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Green efficient frontiers. Part 1: Minimizing the risk impact of exclusions

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1. Introduction

The goal of many investors is to improve the sustainability profile of their portfolios without straying too much from a market-cap weighted benchmark. In other words, they want to maximize their sustainability exposure while limiting active risk.

The first step towards building such a portfolio or index is typically to exclude certain categories of companies that are deemed to be undesirable from an ethics or sustainability standpoint, such as those that produce controversial weapons or are involved in the tobacco business. Following the exclusions, the remaining components are reweighted, often by scaling their initial weights back to a total of 100%. Although this is considered an initial, or basic, ESG exclusion strategy, it already introduces tracking error compared to the benchmark.

Now, according to a recent article[1] on Bloomberg, the European Securities and Markets Authority (ESMA) is proposing new restrictions that will force fund managers to exclude certain assets as part of "minimum safeguards." Such additional exclusions will further increase tracking error.

We believe we can improve on this commonly applied methodology. We have found that using an optimizer to drive the weights in the first step can lead to a substantial decrease in active risk, freeing up more of the risk budget to be allocated to the sustainability metric(s) desired and making the optimized sustainability index more suitable as a replacement for a market cap-weighted benchmark.

We also found that using the optimizer in backtesting produces a more consistent stream of active returns and lower realized tracking error than just reweighting the included stocks. The lower tracking error provides greater assurance that the portfolio return will be closer to that of the underlying market. Core benchmarks typically have a long history of returns that one can use in asset allocation decisions. If the tracking error in an optimized portfolio is considerably lower, the manager can allocate more to the sustainable version of the benchmark.

Use of the optimizer, in conjunction with a risk model, recognizes that individual risk factors such as industries or style factors are correlated with other such factors, and that diversification can therefore be improved by taking advantage of these correlations. Typical exclusions often introduce tracking error through tilts towards or away from risk factors. Replacing excluded stocks, either with highly correlated securities with the same factor characteristics or with or securities in correlated factors, mitigates this.

[1] See Fund Exclusion Rule Has Lawyers Sounding Alarm: ESG Regulation - Bloomberg.

2. Putting theory into practice

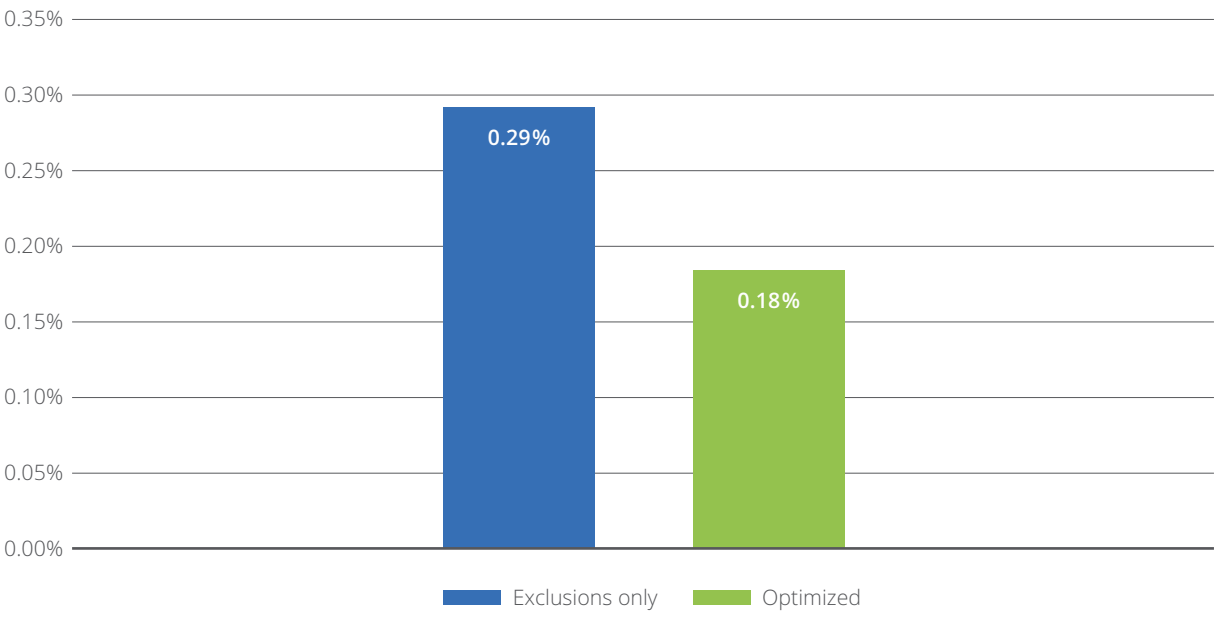
In the following example, we demonstrate the advantage of optimization in this scenario starting with the STOXX® Developed World Index, a broad index of developed market stocks, as the parent index. We then apply four initial screens that are typically used when building portfolios or indices which are intended to be defined as sustainable. The data was sourced from Sustainalytics (as of December 31, 2022, but in practice most of the exclusions remain constant across time):

