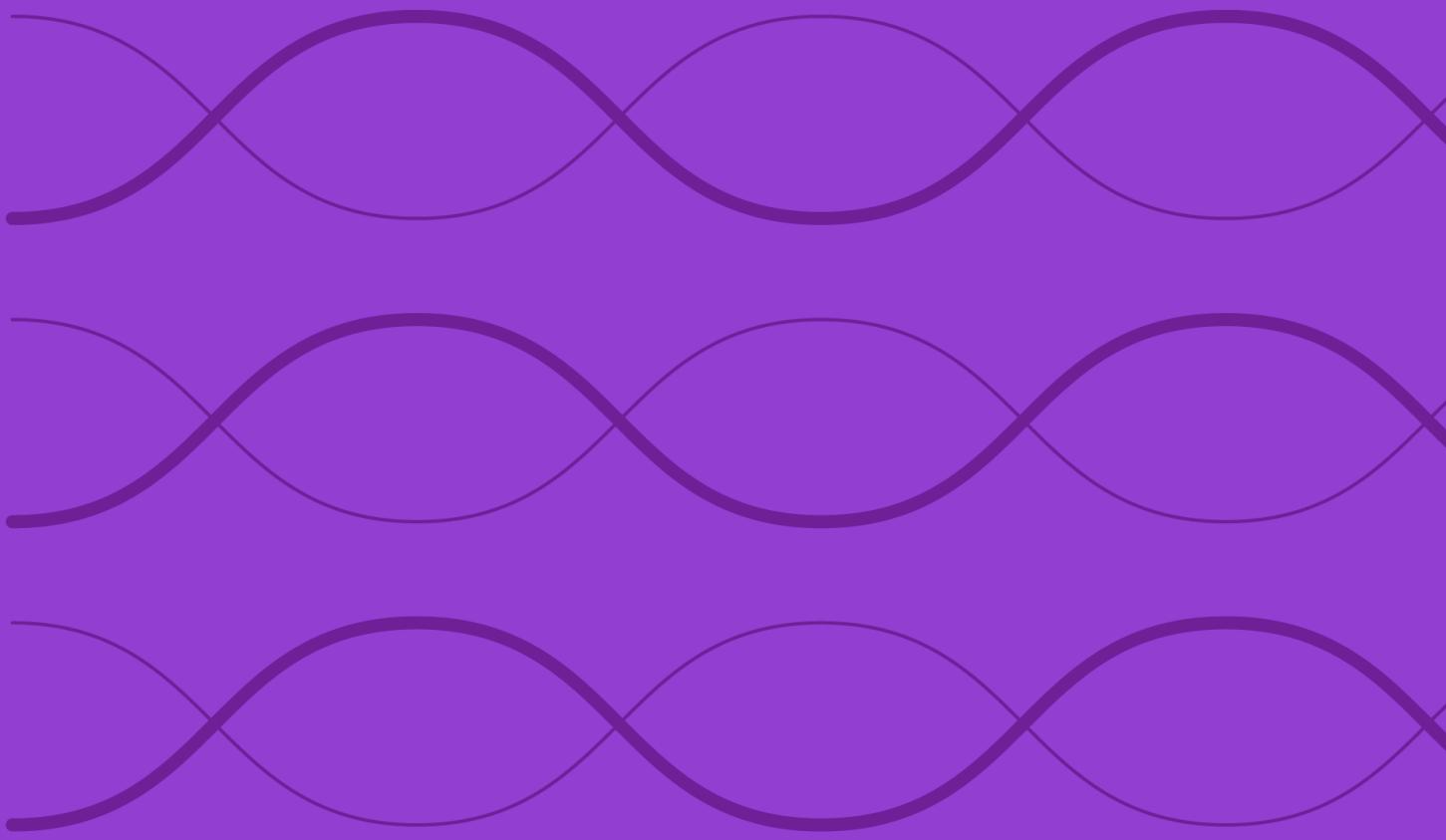
MORNINGSTAR Indexes

Construction Rules for the Morningstar Single Country Factor Indexes



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Overview

The Morningstar Single Country Factor Indexes are designed to deliver efficient, strong exposure to industry standard equity factors within their target markets. The indexes are constructed with transparent, rules-based methodology that aims to mitigate unintended sector and regional biases and facilitate investability.

