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Exclusion Lists: The Hidden Tracking Error and How to Manage It

March 2023

Time to read: 10 minutes

Exclusion lists can lead to significant divergences from benchmarks. We propose a novel method for reducing this tracking error.

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Introduction

Exclusion lists – which can preclude investments in alcohol, tobacco, or other sectors or securities due to considerations about social responsibility – have long been used by investors to align portfolios with their values and make a positive social impact. Portfolio tracking error caused by exclusion lists has largely remained hidden from the attention of asset owners due to limited tracking error risk; tobacco in particular, for example, has become a much smaller part of the market over time.

However, recent exclusions incorporating broad swathes of the energy complex due to increasing concerns about climate and environmental impacts introduce noticeable tracking error impacts. The potential volatility of excluded energy stocks presents unique challenges to managers on how to best manage the exclusion tracking error as part of their overall fiduciary duty. Significant tracking error could lead to undesirable underperformance, particularly during market environments featuring energy price rallies like the one we saw following Russia's invasion of Ukraine in 2022.

We ask ourselves, what would be the feasibility of gaining access to a return stream that reduces exclusion-driven tracking error while also allowing investors to meet their environmental targets?

In this paper, we propose a replication portfolio solution that significantly reduces exclusion-driven tracking error relative to a representative Exclusion Basket. We believe it enables investors to meet not only their environmental and social goals, but also their fiduciary duties to their plan investors. Part I describes the construction of this representative Exclusion Basket based on GICS classifications, and the characteristics of the excluded names. The exclusion replication approach is laid out in Part II. Part III evaluates the efficacy of the proposed solution in terms of realised tracking error and beta relative to the Exclusion Basket.

Part I. Exclusion Basket

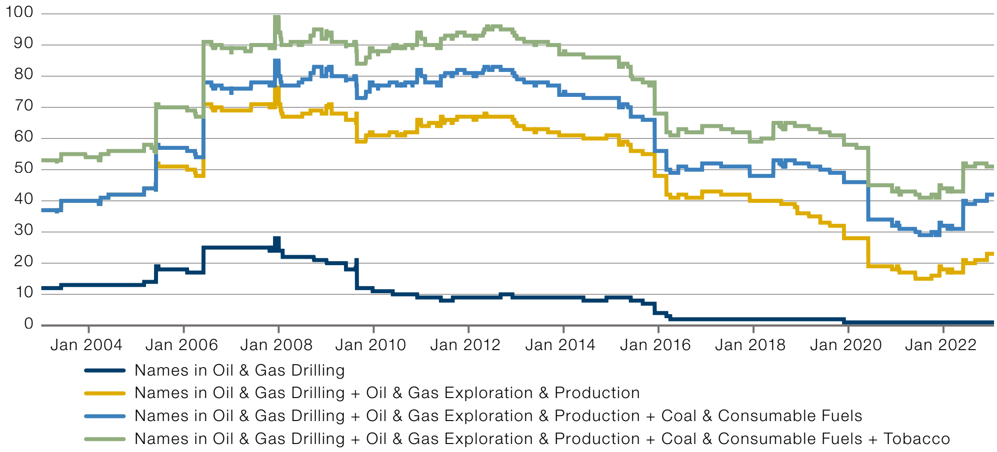
GICS Rule-Based Exclusion list

Exclusion lists considered by investors focused on responsible investing ('RI') typically cover a broad range of themes, including multiple Oil and Gas-linked industries, Coal and Tobacco, among others. To illustrate our replication approach, we construct a representative exclusion list based on GICS classifications that restricts exposure to MSCI ACWI Index stocks in the following sub-industries: Oil & Gas Drilling (GICS code 10101010), Oil & Gas Exploration & Production (10102020), Coal & Consumable Fuels (10102050) and Tobacco (30203010). We are not excluding the entire energy sector, as there are green companies in the GICS energy sector that are leading the way in renewable energy, including solar, wind, biomass and geothermal, and providing solutions for net-zero initiatives.

Characteristics of Exclusion Names

To better understand the characteristics of the excluded names, the following two plots show the summary statistics of the name counts and the total benchmark weights of the excluded names in the MSCI ACWI benchmark. Figure 1 shows the total number of unique excluded names in the MSCI ACWI Index. Between 60 and 100 names from the MSCI ACWI Index are included in the exclusion list for the period 2003 to 2022. Each line shows the number of names added from each additional GICS rule. Some restricted names by the GICS rules are removed from the MSCI ACWI universe over time, but the total number of restricted names has ticked up since mid-2021. For the latest snapshot as of 31 December 2022, 50 names are excluded from the MSCI ACWI benchmark with the majority coming from the Oil & Gas Exploration & Production and Coal & Consumable Fuels sub-industries.