- No tobacco involvement
- No controversial weapons
- No highly controversial assets, and
- No UNGC non-compliant assets

We then created two portfolios: one that simply reweighted the remaining names ("Exclusions Only portfolio") and another that used the Axioma optimizer and an Axioma worldwide risk model[2] to minimize tracking error to the STOXX Developed World Index while disallowing the exclusions ("Optimized portfolio").

In our test case, the Optimized portfolio had just 18 basis points of predicted active risk, compared with 29 basis points for the Exclusions Only version (Figure 1). The Optimized portfolio contained slightly fewer names than the Exclusions Only variant and its overall weight was only slightly less than that of the parent index (Figure 2). These differences were small considering the improvement in active risk.

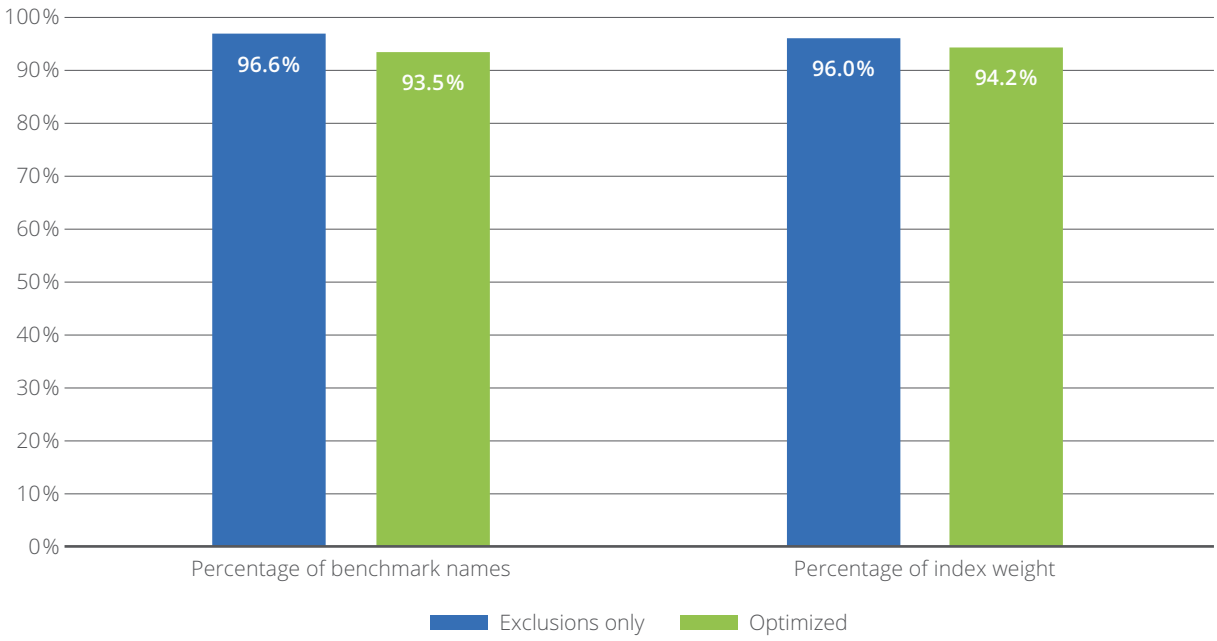
Figure 1: Tracking error.



Sources: Sustainalytics, Qontigo.

[2] The WW4 medium-horizon fundamental variant.

Figure 2: Percentage of benchmark names and index weight in portfolio.



Sources: Sustainalytics, Qontigo.