This family includes indexes that target value, momentum, quality, low volatility, size, and yield, based on data from the Morningstar Global Industry Standard Risk Model[1] (risk model).

For more information on Morningstar risk models, please refer to Morningstar Risk Model Methodology.

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

Index Inception and Performance Start Date

Index inception and performance start dates, when the first back-tested indexes values were calculated, are listed in Appendix 4.

[1] The momentum indexes use a slightly different definition than the risk model, based on local price performance rather than performance in U.S. dollars.

Index Construction

Methodology Summary

Starting Universe

- Morningstar Target Market Exposure Indexes
  - Large/mid indexes covering the top 85% of the investable market

Eligibility

- Companies covered by Morningstar Standard risk model are eligible for inclusion.
- The top ranked stocks based on their target factor exposure are screened, representing 30% of the parent index by float market capitalization.
- Buffer applied to favour existing constituents.

Portfolio Construction

- Constituents are weighted with factor tilts that incorporates their weight in the parent index and factor score.
- Weights are optimized to track the factor tilted weights subject to sector and security level constraints.
- Semi-annual reconstitution.

Morningstar Single Country Factor Indexes

Starting Universe

At each reconstitution, securities for the index are derived from the parent index (benchmarks) from the Morningstar Target Market Exposure Indexes, as shown in Appendix 3. For more details on benchmark construction, refer to the construction rules for the Morningstar Target Market Exposure Indexes. Since factors are intended to be a company-level descriptor, only the primary share class of each company is used, and market capitalization is measured at the company level.

Eligibility

To be eligible for inclusion in each index, all stocks must meet the following criteria:

- Securities must have valid factor exposure scores. This means they must be covered by the Morningstar risk model to qualify for inclusion for the value, quality, yield, low volatility, and size indexes.
- To qualify for inclusion in the Momentum, Quality and Low Volatility indexes, securities must have at least 6 months of price history as of the data cutoff date for index inclusion.
- Risk model exposures must be present for at least 60 securities out of the parent index.

Portfolio Construction

- Each stock is assigned a factor exposure score. See Appendix 4 for further details on how each factor is defined.
- The eligible stocks are ranked based on their target factor exposure that are normalized (z-scored). These normalized exposures are capped at plus and minus 3 to limit the influence of extreme outliers.
- The top ranked stocks, representing 30% of the parent index by float market capitalization, are targeted for inclusion. If multiple securities have the same exposure, then the security with larger float market capitalization would be given preference.
- Buffer rules are enforced to mitigate turnover:
  - Securities in the top 20% are automatically included the portfolio
  - Preference is given to current portfolio constituents that fall between 20% and 40% of the parent index's market capitalization
  - Securities from the remaining selection universe are selected until the targeted 30% market capitalization of the parent index is reached

Number of Stocks

The number of stocks in each index is variable, subject to the selection and eligibility criteria at the time of reconstitution. This count reflects the number of stocks necessary to reach the target representation of the parent index's factor tilted weights.

Index Weighting

The selected securities are assigned factor-tilted weights, which are subsequently subjected to constraints. The exposures of these selected indexes are once again normalized. In situations where only one security is selected from a sector or the standard deviation within a sector is less than 0.001, the raw exposure is adjusted by multiplying it with 0.001. This adjusted value is used for the calculation of factor score. After normalization, it is clipped as described in "Number of Stocks." A factor score is computed for each security using its normalized and clipped exposure, given as "z":

$$\text{Factor\_score} = 1 + a * z, if\ z > 0, else\ \frac{1}{1 - a * z}$$

The tilt strength value, "a," is set at a = 1. The factor weight is then factor_score*benchmark_weight, where benchmark_weight is the company-level market capitalization for the given stock. These factor weights are then normalized to sum to 1. These unconstrained weights are used as targets for the constrained optimization, which produces final weights.