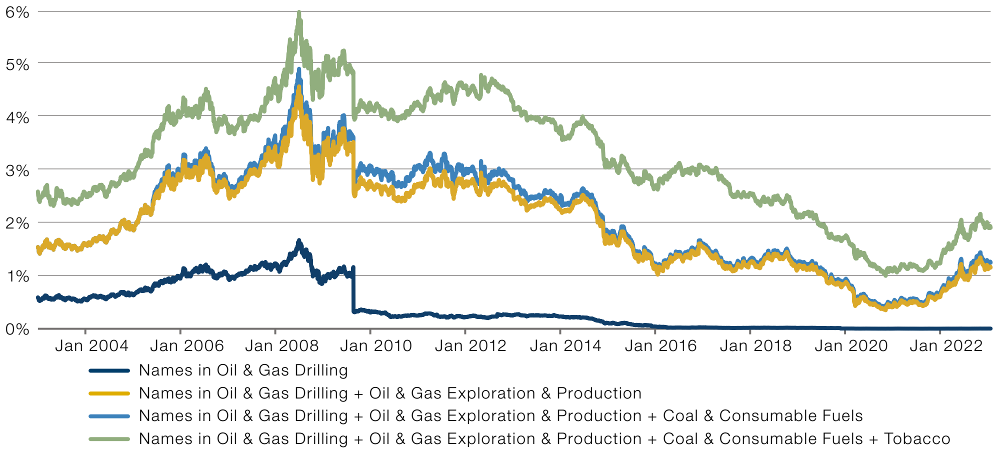
Figure 1. Number of Excluded Names in MSCI ACWI Benchmark



Source: Man Numeric; as of 25 January 2023.

Figure 2 shows the total MSCI AWCI Index weights for the excluded names for the period 2003 to 2022. On average, the excluded names make up between 3% and 6% of the total MSCI ACWI weighting. A similar pattern is seen here, as there has been an increase in the weight of these stocks in the MSCI ACWI Index since mid-2021.

Figure 2. Benchmark Weight of Excluded Names in MSCI ACWI Benchmark



Source: Man Numeric; as of 25 January 2023.

Performance of Exclusion Basket Portfolio and Replication Benchmark Portfolio

The Exclusion Basket portfolio is constructed by taking restricted names within the MSCI ACWI Index and renormalising the associated benchmark weights to 100%. The restricted names are based on the representative GICS exclusion rules as specified in Part I. If investors divest $1 from the Exclusion Basket portfolio, one natural alternative for investors is to invest this $1 into the remaining unrestricted names in the MSCI ACWI Index. This would be our Replication Benchmark portfolio, which normalises the benchmark weights of MSCI ACWI unrestricted stocks to 100%. The tracking error and realised beta of the Replication Benchmark relative to Exclusion Basket serve as a baseline comparison for our replication solution analysis in the next section.

Figure 3 shows the performance of the Exclusion Basket and the Replication Benchmark over the sample period 2003-2022. Over the entire period, the 9.6% annualised return of the Exclusion Basket outperformed the 8.6% annualised return of the Replication Benchmark by only 1%. However, there were significant variations

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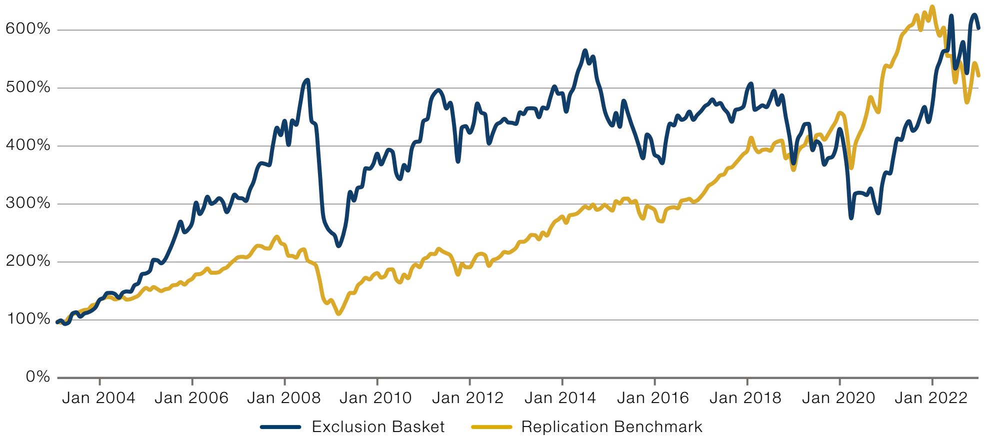
in the performance difference or tracking error of the two portfolios. In particular, the performance of the Replication Benchmark noticeably lags that of the Exclusion Basket during energy rallies like 1) the period leading up to the GFC in 2008, 2) following the GFC as energy demand increased due to strong economic growth in the US and China in particular up until 2014, and 3) the 2022 energy shortage due to the war in Ukraine. The wide swings in the relative performance of the two portfolios highlight the importance of ESG-committed investors managing their exclusion-driven tracking error.

