

# **S&P MAESTRO 5 Index** *Methodology*

June 2024

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# Introduction

## Index Objective and Highlights

The S&P MAESTRO 5 Index (Multi-Asset Equal Risk Factor Contribution) is a weighted return index that measures the performance of a multi-asset risk parity strategy. The index seeks to allocate risk equally among seven equity, fixed income, and commodities component indices.

The base Equal Risk Contribution (ERC) index follows a quantitative approach that seeks to achieve an equal risk exposure to each component index and is designed as a leveraged index to target a 5% level of volatility. The maximum leverage is capped at 150%.

A VIX<sup>1</sup> overlay is applied to the base ERC index, consisting of a 2% monthly allocation to the S&P 500 VIX Mid-Term Futures ER and a dynamic 5% daily allocation to the S&P 500 VIX Short-Term Futures ER, based on a Curvature signal defined in *Eligibility Criteria and Index Construction*.

## Supporting Documents

This methodology is meant to be read in conjunction with supporting documents providing greater detail with respect to the policies, procedures and calculations described herein. References throughout the methodology direct the reader to the relevant supporting document for further information on a specific topic. The list of the main supplemental documents for this methodology and the hyperlinks to those documents is as follows:

Supporting Document	URL
S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology	<a href="#">Equity Indices Policies &amp; Practices</a>
S&P Dow Jones Indices' Commodities Indices Policies & Practices Methodology	<a href="#">Commodities Indices Policies &amp; Practices</a>
S&P Dow Jones Indices' Fixed Income Policies & Practices Methodology	<a href="#">Fixed Income Policies &amp; Practices</a>
S&P Dow Jones Indices' Index Mathematics Methodology	<a href="#">Index Mathematics Methodology</a>
S&P Dow Jones Indices' Fixed Income Index Mathematics Methodology	<a href="#">Index Mathematics Methodology</a>

<sup>1</sup> VIX and Cboe (Chicago Board Options Exchange) are registered trademarks of Cboe Exchange, Inc. and have been licensed for use by S&P Dow Jones Indices.

# Eligibility Criteria and Index Construction

## Index Universe

The following indices form the base ERC index universe:

Index	Return Type	Ticker	Asset Class
S&P 500 Quality	Excess Return*	--	Equity
S&P 500 Momentum	Excess Return*	--	Equity
S&P 500 Low Volatility	Excess Return*	--	Equity
S&P 500 High Dividend	Excess Return*	--	Equity
S&P GSCI Gold	Excess Return	SPGSGCP	Commodity
S&P 5-Year U.S. Treasury Note Futures	Excess Return	SPUST5P	Fixed Income
S&P 10-Year U.S. Treasury Note Futures	Excess Return	SPUSTTP	Fixed Income

The following indices form the VIX Overlay:

Index	Return Type	Ticker	Asset Class
S&P 500 VIX Mid-Term Futures Index	Excess Return	SPVXMP	Volatility
S&P 500 VIX Short-Term Futures Index	Excess Return	SPVXSP	Volatility

\* For purposes of the S&P MAESTRO 5 Index, an excess return version of the list of equity indices is calculated from the total return versions of each index, as follows:

Index	Return Type	Ticker	Asset Class
S&P 500 Quality	Total Return	SPXQUT	Equity
S&P 500 Momentum	Total Return	SP500MUT	Equity
S&P 500 Low Volatility	Total Return	SP5LVIT	Equity
S&P 500 High Dividend	Total Return	SPXHDUT	Equity

$$Excess\ Return_t = \left( \frac{Total\ Return\ Index_t}{Total\ Return\ Index_{t-1}} - 1 \right) - \left( InterestRate_{t-1} * \frac{NumDays_t}{360} \right)$$

$$Excess\ Return\ Index_t = Excess\ Return\ Index_{t-1} * (1 + Excess\ Return_t)$$

where:

$InterestRate_{t-1}$  = Effective Federal Funds Rate. A 360-day year is assumed for the interest calculations in accordance with U.S. banking practices.

$NumDays_t$  = The number of calendar days between day  $t-1$  and day  $t$ .

## Weighting Scheme

On each reference date, to construct the base ERC index, the seven component indices' weights are optimized with the objective of setting an equal risk contribution between the component indices. To achieve the desired weighting scheme, for a given portfolio with weights  $w = (w_1, \dots, w_7)$  and total volatility  $\sigma(w)$ , an optimizer is used to find the optimal weights  $w'$  so that the difference of the marginal risk contribution of each component is minimized.