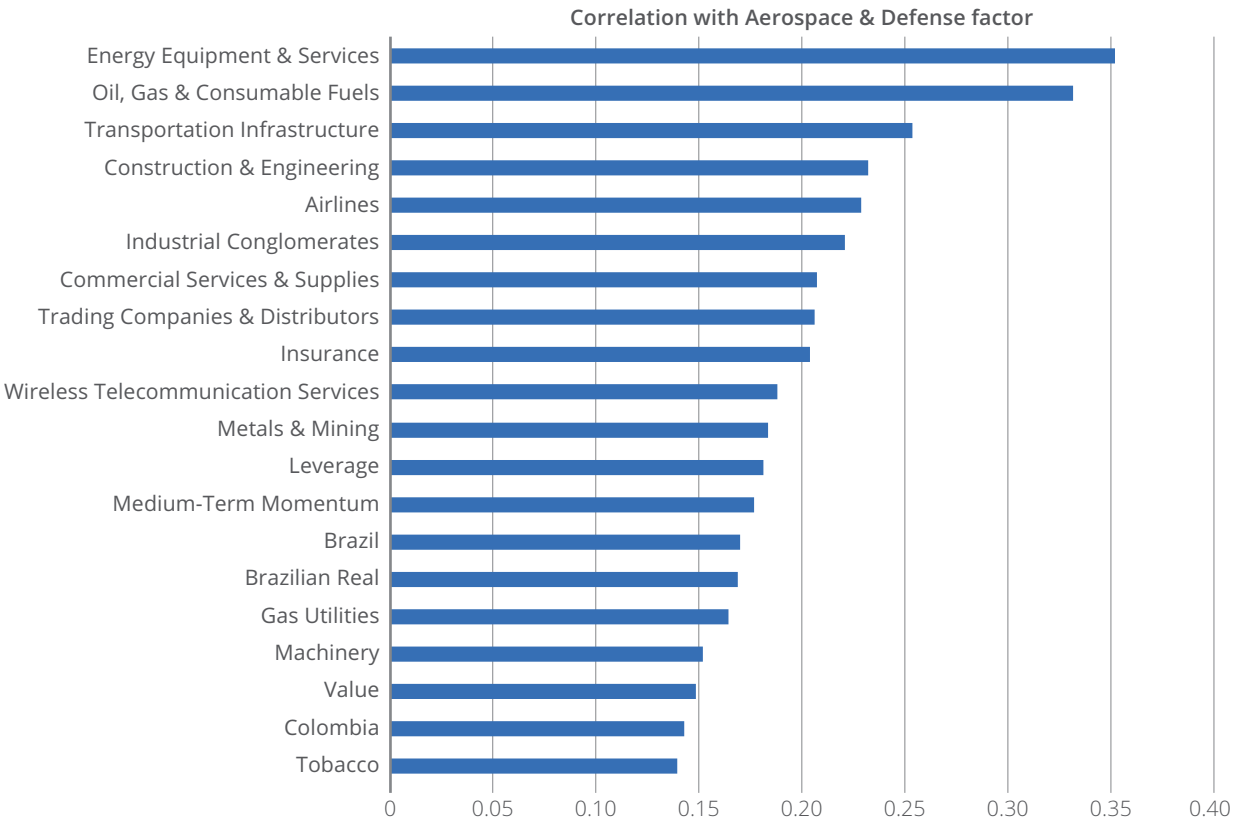
Next, we will explore why we are able to achieve a lower tracking error and why the Optimized portfolio ends up with fewer names and a lower parent index weight.

Controversial weapons form part of Aerospace & Defense (although this industry also includes names that do not produce controversial weapons). Many risk model components, most notably Energy Equipment & Services and Oil, Gas & Consumable Fuels, are highly correlated with Aerospace & Defense (Figure 3). As a result, these correlations can be seen as "risk substitutes" for the disallowed names[3].

Similarly, a number of risk model factors (mainly industries, but also some countries, currencies and style factors) are also highly correlated with the Tobacco factor (Figure 4).

