

MSCI FACTOR ESG TARGET SERIES INDEXES METHODOLOGY

November 2017

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1 INTRODUCTION

The MSCI Factor ESG Target Indexes are designed to represent the performance of a strategy that seeks systematic integration of environmental, social and governance (ESG) norms in factor investing, by seeking higher exposure to a style factor or combination of style factors along with the improvement in the ESG profile of the index.

MSCI categorizes the MSCI Factor ESG Target Indexes as part of the family of MSCI Factor Indexes, which are designed to reflect the systematic elements of particular investment styles or strategies. While capitalization weighted indexes aim to represent the broad market beta, additional sources of systematic return associated with particular investment styles and strategies, such as value, quality, volatility, etc. or their combination could be represented through alternatively weighted indexes.

This index methodology aims to incorporate ESG-based constraints in a bottom-up factor index construction¹ approach.

The MSCI Factor ESG Target Indexes are constructed using individual stock exposures to the target factor/s along with specific ESG score criteria. The indexes aim to achieve relatively high exposure to the target single/multiple style factor/s while improving the index's ESG profile relative to that of the underlying parent index by using risk-constrained optimization. The index construction selects the final index by maximizing the exposure to the target factor(s) less a penalty for the common factor and stock-specific risk characteristics of each potential constituent.

¹ For the methodology of MSCI Minimum Volatility ESG Target Indexes please refer to MSCI Minimum Volatility ESG Target Indexes methodology

2 ESG RESEARCH FRAMEWORK

MSCI ESG Research provides in-depth research, ratings and analysis of the environmental, social and governance-related business practices of thousands of companies worldwide. It consists of an integrated suite of tools and products to efficiently manage research, analysis and compliance tasks across the spectrum of ESG factors.

The MSCI Factor ESG Target Indexes use company ratings and research provided by MSCI ESG Research. In particular, these indexes use the following three MSCI ESG Research products: MSCI ESG Ratings Score, MSCI ESG Controversies Score, and MSCI ESG Business Involvement Screening Research.

For details on MSCI ESG Research's full suite of ESG products, please refer to:
http://www.msci.com/products/esg/about_msci_esg_research.html

3 INDEX CONSTRUCTION METHODOLOGY

The applicable universe includes all the existing constituents of an underlying MSCI parent index (herein, the “Parent Index”). This approach aims to provide an opportunity set with sufficient liquidity and capacity.

The MSCI Factor ESG Target Indexes (herein, “the Index”) are constructed based on an optimization process from the underlying Parent Index using a Barra Equity Model to maximize the index-level exposure to the targeted style factors while controlling tracking error relative to the Parent Index. The optimization selects the final index by maximizing the exposure to the target factor(s) less a penalty for the common factor and stock-specific risk characteristics of each potential constituent, as well as placing an upper bound on the predicted tracking error of the index.

The steps for constructing the MSCI Factor ESG Target Indexes are described below.

3.1 ELIGIBLE UNIVERSE

The eligible universe is the universe of all the securities in the Parent Index that are not involved in very severe ESG controversies (“Red flags”) or in controversial weapons. More detailed information about the ESG-based exclusions is provided in Appendix IV.

3.2 CONSTITUENT SELECTION

The selection of constituents from the applicable universe is done using the optimization process.

The optimization relies on the factor exposures for all the securities in the Parent Index and the factor covariance matrix of the relevant Barra Equity Model. The optimization is performed using a base currency. The default currency is the US Dollar.

3.3 WEIGHTING SCHEME

The optimization objective is to maximize the alpha score (representative of the exposures to the set of target factors), while controlling the ex-ante tracking error relative to the Parent Index at the time of rebalancing.

3.3.1 CALCULATION OF THE ALPHA SCORE

3.3.1.1 Single Factor

$$\alpha_i = F_{1,i}$$

Where,

$F_{j,i}$ = Factor exposure of each security i to the target factor.

The factor exposures for the target factors are sourced as described in Appendix III.

