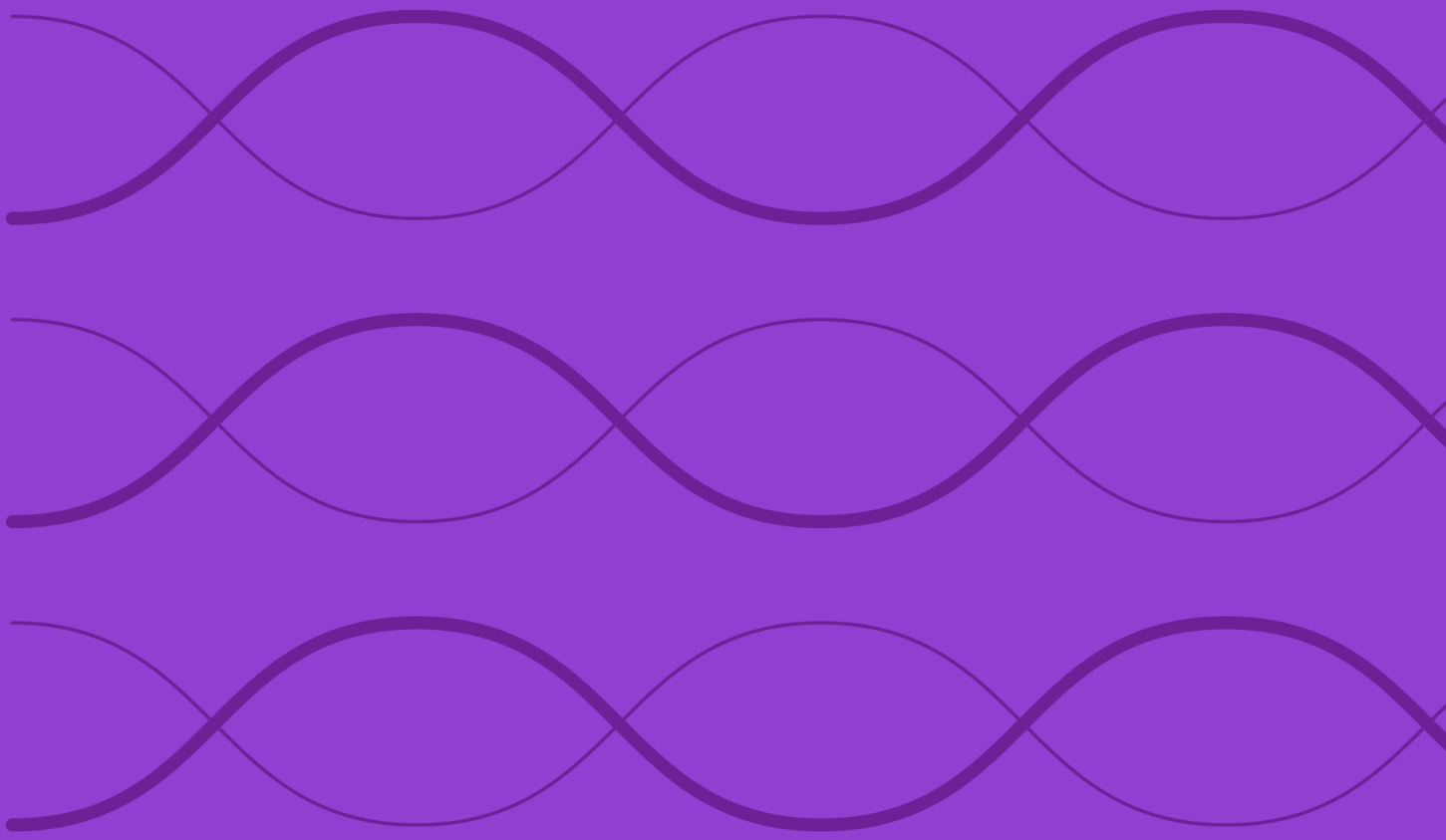
MORNINGSTAR Indexes

Construction Rules for the Morningstar® Global Multifactor Indexes



July 2025

Overview

The Morningstar® Global Multifactor Indexes are designed to deliver efficient, diversified exposure to industry standard equity factors, including low volatility, momentum, quality, and value. These indexes use an optimization framework to maximize portfolio-level factor exposure under a set of constraints to improve diversification and limit turnover, including maintaining equal active exposure to each of the targeted factors.

