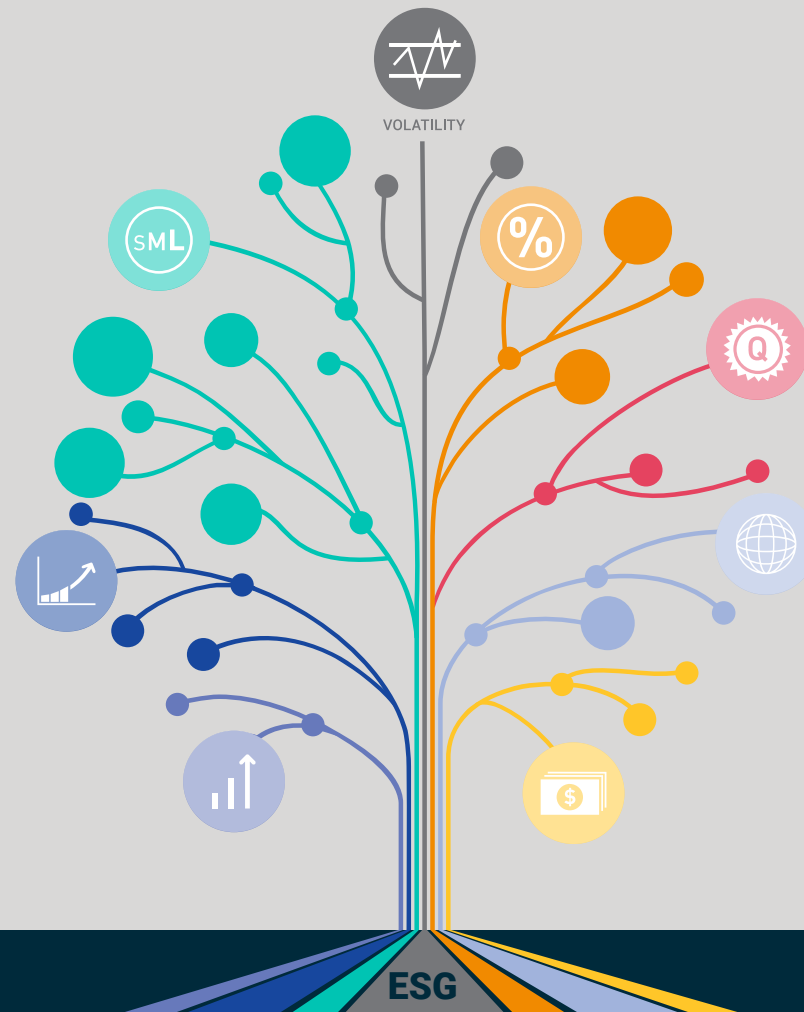
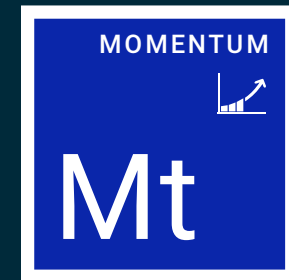
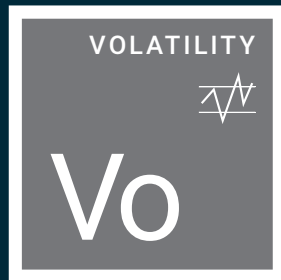


Minimum Volatility Extended ESG Reduced Carbon Target Indexes



Elements of performance™

Factors by MSCI



Factors are the building blocks of many portfolios – the elements capable of turning data points into actionable insights.



Introduction

The demands of institutional investors change, sometimes by the incorporation of new approaches or new data, but the pace of change in institutional investor expectations is faster than ever before. In fact, according to the 2021 MSCI Institutional Investor Insights ¹ survey, nearly 1-in-2 institutional investors consider factors central to their asset allocation and 52% are adopting an ESG framework as part of their investment process. Mainstream investors have long used factors to express investment views and today are increasingly demanding the incorporation of ESG, or environmental, social and governance principles, as part of the process to manage and attribute investment risk.