The marginal risk contribution of the  $i^{th}$  component index to the base ERC index is defined as:

$$mc_i(w) = w_i * \frac{\text{cov}(\sigma_i, \sigma(w))}{\sigma(w)}$$

where:

$w_i$  = The weight of the  $i^{th}$  component index

$\text{cov}(\sigma_i, \sigma(w))$  = The covariance of the  $i^{th}$  component index and the base ERC index

where:

$\sigma(w) = \sqrt{w^T \Sigma w}$  is the base ERC index volatility

$\Sigma$  = The covariance matrix of component index returns, exponentially weighted with decay  $\lambda$  and calculated with a 60-day rolling window

$\lambda$  = 0.94

The optimized weights are obtained after solving the following optimization problem:

$$w' = \arg \min f(w)$$

under constraints:

$$\sum_{i=1}^7 w_i = 1$$

$0 \leq w_i \leq 1$  for each  $i$

where:

$$f(w) = \sum_{i=1}^n \sum_{j=1}^n (mc_i(w) - mc_j(w))^2$$

## VIX Overlay

The VIX Overlay consists of the following two components:

- A 5% dynamic allocation to the S&P 500 VIX Short-Term Futures index that resets daily and is conditional on the *Curvature* signal described below.
- A 2% allocation to the S&P 500 VIX Mid-Term Futures index rebalanced on a monthly basis, effective on the second trading day.

The remaining weight is allocated to the base ERC index in order to sum 100%.

The dynamic allocation to the S&P 500 VIX Short-Term Futures index is triggered if the *Curvature* signal fulfills the requirements described below:

- If *Curvature*  $\geq 0$  (concave), there is no allocation to the S&P 500 VIX Short-Term Futures index.
- If *Curvature*  $< 0$  (convex), there is a 5% allocation to the S&P 500 VIX Short-Term Futures index that is rebalanced daily.

The *Curvature* is defined as:

$$Curvature_t = \frac{UX2_t - UX1_t}{UX2_t} - \frac{1}{3} * \frac{UX7_t - UX4_t}{UX7_t}$$

where:

$UXk_t$  = The  $k$ -month VIX futures closing price on day  $t$ .

The dynamic allocation to the S&P 500 VIX Short-Term Futures index switches when the *Curvature* signal changes and remains for two trading days. The 5% dynamic allocation can remain up to 30 trading days and becomes effective on the second trading day. When the curvature signal is concave, or after 30 trading days of dynamic allocation to the S&P 500 VIX Short-Term Futures, the index only allocates to the base ERC index and the S&P 500 VIX Mid-Term Futures and becomes effective on the second trading day.

See *Index Maintenance* for specific allocation schedules for the VIX Overlay.

### Daily Leverage Calculation for the Base ERC Index

Each day, the leverage is the minimum between 150% and the ratio of the annualized target volatility to the previous 60-day exponentially weighted annualized volatility. For the calculation of the 60-day annualized volatility, sum the product of the weights and the returns of each component index for the lookback period, calculated as follows:

$$\text{Base ERC Index Return}_{t-n} = \sum_{i=1}^7 w_t^i * \text{Component index return}_{t-n}^i$$

where:

$w_t^i$  = The weight of the component index  $i$  in date  $t$

$\text{return}_{t-n}^i$  = Daily return of component index  $i$  in date  $t - n$

$t$  = The analysis date

$n$  = {0,59}

Then, the exponentially weighted annualized volatility is calculated as follows:

$$\sigma_t = \sqrt{252 * \sum_{n=0}^{59} \frac{(1 - \lambda) * \lambda^n * (\text{Base ERC Index Return}_{t-n} - \mu_t)^2}{1 - \lambda^{60}}}$$

where:

$\mu_t$  = The average of the base ERC index returns on date  $t$

$\lambda$  = 0.94

The leverage is calculated as below:

$$\text{Leverage}_{t-2} = \min \left( \frac{\text{Annualized target volatility}}{\sigma_{t-2}}, \text{Maximum leverage} \right)$$

where:

Annualized target volatility = 5%

Maximum leverage = 150%

### Index Level Calculations

On a given business day  $t$ , the base ERC index excess return (ER) is equal to:

$$\text{Base ERC Excess Return}_t = \text{Leverage}_{t-2} * \sum_{i=1}^7 w_{t-2}^i * \text{return}_t^i$$

After including the VIX Overlay, the index excess return (ER) and total return (TR) are equal to:

$$Excess\ Return_t = (1 - w_{t-2}^{ST} * S_{t-2} - w_{t-2}^{MT}) * Base\ ERC\ ER_t + w_{t-2}^{ST} * S_{t-2} * return_t^{ST} + w_{t-2}^{MT} * return_t^{MT}$$

$$Total\ Return_t = Excess\ Return_t + \left( InterestRate_{t-1} * \frac{NumDays_t}{360} \right)$$

where:

- $w_{t-2}^{ST}$  = The allocation to the S&P 500 VIX Short-Term Futures on day  $t - 2$
- $w_{t-2}^{MT}$  = The allocation to the S&P 500 VIX Mid-Term Futures on day  $t - 2$
- $return_t^{ST}$  = The index return of the S&P 500 VIX Short-Term Futures on day  $t$
- $return_t^{MT}$  = The index return of the S&P 500 VIX Mid-Term Futures on day  $t$
- $Base\ ERC\ ER_t$  = The index excess return of the Base ERC index on day  $t$
- $S_{t-2} = \{0, 1\}$  = The curvature signal that indicates whether to allocate  $w_{t-2}^{ST}$  to the S&P 500 VIX Short-Term Futures
- $InterestRate_{t-1}$  = Effective Federal Funds Rate. A 360-day year is assumed for the interest calculations in accordance with U.S. banking practices
- $NumDays_t$  = The number of calendar days between day  $t-1$  and day  $t$

On a given business day  $t$ , the index levels in excess return (ER) and total return (TR) are equal to:

$$Index\ ER_t = Index\ ER_{t-1} * (1 + Excess\ Return_t)$$

$$Index\ TR_t = Index\ TR_{t-1} * (1 + Total\ Return_t)$$

# Index Maintenance

## Rebalancing

Base ERC index optimized weights are calculated after the close of the last business day of each month (the reference date) and become effective on the second trading day of the next month (the rebalancing date).

Leverage is calculated daily and becomes effective on the second trading day.

The 2% allocation to the S&P 500 VIX Mid-Term Futures is reset on a monthly basis and becomes effective on the second trading day of the next month (the rebalancing date). The dynamic allocation to the S&P 500 VIX Short-Term Futures is calculated daily and becomes effective on the second trading day.

## Currency of Calculation and Additional Index Return Series

The index calculates in U.S. dollars.

In addition to the indices detailed in this methodology, additional return series versions of the indices may be available, including, but not limited to the following: currency, currency hedged, decrement, fair value, inverse, leveraged, and risk control versions. For a list of available indices, please refer to the [S&P DJI Methodology & Regulatory Status Database](#).

*For information on various index calculations, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.*

*For the inputs necessary to calculate certain types of indices, including decrement, dynamic hedged, fair value, and risk control indices, please refer to the Parameters documents available at [www.spglobal.com/spdji](http://www.spglobal.com/spdji).*

## Base Date and History Availability

Index history availability, base date, and base value are shown in the table below.

Index	Launch Date	First Value Date	Base Date	Base Value
S&P MAESTRO 5 Index	02/22/2021	01/03/2006	01/03/2006	100

# Index Governance

## **Index Committee**

An Index Committee maintains the index. All committee members are full-time professional members of S&P Dow Jones Indices' staff. The committee meets at regularly. At each meeting, the Index Committee may review pending corporate actions that may affect index constituents, statistics comparing the composition of the index to the market, companies that are being considered as candidates for addition to the index, and any significant market events. In addition, the Index Committee may revise index policy covering rules for selecting companies, treatment of dividends, share counts or other matters.

S&P Dow Jones Indices considers information about changes to its indices and related matters to be potentially market moving and material. Therefore, all Index Committee discussions are confidential.

S&P Dow Jones Indices' Index Committees reserve the right to make exceptions when applying the methodology if the need arises. In any scenario where the treatment differs from the general rules stated in this document or supplemental documents, clients will receive sufficient notice, whenever possible.

In addition to the daily governance of indices and maintenance of index methodologies, at least once within any 12-month period, the Index Committee reviews the methodology to ensure the indices continue to achieve the stated objectives, and that the data and methodology remain effective. In certain instances, S&P Dow Jones Indices may publish a consultation inviting comments from external parties.

*For information on Quality Assurance and Internal Reviews of Methodology, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.*

# Index Policy

## **Holiday Schedule**

The index calculates when the U.S. equity markets are open.

*A complete holiday schedule for the year is available at [www.spglobal.com/spdji](http://www.spglobal.com/spdji).*

## **Unexpected Exchange Closures**

For information on Unexpected Exchange Closures, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

## **Rebalancing**

The Index Committee may change the date of a given rebalancing for reasons including market holidays occurring on or around the scheduled rebalancing date. Any such change will be announced with proper advance notice where possible.

## **Recalculation Policy**

For information on the recalculation policy, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

*For information on Calculations and Pricing Disruptions, Expert Judgment and Data Hierarchy, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.*

## **Contact Information**

For questions regarding an index, please contact: [index\\_services@spglobal.com](mailto:index_services@spglobal.com).

# Index Dissemination

Index levels are available through S&P Dow Jones Indices' Web site at [www.spglobal.com/spdji](http://www.spglobal.com/spdji), major quote vendors (see codes below), numerous investment-oriented Web sites, and various print and electronic media.

## Tickers

The table below lists headline indices covered by this document. All versions of the below indices that may exist are also covered by this document. Please refer to [S&P DJI Methodology & Regulatory Status Database](#) for a complete list of indices covered by this document.