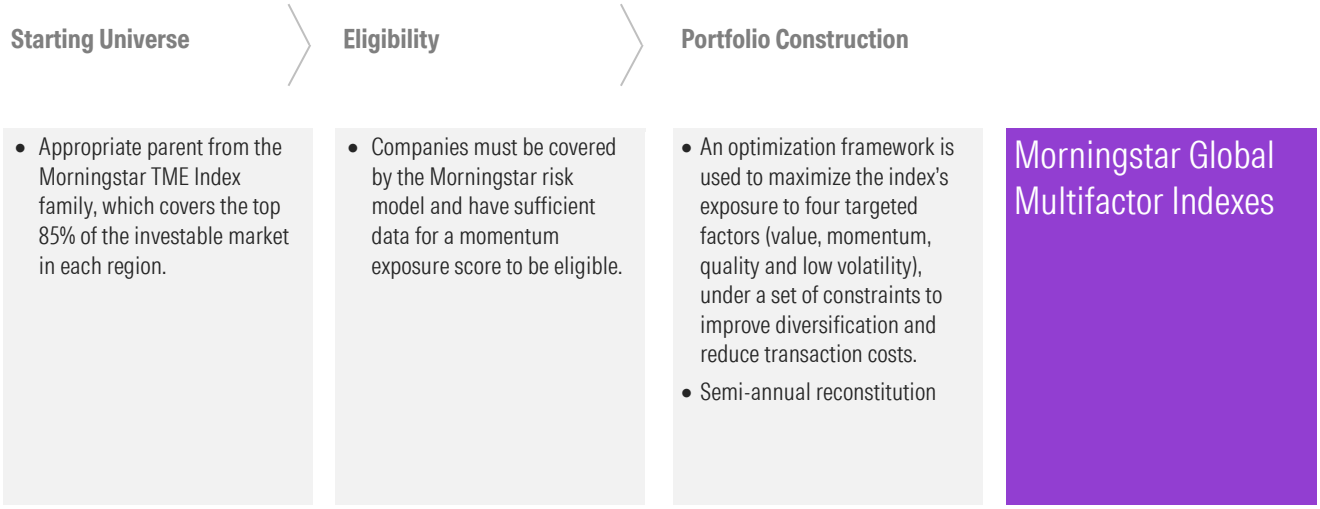
These indexes do not incorporate environmental, social, or governance criteria.

Index Inception and Performance Start Date

The index inception date is 2024-02-23, and the performance start date, when the first back-tested index values were calculated, is 2008-06-20.

Index Construction

Methodology Summary



Starting Universe

At each reconstitution, securities for the Morningstar Global Multifactor Indexes are derived from the parent (benchmarks) from the Morningstar Target Market Exposure Indexes. For more details on benchmark construction, refer to the Construction Rules for the Morningstar Target Market Exposure Indexes. The regional variants and their parent benchmarks are listed in Appendix 2.

Eligibility

To be eligible for inclusion in the indexes, all securities must have exposures available from the Morningstar risk model for the low volatility, quality, small size, and value factors. Constituents must also have a momentum signal available. Please refer to Appendix 5 for more information on the individual factor definitions.

Since factors are intended to be a company-level descriptor, only the primary share class of each company is used, and float market capitalization is measured at the company level.

Portfolio Construction

Optimization Parameters

At each reconstitution, the indexes are modified using an optimizer to solve for the following objective function and constraints:

- The objective is to maximize active exposures to the targeted factors contemporaneously
- Constrain targeted factors (low volatility, momentum, quality and value) to all have equal active risk exposures relative to the parent benchmark
- Constrain small size to have an active risk exposure between [-0.25,0.25]
- No short positions are allowed

- The minimum non-zero weight is 1 basis point
    - The maximum one-way turnover at each reconstitution is 20%
- Sector active weight constraints: To limit deviation from corresponding weights in the parent benchmark, the sector weights in the index are maintained within a lower and upper bound, calculated as:
    - Lower bound = max(0%, Weight in the benchmark – 2%)
    - Upper bound = min(100%, Weight in the benchmark + 2%)
- Country active constraints: To limit deviation from corresponding weights in the parent benchmark, the country weights in the index are maintained within a lower and upper bound, calculated as:
    - If the country makes up more than 2.5% or more of the parent index then:
        - Lower bound = max(0%, Weight in the benchmark – 5%)
        - Upper bound = min(100%, Weight in the benchmark + 5%)
    - Else if the country makes up 2.5% or less of the parent index then:
        - Lower bound = 0%
        - Upper bound = 3*Weight in the benchmark
- Dynamic size segment constraints are applied. In case of an infeasible problem, the constraints are iteratively relaxed until an optimal solution has been solved for.
    - If the security is a large cap:
        - Lower bound = max(0%, Weight in the benchmark – 2%)
        - Upper bound = min(100%, min(LM*Weight in the benchmark, Weight in the benchmark + LS))
    - If the security is mid cap:
        - Lower bound = max(0%, Weight in the benchmark – 1%)
        - Upper bound = min(100%, min(MM*Weight in the benchmark, Weight in the benchmark + MS))

