

S&P 500 Minimum Volatility Index *Methodology*

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Introduction

Index Objective

The S&P 500 Minimum Volatility Index measures the performance of a strategy that seeks to achieve lower total volatility than the underlying parent index, the S&P 500, while maintaining other similar characteristics. Constituent weights are optimized using the Northfield Open Optimizer and the Northfield U.S Fundamental Equity risk model. Details can be found at www.northinfo.com.¹

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	Equity Indices Policies & Practices
S&P Dow Jones Indices' Index Mathematics Methodology	Index Mathematics Methodology

This methodology was created by S&P Dow Jones Indices to achieve the aforementioned objective of measuring the underlying interest of each index governed by this methodology document. Any changes to or deviations from this methodology are made in the sole judgment and discretion of S&P Dow Jones Indices so that the index continues to achieve its objective.

¹ Northfield U.S. Fundamental Equity Risk Model, <http://www.northinfo.com/documents/8.pdf>.

Eligibility Criteria

Index Eligibility

The index universe is the S&P 500, and all S&P 500 stocks are eligible for the index.

The index is optimized using the Northfield Open Optimizer. The risk model used is the most recent month-end release of the Northfield U.S Fundamental Equity Risk Model.

For more information on the S&P 500, please refer the S&P U.S Indices Methodology available at www.spglobal/spdji.com.

Multiple Share Classes

Each company is represented once by the Designated Listing. For more information regarding the treatment of multiple share classes, please refer to Approach B within the Multiple Share Classes section of the S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Index Construction

The methodology employs an optimization driven-weighting scheme, using the divisor methodology used in all S&P Dow Jones Indices equity indices.

The weight of each index constituent is set such that the overall forecasted volatility of the index is minimized while subject to the following stock level, sector level, and the factor exposure constraints.

Constraints

Maximum Stock Weight. The maximum weight of a stock is the lower of 20 times its weight in the S&P 500 or 2%.

Minimum Stock Weight. The minimum weight of a stock is 0.05%.

Sector Weights. Sector weights are constrained to be within five percentage points of the corresponding weights in the S&P 500. The maximum weight of a sector is no more than five percentage points higher than its weight in the parent index. The minimum weight of a sector is no more than five percentage points lower than its weight in the parent index.

Factor Exposure. Except for Price Volatility, exposure to all the Northfield risk factors is constrained to be within 0.25 standard deviations relative to the S&P 500.

Turnover. At each rebalancing the two-way index turnover is limited to a maximum of 20%.

Infeasible Optimizations

In the event that the optimization fails to reach an optimal solution, the constraints listed above are relaxed. First, the two-way turnover constraint is relaxed by increments of 10% from 20% up to the maximum of 60%. Then, the maximum weight of the stock is relaxed by increments of .05% from 2% to a maximum of 3%, followed by the minimum weight of a security lowered to 0.01%. Finally, the sector weight is relaxed to within 7.5% of the S&P 500.

Index Calculations

The index is calculated following S&P Dow Jones Indices' non-market capitalization, divisor-based index methodology. Corporate actions and index changes are implemented in the same manner as for other non-market capitalization weighted indices.

For more information on the calculation of non-market capitalization weighted, divisor-based indices, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.

Index Maintenance

Rebalancing

Frequency. The index is rebalanced semi-annually after the close on the third Friday of March and September. The rebalancing reference date is after the close of the last business day of the respective February and August.

The target rebalance weights are derived with the Northfield Open Optimizer using constituent and index data as of the rebalancing reference date. The constituents' shares are calculated using closing prices on the second Friday of the rebalancing month as the reference price. Index share amounts are calculated and assigned to each stock to arrive at the weights determined on the reference date. Since index shares are assigned based on prices one week prior to rebalancing, the actual weight of each stock at the rebalancing will differ from these weights due to market movements.

Additions. Except for major corporate actions, such as mergers and spin-offs, companies can only be added to the index at the time of the semi-annual rebalancing.

Deletions. Constituents removed from the S&P 500 are removed from the index simultaneously.

Spin-offs. The spun-off company is added to all the indices of which the parent is a constituent, at a zero price at the market close of the day before the ex-date (with no divisor adjustment). The spun-off company is then removed after at least one day of regular way trading (with a divisor adjustment).

For further information on Spin-offs, please refer to the Treatment of Spin-offs in S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Corporate Actions

Corporate Action	Adjustment Made to the Index	Divisor Adjustment?
Rights Offering	The price is adjusted to the Price of the Parent Company minus (the Price of the Rights Offering/Rights Ratio). Index shares change so that the company's weight remains the same as its weight before the rights offering.	No
Stock Split	Index shares are multiplied by and the price is divided by the split factor.	No
Share Issuance or Share Repurchase	None. Actual shares outstanding of the company play no role in the daily index calculation.	No
Special Dividends	The price of the stock making the special dividend payment is reduced by the per share special dividend amount after the close of trading on the day before the dividend ex-date.	Yes
Delisting, acquisition, or any other corporate action resulting in the deletion of the stock from the S&P 500.	The stock is dropped from the Index. No intra-rebalancing replacements are made.	Yes

For more information on Corporate Actions, please refer to the Non-Market Capitalization Indices section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Currency of Calculation and Additional Index Return Series

The index is calculated 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: 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 the index calculation, 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/spdji.com.

Base Date

The index base date is December 21, 1990. The base value, for both the price return and total return series, is 1000. Daily returns are available from December 21, 1990.

