NORTHERN TRUST
ASSET MANAGEMENT

RESEARCH INSIGHTS

ESG (IN)EFFICIENCY

PASSIVE ESG INVESTING HAS BECOME INCREASINGLY ACTIVE. IT'S TIME FOR A RETHINK.

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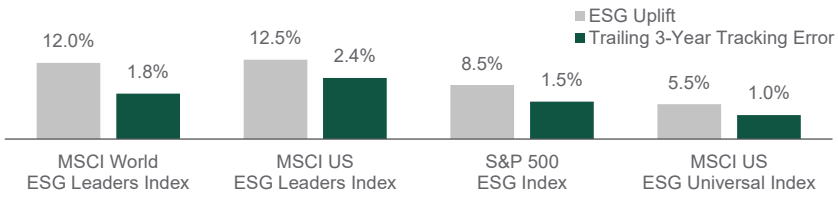
Assets tied to passive ESG indexes have soared in recent years[1], as more investors look to align sustainability goals with their investments. Yet assets aren't the only thing on the rise. With ever-changing methodologies and expanding exclusion lists, the active risk of popular ESG indexes is also climbing. This begs the question: when it comes to ESG investing, does the term 'passive' even apply? Given the lack of consensus on sustainability criteria, along with evolving data sets and exclusions, we find that ESG investing is inherently active. Investors should therefore evaluate ESG strategies accordingly, focusing on the drivers of return while also evaluating potential sources of risk. In our analysis, we explore what's driving the rise in index tracking errors, while demonstrating how factors can be integrated to deliver a risk-efficient portfolio with a proven source of return not found in leading 'passive' offerings.

Passive indexes are popular among investors who wish to track broad market benchmarks at a low cost. Given their similar inclusion criteria and construction methodologies, capitalization-weighted indexes exhibit features of commonality and consensus. Yet when it comes to passive ESG indexes, we find these concepts simply do not apply.[2] To illustrate this point, **Exhibit 1** highlights the varying levels of ESG uplift and tracking error of four popular ESG indexes in the market today.

EXHIBIT 1: ESG UPLIFT AND TRACKING ERROR FOR POPULAR ESG INDEXES (9/30/2022)



Source: Northern Trust Quantitative Research, MSCI, S&P. Data as of 9/30/2022. Tracking error measures the standard deviation of the difference between the investment performance of the strategy or fund and that of the benchmark index. It is not possible to invest directly in any index.

While the drivers of active risk vary among indexes, we find that the bulk is sourced from idiosyncratic risk. This finding is highlighted in **Exhibit 2**, which lists the top five overweights and underweights of each index. The MSCI US ESG

[1] According to a recent PwC study (2022), global ESG AUM has rising from $2.2T in 2015 to $18.4T in 2021.
[2] See Berg et al (2022) for the divergence of major ESG ratings.

Leaders Index stands out among the group with its 5.3% overweight to Microsoft and -7.0% underweight to Apple. Investors typically associate active weights of this magnitude with traditional active management as opposed to passive investing.

EXHIBIT 2: TOP ACTIVE HOLDINGS OF COMMON ESG INDEXES (9/30/2022)

MSCI World ESG Leaders Index	MSCI US ESG Leaders Index	S&P 500 ESG Index	MSCI US ESG Universal Index
Top 5 Overweights			
Microsoft (+3.7%) Alphabet (+2.5%) Tesla (+1.6%) Johnson & Johnson (+1.0%) Nvidia (+0.7%)	Microsoft (+5.3%) Alphabet (+2.9%) Tesla (+2.3%) Johnson & Johnson (+1.4%) Nvidia (+1.0%)	Apple (+2.8%) Microsoft (+2.3%) Alphabet (+1.4%) Amazon (+1.3%) UnitedHealth (+0.6%)	Nvidia (+0.6%) Home Depot (+0.6%) Coca-Cola (+0.5%) PepsiCo Inc (+0.5%) Cisco Systems (+0.3%)
Top 5 Underweights			
Apple (-4.9%) Amazon (-2.3%) UnitedHealth (-1.0%) Exxon (-0.8%) Berkshire (-0.8%)	Apple (-7.0%) Amazon (-3.2%) UnitedHealth (-1.5%) Exxon (-1.2%) Berkshire (-1.1%)	Tesla (-2.4%) Berkshire (-1.6%) Johnson & Johnson (-1.4%) Meta (-1.0%) Home Depot (-0.9%)	Apple (-1.5%) Amazon (-0.6%) Alphabet (-0.6%) Meta (-0.6%) Wells Fargo (-0.5%)

Source: Northern Trust Quantitative Research, MSCI, S&P. Data as of 9/30/2022.