3.3.1.2 Factor Combination

$$\alpha_i = W_1 * F_{1,i} + W_2 * F_{2,i} + \dots + W_N * F_{N,i}$$

Where,

$F_{j,i}$ = Factor exposure of each security i to each of the target factor j .

N = Number of factors

$$W_1 = W_2 = \dots = W_N = 1/N$$

The factor exposures for the target factors are sourced as described in Appendix III.

3.4 OPTIMIZATION CONSTRAINTS

At each Semi-Annual Index Review (SAIR), the following optimization constraints are employed, which aim to ensure investability while achieving improvement in ESG profile, subject to tracking error constraint relative to the Parent Index.

- The ex-ante tracking error of the Index, relative to the Parent Index will be capped at 3%
- The weighted-average industry-adjusted ESG score of the Index portfolio will be at least 20% more than the weighted-average industry-adjusted ESG score of the Parent Index portfolio
- If the Parent Index is based on the Standard size-segment, the maximum weight of an index constituent will be restricted to the lower of (the weight of the security in the Parent Index + 2%) and 10 times the weight of the security in the Parent Index. The minimum weight of an index constituent will be restricted to the higher of the (weight of the security in the Parent Index - 2%) and 0.
- If the Parent Index is based on the Small Cap size-segment, the maximum weight of an index constituent will be restricted to the lower of (the weight of the security in the Parent Index + 1%) and 5 times the weight of the security in the Parent Index. The minimum weight of an index constituent will be restricted to the higher of (the weight of the security in the Parent Index - 1%) and 0.
- The exposure of the MSCI Factor ESG Target Index to the non-target Barra style factors (factors not included in the calculation of alpha score) will be restricted to +/-0.25 standard deviations relative to the Parent Index.

- The sector weights of the MSCI Factor ESG Target Index will not deviate more than +/- 5% from the sector weights of the Parent Index.
- For countries with weight greater than 2.5% in the Parent Index, the weight in the MSCI Factor ESG Target Index will not deviate more than +/-5% from the country weight in the Parent Index.
- For countries with weight less than 2.5% in the Parent Index, the weight in the MSCI Factor ESG Target Index will be capped at 3 times their weight in the Parent Index.
- The one-way turnover of the MSCI Factor ESG Target Index is constrained to a maximum of 20% at each SAIR.
- The common factor risk aversion parameter used in the optimization of the risk-adjusted target factor exposure is 0.0015 and the specific risk aversion parameter is 0.015.

3.5 DETERMINING THE OPTIMIZED INDEX

The MSCI Factor ESG Target Index is constructed using the Barra Open Optimizer in combination with the relevant Barra Equity Model². The optimization uses the Parent Index as the universe of eligible securities and the specified optimization objective and constraints to determine the MSCI Factor ESG Target Index. Infeasible optimizations are handled as explained in Appendix I.

² Please refer to Appendix II for the detailed information on model usage

4 MAINTAINING THE INDEXES

4.1 SEMI-ANNUAL INDEX REVIEWS

The MSCI Factor ESG Target Indexes are rebalanced on a semi-annual basis, usually as of the close of the last business day of May and November, coinciding with the May and November Semi-Annual Index Reviews (SAIRs) of the MSCI Global Investable Market Indexes. The Barra Equity Model data as of the end of April and October are used respectively. This approach aims to capture timely updates to the risk characteristics of the companies and coincide with the rebalancing frequency of the relevant Parent Index. Similarly, the ESG data used for the Semi-annual Index Reviews will be taken as of the end of the month preceding the Index Review i.e., April and October. For some securities, ESG data may not be published by MSCI ESG Research by the end of the month preceding the Index Review. For such securities, MSCI will use ESG data published after the end of month, when available, for the rebalancing of MSCI Factor ESG Target Indexes. This approach aims to capture timely updates to ESG data of the constituents and coincides with the rebalancing of the relevant MSCI Parent Indexes.

The pro forma MSCI Factor ESG Target Indexes are in general announced nine business days before the effective date.