Figure 3. Cumulative Return of Exclusion Basket and Replication Benchmark



Source: Man Numeric; as of 31 December 2022. Please see the important information linked at the end of this document for additional information on hypothetical results.

Part II. Exclusion Replication Approach

The goal of the exclusion replication analysis is to construct a replication portfolio that minimises the tracking error and maximises the realised beta relative to the Exclusion Basket, without holding any of the excluded stocks. Thus, the investable replication universe would be the unrestricted stocks in the MSCI ACWI Index. The replication portfolio is constructed by an optimisation calibrated to minimise expected tracking error with respect to the Exclusion Basket. Moreover, the portfolio construction process takes into account stock-level risk models, country/sector exposures, position sizing, and carbon exposure control.

Simulation Setup

In terms of detailed exclusion replication simulation specifications, we seek to improve the tracking error minimisation optimisation procedure with rigorous risk models, position control, and carbon emission control. We apply both the Numeric proprietary statistical factor risk model and the Barra risk model to the simulation process.
This aids in tracking-error reduction by closely matching the characteristics of the Exclusion Basket portfolio with those of the Replication Benchmark portfolio in terms of sector, style factors, and statistical factor exposures. Moreover, we tighten sector, country, and currency deviations. Maximum positions for individual names and beta exposure are also considered for risk-control purposes, so that the performance of the replication portfolio is not driven by a small number of concentrated names. In addition, given the mandate of RI-focused asset managers to comply with their environmental responsibility goals, we further cap the carbon emissions of the replication portfolio at 50% below the Exclusion Basket. This ensures that we are not reducing the exclusion tracking error at the expense of adding toxic names to the portfolio. Finally, the replication portfolio construction process can flexibly adjust to the new restriction names added over time either via GICS rule changes or client specifications.

Part III. Exclusion Replication Solution Comparison

Simulation Results

Figure 4 shows the simulated results over the period 2003 to 2022 based on a sample run at $500 million of AUM reset annually. It compares the Numeric Replication Solution to the Replication Benchmark, which invests in a cap-weighted MSCI ACWI portfolio after removing the excluded names. As mentioned in the previous section, this Replication Benchmark portfolio will serve as a baseline case for our exclusion replication analysis. The replication efficacy is measured in terms of the tracking error and realised beta of the replication portfolio returns with respect to the Exclusion Basket. A lower tracking error with a higher realised beta is preferred.

Figure 4. Comparison of Simulated Portfolio Characteristics

2003-2022	Exclusion Basket	Replication Benchmark	Simulated Numeric Solution
Number of Long Holdings	72	2,578	147
Annual Turnover			93%
Exposure Control			Yes
Carbon Control			50%
Annualised Total Return	9.41%	8.61%	9.11%
Annualised Alpha	0.00%	-0.80%	-0.30%
Realised Beta	1.00	0.53	0.85
Annualised Tracking Error	0.00%	14.63%	6.85%
Carbon Intensity (Tonnes CO2e USD Million)	378	203	207
Carbon Exposure (Tonnes CO2e USD Million)		-175	-171

Source: Man Numeric; as of 31 December 2022. Alpha, Beta, Tracking Error, and Carbon Exposure are measured relative to Exclusion Basket. Please see the important information linked at the end of this document for additional information on hypothetical results.

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Analysis of Numeric Solution