Index Constraints via Optimization

Once the unconstrained tilted weights are computed, we modify them by adjusting them as little as possible to meet the constraints. At every reconstitution, the portfolios are modified using an optimizer to minimize the objective and meet the constraints as follows:

- Minimize the L2 norm between the unconstrained tilted (target) weights and final weights.
- No short positions are allowed.

- The maximum weight of a security is restricted to 20 times its weight in the benchmark.
- The maximum weight of a security is restricted to be less than or equal its weight in the benchmark parent index + 4%.
- The minimum weight of a security is restricted to 0.01%.
- 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 = Weight in the benchmark – Sector Misfit
    - Upper bound = Weight in the benchmark + Sector Misfit
- Region active weight constraints: To limit deviation from corresponding weights in the parent benchmark, the region weights in the index are maintained within a lower and upper bound, calculated as:
    - Lower bound = Weight in the benchmark – Region Misfit
    - Upper bound = Weight in the benchmark + Region Misfit

- An absolute sector cap of 40% is also applied.
- Handling of infeasible optimizations.
    - Constraints will be relaxed if a feasible solution is not obtained. The relaxation happens as:
        - Sector Misfit and Region Misfit start at 2% and both loosen in increments of 1% for Quality, Size, Value, and Yield.
        - Sector Misfit and Region Misfit start at 10% and both loosen in increments of 1% for Momentum and Low Volatility.
        - Maximum sector weight deviation allowed is 35% for Quality, Size, Value and Yield.
        - Effective from the December 2026 reconstitution on, there is no maximum sector weight deviation for the Momentum and Low volatility indexes.
        - Region Misfit is not applicable for US and Developed Markets Europe, as they are each contained within a single region.
        - For the Momentum and Low Volatility indexes, the absolute sector cap may be relaxed up to 100% in increments of 5% in case of infeasibility.

Index Maintenance and Calculation

Scheduled Maintenance

The index is reconstituted (the membership is reset) and rebalanced (the number of free-float shares of each constituent security is adjusted) semi-annually. Adjustments are implemented after Friday's market close and reflected the following Monday. If Monday is an index holiday, reconstitution is reflected the next business day. 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. 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 Decommissioning Policy

The index methodology is continually reviewed to ensure it achieves all stated objectives. These reviews consider corporate action treatment, selection, 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 Decommissioning Policy.

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 be corrected upon detection. In addition, an incorrect divisor of an index, if discovered 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 methodology as described within this document, 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 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	June 2025
Eligibility	To qualify for inclusion in the Quality and Low Volatility indexes, securities must have at least 6 months of price history. This requirement will be effective from the December 2026 reconstitution, on.	August 2026
Portfolio Construction	The relative and absolute sector caps for the Momentum and Low Volatility indexes may be relaxed up to 100% until a feasible solution is found. This will be effective from the December 2026 reconstitution, on.	August 2026

Appendix 2: Index Inception and Performance Start Dates

Index	Inception Date	Performance Start Date
Morningstar Australia Momentum Factor Index	November 30, 2023	June 20, 2008
Morningstar Australia Quality Factor Index	November 30, 2023	June 20, 2008
Morningstar Australia Size Factor Index	November 30, 2023	June 20, 2008
Morningstar Australia Value Factor Index	November 30, 2023	June 20, 2008
Morningstar Australia Low volatility Factor Index	November 30, 2023	June 20, 2008
Morningstar Australia Yield Factor Index	November 30, 2023	June 20, 2008
Morningstar Brazil Momentum Factor Index	November 30, 2023	December 21, 2012
Morningstar Brazil Quality Factor Index	November 30, 2023	December 21, 2012
Morningstar Brazil Size Factor Index	November 30, 2023	December 21, 2012
Morningstar Brazil Value Factor Index	November 30, 2023	December 21, 2012
Morningstar Brazil Low volatility Factor Index	November 30, 2023	December 21, 2012
Morningstar Brazil Yield Factor Index	November 30, 2023	December 21, 2012
Morningstar Canada Momentum Factor Index	November 30, 2023	June 20, 2014
Morningstar Canada Quality Factor Index	November 30, 2023	June 20, 2014
Morningstar Canada Size Factor Index	November 30, 2023	June 20, 2014
Morningstar Canada Value Factor Index	November 30, 2023	June 20, 2014
Morningstar Canada Low volatility Factor Index	November 30, 2023	June 20, 2014
Morningstar Canada Yield Factor Index	November 30, 2023	June 20, 2014
Morningstar Japan Momentum Factor Index	November 30, 2023	December 18, 2009
Morningstar Japan Quality Factor Index	November 30, 2023	December 18, 2009
Morningstar Japan Size Factor Index	November 30, 2023	December 18, 2009