    Where the four variables LM (large multiplier), LS (large spread), MM (mid multiplier), and MS (mid spread) are iteratively relaxed according to the rules in appendix 3.

Number of Stocks

The number of stocks in the index is variable, subject to the size of the starting universe and the application of eligibility criteria at the time of reconstitution.

Index Weighting

The weights of index constituents are determined through an optimization process subject to the objective function and weight constraints described in the "Optimization Parameters" section above.

Index Maintenance and Calculation

Reconstitution and Rebalancing

The index is reconstituted, where the membership is reset, and rebalanced semi-annually on the third Friday of June and December. Adjustments are implemented after Friday's market close and reflected the following Monday. The market data used for reconstitution is as of the last trading day of May and November.

Index files are published according to the global calendar schedule. For more information, please refer to the Morningstar Indexes Holiday Calendar.

Corporate Actions

The treatment of corporate actions will be as per the alternatively-weighted indexes corporate action methodology. For more details, please refer to the Morningstar Indexes Corporate Actions Methodology rulebook.

Index Calculation and Price Data

Details about index calculations and price data can be found in their respective rulebooks: Morningstar Indexes Calculation Methodology and Equity Closing Prices Used for Index Calculation.

Methodology Review and Index Cessation Policy

The index methodology is continually reviewed to ensure it achieves all stated objectives. These reviews consider corporate action treatment, eligibility requirements, and maintenance procedures. Subscribers to the index will be notified before any methodology changes are made. For more details, refer to the Morningstar Index Methodology Change Policy.

Morningstar Indexes notifies all subscribers and stakeholders of the index that circumstances might arise that require a material change to, or a possible cessation of, the index. These circumstances are generally not within Morningstar's control and may include significant changes to the underlying market structure, inadequate access to necessary data, geo-political events, and regulatory changes. In addition, factors such as low usage or methodology convergence may result in the cessation of an index.

Because the cessation of the index or benchmark index could disrupt subscriber products that reference this index, all subscribers are encouraged to have robust fallback procedures if an index is terminated. For more details, refer to the Morningstar Index Cessation Process.

Data Correction and Precision

Intraday Index Data Corrections

Commercially reasonable efforts are made to ensure the accuracy of data used in real-time index calculations. If incorrect price or corporate action data affects index calculations, corrections are applied prospectively.

Index-Related Data and Divisor Corrections

Incorrect pricing and corporate action data for individual issues in the database will generally be corrected upon detection. In addition, an incorrect divisor of an index, if discovered within two days of its occurrence, will be fixed retroactively on the day it is discovered to prevent an error from being carried forward. Commercially reasonable efforts are made to correct an older error subject to its significance and feasibility.

For more details, refer to the Recalculation Guidelines.

Exceptions

While Morningstar will seek to apply the method described above, the market environment, supervisory, legal, financial, or tax reasons may require an alternative approach to be adopted. A decision to take an alternative approach will be made by the relevant Morningstar Index Methodology Committee, and in all instances, the application of a nonstandard process will be reported to the Morningstar Index Oversight Committee.

