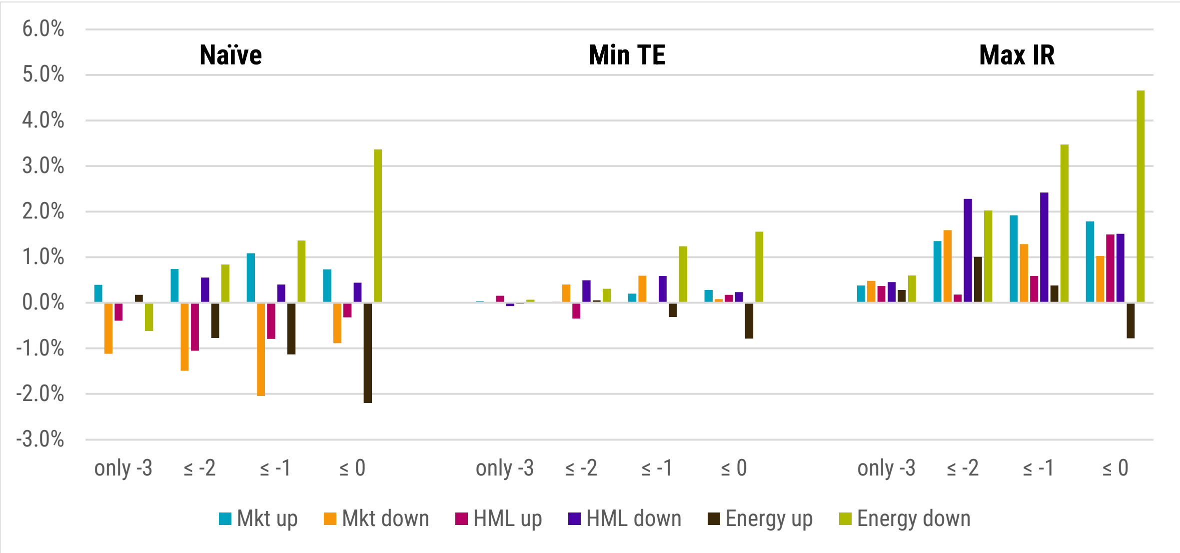
To get a better understanding of the behavior of the risk- or return-optimized portfolios compared to the naïve approach, we examine their performance in different market environments. Figures 9 and 10 show relative performance in up versus down months for the market, value versus growth (HML), and the energy sector relative to the market. For the maximum information ratio (IR) strategy, we consider the return-optimized strategies that have a similar tracking error to the corresponding naïve base-case portfolios.

Figure 9: Conditional performance of portfolios with carbon constraints



Source: Robeco, January 2006 to December 2022

Figure 10: Conditional performance of portfolios with SDG exclusions



Source: Robeco, January 2006 to December 2022

We observe that the naïve approach is very sensitive to different market environments. It does well in market up, value down, and energy down months, but struggles with clear negative expected returns in the opposite scenarios: market down, value up, or energy up. In other words, the naïve approach bets on high beta, growth, and falling oil prices. The tracking error minimization approach massively reduces this sensitivity, attesting to its effectiveness in reducing the tracking error. The return-optimized portfolios manage to achieve positive expected returns in almost every scenario.

The only exception is that for the SDG exclusions, it remains challenging to obtain an expected outperformance if the energy sector does very well. However, compared to the base case, which has a large expected underperformance in this scenario, the outcome is still vastly improved.

Conclusion

Sustainable investing inherently involves exclusions of certain stocks, whether explicit or implicit. These actively imposed underweight positions require carefully chosen overweight positions in other stocks to fill the gap. A common approach is to simply redistribute the weight of the exclusions to the remaining stocks in proportion to their market capitalizations, emulating a passive portfolio.

However, we find that this naïve approach is highly sensitive to various systematic risk factors. We also find that much better results can be achieved with more sophisticated portfolio management techniques. One alternative is to minimize the tracking error of the portfolio. Another is to leverage the forced underweights to improve the expected return by selecting stocks with attractive factor characteristics as replacements. Our empirical tests validate the substantial performance boost from both methodologies. A hybrid approach is of course also viable, combining tracking error reduction and return enhancement.

References

Blitz, D. and de Groot, W., 2019. "Passive Investing and Sustainability Integration Are Fundamentally Irreconcilable Investment Philosophies." *Journal of Portfolio Management* 45 (4): 7-11.
Blitz, D., and Fabozzi, F.J., 2017. "Sin Stocks Revisited: Resolving the Sin Stock Anomaly." *Journal of Portfolio Management* 44 (1): 105-111.
Blitz, D., and Swinkels, L.A.P., 2021. "Does Excluding Sin Stocks Cost Performance?" *Journal of Sustainable Finance and Investment*.

