

S&P Riskcasting Indices *Methodology*

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Introduction

Index Objective and Highlights

The S&P Riskcasting Indices are weighted return indices that measure the performance of a strategy that switches the component sub-indices' allocations based on a signal called the Riskcasting signal. Sub-index allocations alternate between specific S&P equity and sovereign fixed income futures indices, as detailed in *Index Construction*.

The Riskcasting signal is owned and calculated by Bramham Gardens. The Riskcasting signal is a measure of the U.S. stock market participant's prevailing level of risk aversion. Depending on the degree of risk aversion, allocations to the equity sub-index can vary from 0% to 100%, with the remainder assigned to the sovereign fixed income futures sub-index. The Riskcasting signal is computed every business day after the market close. The index rebalances daily, after the market close, to the target allocation, determined by the Riskcasting signal computed two business days prior. Risk aversion information is first extracted at different maturities and strikes from the implied volatility surface derived from the S&P 500 listed put and call options. The resulting information is then filtered using signal processing techniques and synthesized before being transformed into a digital Riskcasting signal which flags benign and rough periods, using a supervised artificial intelligence technique.

For more information about the Riskcasting signal, please refer to the Bramham Gardens' [Riskcasting Signal Methodology](#).

For more information on the S&P 500, please refer to S&P Dow Jones Indices' S&P U.S Indices Methodology available at www.spdji.com.

Index Family

The index family currently includes the following indices:

- S&P 500 Riskcasting Index
- S&P 500 Low Volatility Riskcasting Index
- S&P Global 1200 Riskcasting Index
- S&P Global 1200 Low Volatility Riskcasting Index
- S&P Europe 350 Riskcasting Index
- S&P Europe 350 Low Volatility Riskcasting Index

Bramham Gardens

Bramham Gardens is a Paris-based firm that specializes in artificial intelligence-driven investment strategies that screen, anticipate, and signal market risk increases with the goal of delivering a smoother return stream while investing in equity assets. The team is comprised of several PhDs in Financial Economics and Machine Learning.

For more information about Bramham Gardens, please refer to their website www.bramham-gardens.com.

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
S&P Dow Jones Indices' Float Adjustment Methodology	Float Adjustment Methodology

This methodology was created by S&P Dow Jones Indices (S&P DJI) 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.

Index Construction

The indices dynamically switch between two sub-indices, using the Riskcasting signal to determine the target allocation to the equity index. The target allocations for the indices are:

Index Name	Risk Tolerance Score		
	Bullish	Neutral	Bearish
S&P 500 Riskcasting Index	100% in the S&P 500	50% in the S&P 500 Index; 50% in the S&P 10-Year U.S. Treasury Note Futures Index	100% in the S&P 10-Year U.S. Treasury Note Futures Index
S&P 500 Low Volatility Riskcasting Index	100% in the S&P 500	50% in the S&P 500 Low Volatility Index; 50% in the S&P 10-Year U.S. Treasury Note Futures Index	100% in the S&P 10-Year U.S. Treasury Note Futures Index
S&P Global 1200 Riskcasting Index	100% in the S&P Global 1200	50% in the S&P Global 1200 Index; 50% in the S&P 10-Year U.S. Treasury Note Futures Index	100% in the S&P 10-Year U.S. Treasury Note Futures Index
S&P Global 1200 Low Volatility Riskcasting Index	100% in the S&P Global 1200	50% in the S&P Global Low Volatility Index; 50% in the S&P 10-Year U.S. Treasury Note Futures Index	100% in the S&P 10-Year U.S. Treasury Note Futures Index
S&P Europe 350 Riskcasting Index	100% in the S&P Europe 350	100% in the S&P Euro-Bund Futures Index	100% in the S&P Euro-Bund Futures Index
S&P Europe 350 Low Volatility Riskcasting Index	100% in the S&P Europe 350 Low Volatility	100% in the S&P Euro-Bund Futures Index	100% in the S&P Euro-Bund Futures Index

Excess Return Index Calculation

On any business day t , the excess return index value is calculated as:

$$IndexER_t = IndexER_{trb} * (1 + ER_t) \quad (1)$$

where:

$IndexER_t$ = Excess return index level at the close of day t .

$IndexER_{trb}$ = Excess return index level at the close of the rebalancing day.

ER_t = Excess return since the last rebalancing day at the close of day t , calculated as:

$$ER_t = W_{E,lr} * EqtER_t + W_{T,lr} * BondER_t \quad (2)$$

where:

$EqtER_t$ = Excess return of the equity component since the last rebalancing day on day t , calculated as:

$$EqtER_t = \frac{E_t}{E_{trb}} - 1 \quad (2a)$$

E_t = The equity component value at the close of day t .

E_{lrb} = The equity component value at the close of the last rebalancing day.

$BondER_t$ = Excess return of the bond component since the last rebalancing day on day t, calculated as:

$$BondER_t = \frac{B_t}{B_{lrb}} - 1 \quad (2b)$$

B_t = The bond component value at the close of day t.