4.2 QUARTERLY INDEX REVIEWS

In addition to the SAIR, the ESG-based exclusions are applied on a quarterly basis at the time of regular Quarterly Index Reviews (QIR) of the MSCI Global Investable Market Indexes, usually as of the close of the last business day of February and August. At the quarterly index reviews, the Indexes are not re-constituted, but existing constituents are deleted if they do not satisfy the eligibility criteria as described in section 3.1 above. The ESG data used for the QIR will be taken as of the end of the month preceding the Index Review i.e., January and July. For some securities, this data may not be published by MSCI ESG Research by the end of the month preceding the Index Review. For such securities, MSCI will use ESG data published after the end of month, when available, for the rebalancing of MSCI Factor ESG Target Indexes.

4.3 ONGOING EVENT RELATED CHANGES

The general treatment of corporate events in the MSCI Factor ESG Target Indexes aims to minimize turnover outside of Index Reviews. The methodology aims to appropriately represent an investor’s participation in an event based on relevant deal terms and pre-event weighting of the index constituents that are involved. Further, changes in index market

capitalization that occur as a result of corporate event implementation will be offset by a corresponding change in the Variable Weighting Factor (VWF) of the constituent.

Additionally, if the frequency of Index Reviews in the Parent Index is greater than the frequency of Index Reviews in the MSCI Factor ESG Target Index, the changes made to the Parent Index during intermediate Index Reviews will be neutralized in the MSCI Factor ESG Target Index.

The following section briefly describes the treatment of common corporate events within the MSCI Factor ESG Target Indexes.

No new securities will be added (except where noted below) to the Index between Index Reviews. Parent Index deletions will be reflected simultaneously.

EVENT TYPE

EVENT DETAILS

New additions to the Parent Index

A new security added to the parent index (such as IPO and other early inclusions) will not be added to the index.

Spin-Offs

All securities created as a result of the spin-off of an existing Index constituent will be added to the Index at the time of event implementation. Reevaluation for continued inclusion in the Index will occur at the subsequent Index Review.

Merger/Acquisition

For Mergers and Acquisitions, the acquirer’s post event weight will account for the proportionate amount of shares involved in deal consideration, while cash proceeds will be invested across the Index.

If an existing Index constituent is acquired by a non-Index constituent, the existing constituent will be deleted from the Index and the acquiring non-constituent will not be added to the Index.

Changes in Security Characteristics

A security will continue to be an Index constituent if there are changes in

characteristics (country, sector, size segment, etc.) Reevaluation for continued inclusion in the Index will occur at the subsequent Index Review.

Further detail and illustration regarding specific treatment of corporate events relevant to this Index can be found in the MSCI Corporate Events Methodology book under the sections detailing the treatment of events in Capped Weighted and Non-Market Capitalization Weighted indexes.

The MSCI Corporate Events methodology book is available at:
<https://www.msci.com/index-methodology>

APPENDIX I: HANDLING INFEASIBLE OPTIMIZATIONS

During the Semi-Annual Index Review, in the event that there is no optimal solution that satisfies all the optimization constraints defined in Section 3.4, the following constraints are relaxed, until an optimal solution is found:

- Relax the maximum weight multiple in steps of 2 up to a maximum of 5 iterations based upon the following formula

$$wm_{i+1} = 2 + wm_i \text{ for } i = 0 - 4$$

Where wm_i = Maximum Active weight multiple

$$wm_0 = 10 \text{ for Standard Indexes}$$

For small cap indexes, wm_0 is 5 and it will be relaxed in the step of 1

- Relax the turnover constraint in steps of 2%, up to a maximum of 30%
- The maximum active weight multiple constraint and the maximum turnover constraint are alternately relaxed until a feasible solution is achieved. For example, constraints relaxation is executed in the sequence as illustrated below:

Order of Relaxation	Maximum Asset Weight Multiple	Turnover Limit
1	12 times the weight of the security in the Parent Index	20%
2	12 times the weight of the security in the Parent Index	22%
3	14 times the weight of the security in the Parent Index	22%
4	14 times the weight of the security in the Parent Index	24%

In the event that no optimal solution is found after the above constraints have been relaxed over all 5 iterations, the MSCI Factor ESG Target Index will not be rebalanced for that Semi-Annual Index Review.