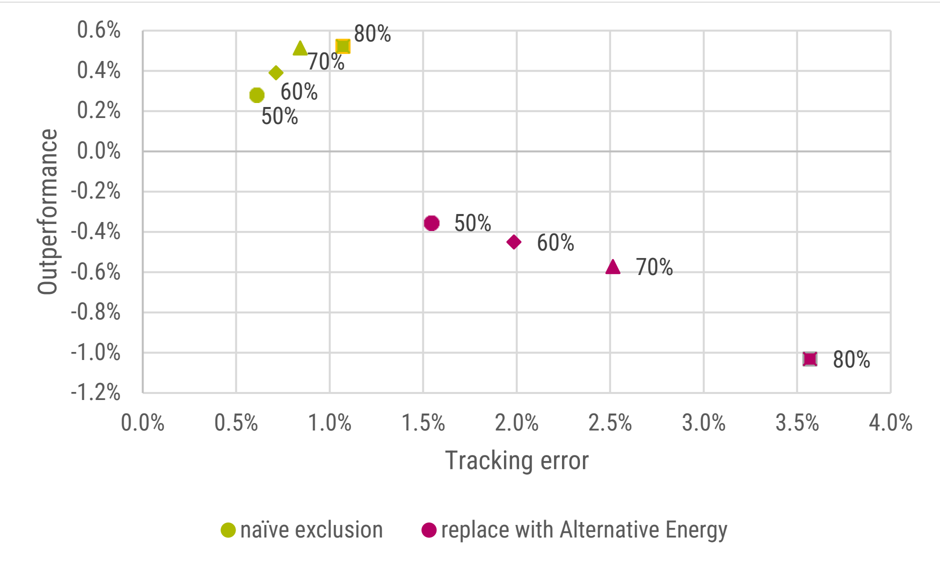
Appendix: Investing in alternative energy

In this appendix, we explore the option of replacing the exclusions arising from carbon constraints or the SDG exclusions with highly sustainable stocks. As a concrete example we consider the MSCI Alternative Energy index, which consists predominantly of stocks in the solar and wind energy industries. This seems a fitting alternative to the carbon and SDG exclusions targeting the traditional fossil fuel industry.

In simple terms, this approach aims to replace brown energy with green energy stocks. This analysis covers a slightly shorter sample period, from January 2009 to December 2022, because the available history for the MSCI Alternative Energy index is limited.

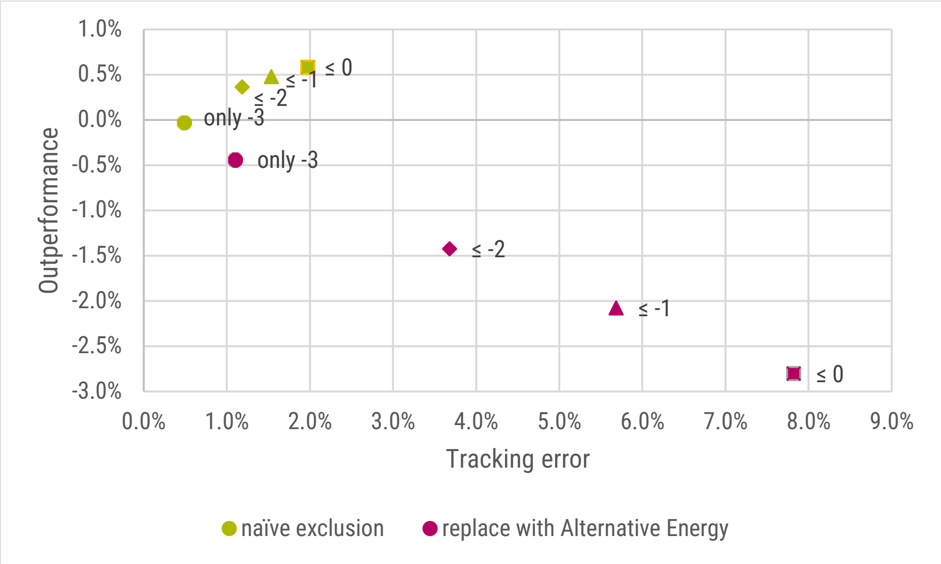
Unfortunately, the MSCI Alternative Energy index had a very poor return combined with very high volatility. In US dollar terms, the total return of the index was even slightly negative over the full 14-year sample period, while the market index had a double-digit annualized return. This disappointing return may be related to its significant anti-value, anti-quality, anti-low-risk factor exposures. Figures A1 and A2 show that replacing exclusions with MSCI Alternative Energy would have resulted in sizable underperformances combined with a substantial tracking error. Thus, although this alternative makes for a very green portfolio, it is deeply unattractive from a financial perspective.

Figure 11 - Replacing exclusions from carbon constraint with MSCI Alternative Energy



Source: Robeco, January 2009 to December 2022

Figure 12: Replacing SDG exclusions with MSCI Alternative Energy



Source: Robeco, January 2009 to December 2022

Of course, many other sustainable indices exist that could be considered as an alternative to replacing exclusions. Given the wide variation in design philosophies and characteristics of sustainable indices, the MSCI Alternative Energy index is not necessarily representative for the outcomes obtained here, but it does serve to illustrate the pitfalls involved. In general, it is not efficient to take an off-the-shelf index as a substitute for selected exclusions. Better results may be obtained by incorporating the desired sustainability goals in the objective function of the optimization problem. For instance, instead of trading off the expected alpha (based on a quant multi-factor model) against tracking error, one could replace the alpha in the objective function with a sustainability metric, such as the portfolio ESG score.

Important Information

Additional Information for US investors

Additional Information for investors with residence or seat in Canada