Index Data

Calculation Return Types

S&P Dow Jones Indices calculates multiple return types which vary based on the treatment of regular cash dividends. The classification of regular cash dividends is determined by S&P Dow Jones Indices.

- Price Return (PR) versions are calculated without adjustments for regular cash dividends.
- Gross Total Return (TR) versions reinvest regular cash dividends at the close on the ex-date without consideration for withholding taxes.
- Net Total Return (NTR) versions, if available, reinvest regular cash dividends at the close on the ex-date after the deduction of applicable withholding taxes.

In the event there are no regular cash dividends on the ex-date, the daily performance of all three indices will be identical.

For a complete list of indices available, please refer to the daily index levels file (".SDL").

For more information on the classification of regular versus special cash dividends as well as the tax rates used in the calculation of net return, please refer to S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

For more information on the calculation of return types, please refer to S&P Dow Jones Indices' Index Mathematics Methodology.

Index Governance

Index Committee

An S&P Dow Jones Indices Index Committee maintains the index. All Committee members are full-time professionals at S&P Dow Jones Indices. The Committee meets regularly. At each meeting, the Committee reviews pending corporate actions that may affect index constituents, statistics comparing the composition of the indices to the market, companies that are being considered as candidates for addition to the index, and any significant market events. In addition, the 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

Announcements

All index constituents are evaluated daily for data needed to calculate index levels and returns. All events affecting the daily index calculation are typically announced in advance via the Index Corporate Events report (.SDE), delivered daily to all clients. Any unusual treatment of a corporate action or short notice of an event may be communicated via email to clients.

All methodology changes are posted to the S&P Dow Jones Indices Web site and announced via email to all clients. The latest available version is posted on the Web site at www.spglobal/spdji.com.

For more information, please refer to the Announcements section of S&P Dow Jones Indices' Equity Indices Policies & Practices Methodology.

Pro-forma Files

In addition to the corporate events file (.SDE), S&P Dow Jones Indices provides constituent pro-forma files each time the index rebalances. The pro-forma file is typically provided daily in advance of the rebalancing date and contains all constituents as well as their corresponding weights and index shares effective for the upcoming rebalancing.

Please visit www.spglobal/spdji.com for a complete schedule of rebalancing timelines and pro-forma delivery times.

Holiday Schedule

The index is calculated daily, throughout the calendar year. The only days the index is not calculated are on days when all exchanges where the index's constituents are listed are officially closed.

A complete holiday schedule for the year is available on S&P Dow Jones Indices' Web site at www.spglobal/spdji.com.

Rebalancing

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

Unexpected Exchange Closures

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

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.

Index Dissemination

Index levels are available through S&P Dow Jones Indices' Web site at www.spglobal/spdji.com, 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 the [S&P DJI Methodology & Regulatory Status Database](#) for a complete list of indices covered by this document.

Index	Return Type	Bloomberg	RIC
S&P 500 Minimum Volatility Index	Price Return	SP5MV	.SP5MV
	Total Return	SP5MVT	.SP5MVT
	Net Total Return	SP5MVN	.SP5MVN

Index Data

Daily stock level and index data are available via subscription.

For product information, please contact S&P Dow Jones Indices, www.spglobal/spdji.com/contact-us.

Web site

For further information, please refer to S&P Dow Jones Indices' Web site at www.spglobal/spdji.com.

Appendix I

Methodology Changes

Methodology changes since January 1, 2015, are as follows:

Change	Effective Date (After Close)	Previous	Methodology Updated
Treatment of Spin-offs	09/30/2015	<p>Spin-offs are generally not added to the index and there is no weight change to the parent stock. The price of the parent company is adjusted to the Price of the Parent Company minus (the Price of the Spun-off Company/Share Exchange Ratio). Index shares change so that the company's weight remains the same as its weight before the spin-off. There is no index divisor change.</p> <p>However, when the price of the spin-off is not known, the spun-off company is added to the index at a zero price. Once the spun-off company trades, the company is dropped from the index and the parent's index shares are adjusted so that the company's weight remains the same as the combined weight of parent and the spin-off, determined on the first day of trading.</p>	<p>The spun-off company is added to all the indices of which the parent is a constituent, at a zero price at the market close of the day before the ex-date (with no divisor adjustment). The spun-off company is then removed after at least one day of regular way trading (with a divisor adjustment).</p>

Appendix II

EU Required ESG Disclosures

EXPLANATION OF HOW ENVIRONMENTAL, SOCIAL & GOVERNANCE (ESG) FACTORS ARE REFLECTED IN THE KEY ELEMENTS OF THE BENCHMARK METHODOLOGY²	
1.	Name of the benchmark administrator. S&P Dow Jones Indices LLC.
2.	Underlying asset class of the ESG benchmark.³ N/A
3.	Name of the S&P Dow Jones Indices benchmark or family of benchmarks. S&P DJI Equity Indices Benchmark Statement
4.	Do any of the indices maintained by this methodology take into account ESG factors? No
Appendix latest update: January 2021	
Appendix first publication: January 2021	

² The information contained in this Appendix is intended to meet the requirements of the European Union Commission Delegated Regulation (EU) 2020/1817 supplementing Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards the minimum content of the explanation of how environmental, social and governance factors are reflected in the benchmark methodology.

³ The 'underlying assets' are defined in European Union Commission Delegated Regulation (EU) 2020/1816 supplementing Regulation (EU) 2016/1011 of the European Parliament and of the Council as regards the explanation in the benchmark statement of how environmental, social and governance factors are reflected in each benchmark provided and published.

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