The lack of alignment among the indexes is surprising to many investors, particularly when found within the same index family. When comparing the MSCI US ESG Leaders and MSCI US ESG Universal Indexes, we find that only one of the top five overweights overlap (Nvidia), while Alphabet[3] finds itself as the second largest *overweight* in Leaders and the third largest *underweight* in Universal – a curious outcome given that the same ESG ratings are employed in both. The differences are even more dramatic when looking across index providers. Three of the top five overweights in the S&P 500 ESG Index are among the top five underweights within the MSCI US ESG Leaders Index, and two of the top Leaders holdings (Tesla, Johnson & Johnson) are underweights within S&P. The most extreme example is Apple, which has an absolute difference of nearly 10% between the two indexes (-7.0% vs. +2.8%). By comparison, Apple's weight differs by less than 10 basis points between the cap-weighted indexes (MSCI US Index vs. S&P 500 Index). Such differences have led to a 2.5% tracking error over the past 5-years between the MSCI US ESG Leaders and S&P 500 ESG Indexes, a level over three times that of their cap-weighted counterparts. Given the lack of commonality among ESG indexes and wide dispersion in risk levels, investors must be diligent in aligning their ESG objectives with their chosen strategy while ensuring that the level of ESG is commensurate with the active risk taken. Unfortunately for investors, the evolving ESG landscape requires constant oversight.

ESG index holdings can be dramatically different, even within the same index family.

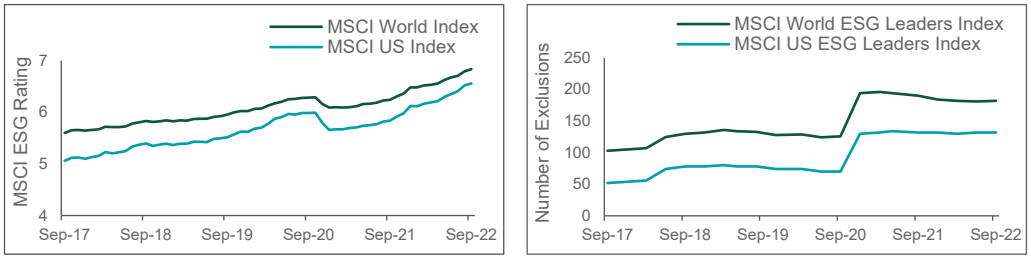
LESS ESG FOR MORE RISK

While higher ESG content has always necessitated higher active risk, this trade-off has become more pronounced due to recent trends. **Exhibit 3** plots the aggregate cap-weighted ESG ratings of the MSCI World & US Indexes on the left, next to the number of exclusions for the MSCI World & US ESG Leaders Indexes on the right. The broad-based ESG rating improvements over the past five years are encouraging, and suggest that companies are successfully addressing their ESG risks. However, over this same time period we find that more and more companies are being excluded from ESG indexes. These trends are difficult to

[3] Alphabet Class A and Class C shares have been combined.

reconcile, as one might expect higher aggregate ESG ratings to lead to less exclusions, not more. In practice, the additional exclusions have proven easy to add, yet difficult to remove.

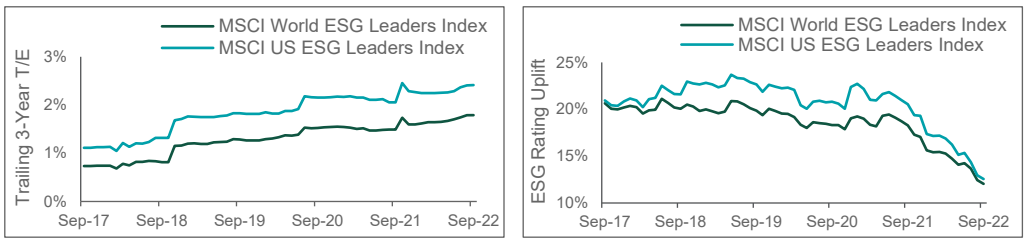
EXHIBIT 3: ESG RATINGS AND EXCLUSIONS OF MSCI INDEXES (9/30/2017–9/30/2022)



Source: Northern Trust Quantitative Research, MSCI. Data from 9/30/2017-9/30/2022.