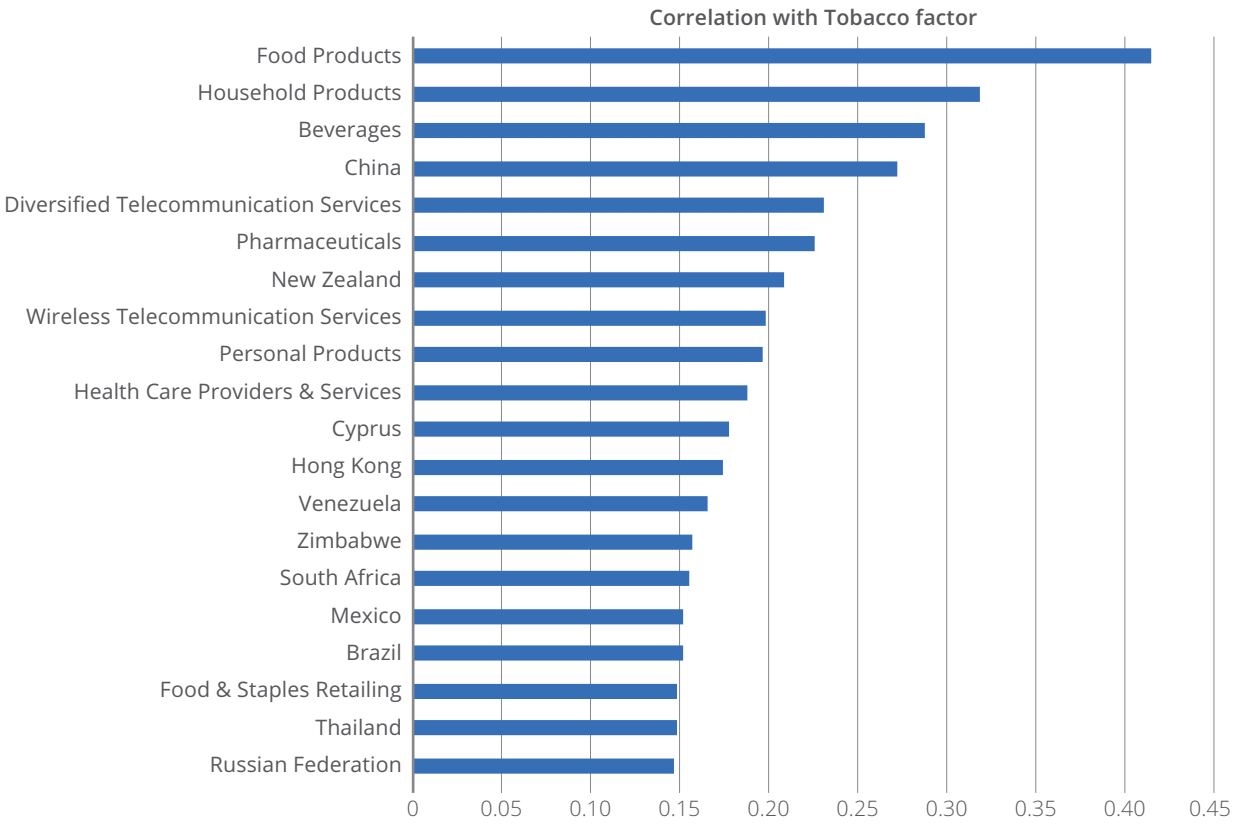
[3] However, in practice these two industries may not pass the other sustainability criteria used later in the process.

Figure 3: The 20 factors with the highest correlation to Aerospace & Defense.



Sources: Sustainalytics, Qontigo.

Figure 4: The 20 factors with the highest correlation to Tobacco.



Sources: Sustainalytics, Qontigo.

As a result, the Optimized portfolio has smaller exposures (both positive and negative) to many of these risk factors compared with the Exclusions Only portfolio.

Figure 5 shows the active exposures to a number of risk model factors. The biggest difference in our two portfolios was in the exposure to Aerospace & Defense, but note that the underweight in the industry was much smaller for the Optimized portfolio. The Exclusions Only portfolio merely excluded the relevant names and reweighted the rest, whereas the Optimized portfolio was able to hold a higher weight in these companies (and hence be less underweight), since the risk was offset by other holdings. Also, whereas the Exclusions Only portfolio was overweight Oil, Gas & Consumable Fuels, the optimizer mitigated some of that exposure (giving less weight to those names) and hence reduced their inherent risk. A look at the contribution to active variance taking factor covariances into account (Figure 6) shows that Aerospace & Defense contributes far less to risk in the Optimized portfolio. This also applies to every other risk factor.