Index	Return Type	BBG
S&P MAESTRO 5 (USD)	Excess Return Total Return	SPMAES5E SPMAES5T

## Index Data

Daily constituent and index level data are available via subscription.

For product information, please contact S&P Dow Jones Indices, [www.spglobal.com/spdji/en/contact-us](http://www.spglobal.com/spdji/en/contact-us).

## Web site

For further information, please refer to S&P Dow Jones Indices' Web site at [www.spglobal.com/spdji](http://www.spglobal.com/spdji).

# Disclaimer

## Performance Disclosure/Back-Tested Data

Where applicable, S&P Dow Jones Indices and its index-related affiliates (“S&P DJI”) defines various dates to assist our clients by providing transparency. The First Value Date is the first day for which there is a calculated value (either live or back-tested) for a given index. The Base Date is the date at which the index is set to a fixed value for calculation purposes. The Launch Date designates the date when the values of an index are first considered live: index values provided for any date or time period prior to the index’s Launch Date are considered back-tested. S&P DJI defines the Launch Date as the date by which the values of an index are known to have been released to the public, for example via the company’s public website or its data feed to external parties. For Dow Jones-branded indices introduced prior to May 31, 2013, the Launch Date (which prior to May 31, 2013, was termed “Date of introduction”) is set at a date upon which no further changes were permitted to be made to the index methodology, but that may have been prior to the Index’s public release date.

Please refer to the methodology for the Index for more details about the index, including the manner in which it is rebalanced, the timing of such rebalancing, criteria for additions and deletions, as well as all index calculations.

Information presented prior to an index’s launch date is hypothetical back-tested performance, not actual performance, and is based on the index methodology in effect on the launch date. However, when creating back-tested history for periods of market anomalies or other periods that do not reflect the general current market environment, index methodology rules may be relaxed to capture a large enough universe of securities to simulate the target market the index is designed to measure or strategy the index is designed to capture. For example, market capitalization and liquidity thresholds may be reduced. In addition, forks have not been factored into the back-test data with respect to the S&P Cryptocurrency Indices. For the S&P Cryptocurrency Top 5 & 10 Equal Weight Indices, the custody element of the methodology was not considered; the back-test history is based on the index constituents that meet the custody element as of the Launch Date. Also, the treatment of corporate actions in back-tested performance may differ from treatment for live indices due to limitations in replicating index management decisions. Back-tested performance reflects application of an index methodology and selection of index constituents with the benefit of hindsight and knowledge of factors that may have positively affected its performance, cannot account for all financial risk that may affect results and may be considered to reflect survivor/look ahead bias. Actual returns may differ significantly from, and be lower than, back-tested returns. Past performance is not an indication or guarantee of future results.

Typically, when S&P DJI creates back-tested index data, S&P DJI uses actual historical constituent-level data (e.g., historical price, market capitalization, and corporate action data) in its calculations. As ESG investing is still in early stages of development, certain datapoints used to calculate certain ESG indices may not be available for the entire desired period of back-tested history. The same data availability issue could be true for other indices as well. In cases when actual data is not available for all relevant historical periods, S&P DJI may employ a process of using “Backward Data Assumption” (or pulling back) of ESG data for the calculation of back-tested historical performance. “Backward Data Assumption” is a process that applies the earliest actual live data point available for an index constituent company to all prior historical instances in the index performance. For example, Backward Data Assumption inherently assumes that companies currently not involved in a specific business activity (also known as “product involvement”) were never involved historically and similarly also assumes that companies currently involved in a specific business activity were involved historically too. The Backward Data Assumption allows the hypothetical back-test to be extended over more historical years than would be feasible using only actual data. For more information on “Backward Data Assumption” please refer to the FAQ. The methodology and factsheets of any index that employs backward assumption in the back-tested history

will explicitly state so. The methodology will include an Appendix with a table setting forth the specific data points and relevant time period for which backward projected data was used. Index returns shown do not represent the results of actual trading of investable assets/securities. S&P DJI maintains the index and calculates the index levels and performance shown or discussed but does not manage any assets.

Index returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the Index or investment funds that are intended to track the performance of the Index. The imposition of these fees and charges would cause actual and back-tested performance of the securities/fund to be lower than the Index performance shown. As a simple example, if an index returned 10% on a US \$100,000 investment for a 12-month period (or US \$10,000) and an actual asset-based fee of 1.5% was imposed at the end of the period on the investment plus accrued interest (or US \$1,650), the net return would be 8.35% (or US \$8,350) for the year. Over a three-year period, an annual 1.5% fee taken at year end with an assumed 10% return per year would result in a cumulative gross return of 33.10%, a total fee of US \$5,375, and a cumulative net return of 27.2% (or US \$27,200).

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