These changes, along with numerous methodology revisions, have meaningfully increased 'passive' ESG index tracking error levels over the past five years, as evidenced in **Exhibit 4**. This progression demonstrates the increasingly active nature of these indexes. While the COVID crisis has been a contributing factor, it does not fully account for the rise in tracking error. Exhibit 4 reveals a sharp increase in tracking error at the end of 2018, well before the market turmoil began in 2020. Also shown in Exhibit 4 are the gradually declining ESG rating uplifts, in response to the higher ratings of the underlying indexes (Exhibit 3).

EXHIBIT 4: TRACKING ERROR AND ESG RATING UPLIFTS OF MSCI INDEXES (9/30/2017–9/30/2022)



Source: Northern Trust Quantitative Research, MSCI. Data from 9/30/2017-9/30/2022. It is not possible to invest directly in any index.

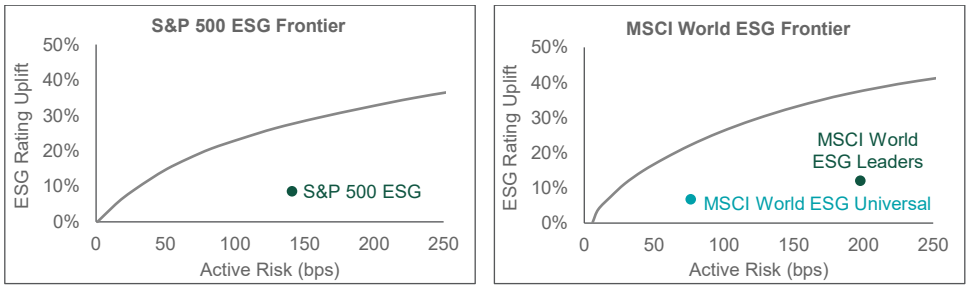
After adding it all up, we are left with more concentrated portfolios, with lower ESG uplifts and considerably more active risk. The irony of course is that the integration of ESG data is often promoted as a way to decrease portfolio risk. In order to capture ESG benefits, and capture them efficiently, we need to employ modern portfolio construction techniques.

IMPROVING ESG EFFICIENCY

In order to assess how we might improve the efficiency of a portfolio integrating ESG content, we first need to establish a baseline. This baseline, shown in **Exhibit 5**, plots the achievable active risk levels at varying degrees of ESG uplift using the unique ESG ratings of each index provider. A small set of exclusions have also been applied.[4] We then plot the ESG indexes on the chart, noting that each falls well outside of what would be considered efficient.

[4] Baseline exclusions are defined as any company flagged by MSCI controversy criteria.

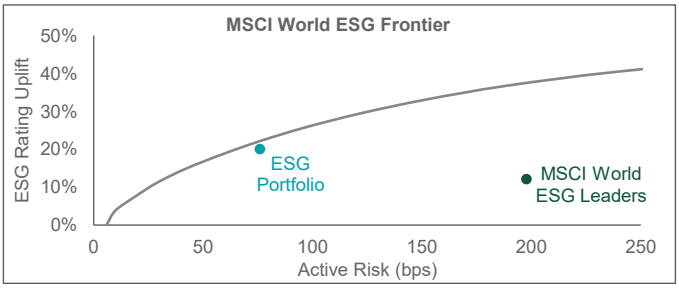
EXHIBIT 5: EFFICIENT FRONTIERS OF ESG INDEXES (9/30/2022)



Source: Northern Trust Quantitative Research, MSCI. Data as of 9/30/2022. Efficient frontiers generated with the MSCI Barra GEMLT risk model, MSCI controversy criteria, and index ESG ratings (S&P and MSCI). For optimization details refer to the appendix.