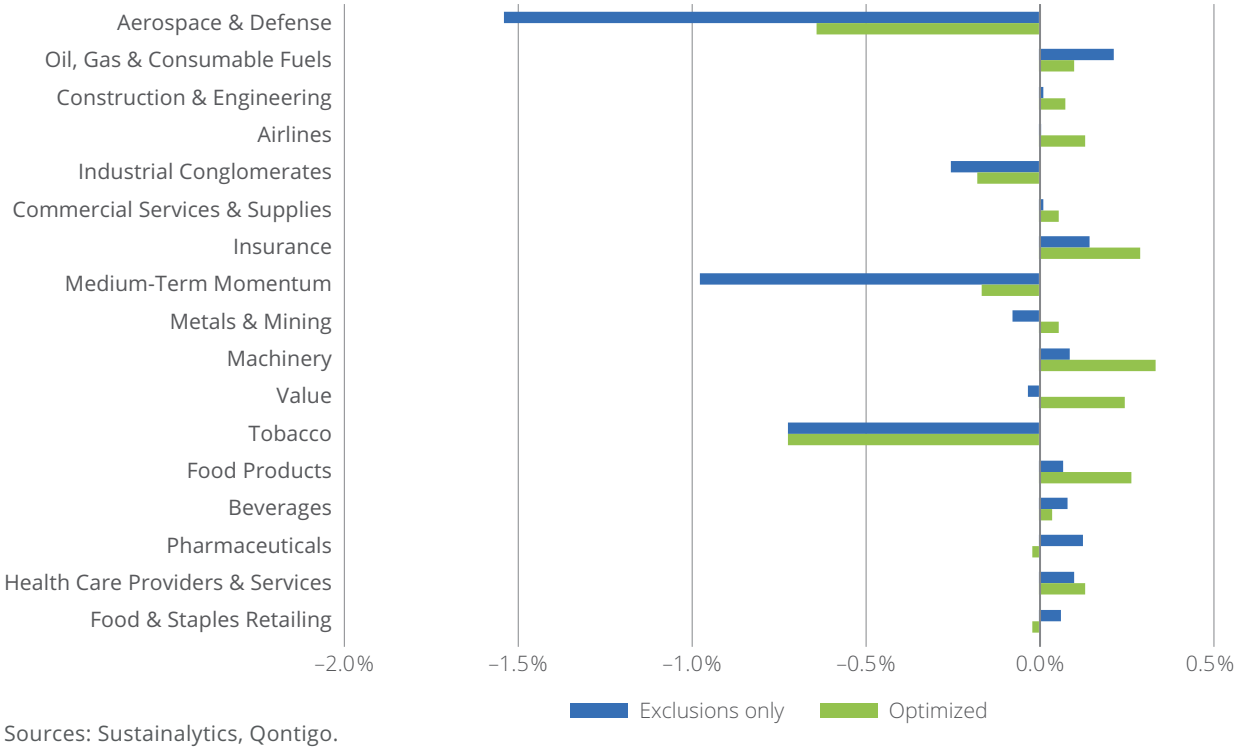
Since the Optimized portfolio was not allowed to hold any Tobacco names, it had to offset that risk (most notably with an overweight in the Food Products industry) while maintaining its underweight Tobacco position. Tobacco's contribution to active risk was also cut by more than half.

Style factor exposures are also interesting. The Exclusions Only portfolio had a significant underweight in Medium-Term Momentum, which also introduced added active risk, whereas the Optimized version was able to reduce the negative bet. It was also able to offset it with a small overweight to Value, which is negatively correlated with Momentum.

As to why we end up with slightly fewer names and less weight, we should also note that the optimizer's goal is to minimize active risk relative to the parent benchmark. In line with this, it may find that certain individual stocks are so volatile, or so highly correlated with other names, that it chooses not to include them so as not to increase active risk.

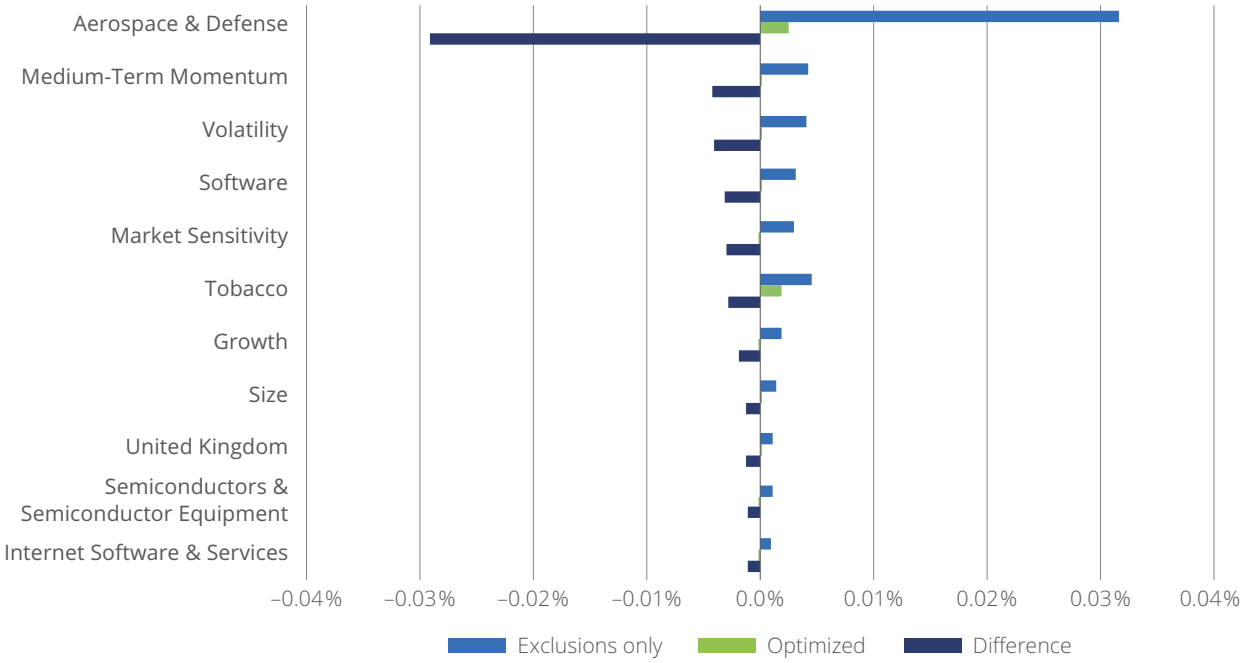
When we aggregate our risk exposures, common factor risk is reduced to almost zero, as the optimizer relies on correlations between factors to minimize risk (Figure 7). This contrasts sharply with the Exclusions Only portfolio, which simply reweights the included stocks. Also, while the specific risk is roughly the same in both portfolio variants, it accounts for a much higher proportion of the lower total level of active risk in the Optimized version. This is exactly what we would expect from a process that merely eliminates certain names.