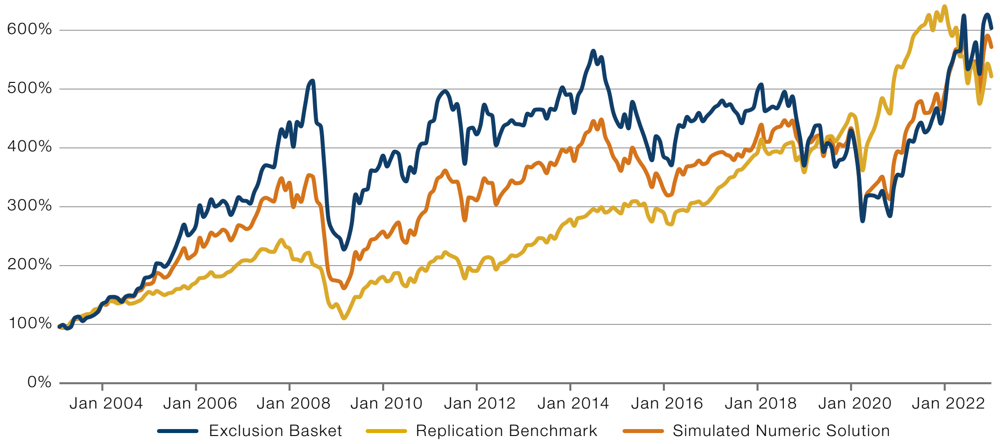
Compared with the Replication Benchmark portfolio, in our simulation the Numeric Solution reduces tracking error and increases beta with comparable annualised alpha. Investing in the Replication Benchmark (essentially cap-weighted unrestricted stocks from MSCI ACWI) incurs an annualised tracking error of 14.63% relative to the Exclusion Basket. The realised beta of the Replication Benchmark returns with respect to the return stream of the Exclusion Basket is 0.53. The average number of holdings in the Replication Benchmark is 2,578. In comparison, the Numeric Solution holds 147 stocks in its replication portfolio to hedge the Exclusion Basket. Compared to the Replication Benchmark, the Numeric Solution reduced the exclusion tracking error by more than 50%, from 14.63% to 6.85%. It also improved the realised beta by more than 60%, from 0.53 to 0.85. In addition, it had a slightly higher annualised return (9.11%) compared with that of the Replication Benchmark portfolio (8.61%).

With a carbon-control constraint built into the optimisation process, the Numeric Solution delivered a similar carbon intensity to the Replication Benchmark portfolio, demonstrating that the Numeric Solution is able to reduce exclusion-driven tracking errors and maintain a low carbon exposure at the same time.

Long-term Performance Comparison of Replication Solutions

Figure 5 shows the cumulative returns for each of the three cases. Overall, the simulated performance of the Numeric Solution (orange line) matches the Exclusion Basket (blue line) with lower tracking errors and comparable returns over the long term. It is interesting to note that during the period when the Exclusion Basket outperformed the Replication Benchmark, the Numeric Solution closely tracked the Exclusion Basket and delivered higher returns than the Replication Benchmark. When the performance of the Exclusion Basket tanked after the Covid period, the Numeric Solution was still able to track the trend of the Exclusion Basket but delivered higher returns. Overall, the Numeric Solution demonstrated robust tracking-error reduction across diverse market environments.

Figure 5. Cumulative Return of Replication Solutions



Source: Man Numeric; as of 31 December 2022. Please see the important information linked at the end of this document for additional information on hypothetical results.

Conclusion

"This may appeal to a broad range of responsible investors who are worried about the active risk that arises from their ESG initiatives."

Environmental awareness and the transition to renewable energy have been rapidly gaining popularity in the RI community. However, asset owners who exclude fossil fuel and coal stocks to meet their environmental and social responsibility targets are likely exposed to exclusion-driven tracking errors, particularly in the current market environment of high macroeconomic uncertainty. Energy rallies due to inflation concerns and China's re-opening may create headwinds to the investment performance of portfolios with broad-based energy exclusions. To mitigate this risk, in simulations the Numeric exclusion replication solution proposed in this paper has demonstrated the potential to help investors minimise exclusion tracking errors, maximise the realised beta, and deliver comparable returns versus the exclusion list. We believe this may appeal to a broad range of responsible investors who are worried about the active risk that arises from their ESG initiatives and equip them to meet their environmental and social targets while also fulfilling their fiduciary duties.

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Bingcheng ('Bing') Yan is Principal Researcher of Man Numeric. He leads strategic research initiatives and product development. Previously, Bing was Co-Head of Hedge Fund Strategies at Man Numeric, responsible for day-to-day management of Man Numeric's hedge fund strategies and development of alpha innovation portfolios. Prior to joining Man Numeric in 2008, Bing was a portfolio manager of the 32 Capital hedge fund at Barclays Global Investors. Bing's publications include articles in *The Journal of Financial Markets and American Finance Association Annual Meetings.* Bing received a bachelor's degree in economics from Nanjing University in China and a doctorate and a master's degree in economics from the University of Washington.

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Hypothetical Results

Hypothetical Results are calculated in hindsight, invariably show positive rates of return, and are subject to various modelling assumptions, statistical variances and interpretational differences. No representation is made as to the reasonableness or accuracy of the calculations or assumptions made or that all assumptions used in achieving the results have been utilized equally or appropriately, or that other assumptions should not have been used or would have been more accurate or representative. Changes in the assumptions would have a material impact on the Hypothetical Results and other statistical information based on the Hypothetical Results.

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MKT007094/ST/GL/W/24022028