Given this baseline, we note that the distance of each index from the efficient frontier is comprised of (1) additional business involvement exclusions, and (2) inefficient portfolio construction. In order to quantify the impact of each, we plot a hypothetical ESG portfolio within the MSCI World ESG frontier in **Exhibit 6**. The ESG Portfolio excludes the same set of companies as the MSCI World ESG Leaders Index, while targeting a higher (20%) ESG rating uplift and similar levels of carbon reduction. As shown on the chart, the ESG Portfolio plots very close to the efficient frontier, indicating that one can achieve multiple ESG objectives with a minimal increase in active risk. When comparing the ESG Portfolio to the MSCI World ESG Leaders Index, we attribute the more than doubling of active risk (76 bps vs. 198 bps) to portfolio construction. Although the x-axis of the efficient frontier represents predicted risk, the 5-year backtest simulation results in a tracking error reduction of greater than 50% for the hypothetical ESG portfolio vis-à-vis the MSCI World ESG Leaders Index.

EXHIBIT 6: HYPOTHETICAL EFFICIENT ESG PORTFOLIO (9/30/2022)



	MSCI World ESG Leaders	ESG Portfolio
ESG Profile		
ESG Uplift	+12%	+20%
Carbon Emission Reduction	-44%	-50%
Carbon Reserves Reduction	-72%	-75%
Exclusions		
Business Involement	✓	✓
Controversy	✓	✓
Active Risk		
5-Year Tracking Error	1.7%	0.8%
Tracking Error Reduction	-	-0.9%

Source: Northern Trust Quantitative Research, MSCI. Frontier data as of 9/30/2022. Active risk data from 9/30/2017-9/30/2022. Efficient frontier generated with the MSCI Barra GEMLT risk model, MSCI controversy criteria, and MSCI ESG ratings. Active risk data for the hypothetical ESG Portfolio was derived from backtest simulation. For optimization and backtest details refer to the appendix. The ESG Portfolio data contained herein does not represent the results of an actual investment portfolio but reflects hypothetical historical performance. Past performance is not indicative of future results. For illustrative purposes only. It is not possible to invest directly in any index.

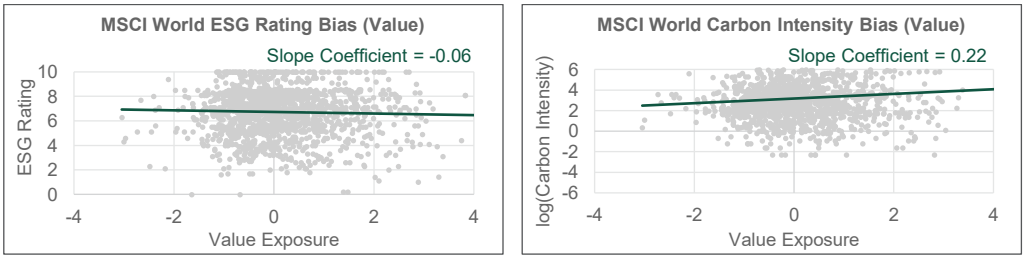
Obtaining higher levels of ESG content at lower levels of active risk than passive ESG indexes might tempt some investors into declaring victory. However, the constantly evolving nature of ESG reminds us that higher tracking error may become unavoidable even with the help of portfolio optimizers. While some believe higher ESG content leads to higher returns, such relationships are difficult to prove empirically. Indeed, excess return objectives are conspicuously absent from the prospectus of most passive ESG indexes, and the lack of consensus highlighted in Exhibit 2 suggests the industry is far from coalescing on the ESG investment thesis. As an investor who is concerned with the return potential of their equity portfolio, we think it's prudent to allocate some active risk to proven drivers of return. In this last section we'll demonstrate how we can efficiently integrate ESG content with style factors to achieve a portfolio that targets excess return with lower risk.

ADDING A PROVEN, DIVERSIFIED SOURCE OF RETURN

With the aim of delivering on both ESG and excess return objectives, we begin by analyzing the relationship between style factors and ESG at the security level. **Exhibit 7** plots pairwise observations between value and two common ESG characteristics – ratings (MSCI ESG score) and carbon intensity. The scatter plots show significant dispersion and mild trendlines, indicating that the value factor exhibits no strong bias to either ESG dimension. While we have highlighted value for the purpose of illustration, the range of slope coefficients over the past 5 years for value, momentum, low volatility, and quality are reported in the accompanying table (see Exbibits A and B in the appendix for corresponding scatter plots). Collectively, the data shows no evidence of persistent problematic bias, indicating the ease with which style factors can be integrated with ESG objectives to enhance the investment thesis.