Figure 5: Active exposures.



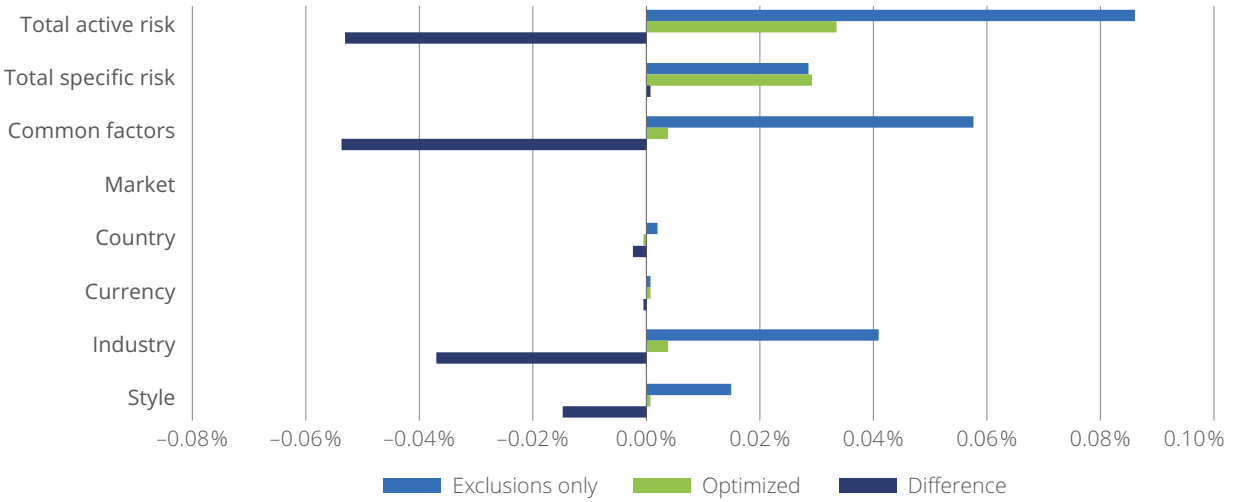
Sources: Sustainalytics, Qontigo.

Figure 6: Contribution to active variance – Largest differences.



Sources: Sustainalytics, Qontigo.

Figure 7: Contribution to active variance by group.



Sources: Sustainalytics, Qontigo.

Note: Total active risk is the sum of the active common factor risk and the specific active risk. Total common factor risk is the sum of risk from the Market, Country, Currency, Industry and Style factors. When performing this calculation, we distribute the covariance between the factors so that their risks are additive.

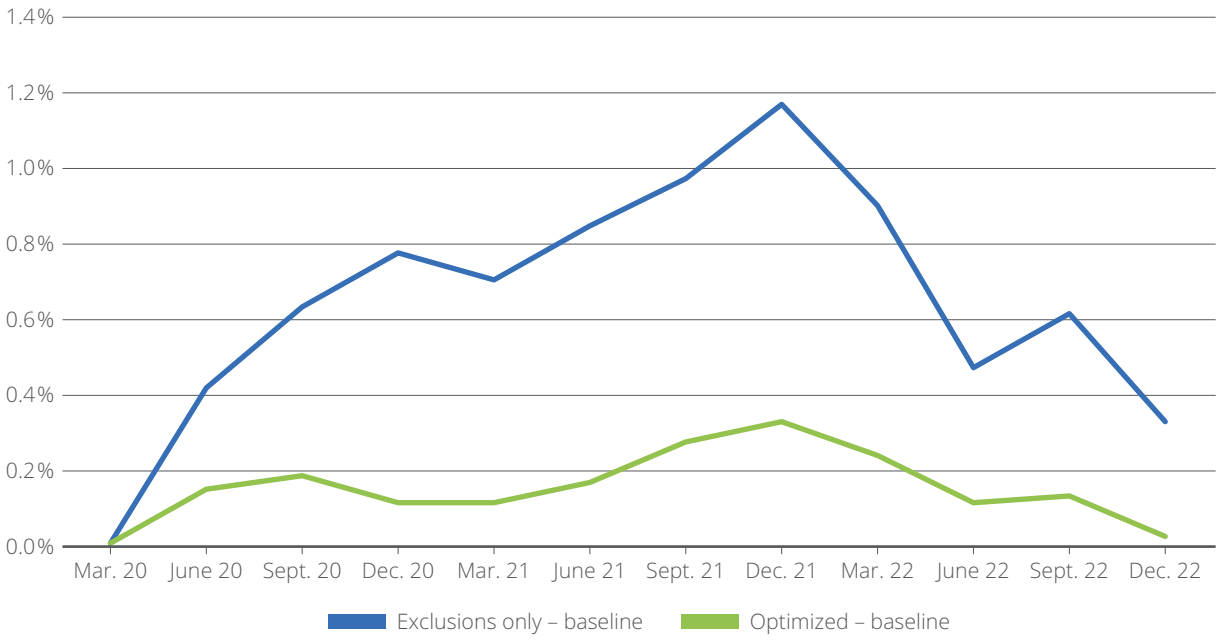
3. Optimization also produces lower realized tracking error over time