The use of factor models and indexes is common today among mainstream investors to manage portfolio risk and

identify investment opportunities. As evidence, Factor Investing, sometimes referred to as Strategic Beta investing, among ETF investors has grown to \$1.22 trillion in assets as of December 2020 ².

The growth in ESG is similarly strong, with the number of UN Principles for Responsible Investment (PRI) signatories reaching 3,000 as of year-end 2020 ³. ESG investors have long focused on exclusions of companies based on a set of values. Today, investors are taking a more holistic view of ESG to manage risk, placing ESG principles within factor models, as part of the risk management toolbox.

For many investment managers and product providers, the key challenge of combining factors and ESG into a single portfolio has been constructing an appropriate methodological framework to balance the

desired factor exposure while incorporating ESG principles. To help address this challenge, MSCI has conducted detailed research, focused on the integration of ESG criteria into factor indexes ⁴.

The MSCI Minimum Volatility Extended ESG Reduced Carbon Target Indexes integrate ESG principles into an equity index designed to reflect the performance of a minimum volatility strategy. The Indexes build upon the methodology of MSCI's flagship Minimum Volatility Index series, by adding improvement in ESG score and reduced carbon exposure as key index objectives, in addition to minimizing volatility risk.

1. MSCI Investment Insights 2021: Global Institutional Investor Survey

2. Morningstar Strategic Beta Landscape report April 2021

3. United Nations Principles for Responsible Investing. <http://www.unpri.org/>

4. Kulkarni, P., M. Alighanbari, and S. Doole. (2017). "The MSCI Factor ESG Target Indexes." MSCI Research Insight



Index methodology ⁵

review

The MSCI Minimum Volatility Extended ESG Reduced Carbon Target Indexes are constructed by selecting constituents from a market capitalization weighted index (the 'Parent Index'). Companies involved in certain business activities relating to environmental (thermal coal, oil sands), social (tobacco, controversial weapons, and civilian firearms) and governance (severe business controversies ⁶) criteria, are excluded from inclusion into the index.

Securities are selected into the Index through an optimization process that aims to minimize index volatility risk, while simultaneously reducing its exposure to both current greenhouse gas emissions, and potential future emissions by 30% (with respect to the Parent Index), and improving its weighted average industry-adjusted MSCI ESG score by 20% (with respect to the Parent Index).

The optimization process also employs security-level weight constraints to help maintain diversification and investability, as well as country and sector weight constraints relative to the Parent Index. The Index is rebalanced semi-annually (during MSCI's Semi-Annual Index Reviews) at which time the optimization process is employed.

5. MSCI Minimum Volatility Extended ESG Reduced Carbon Target Indexes Methodology

6. As defined by the MSCI ESG controversies methodology

Figure 1 - Key parameters of the MSCI Minimum Volatility Extended ESG Reduced Carbon Target Index methodology ⁷

Parameters	Details
Key Index Objectives	<ul style="list-style-type: none"> » Minimize volatility risk, while improving ESG score, and reducing carbon footprint
Selection Universe	<ul style="list-style-type: none"> » Market capitalization weighted 'Parent' Index
Exclusions	<ul style="list-style-type: none"> » Companies meeting specific business involvement criteria relating to controversial weapons, tobacco, civilian firearms, thermal coal, and oil sands » Companies identified as involved in very serious controversies involving the environmental, social, or governance impact of their operations and/or products and services ("Red Flag" companies as per MSCI Controversies Score)
Optimization Constraints	
ESG Score	<ul style="list-style-type: none"> » Minimum increase of weighted-average industry-adjusted ESG score of at least 20%, relative to the Parent Index
Carbon Reduction	<ul style="list-style-type: none"> » Minimum reduction in Carbon Emission Intensity of 30%, relative to the Parent Index » Minimum reduction in Potential Carbon Emissions of 30%, relative to the Parent Index
Exposure Constraints	<ul style="list-style-type: none"> » No constraint applied to volatility risk factors; exposure to all other risk factors restricted to +/-0.25 standard deviations, relative to the Parent Index » Sector weights held within +/-5% of the sector weights of the Parent Index » Countries (with weight greater than 2.5% in the Parent Index) held within +/-5% of the country weights of the Parent Index » Countries (with weight less than 2.5% in the Parent Index) capped at 3 times their weight in the Parent Index
Investability Constraints	<ul style="list-style-type: none"> » Maximum weight of an index constituent restricted to the lower of 1.5% and 20 times the weight of the security in the Parent Index » Minimum weight of an index constituent of 0.05% » Index one-way turnover constrained to a maximum of 10% at each Semi-Annual Index Review