Style factors are easily integrated with ESG data to enhance the investment thesis.

EXHIBIT 7: STYLE FACTOR COMPATIBILITY WITH ESG INVESTING (9/30/2022)



Range of Slope (Beta) Coefficients MSCI World (2017-2022)

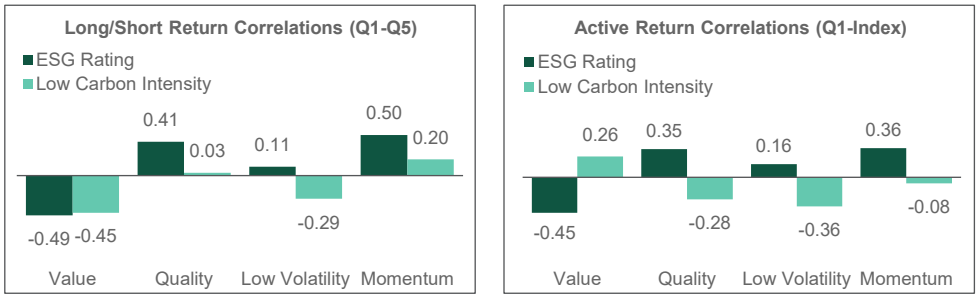
	Value	Momentum	Low Volatility	Quality
ESG Rating				
Minimum	-0.25	-0.34	0.15	0.17
Maximum	0.07	0.43	0.48	0.35
log(Carbon Intensity)				
Minimum	-0.19	-0.35	-0.04	0.17
Maximum	0.22	0.72	0.31	0.32

Source: Northern Trust Quantitative Research, MSCI. Data from 9/30/2017-9/30/2022. MSCI ESG ratings, MSCI carbon intensity, and MSCI Barra FaCS factor definitions shown. Carbon intensity is defined as the average emission rate of CO2 from a given source relative to the intensity of a specific activity. All slope (beta) coefficients estimated by the form: $y = \beta x + \varepsilon$.

Having evaluated style factors and ESG in the cross-section, we next analyze the relationship from a returns perspective. **Exhibit 8** charts long/short and active return correlations over the past five years. We find that all correlations are within

+/-0.5, implying that style factors offer attractive diversification potential to ESG investors.[5]

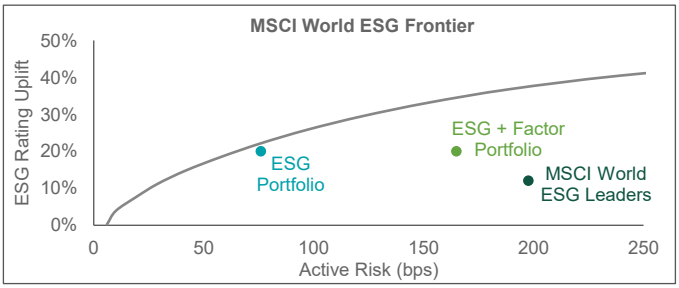
EXHIBIT 8: ACTIVE RETURN CORRELATIONS OF STYLE FACTORS MSCI WORLD (2017-2022)



Source: Northern Trust Quantitative Research, MSCI. Data from 9/30/2017-9/30/2022. MSCI ESG ratings, MSCI carbon intensity, and MSCI Barra FaCS factor definitions shown. Q1/Q5 refer to top/bottom quintile.

As a final step we extend the analysis shown in Exhibit 6 by introducing an additional hypothetical portfolio which incorporates significant multi-factor content. The ESG + Factor Portfolio in **Exhibit 9** contains balanced, material exposure to value, momentum, low volatility, and quality while preserving the ESG profile of the ESG Portfolio.