APPENDIX II: NEW RELEASE OF BARRA[®] EQUITY MODEL OR BARRA[®] OPTIMIZER

The methodology presently uses MSCI Barra Global Equity Model for Long-Term Investors (“GEMTL”) for the optimization. A new release of the relevant Barra Equity Model or Barra Optimizer may replace the former version within a suitable timeframe.

APPENDIX III: TARGET FACTOR DEFINITION SUMMARY

The style factors targeted in the MSCI Factor ESG Target Index are the six style factor families and their combinations: Value, Quality, Momentum, Low Size, Yield and Low Volatility. These factor families are described using individual factor scores from the current release of the MSCI Barra Equity Model. The choice of factors used within each factor family is governed by the current model used for the optimization, which may change with a new release of the Barra Equity Model (as specified in Appendix II). The model data will be used from previous end-of-month, prior to the rebalancing date. Following are the definitions of factor families currently used in the Index. For more detailed information on individual factors in GEMTL, please refer to <https://www.msci.com/portfolio-management>

Value:

The value score for each security is calculated by combining the security-level exposures to two factors, Book-to-Price and Earnings Yield, from the GEMTL model. A sector-relative score is derived from the combined score by standardizing the latter within each sector and winsorizing at +/- 3

$$\text{Value}_i = (0.33) * \text{BtoP}_i + (0.67) * \text{EarningsYield}_i$$

Quality:

The quality score for each security is calculated by combining in equal proportion the security-level exposures to five factors - Profitability, Investment Quality, Earnings Quality, Leverage and Earnings Variability - from GEMTL model. A sector-relative score is derived from the combined score by standardizing the latter within each sector and winsorizing at +/- 3

$$\text{Quality}_i = (0.2) * \text{Profitability}_i + (0.2) * \text{Investment Quality}_i + (0.2) * \text{Earnings Quality}_i + (-1) * (0.2) * \text{Earnings Variability}_i + (-1) * (0.2) * \text{Leverage}_i$$

Low Volatility:

The low volatility score for each security is calculated by combining in equal proportion the security-level exposures to two factors - Beta and Residual Volatility - from GEMTL model.

$$\text{Low Volatility}_i = (-1) * (0.5) * \text{Beta}_i + (-1) * (0.5) * \text{Residual Volatility}_i$$

Momentum:

The momentum score for each security is same as the Momentum factor score in the GEMTL Barra Equity Model

Low Size:

The low size score for each security is represented by the Size factor score in the GEMTL Barra Equity Model with sign reversed.

$$\text{Low Size}_i = (-1) * \text{Size}_i$$

Yield:

The yield factor score for each security is same as the Dividend Yield factor score in the GEMTL Barra Equity Model with sign reversed.

APPENDIX IV: CONTROVERSY SCORE AND CONTROVERSIAL WEAPONS EXCLUSION CRITERIA

- ESG Controversy Score (“Red Flags”)

Securities of companies having faced very severe controversies pertaining to ESG issues are not eligible for inclusion in the Index. This is implemented by excluding constituents of Parent Index with MSCI ESG Controversy Score = 0 (“Red Flag” companies). For more details on MSCI ESG Controversies Score, please refer to <https://www.msci.com/esg-integration>

- Controversial Weapons Involvement

For details, please refer to MSCI Global ex Controversial Weapons Indexes Methodology at <https://www.msci.com/index-methodology>.

The following sections have been modified since September 2017:

- Clarified the mean-variance optimization problem solved in the index construction in the Introduction (Section 1) and section 3.
- Added a description of the values used for the common factor risk aversion and the specific aversion parameters used in the optimization in Section 3.4.
- Updated Appendix III to explain the dependence of the precise factor definitions used within each target factor on the Barra model currently used for optimization.

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