Morningstar Japan Value Factor Index	November 30, 2023	December 18, 2009
Morningstar Japan Low volatility Factor Index	November 30, 2023	December 18, 2009
Morningstar Japan Yield Factor Index	November 30, 2023	December 18, 2009

Appendix 3: Parent Benchmarks

Index	Parent Benchmark
Morningstar Australia Momentum Factor Index	Morningstar Australia Target Market Exposure
Morningstar Australia Quality Factor Index	Morningstar Australia Target Market Exposure
Morningstar Australia Size Factor Index	Morningstar Australia Target Market Exposure
Morningstar Australia Value Factor Index	Morningstar Australia Target Market Exposure
Morningstar Australia Low volatility Factor Index	Morningstar Australia Target Market Exposure
Morningstar Australia Yield Factor Index	Morningstar Australia Target Market Exposure
Morningstar Brazil Momentum Factor Index	Morningstar Brazil Target Market Exposure
Morningstar Brazil Quality Factor Index	Morningstar Brazil Target Market Exposure
Morningstar Brazil Size Factor Index	Morningstar Brazil Target Market Exposure
Morningstar Brazil Value Factor Index	Morningstar Brazil Target Market Exposure
Morningstar Brazil Low volatility Factor Index	Morningstar Brazil Target Market Exposure
Morningstar Brazil Yield Factor Index	Morningstar Brazil Target Market Exposure
Morningstar Canada Momentum Factor Index	Morningstar Canada Target Market Exposure
Morningstar Canada Quality Factor Index	Morningstar Canada Target Market Exposure
Morningstar Canada Size Factor Index	Morningstar Canada Target Market Exposure
Morningstar Canada Value Factor Index	Morningstar Canada Target Market Exposure
Morningstar Canada Low volatility Factor Index	Morningstar Canada Target Market Exposure
Morningstar Canada Yield Factor Index	Morningstar Canada Target Market Exposure
Morningstar Japan Momentum Factor Index	Morningstar Japan Target Market Exposure
Morningstar Japan Quality Factor Index	Morningstar Japan Target Market Exposure
Morningstar Japan Size Factor Index	Morningstar Japan Target Market Exposure
Morningstar Japan Value Factor Index	Morningstar Japan Target Market Exposure
Morningstar Japan Low volatility Factor Index	Morningstar Japan Target Market Exposure
Morningstar Japan Yield Factor Index	Morningstar Japan Target Market Exposure

Appendix 4: 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.

$$CAPM: ri,t - rft = \alpha i,t + \beta t\,(rm,t - rft) + \varepsilon i,t$$
$$IVOL: \sigma i,t = std(\varepsilon i,t)$$

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.

$$TVOL = std(ri,t)$$

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 factor1 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.

$$Quality = 1/2[ROA_z + (1 - Total\ Debt\ /\ Total\ Capital)_z]$$

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

The quality factor is sector neutralized.

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:

$$sizei,t = -ln(MVi,t)$$

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.

Yield Factor

The yield factor is defined as a total yield, which is the sum of trailing 12-month buyback and dividend yield of a company. Higher values indicate larger, positive yield exposure:

$$Total\ Yield = Buyback\text{Yield}_{ttm} + Dividend\ \text{Yield}_{ttm}$$

The yield 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 the European Benchmarks Regulation ("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 European BMR, providing independent oversight of all aspects of the governance of benchmark administration as required by the 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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