EXHIBIT 9: HYPOTHETICAL EFFICIENT ESG FACTOR PORTFOLIO



	MSCI World ESG Leaders	ESG Portfolio	ESG + Factor Portfolio
Factor Content			
Multi-Factor Exposure			✓
ESG Profile			
ESG Uplift	+12%	+20%	+20%
Carbon Emission Reduction	-44%	-50%	-50%
Carbon Reserves Reduction	-72%	-75%	-75%
Exclusions			
Business Involement	✓	✓	✓
Controversy	✓	✓	✓
Active Risk			
5-Year Tracking Error	1.7%	0.8%	1.2%
Tracking Error Reduction	-	-0.9%	-0.5%

Source: Northern Trust Quantitative Research, MSCI. Frontier data as of 9/30/2022. Active risk data from 9/30/2017-9/30/2022. Efficient frontiers generated with the MSCI Barra GEMLT risk model, MSCI controversy criteria, and MSCI ESG ratings. Multi-factor exposure represents +0.2 active MSCI FaCS exposure for value, momentum, low volatility, and quality. Active risk data for the hypothetical ESG Portfolios were derived from backtest simulation. For optimization and backtest details refer to the appendix. The ESG Portfolio and ESG + Factor Portfolio data contained herein does not represent the results of an actual investment portfolio but reflects hypothetical historical performance. Past performance is not indicative of future results. For illustrative purposes only. It is not possible to invest directly in any index.

[5] Our results are consistent with previous studies, for example Chan et al (2020) and Melas et al (2017).

Given the location of the ESG + Factor Portfolio on the graph, we demonstrate that investors can target a robust set of ESG objectives, with less risk, while incorporating proven sources of excess return not found in passive ESG indexes. Such results often surprise investors, as the 'passive' alternative is commonly assumed to have lower risk than an actively managed multi-factor ESG strategy.

CONCLUSION

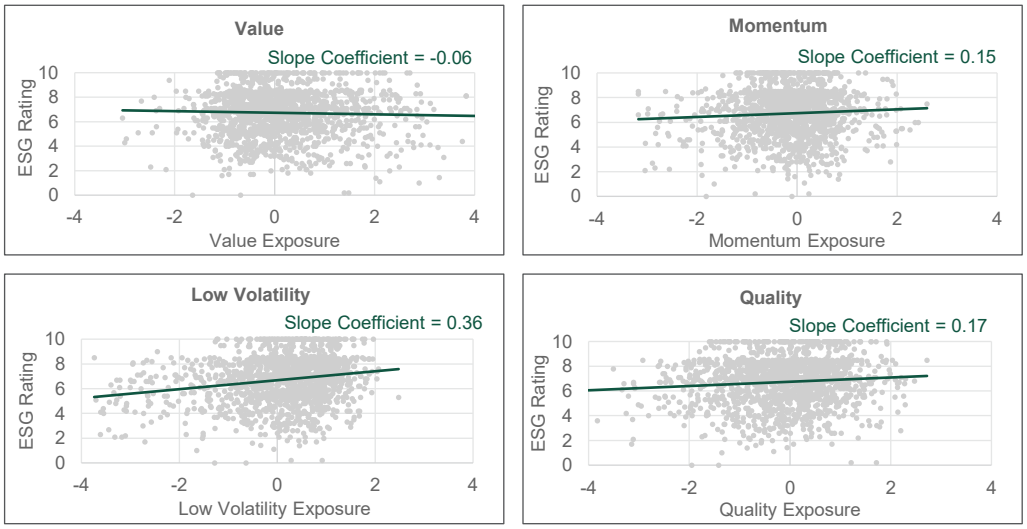
The integration of ESG data requires investors to make active decisions, including which ratings provider to use, the types of businesses to exclude, how to effectively mitigate carbon risk, and so on. These decisions must be revisited frequently as data improves, new frameworks are put forth, and investor preferences change. These dynamics point to the inherently active nature of ESG investing, despite the (quite successful) attempts to paint them with a passive brush.

While better data and forward-looking materiality frameworks have delivered new tools for more informed portfolio construction, the impacts to portfolio performance have yet to be proven. Investors should therefore approach ESG strategies by asking the same question they would of any actively managed strategy, namely: What are the drivers of return? A satisfactory answer to this question will deliver a solution that stands on its own merits amongst peers, not one simply categorized under an "ESG" subheading. Integrating factors in conjunction with ESG objectives offers a compensated source of returns not found in leading ESG offerings, and often with less risk.