Our point-in-time analysis illustrates the benefits of optimization. What is more, backtesting can help show not only that is predicted tracking error reduced for the Optimized portfolio as just demonstrated, but also that realized tracking error is consistently lower. We constructed quarterly portfolios for this set of tests from March 2020 through December 2022. Our goal was not to show that one particular methodology produces better returns (in practice sometimes one and sometimes the other does), but rather to highlight the consistency of the active returns – and therefore the lower realized tracking error – produced using optimization.

Figure 8 shows the cumulative active return of our two portfolios as defined in our point-in-time test. In this case, the Exclusions Only portfolio realized a higher active return over our short test period, but the variability was much greater. In Figure 9, we added two further exclusion screens based on Sustainalytics data and then ran the same tests. On the left we show the test excluding companies involved in producing Thermal Coal (another common screen for sustainability portfolios), while on the right we excluded all companies with Oil & Gas involvement (this often results from typical screens to reduce or eliminate carbon emissions). The returns pattern for the no-coal portfolio looks similar to that for our base case but has a much greater tracking error. Eliminating Oil & Gas initially produced a higher return for the Exclusions Only portfolio. By contrast, after oil prices started to decline in mid-2022 the Optimized portfolio, which was able to offset some of that industry risk, started to outperform. The key in all these cases, however, is that the active return stream for the Optimized portfolio was much more consistent.

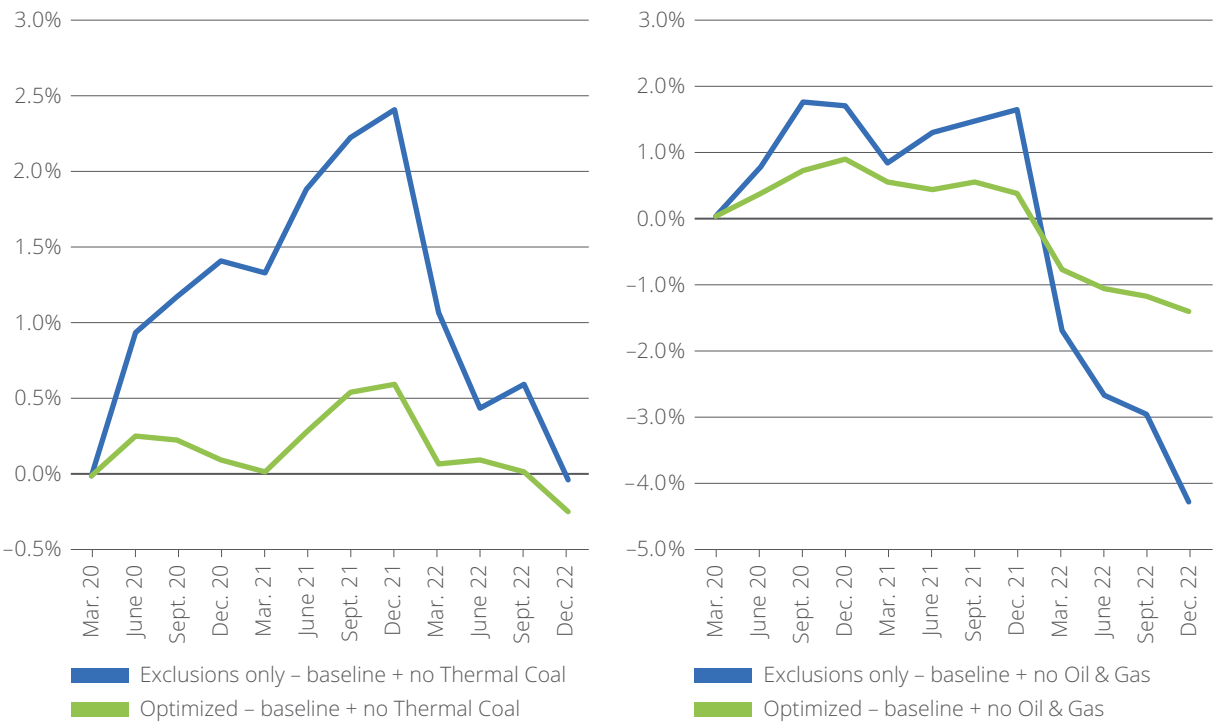
Overall, realized tracking error was much lower for the various versions of the Optimized portfolio than for the Exclusions Only alternative (Figure 10).