Appendixes

Appendix 1: Modifications to the Rulebook

Section	Description of Change	Update Date
Data Correction and Precision	Computational and Reporting Precision Section Removed	November 2024

Appendix 2: Regional Variants and Parent Benchmarks

Factor Index	Parent Benchmark
Morningstar® Developed Markets Multifactor Index	Morningstar® Developed Markets Target Market Exposure Index
Morningstar® Developed Markets Europe Multifactor Index	Morningstar® Developed Europe Target Market Exposure Index
Morningstar® Developed Markets ex-North America Multifactor Index	Morningstar® Developed Markets ex-North America Target Market Exposure Index
Morningstar® Developed Markets ex-US Multifactor Index	Morningstar® Developed Markets ex-US Target Market Exposure Index
Morningstar® Emerging Markets Multifactor Index	Morningstar® Emerging Markets Target Market Exposure Index
Morningstar® Global Multifactor Index	Morningstar® Global Target Market Exposure Index
Morningstar® US Multifactor Index	Morningstar® US Target Market Exposure Index

Appendix 3: Handling of Infeasible Optimizations

If the problem statement defined in the portfolio construction section is infeasible, the following constraints will be relaxed until the problem statement is feasible and an optimal solution is found:

Relax the maximum weight multiple of the Large Cap size segment (10x) in steps of 2 based upon the following formula

$LM_{i+1} = 2 + LM_i$
Where LM_i = Maximum active weight multiple for large caps (LM = Large Multiple)

Relax the maximum weight multiple of the Mid Cap size segments (5x) in steps of 1 based upon the following formula

$MM_{i+1} = 1 + MM_i$
Where MM_i = Maximum active weight multiple for mid caps (MM = Mid Multiple)

Relax the maximum active weight constraint of the Mid Cap size segments (1%) in multiples of 1.25 based upon the following formula

$MS_{i+1} = 1.25 * MS_i$
Where MS_i = Maximum active weight for mid caps (MS = Mid Spread)

Relax the maximum active weight constraint of the Large Cap size segment (2%) in multiples of 1.25 based upon the following formula
$LS_{i+1} = 1.25 * LS_i$
Where LS_i = Maximum active weight for large caps (LS = Large Spread)

The above four constraints are alternately relaxed until the problem statement is feasible and an optimal solution is found.

Appendix 4: Index Inception and Performance Start Dates

Index Name	Index Inception Date	Performance Start Date
Morningstar® Developed Markets Multifactor Index™	2024-02-23	2008-06-20
Morningstar® Developed Markets Europe Multifactor Index™	2024-02-23	2008-06-20
Morningstar® Developed Markets ex-North America Multifactor Index™	2024-02-23	2008-06-20
Morningstar® Developed Markets ex-US Multifactor Index™	2024-02-23	2008-06-20
Morningstar® Emerging Markets Multifactor Index™	2024-02-23	2008-06-20
Morningstar® Global Multifactor Index™	2024-02-23	2008-06-20
Morningstar® US Multifactor Index™	2024-02-23	2008-06-20

Appendix 5: Factor Definitions

All raw factor exposures, except for momentum, are from the Morningstar Risk Model Methodology. As such, regional normalizations are with respect to those defined in the risk model methodology document. Regional normalization for momentum is defined by regions listed in Appendix 5.

Low Volatility Factor

The firm-specific volatility is a combination of three standardized volatility proxies:

$$Volatility\ Composite = 50\% * IVOLz + 25\% * TVOLz + 25\% * MAX5$$

(1) IVOL (six-month horizon, 50%):

Idiosyncratic volatility (IVOL) is the capital asset pricing model's (CAPM) residual volatility over the past six months. A time series regression of excess daily stock return against the value-weighted excess daily market return of the estimation universe is used. The IVOL is the standard deviation of the CAPM residuals. IVOL is standardized to obtain its z-score.

$$CAPM: r_{i,t} - r_{ft} = \alpha_{i,t} + \beta_t (r_{m,t} - r_{ft}) + \varepsilon_{i,t}$$
$$IVOL: \sigma_{i,t} = std(\varepsilon_{i,t})$$

(2) TVOL (six-month horizon, 25%):

Total volatility (TVOL) is defined as the volatility of a stock's daily returns over the past six months. TVOL is standardized to obtain its z-score.

$$TVOL = std(r_{i,t})$$

(3) MAX5 (one-month horizon, 25%):

MAX5 is defined as the average of the highest five daily returns over the past one month. MAX5 is standardized to obtain its z-score.

The negative of the volatility composite is used (the sign is flipped from the risk model convention), so large values are related to low volatility, and small values are related to higher-volatility stocks.