7. Please see the MSCI Minimum Volatility Extended ESG Reduced Carbon Target Index methodology book for full details of the Index methodology



review

Using the MSCI USA Index as the parent universe, we simulated the Index methodology from May 2010 through August 2021, comparing the risk, return and ESG characteristics of the MSCI USA Minimum Volatility Extended ESG Reduced Carbon Target Index, relative to MSCI USA and MSCI USA Minimum Volatility Indexes.

Among the key criteria that investors may evaluate in a combined factor and ESG strategy is the impact that ESG integration has on key risk and return characteristics; factor exposures; and the net change in ESG and climate metrics.

Based on the risk and return characteristics, we found that the MSCI USA Minimum Volatility Extended ESG Reduced Carbon Target Index, when compared to the MSCI USA Index, demonstrated many of the characteristics seen in a low volatility strategy, including lower total risk, lower beta, and a higher Sharpe ratio. Over the study period, the Index also looked quite similar to the MSCI USA Minimum Volatility Index along these dimensions, as seen in Figure 2.

The level of exposure to target factors is central to factor investors and to measure the index exposure we used the MSCI Global Equity Model Long Term + ESG (GEMLTESG) risk model, and compared exposures between the MSCI USA Minimum Volatility Index and the MSCI USA Minimum Volatility Extended ESG Reduced Carbon Target Index. As seen in Figure 3, we found that the MSCI USA Minimum Volatility Extended ESG Reduced Carbon Target Index exhibits materially greater, and positive, exposure to the ESG factor. In addition, we observe there is minimal difference in the two Indexes' exposure to other key factors, including volatility.

When comparing the weighted average MSCI ESG scores, we also see that the MSCI USA Minimum Volatility Extended ESG Reduced Carbon Target Index demonstrates roughly a 20% higher score compared to the Parent Index (MSCI USA Index). As a comparison, the ESG score of the MSCI USA Minimum Volatility Index is similar to that of the Parent Index, as seen in Figure 4.

While the MSCI USA Minimum Volatility Extended ESG Reduced Carbon Target Index possesses a higher ESG score, and stronger ESG factor exposure, it also importantly, preserves the risk reduction benefits of a minimum volatility strategy. As seen in Figure 5, the Index's rolling volatility is similar to that of the MSCI USA Minimum Volatility Index, and materially lower than that of the MSCI USA Index.

Finally, an important aspect of the MSCI USA Minimum Volatility Extended ESG Reduced Carbon Target Index methodology is the reduction in carbon exposure, relative to the market cap weighted Parent Index. As seen in Figure 6, the Index significantly reduces exposure to both carbon intensity, as well as potential carbon emissions.



Figure 2 - Key performance metrics

	MSCI USA Index	MSCI USA Min Vol Index	MSCI USA Min Vol Ext ESG Reduced Carbon Target Index
Total Return* (%)	15.4	14.2	14.5
Total Risk (%)	13.8	10.7	10.8
Return/Risk	1.11	1.33	1.35
Sharpe Ratio	1.07	1.28	1.30
Active Return (%)	0.0	-1.2	-0.9
Tracking Error (%)	0.0	6.6	5.9
Information Ratio	NaN	-0.18	-0.15
Historical Beta	1.00	0.68	0.71
No of Stocks***	617	166	159
Turnover** (%)	1.8	20.1	20.0
Price To Book***	2.8	3.3	3.3
Price to Earnings***	19.5	20.6	20.0
Dividend Yield*** (%)	2.0	2.4	2.3