ESG investing is inherently active, and investors should be focused on the drivers of return

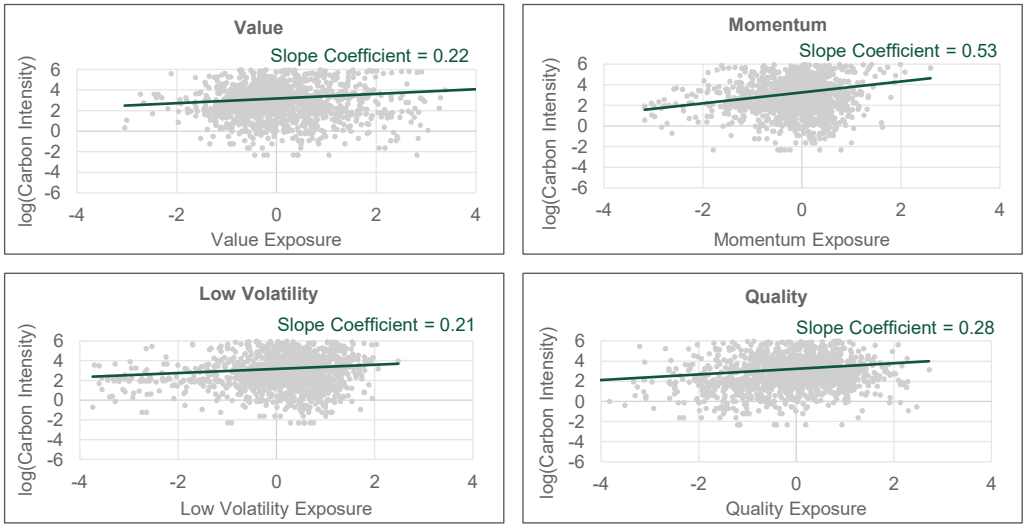
Appendix

EXHIBIT A: STYLE FACTOR COMPATIBILITY WITH ESG RATING
MSCI WORLD ESG RATING BIAS (9/30/2022)



Source: Northern Trust Quantitative Research, MSCI. Data as of 9/30/2022. MSCI ESG ratings and MSCI Barra FaCS factor definitions shown. All slope (beta) coefficients estimated by the form: $y = \beta x + \varepsilon$.

EXHIBIT B: STYLE FACTOR COMPATIBILITY WITH CARBON INTENSITY
MSCI WORLD CARBON INTENSITY BIAS (9/30/2022)



Source: Northern Trust Quantitative Research, MSCI. Data as of 9/30/2022. MSCI carbon intensity and MSCI Barra FaCS factor definitions shown. Carbon intensity is defined as the average emission rate of CO2 from a given source relative to the intensity of a specific activity. All slope (beta) coefficients estimated by the form: $y = \beta x + \varepsilon$.

Methodology Notes

Efficient Frontier Optimizations

Objective function
- Minimize Active Risk[1]

Subject to the following constraints
- Companies flagged with controversy criteria as defined by MSCI are ineligible
- Minimum ESG uplift (specified for each point along the frontier)[1]

Hypothetical Efficient ESG Portfolio Optimizations

Objective function
- Minimize Active Risk[1]

Subject to the following constraints
- Companies flagged with controversy criteria as defined by MSCI are ineligible
- Minimum 20% ESG uplift[1]
- Minimum 50% carbon emissions reduction[1,2]
- Minimum 75% carbon reserves reduction[1,2]
- Companies flagged with business involvement criteria as defined by the MSCI World ESG Leaders Index methodology are ineligbile[3]
- Minimum +0.2 active factor exposure for value, momentum, low volatility, and quality[1,3]

Backtest simulation parameters
- Quarterly rebalance frequency
- Turnover not to exceed 60% annualized

Notes
1. Relative to the underlying benchmark
2. MSCI carbon data used
3. Where denoted as having been applied

References

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Melas, D., Nagy, Z., & Kulkarni, P. (2017). Factor investing and ESG integration. *In Factor Investing* (pp. 389-413). Elsevier.

PricewaterhouseCoopers (PwC). (2022). *Asset and wealth management revolution 2022*.

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