B_{lrb} = The bond component value at the close of the last rebalancing day.

$W_{E,lrb}$ = Weight of the equity component on the last rebalancing day.

$W_{B,lrb}$ = Weight of the bond component on the last rebalancing day.

Total Return Index Calculations

On any business day t, the total return index value is calculated as:

$$IndexTR_t = IndexTR_{lrb} * (1 + TR_t) \quad (3)$$

where:

$IndexTR_t$ = Total return index level at the close of day t.

$IndexTR_{lrb}$ = Total return index level at the close of the last rebalancing day.

TR_t = Total return since the last rebalancing day at the close of day t, calculated as:

$$TR_t = W_{E,lrb} * EqtTR_t + W_{B,lrb} * BondR_t \quad (4)$$

where:

$EqtTR_t$ = Total return of the equity component since the last rebalancing day on day t, calculated as:

$$EqtTR_t = \frac{ETR_t}{ETR_{lrb}} - 1 \quad (4a)$$

ETR_t = The equity Total Return index value at the close of day t.

ETR_{lrb} = The equity Total Return index value at the close of the last rebalancing day.

$BondTR_t$ = Total return of the bond component since the last rebalancing day on day t, calculated as:

$$BondTR_t = \frac{BTR_t}{BTR_{lrb}} - 1 \quad (4b)$$

BTR_t = The bond Total Return index value at the close of day t.

BTR_{lrb} = The bond Total Return index value at the close of the last rebalancing day.

$W_{E,lrb}$ = Weight of the equity component on the last rebalancing day.

$W_{B,lrb}$ = Weight of the bond component on the last rebalancing day.

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

Index Maintenance

Rebalancing

The indices' target allocation is determined by the Riskcasting signal, which is reviewed at the close of each business day. If the Riskcasting signal changes on a given business day, then a change of the target allocation is triggered. The effective date for the new target allocation is after the close of the next trading day, also referred to as the open of two trading days in the future. The indices rebalance daily to the target allocation.

In the event a change to the Riskcasting signal results in a change to the asset allocation, the table below illustrates the implementation timing:

Asset Class Allocation Timing of Changes	
Reference Data used to calculate Riskcasting Signal	T - 3
Riskcasting Signal Calculation	T - 2
Announcement of changes to Asset Allocation	T - 1
Effective Date of Change	T

All days reflect after the close and count business days.

S&P DJI adheres to the above schedule even if the Riskcasting signal changes prior to the effective date. If the score changes during the announcement period, and requires a further change to the asset allocation, S&P DJI will continue to implement the previously announced allocations on T and provide the updated asset allocation which will become effective T+1.

Currency of Calculation and Additional Index Return Series

The indices are calculated in U.S. dollars. The S&P Europe 350 Riskcasting and S&P Europe 350 Low Volatility Riskcasting indices are also calculated in euros.

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 [S&P DJI's All Indices by Methodology Report](#).

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.spdji.com.

Base Dates and History Availability

Index history availability, base dates, and base values are:

Index	Launch Date	First Value Date	Base Date	Base Value
S&P 500 Riskcasting Index	04/13/2020	01/05/2006	01/05/2006	100
S&P 500 Low Volatility Riskcasting Index	04/13/2020	01/05/2006	01/05/2006	100
S&P Global 1200 Riskcasting Index	08/10/2020	01/05/2006	01/05/2006	100
S&P Global 1200 Low Volatility Riskcasting Index	08/10/2020	01/05/2006	01/05/2006	100
S&P Europe 350 Riskcasting Index	08/10/2020	01/05/2006	01/05/2006	100
S&P Europe 350 Low Volatility Riskcasting Index	08/10/2020	01/05/2006	01/05/2006	100

Index Governance

Index Committee

The indices are maintained by an S&P Dow Jones Indices Index Committee. All committee members are full-time professional members of S&P Dow Jones Indices' staff. 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 an 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

Announcements

Rebalancing announcements, if needed, are made at the close of two days prior to the rebalancing effective date.

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

Holiday Schedule

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

A complete holiday schedule for the year is available at www.spdji.com.

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.

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.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 [S&P DJI's All Indices by Methodology Report](#) for a complete list of indices covered by this document.

Index (Currency)	Return Type	Bloomberg
S&P 500 Riskcasting Index (USD)	Excess Return Total Return	SPXRCE SPXRCT
S&P 500 Low Volatility Riskcasting Index (USD)	Excess Return Total Return	SPXLVRCE SPXLVRCT
S&P Global Riskcasting Index (USD)	Excess Return Total Return	SPGRCE SPGRCT
S&P Global Low Volatility Riskcasting Index (USD)	Excess Return Total Return	SPGLVRCE SPGLVRCT
S&P Europe 350 Riskcasting Index (EUR)	Excess Return Total Return	SPERCE SPERCT
S&P Europe 350 Low Volatility Riskcasting Index (EUR)	Excess Return Total Return	SPELVRCE SPELVRCT

Index Data

Daily index level data is available via subscription.

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

Web site

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

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