Momentum Factor

The momentum factor[1] is the normalized value of the stock price's raw momentum score. The raw momentum score is calculated as the total return, minus local risk-free rate, of a stock over an 11-month period (at least 7 months of data is required, and a 6+ month window is used until 12 months is available). This is the classical 12-1 momentum formulation and is computed using local currency. This can be stylized in the following way:

P_{12} = Local price 12 months prior to previous month end (for new securities, allow it to be less than 12 months but at least 6 months)
P_1 = Local price 1 month prior to previous month-end
D = the sum of the dividends paid within this time interval, which are reinvested on the ex-date
The total return over that horizon is:

$TR = (P_1 - P_{12}) / P_{12} + D / P_{12}$ = capital gain return + gross dividend yield

The mean annualized local risk-free rate over the 11-month (or shorter, when data for the full time horizon is not available) window, RF, is then subtracted to arrive at the raw momentum score for each security:

$MOM = TR - RF$

Quality Factor

The quality score of a stock is defined as the equally weighted z-score of a company's profitability (trailing 12-month return on assets) and the z-score of its financial leverage (trailing 12-month debt/capital). The z-score is with respect to all the stocks in the global universe.

$Quality = 1/2[ROA_z + (1 - Total\ Debt_t / Total\ Invested\ Capital_t)_z]$

Where ROA is the trailing 12-month return on assets and the subscript z indicates a z-score.

The quality factor is sector neutralized.

[1] The momentum factor excludes the following countries due to lack of a sufficient local risk-free rate: Kuwait, Pakistan, and Saudi Arabia.

Size Factor

The size factor is the normalized value of the logarithm of a firm's market capitalization, such that large values correspond to smaller sized companies:

$$size_{i,t} = -ln(MV_{i,t})$$

The size factor is sector neutralized.

Value Factor

The value factor exposure uses the raw style score from the Style Box as the input for calculating the growth-value exposure of stocks. The raw style score is calculated as the difference between a stock's growth score and value score. The negative of the raw style score is used (the sign is flipped from the risk model convention), so large values are related to value oriented stocks, and smaller values are related to growth oriented stocks.

Value Factor $= Value\ Score - Growth\ Score$

The value score is the weighted average of a stock's prospective earnings (E), book value (BV), revenue (R), cash flow (CF), and dividend (D), all scaled by the current price of the stock:

$$Value\ Score = [wE \times E\ Pt + wBV \times BV\ Pt + wR \times R\ Pt + wCF \times CV\ Pt + wD \times D\ Pt\ ].$$

The growth score of a stock is the weighted average of the growth rates in a company's earnings (E), book value (BV), revenue (R), cash flow (CF), and dividend (D):

$$Growth\ Score = [wE \times Egrowth + wBV \times BVgrowth + wR \times Rgrowth + wCF \times CFgrowth + wD \times Dgrowth\ ].$$

The value factor is sector neutralized.

About Morningstar Indexes

Morningstar Indexes was built to keep up with the evolving needs of investors—and to be a leading-edge advocate for them. Our rich heritage as a transparent, investor-focused leader in data and research uniquely equips us to support individuals, institutions, wealth managers, and advisors in navigating investment opportunities across major asset classes, styles, and strategies. From traditional benchmarks and unique IP-driven indexes to index design, calculation, and distribution services, our solutions span an investment landscape as diverse as investors themselves.

Morningstar Index Methodology Committee

The Morningstar Index Methodology Committee oversees all new index development, index methodology changes, and cessation of indexes for any indexes where Morningstar owns the intellectual property. This committee is also charged with ensuring that indexes align with Morningstar Research principles and values. The group comprises members of the index team with index research, product development, product management, client service, index implementation, and operation expertise who provide the first layer of governance over index design and methodology.

Morningstar Index Operations Committee

The Morningstar Index Operations Committee governs the processes, systems, and exception handling of the day-to-day management of all live indexes, including index rebalancing and reconstitution, restatements, market classification, and contingency management. The committee oversees the annual review of index methodology (as required by U.K. and EU benchmark regulations, or BMR), ensuring that methodologies remain fit for purpose and continue to achieve their stated investment objectives. The group comprises members of the index team with data, operations, corporate actions, product development, index launch, client service, and index management experience who provide the first layer of governance over index operations.

Morningstar Index Oversight Committee

The Morningstar Index Oversight Committee is responsible for the index oversight function as per the requirements of the U.K. and European BMR, providing independent oversight of all aspects of the governance of benchmark administration as required by the relevant BMR. Its remit extends to all calculation and administration-related business activities of Morningstar Indexes, including administration of Morningstar-owned benchmarks as well as client-owned benchmarks and index calculation. The oversight function is part of the organizational structure of Morningstar but is separate and independent from the index business, index management, and the other index committees.

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