Figure 8: Cumulative active return.



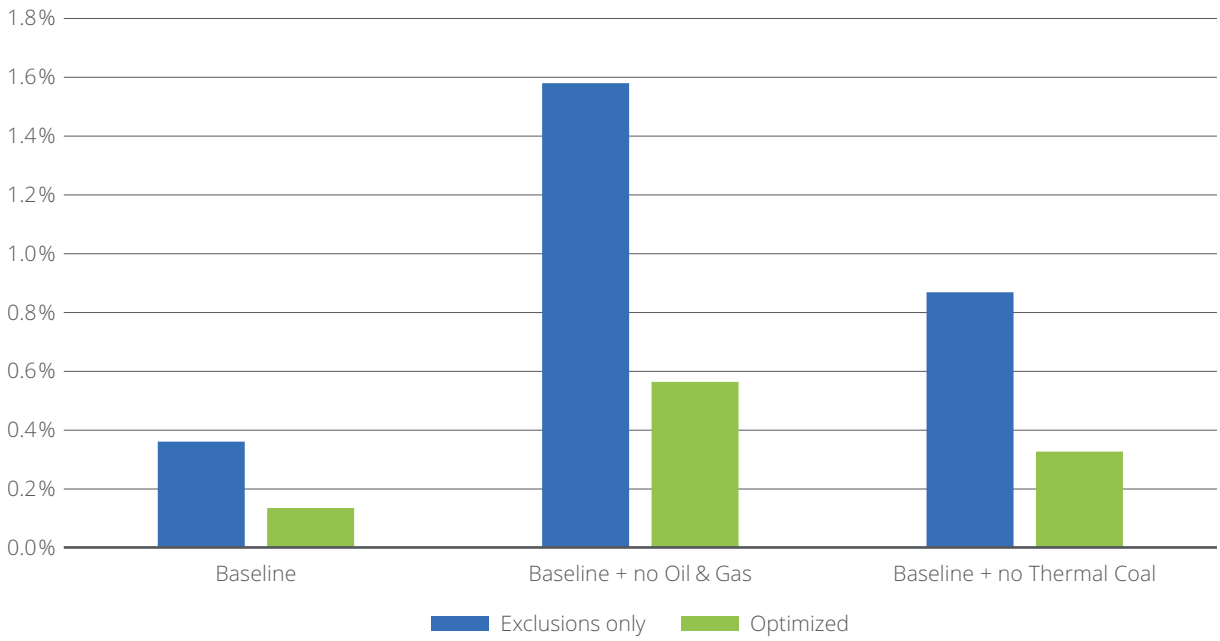
Sources: Sustainalytics, Qontigo.

Figure 9: Cumulative active return plus additional exclusions.



Sources: Sustainalytics, Qontigo.

Figure 10: Realized tracking errors.



Sources: Sustainalytics, Qontigo.

4. Summary and conclusion

Investors targeting sustainability (or any other) goals often want to do so without taking on a lot of extra risk relative to the broad market. Regulation frequently requires a strict set of exclusions before any portfolio can be called sustainable. Therefore, the starting point for many portfolio or index managers is often an index that takes these exclusions into account. In this paper, we have attempted to show that we can use an optimizer and a risk model to take advantage of the relationship between excluded and allowable names and hence reduce active risk. Admittedly, the differences in predicted tracking error may seem small in this example. However, more criteria will be excluded and potential deviations from the parent benchmark become get larger as regulation increases. This means that minimizing active risk will become more and more important going forward.

Of course, excluding companies with specific characteristics is often only a first step. After considering exclusions, the next step for many managers is to choose other sustainability metrics that they should avoid or tilt toward, thereby creating a portfolio with the desired characteristics. Reducing active risk from the start can free up the risk budget, which can then be used on bets that are expected to pay off in terms of better sustainability exposures, better returns, or both.

5. Contacts and further information

Learn more about how Qontigo can help you better manage risk and enhance your investment process.
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