Period: May 31, 2010 to Sep 30, 2021

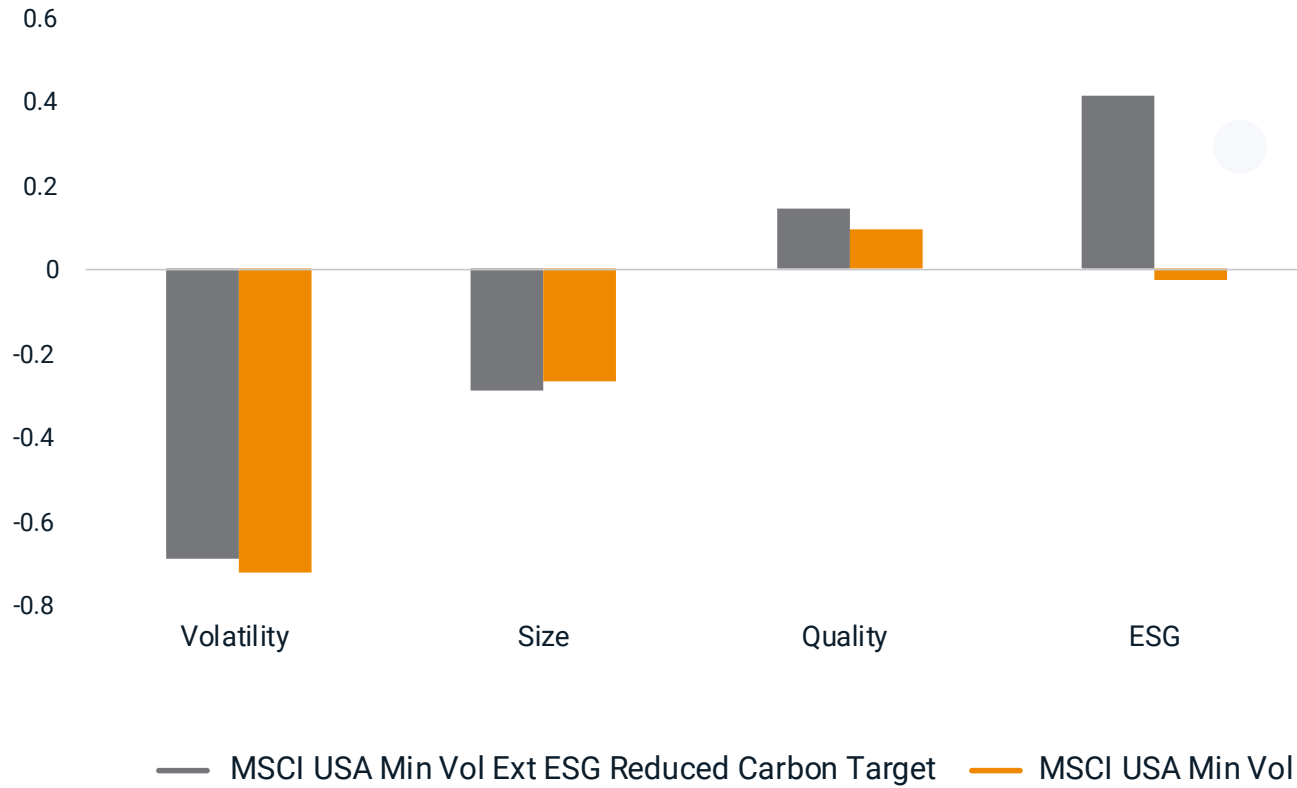
* Gross returns annualized in USD

** Annualized one-way index turnover over index reviews

*** Monthly averages



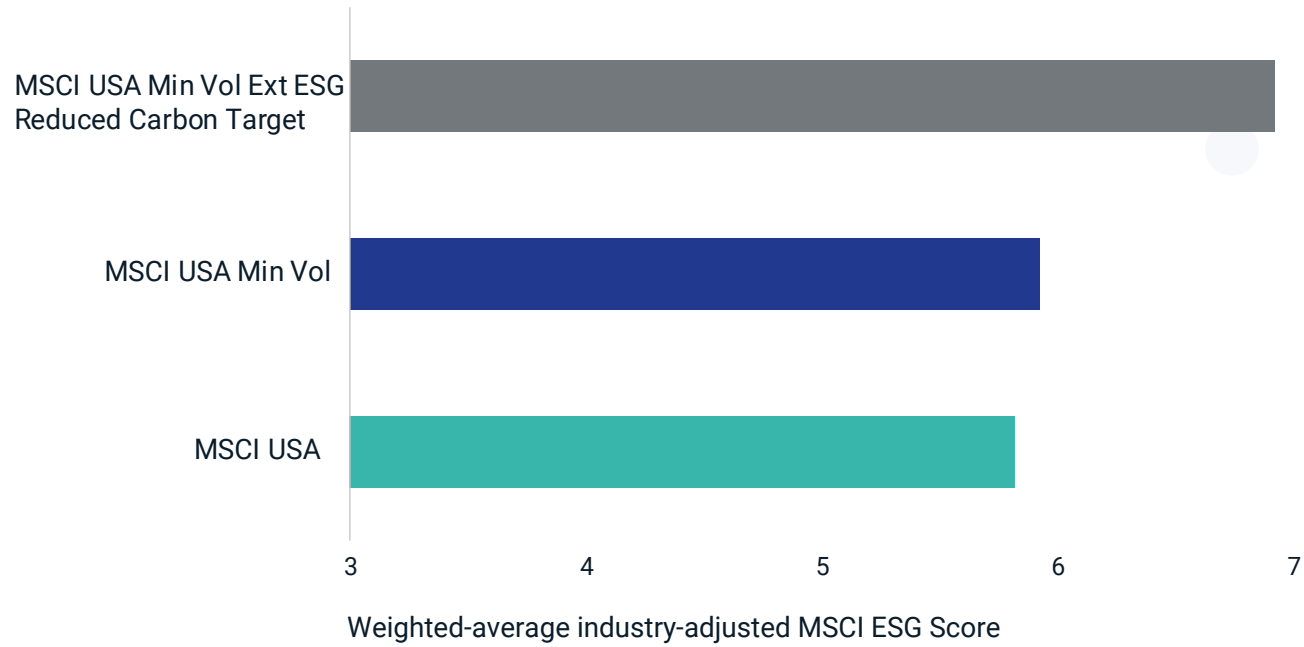
Figure 3 - Active factor exposures



Average active factor exposure for the period May 2010 to September 2021



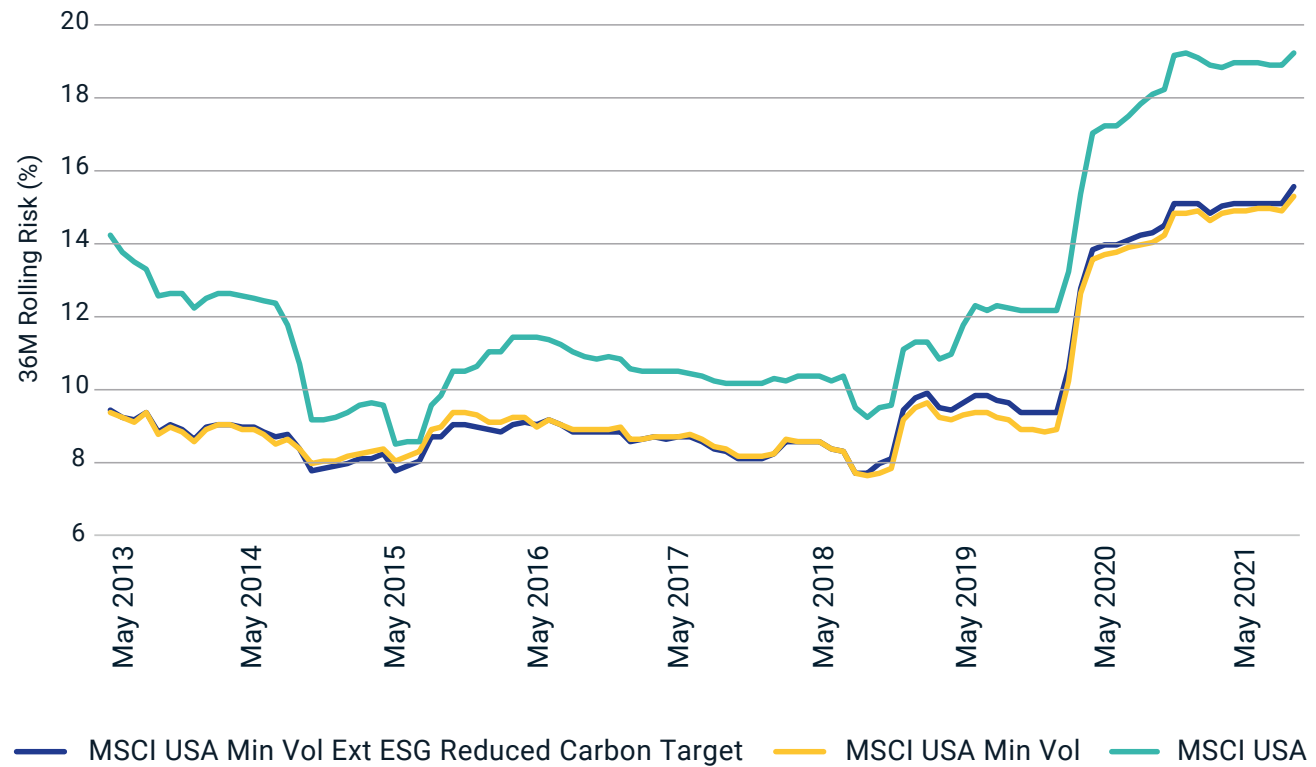
Figure 4 - Increase in weighted-average industry-adjusted MSCI ESG Score



Data as of Sep 2021



Figure 5 - Rolling volatility (36 Month)



Period: May 2013 to Sep 2021



Figure 6 - Key carbon exposure metrics

	MSCI USA Index	MSCI USA Min Vol Ext ESG Reduced Carbon Target Index
Carbon intensity (t CO₂e / \$M sales)	160	91
Potential carbon emissions (t CO₂e / \$M invested)	440	0

Data as of Sep 2021



Potential **applications**

Conclusion

Indexes are often used as performance benchmarks for active managers. Investors may also use indexes as policy benchmarks in their strategic asset allocation to define eligible markets and the universe of eligible securities for their portfolios. At the same time, investors increasingly use indexes for passive allocations when implementing their asset allocation strategies. We have observed an increasing number of investors incorporating factor indexes and ESG principles into their investment process through index replication.

Addressing ESG considerations, and the risks presented by climate change, are increasingly important for global institutional investors. Simultaneously, minimum volatility indexes and strategies continue to be used by institutional investors focused on lowering equity risk, while still maintaining their allocation to equities.

The MSCI Minimum Volatility Extended ESG Reduced Carbon Target Indexes are designed to preserve the factor exposure of a minimum volatility strategy, while also improving key ESG and climate characteristics.

In our review of the simulated history of the MSCI USA Minimum Volatility Extended ESG Reduced Carbon Target Index, we have observed similar risk-return characteristics to the MSCI USA Minimum Volatility Index, but with improved ESG scores, ESG factor exposures, and reduced carbon footprint.

These Indexes may be useful tools for investors focused on minimum volatility strategies, but also concerned with integrating ESG principles in the investment process, while also managing risks associated with carbon exposure.



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